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Dr Catur Budi Susilo, S.Pd, S.Kp, M.Kes

NIP :

Nurun Laasara, S.Kep.Ns, M.Kep

NIP :

Artificial Intelligence In The Public Health Sector: The Use Of Telemedicine In Indonesia During Covid-19

[1]Muslimin Machmud, [2]Abdullah Masmuh, [3]Chairun Nasirin, [4]Salahudin, [5]Tawakkal Baharuddin, [6]Andi Ernie Zaenab Musa

[1,2] Department of Communication Science, Universitas Muhammadiyah Malang, Indonesia
[3] College of Health (STIKES Mataram), Indonesia
[4] Department of Government Studies, Universitas Muhammadiyah Malang, Indonesia
[5] Jusuf Kalla School of Government, Universitas Muhammadiyah Yogyakarta, Indonesia
[6] Department of Port Management, Politeknik Maritim AMI Makassar, Indonesia
Email: [1]machmudmus@gmail.com

ABSTRACT

The Covid-19 outbreak affected the problem of access and health services in many countries including Indonesia. This study aims to explain the use of technology that supports public health services during Covid-19 took place in Indonesia. This research uses a qualitative approach which is carried out through document and literature studies that are analyzed using Nvivo 12 Plus software. The results of this study revealed that in an effort to guarantee public health during the co-19 period, the Indonesian government in this case the ministry of health made efforts and appeals for access and services to health to continue to be carried out by utilizing Artificial Intelligence as information and communication technology. The government uses technology such as telemedicine as an application used in public health services over long distances or online between hospitals and patients. The government also continues to collaborate between hospitals and medical personnel in utilizing the telemedicine. The use of technology in the form of Artificial Intelligence (Telemedicine) also has an influence on prevention efforts in the spread of co-19 cases in Indonesia. In addition, the use of Artificial Intelligence also impacts on the development and application of E-Government in Indonesia. The limitation of this study is that this study has not explained the challenges and public response to the use of telemedicine as a means of public health services. The future research needs to explain this aspect by using a survey approach and quantitative descriptive analysis.

1.   Introduction

Problems with access to health in Indonesia make the community quite vulnerable in the Covid-19 pandemic situation and this is at risk of other public health problems. In order to prevent the spread of Covid-19 in Indonesia, some health service activities were also carried out face-to-face restrictions. This adds to the problem of access and public health services. Nevertheless, the government continues to make efforts so that access to information on health services continues. In a pandemic situation, health services are possible to be carried out through Artificial Intelligence by utilizing information and communication technology.

Several governments around the world have begun implementing technological systems in government by utilizing the Internet and Information and Communication Technology in accessing information on public services including public health services (Carter & Bélanger, 2005; Tursunbayeva et al., 2017). In the co-19 situation, the government expects access to public health to continue through information and communication technology through the use of telemedicine. Telemedicine is a general term that encompasses medical activities that involve an element of distance (Weinstein et al., 2014). Telemedicine can be widely used as a communication tool to provide information and medical services. In providing a health service, interaction between doctor and patient will involve a communication technology or online health service (Latifi & Doarn, 2020). In utilizing this technology, doctors who provide telemedicine services to patients are responsible for the health services they provide, including ensuring the safety of patient data accessing telemedicine services (kemenkes.go.id, 2020).

The use of technology in the form of telecommunications network devices in Indonesia continues to experience a fairly good trend, this is also based on advances in the fields of multimedia, imaging, computers, information systems and telecommunications and one of them is telemedicine (Kuntardjo, 2020). The development of these technologies can affect the implementation of e-Government in Indonesia. The use of technology in the Covid-19 pandemic situation is essential so that the quality of health services can also be accessed anywhere and anytime. The quality of service in health greatly affects public trust (Nugraheni et al., 2020). Utilization of technology such as telemedicine can be used to provide health services, ranging from consultation, diagnosis and medical treatment without being confined to space or carried out remotely (Rao et al., 2020).

The Minister of Health, Terawan Agus Putranto has made Circular Number HK.02.01 / MENKES / 303/2020 regarding the implementation of health services through the use of information and communication technology in the context of preventing the spread of covid-19 on 29 April 2020. The Circular Letter explains that health services done through the use of telemedicine technology (kemenkes.go.id, 2020). The delivery of health services through technology (telemedicine) can be carried out during the pandemic period. This is a positive response from the government in an effort to reduce the number of co-19 cases in Indonesia. The technology use program has previously been

implemented in various countries such as health institutions in the United States, namely Jefferson Health, Mount Sinai, Kaiser Permanente, Cleveland Clinic, and Providence (Xu et al., 2020). So that the existence of technology-based health access services is expected to be beneficial for the whole community during the co-19 period.

There have not been many previous studies that explain the use of artificial intelligence (AI) which was focused on health services during the Covid-19 pandemic. So far, previous studies have focused more on the management of Covid-19 which is explained from the perspective of crisis management, public communication, and treatment and prevention of the spread of Covid-19. This research is focused on utilization (AI) through telemedicine technology that supports the delivery of public health services during the Covid-19 pandami in Indonesia. This research contributed to the development of telemedicine technology that supports the effective and efficient delivery of public health services during the Covid-19 outbreak.

2. Literature Review

Artificial Intelligence

Artificial Intelligence refers to a series of technologies that have an influence on abilities, improvements, decisions that contribute to human tasks that were previously thought to have a dependency on human experience alone (Desouza et al., 2020). There is a unique characteristic of Artificial Intelligence that is its capacity for self-development. However, in its use required a large amount of data. Thus considered important in the use of Artificial Intelligence (AI) to compile a raw database so that the machine can work (Bokolo Anthony Jnr, 2020). Artificial Intelligence (AI) has the potential to have a critical impact on human activities (Cave, 2020).

Studies on Artificial Intelligence have come in various forms in the form of applications over the past few years, but recently widely used in a virtual environment. The use of Artificial Intelligence can also have an impact on the progress and improvement of a country's economy (Mehr, 2017).The use of Artificial Intelligence in government affects the administrative burden, helps solve the problem of resource allocation, and takes on very complex tasks (Edoardo et al., 2020). While the potential case of using Artificial Intelligence (AI) in the future within the scope of government still has a major problem namely government resources. There are several obstacles in the government for implementing Artificial Intelligence such as, Resource Allocation, Large Datasets that impact employees to work efficiently, and Experts Shortage and Procedural (Procedural) (Doshi et al., 2020).

Artificial Intelligence in E-Government: Public Health Sector

Quality of Human Resources (HR) of a country is predominantly determined by the ease of access, one of which is quality health facilities (Chang et al., 2019). The public sector such as public health is a management that needs to be considered in the lives of people who live side by side with one another (Valderas et al., 2009). So in an effort to guarantee public health a quality

public health service is needed and can be accessed under any conditions. Health services are a shared responsibility, in this case health practitioners and of course the government in making policies related to health issues in the public sector (Batterham et al., 2016). So that in health issues, such as the restrictions imposed during Covid-19 pandemic period, the government must also be able to guarantee public health in general by making decisions.

The presence of Artificial Intelligence is a hope that access and health services in a pandemic situation can still reach the general public. Artificial Intelligence (AI) projects in the public sector can add value and ease for the government (Desouza et al., 2020). The use of Artificial Intelligence in access to and health services also influences the development of e-government such as aspects of decision making (Hadi & Fleshler, 2016). E-government is a government service with the use of information technology to enable and improve efficiency in public services provided to the public, local governments, the private sector and other institutions (Carter & Bélanger, 2005). E-government can influence large expenditure and faster and more convenient distribution of services (Carter and Bélanger, 2005). Failures in E-Government projects are generally influenced by several things such as design and reality gaps, project management and unclear planning factors (Anthopoulos et al., 2016).

Telemedicine and Technology: Access Health Services

The use of technology in the world of health is very influential on efficiency in the delivery of health services. This continues to experience explosive growth and can be an innovation in the world of health in the future (Weinstein et al., 2014). Technology enables clinical services from doctors to provide health services remotely (Weinstein et al., 2014). Telemedicine as information technology and telecommunications are used to transfer medical information, diagnosis, therapy and education (Perednia, 1995). Information transfer is carried out with interactive video and audio between patients and medical professionals. This information includes images, videos, audio and other patient medical records (Hong et al., 2020).

The success of a telemedicine program is very influential in handling service gaps, urgent services and services mandated by the government (Weinstein et al., 2014).Telemedicine is an example of how telemedicine can successfully address the needs of public health services (Hare et al., 2020). The presence of technology and applications such as smartphones is also a new alternative in the world of health (Bauer et al., 2020). As for the development of Internet technology, it is also utilized to serve the community better. User data can be collected and analyzed accurately, and the general public can get the same quality of medical services without having to go to the hospital. Health services using technology can also affect social burdens and financial burdens (Shankar et al., 2020). So in a pandemic situation it is necessary to consider the technological aspects of access and public health services.

3.   Method

This study uses a qualitative method. Data on research sourced from news documents, internet sites, scientific articles, google trends, and social media are then collected and analyzed using Nvivo 12 Plus. This research was analyzed in the period of the 19th id pandemic in Indonesia in 2020. The selected national online media are www.tribunnews.com, www.detik.com, and www.kompas.com. Documentation of online media reporting is done using the Nvivo 12 plus software through the NCapture feature. The NCapture Nvivo 12 plus feature has the ability to document systematically and is able to extract in-depth reporting information (Fallis, 2013).

The use of online media reporting documents aims to complete and confirm telemedicine official website content, namely temenin.kemkes.go.id and kemenkes.go.id (document triangulation). Application of the document triangulation method in a study results in research conclusions that can answer research questions well (Flick, 2009). This research uses explore features consisting of crosstab analysis, cluster analysis, comparison analysis, and group analysis. Crosstab analysis is used to understand telemedicine implementation, cluster analysis is applied to understand topics that are often discussed in telemedicine.

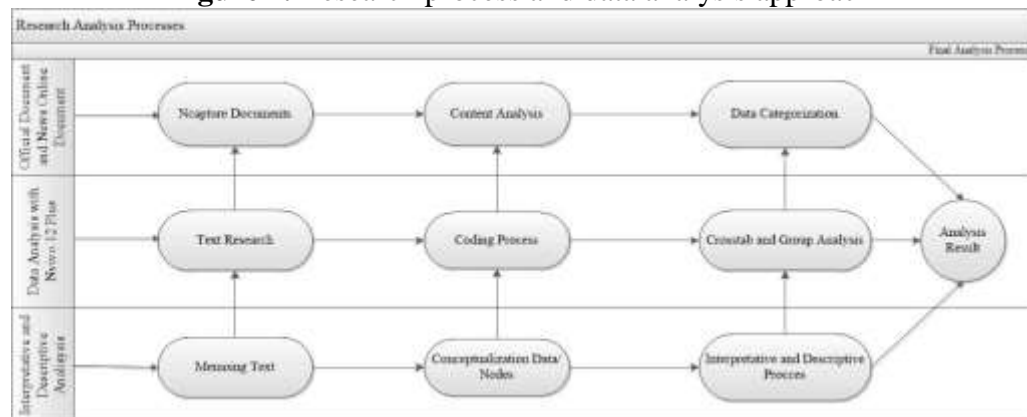**Figure 1.** Research process and data analysis approach

Figure 1 above is the research stage including the collection of case documents and online media reporting documents, Telemedicine website content, and articles on telemedicine, data analysis with Nvivo 12 Plus, and interpretation / description of results. Each of the stages of the research is related to the process of data analysis, namely the process of collecting documents including selecting documents, analyzing document content, and categorizing data (Flick, 2009). Then, the data analysis process includes text search, coding process, and coding analysis. Meanwhile, the exploration and description process includes text memoing, coding conceptualization, exploration and description of the results of the analysis (Fallis, 2013).

4.   Result And Discussion

Artificial Intelligence: Telemedicine Trends in Health Issues in Indonesia
The development of increasingly advanced technology is considered to have a positive impact in inhibiting the spread of the corona virus (Edoardo et al., 2020). The role of technology is also involved in each of our daily activities. With the application of interaction restrictions, people are more dependent on technology. Daily activities, entertainment, social relations, and logistics needs can be easily accessed through their respective gadgets (Chang et al., 2019). Following are trends towards health issues in telemedicine use in Indonesia in the March-May 2020 period.
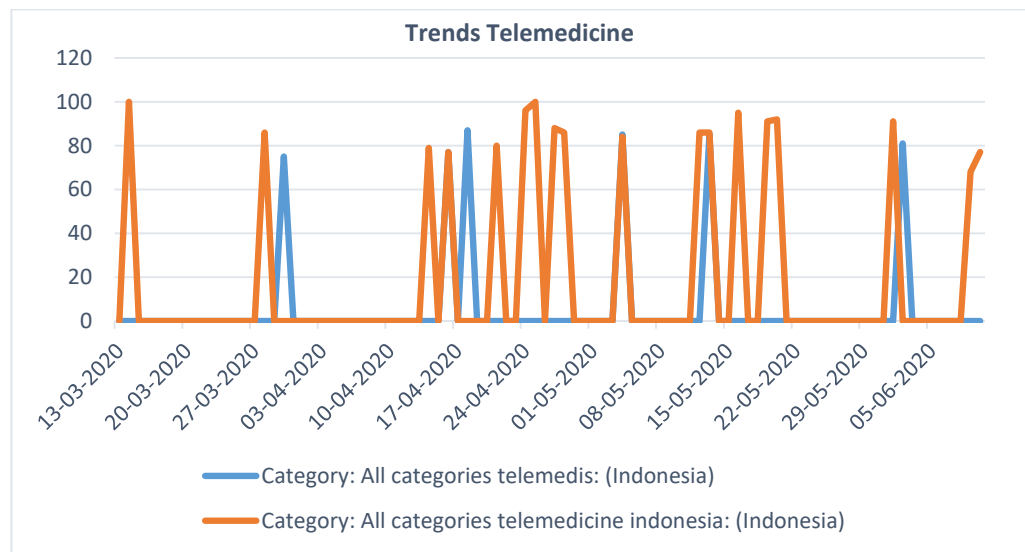

Figure 2. Indonesian Telemedicine Trends Based on Web Search (March-June 2020)
Source: Processed by researchers using Google Trends (2020)

Based on the above results, it can be explained that the trends and issues of the use of Indonesian telemedicine in the co-19 pandemic situation have begun to experience a positive trend. Nevertheless, this trend must also be followed by supporting facilities and services in each process (Perednia, 1995). It is expected that health services must be easily accessible in various regions in Indonesia. This requires the role of the government to ensure that every telemedicine service is available to many people (Nugraheni et al., 2020).
Trends in the use of telemedicine through information and communication technology have also been carried out in Indonesia several years ago. If the government through the ministry of health uses the Indonesian telemedicine application (https://temenin.kemkes.go.id/), then several other telemedicine service platforms will already dominate the service. Following are trends in the use of telemedicine health applications in Indonesia in 2019.
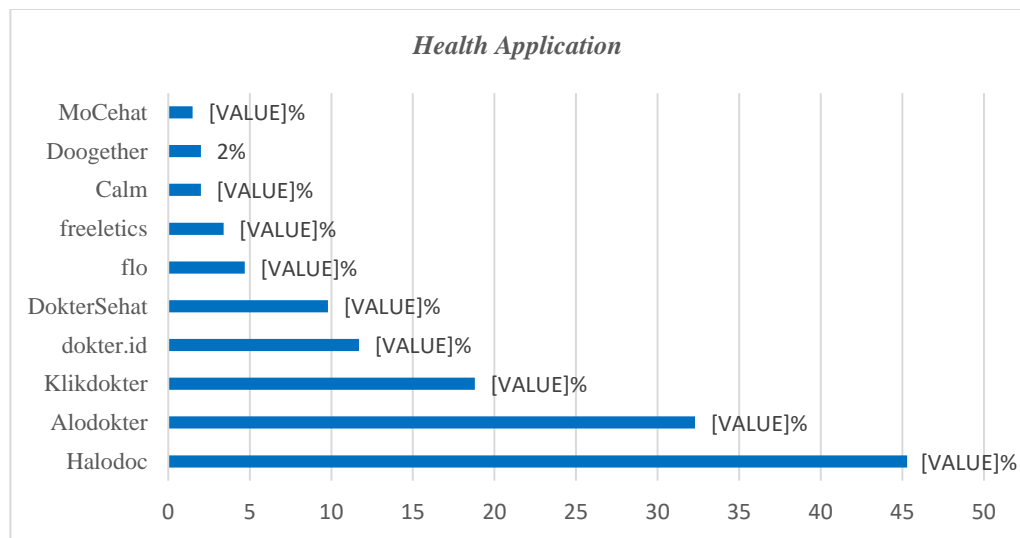
Figure 3. Use of Health Applications in 2019
Source: Processed by researchers from databoks.katadata.co.id (2020)

Limited access to health during the covid-19 pandemic period allowed the community to carry out activities related to health services by utilizing technology supported by the availability of hospitals and resources for information and communication (Latifi & Doarn, 2020). In 2019, it is a good trend for Indonesian startups engaged in technology-based health or healthtech. Indonesia has a number of well-developed startups. The startup ecosystem in Indonesia moves quickly in various sectors including the health sector (Oliver, 2013).

The Government's Role: Telemedicine Based Health Services in the co-19 situation

In order to prevent the spread of Covid-19, the Government in this case is the Minister of Health making Circular Letter number HK.02.01 / MENKES / 303/2020 concerning the delivery of health services through the use of technology (kemenkes.go.id, 2020). This is a step in anticipation of the government in reducing the risk of the spread of co-19 increasingly widespread. It is also the responsibility of the government to continue providing health services to the public in general in a pandemic situation. Thus, the Government explained the importance of technology-based health services through telemedicine (kemenkes.go.id, 2020). In the context of the socialization of the use of telemedicine, the government coordinated the Head of Provincial and Regency / City Health Services, General Chair of the Indonesian Doctors Association, General Chair of the Indonesian Dentists Association (PB PDGI), and General Chair of the Central Board of Pharmacists Association Indonesia (PP IAI) throughout Indonesia (kemenkes.go.id, 2020).

The Government through the Indonesian Minister of Health has also provided its own application (telemedicine). The application is Telemedicine Indonesia (https://temenin.kemkes.go.id/) (Indonesia, 2019). The telemedicine technology is integrated for medical services. Medical services that can realize

affordable health access online (kemkes.go.id). The telemedicine services provided cover 4 main areas namely Radiology, USG, Electrocardiography and Consultation (kemenkes.go.id, 2020).

1 Tele-Radiology, Tele-radiology interprets photos into a diagnosis, sent online and used by radiologists for quick treatment.
2 Tele-Ultrasound, Tele-USG is used to help diagnose pregnant women in remote areas and be linked to specialist obstetricians to speed up referrals.
3 Tele-ecg, a health examination of the electrical activity of the heart, aimed at assessing the workings of the heart, ECG results are sent to a heart disease specialist for a rapid diagnosis.
4 Tele-Consultation, Tele-Consultation brings patients together with expert doctors for online consultation, knowing the patient's condition, and making treatment recommendations.

The Indonesian government created a website "temenin.kemkes.go.id" about health services and access using telemedicine technology. On the website there are several themes for discussion that are sought after, as follows:
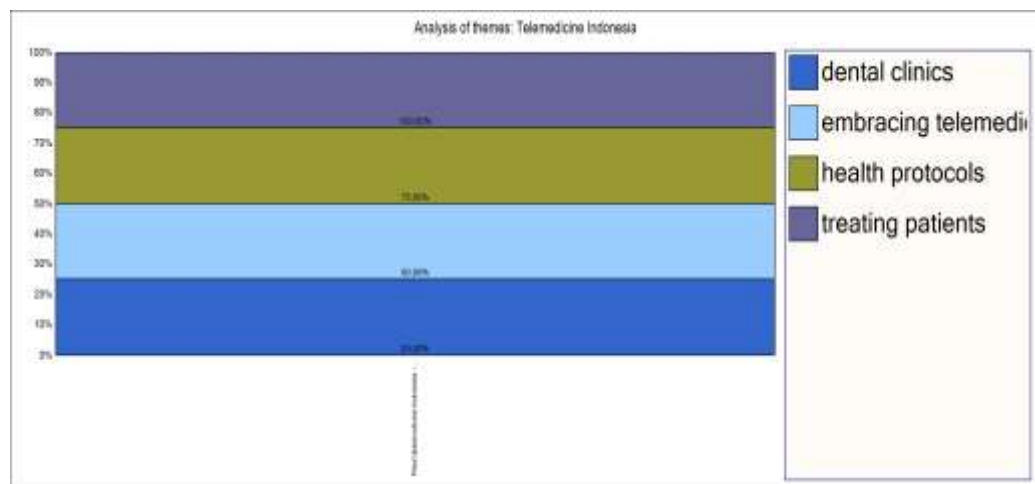

Figure 4. Analysis of Telemedicine Content in Indonesia
Source: Processed by researchers using Nvivo 12 Plus (2020)

As for the website "temenin.kemkes.go.id", also received a response from the public for access and services through telemedicine. Some number of visitors to the website get access to information through the use of desktop and mobile users. The amount of data was analyzed in March-May 2020 and described as follows.
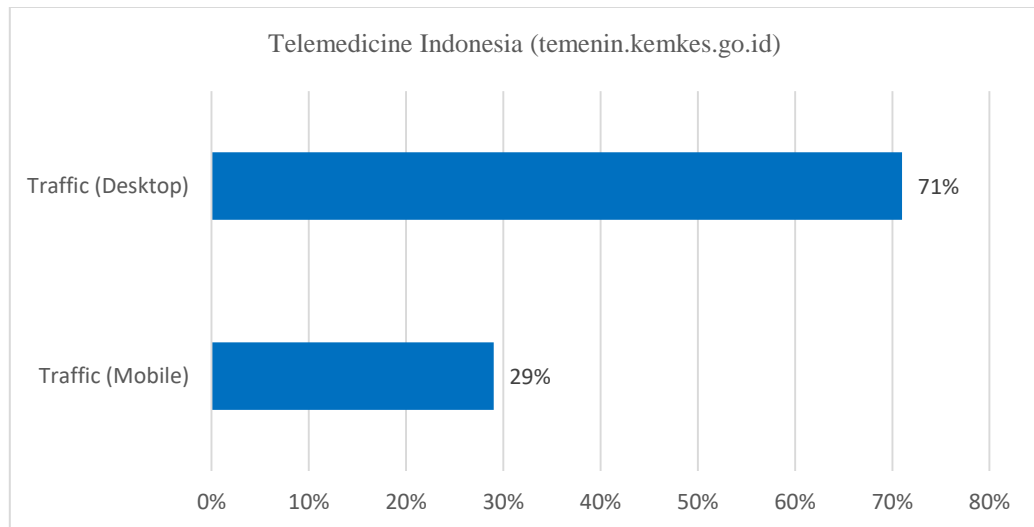
Figure 5. Number of visitors to the website (March-May 2020)
Source: Processed by researchers using similar web (2020)

The data above illustrates how the government in providing access and health services through telemedicine received a response from the community (Archer et al., 2018). In addition, the Government through the Ministry of Health also conducted several collaborations with hospitals and health centers related to technology-based health services such as Telemedicine Indonesia (https://temenin.kemkes.go.id/). Following are the number of hospitals and puskesmas registered with Indonesian telemedicine services. The data can be seen in the following figure 6.
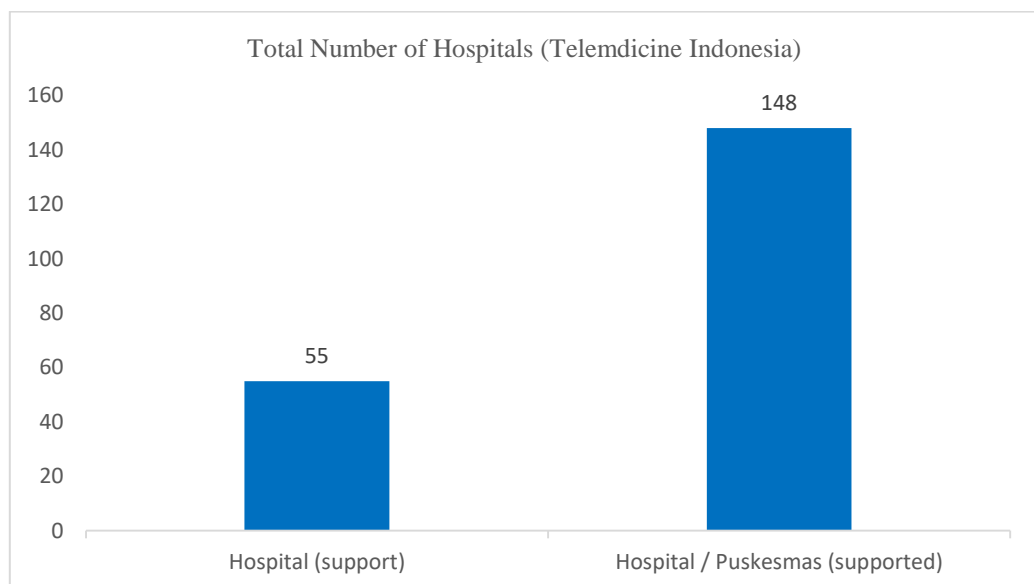
Source: Ministry of Health of the Republic of Indonesia (2020)
Figure 6. Number of Hospitals with Indonesian Telemedicine Facilities

In addition to collaborating with hospitals, the government has also confirmed doctors who collaborate in telemedicine-based health services. Doctors in the medical service are General Practitioners, Obgyn Specialists, Cardiologists and Radiology Specialists. Following are data on the number of doctors in providing Indonesian telemedicine services, as shown in figure 7.
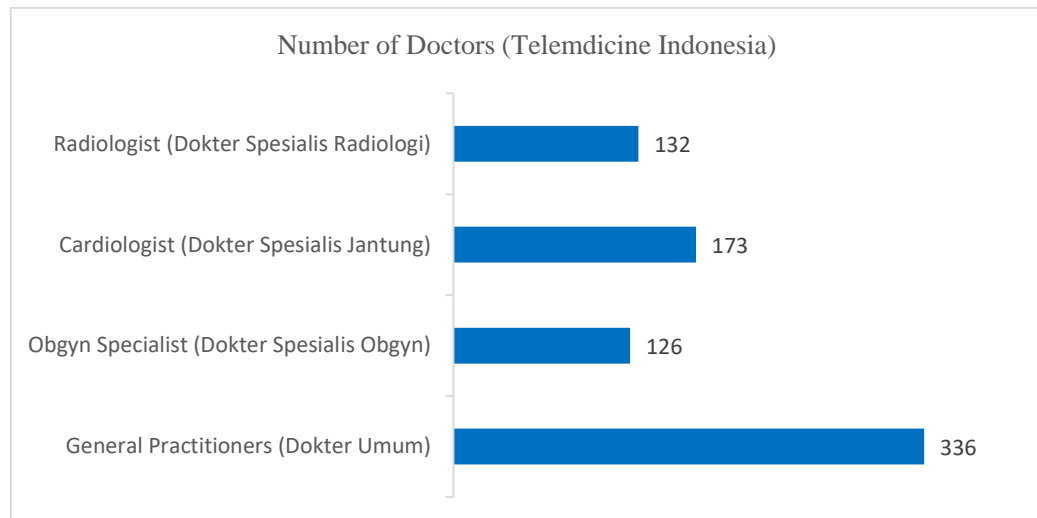

Figure 7. Number of Doctors in Indonesian Telemedicine Services
Source: Ministry of Health of the Republic of Indonesia (2020)

Telemedicine services are the government's response in utilizing technological developments such as Artificial Intelligence. Information and communication technology (Telemedicine) is a health service performed by a doctor or health practitioner to diagnose, treat, prevent, and evaluate a patient's health condition (Adenuga, 2020). The activity is in accordance with his competence and authority, as evidenced by the Registration Certificate (STR). In these services also pay attention to the quality of service and patient safety (kemenkes.go.id, 2020)(kemenkes.go.id, 2020). The doctor's authority in providing telemedicine services includes Anamnesa, certain physical examinations carried out through audiovisual, provision of recommendations needed based on the results of supporting examinations or results of certain physical examinations, enforcement of diagnoses, management and treatment of patients, writing prescriptions for drugs or medical devices, issuance of letters referral for further examination or action to a laboratory or health care facility according to the results of the patient's management (Hare et al., 2020; Shankar et al., 2020).

5. Conclusion

Services on access to health in the public sector are of concern to the government in the co-19 pandemic situation. The Indonesian government calls for a pandemic situation that health services must continue to be run with a variety of considerations and one of them is by utilizing information and communication technology based on Artificial Intelligence. The use of

technology in health services has the potential to be exploited within limitations during the covid-19 period. The Indonesian government in guaranteeing access and health services in pandemic situations using telemedicine technology.

Telemedicine Indonesia made a very positive contribution related to national health issues during the co-19 pandemic. The use of these technologies must be adjusted to the ability of the government to cooperate with the public sector (hospitals and doctors) and other sectors such as startups engaged in health services. Trends in the use of technology and the use of Artificial Intelligence such as telemedicine also have an impact on the development of startups (new developing companies) in the national health sector. Seeing this situation, the use of Artificial Intelligence can also have an impact on economic growth and can affect social patterns indirectly where the community has several alternatives to access and health services that depend on the use of technology.

This study has limitations on aspects of the use of research data which focuses on previous documents and literature that explain the application of AI in public health services. Future studies need to explain the impact of the use of AI on health services described based on survey data and analyzed based on a quantitative approach with Partial Least Square (PLS) software..

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BORCELLE COMPANY

CERTIFICATE
OF ACHIEVEMENT

THIS CERTIFICATE IS PRESENTED TO

Donna Stroupe

In recognition of his/her efforts and achievement in completing the three months internship program.

AARON LOEB
Head of Departement

JULIANA SILVA
Company CEO