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Research Article

The Role Of Indonesia In Achieving Sustainable Development Goals Target 3b In Asean By Producing Covid Vaccines

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ABSTRACT

The study aims to explain the role of Indonesia in achieving Sustainable Development Goals number 3b, namely "essential medicine and vaccines" in ASEAN members. The article aims to determine how Indonesia can become a leader in ASEAN in ensuring the availability of vaccines needed in the region. The research design is the qualitative study method, by reviewing relevant literature both primary sources with data collection techniques from official reports and government records, as well as from secondary data derived from books, print and online media and journals. The results of this articles show that Indonesia can play a role as a country that can meet the needs of covid vaccines in ASEAN. This is because Indonesia has a good marketing network and has been able to meet vaccine standards at the international standard level. In addition, geographically, vaccines produced by Indonesia have a greater opportunity to be distributed regionally. In achieving the Sustainable Development Goals number 3b, Indonesia can encourage the achievement of these goals with its current potential.

Keywords: sustainable development goals, ASEAN, covid vaccines, Indonesia

INTRODUCTION

The Sustainable Development Goals (SDGs) is a United Nations program that contains development targets that need to be carried out jointly by all countries in the world to create a sustainable planet earth with all people living peacefully and prosperously. The SDGs were jointly established by UN member states in 2015. The main goal of the SDGs is that by 2030, all humanity will be in a peaceful and prosperous life. SDGs have 17 goals that are integrated. In other words, to achieve one of the 17 Goals, it is necessary to achieve the other Goals. Thus, the achievement of the 17 SDGs Goals needs to be done synergistically. The 17 SDGs Goals are (1) no poverty, (2) zero hunger, (3) good health and well-being, (4) quality education, (5) gender equality, (6) clean water and sanitation, (7) affordable and clean energy, (8) decent work and economic growth, (9) industry, innovation and infrastructure, (10) reduced inequality, (11) sustainable cities and communities, (12) responsible consumption and production, (13) climate action, (14) life below water, (15) life on land, (16) peace, justice, and strong institutions, (17) partnerships for the goals (United Nations, 2022).

SDGs goal number 3 specifically aspires to the realization of a healthy life and well-being for all people at all ages. SDGs goal number 3 is detailed in nine targets, namely: Until 2030 in this world there is a drastic reduction in mortality due to the following cases: (1) Postpartum maternal mortality, (2) Neonatal and child deaths, (3) Infectious diseases, (4) Non-communicable diseases, (5) Abuse of hazardous substances, such as narcotics and alcohol, (6) road traffic accidents, and improvement of conditions of (7) sexual and reproductive health, (8) universal health services, and (9) environmental health.1 In addition to the nine targets above, "means of implementation for the targets" are also established, namely: (3.a.) Tobacco control, (3.b.)

[1] https://www.who.int/europe/about-us/our-work/sustainable-development-goals/targets-of-sustainable-development-goal-3

Medicines and vaccines, (3.c.) Health and labor financing, (3.d.) Emergency preparedness. In this article, the author will focus on achieving Target 3.b., which is related to vaccine supply efforts.

The achievement in the provision of the vaccine in question is to encourage national vaccine independence for various diseases (Wicaksono et al., 2022). With vaccine independence, it can make Indonesia a vaccine hub in the regional and global context. The affordability of these vaccines encourages opportunities for reducing the number of infectious and non-communicable diseases that can be prevented from spreading with vaccines, as well as reducing emergency conditions such as pandemics. This is very important, considering that in the context of a pandemic, the availability and affordability of vaccines can reduce the risk of spread, more casualties and build herd immunity.

The determination of the status of the COVID-19 pandemic globally in February 2020 was a game changer in the global constellation. The multiplier effect causes a turnback in the health, economic and social sectors as a result of the spread of *Covid-19 contagious diseases* (Fonjungo et al., 2020). According to a World Bank report, in addition to millions of people around the world who have died from the COVID-19 virus, it turns out that the impact of this pandemic is much wider. The pandemic has created various difficulties, including restrictions on people's movements, hampering access to health services and this has resulted in increased deaths due to cases of other diseases. The focus on COVID-19 vaccination efforts has also caused essential vaccination rates for children to also decline.[2]

With the COVID-19 pandemic, it has had a significant impact on the economy, health and social of a country, one of which is Indonesia. The Indonesian government is trying to overcome the pandemic problem so that the case does not continue to increase. One of the first steps made by the Indonesian government is to self-quarantine people who feel exposed to the virus, then the implementation of social distancing in the local area. The initial step decided by the government is of course to reduce and break the chain of transmission of COVID-19. This is also stated in government regulation Number 21 of 2020 concerning Large Coverage Social Restrictions in the Context of Accelerating Covid-19 Handling (Buana D.R, 2020).

Regarding the handling of the COVID-19 pandemic in Indonesia, the government has also found alternative ways to maintain the health of citizens. Starting from determining the status of health crises through Official Decree Number 11 of 2020 concerning the Determination of General Health Crises, implementing government commitments in implementing 3T *(testing, tracing, treatment),* building emergency hospitals, and so on. Facing this, along with the increasingly massive spread of COVID-19 infection and the increasing number of positive COVID-19 cases, the government has provided a strategy in handling COVID-19 pandemic cases which has been determined through the 2021 Official Guideline No. 14 concerning Vaccine Program Structuring. With the increasing need for vaccines in the world, Retno Marsudi, Minister of Foreign Affairs of Indonesia, expressed the need to encourage the achievement of justice and equal access to the COVID-19 vaccine which is an important issue that must be of concern to all countries. Therefore, the Government of Indonesia continues to strive to accelerate domestic vaccination and increase vaccine access in the region. This effort is carried out by making Indonesia a COVID-19 vaccine production hub in the Southeast Asian region, in line with the target of SDG no. 3 specifically number 3.b.

The Minister of Health also encouraged national vaccine production to suppress *public hesitancy*, especially for the Indonesian people who at that time mostly doubted the halality of vaccines imported from abroad (ASEAN, 2021). The challenges faced by Indonesia are in the context of *supply*, Indonesia's geographical conditions and inadequate logistical facilities, especially in remote areas, become obstacles and obstacles for the proper and equitable distribution of vaccines. Seeing the condition of the Covid-19 pandemic in Indonesia is also as worrying as other ASEAN countries. From data released by the Ministry of Health of the Republic of Indonesia until September 13, 2023, the number of confirmed patients with COVID-19 in Indonesia reached 6,813,429 people with 161,918 death cases (Ministry of Health, 2023). While the first-dose vaccination rate of the Indonesian people reached 92.01 percent, the second-dose vaccination rate reached 74.5 percent and the third dose of vaccination was 29.3 percent and the fourth dose of vaccination was 1.3 percent (Setkab, 2023). The need to produce vaccines independently in the ASEAN region is Indonesia's effort to encourage efforts to achieve *herd immunity* and participate in efforts to achieve the ASEAN Sustainable Development Goals, especially in point 3b.

Currently PT. Bio Farma is the only vaccine manufacturer in Indonesia. PT Bio Farma is a state-owned company whose share ownership is fully owned by the government. Since its inception, Bio Farma has continued to play a role in providing, marketing and creating vaccine technology innovations to guarantee domestic vaccine needs and help meet vaccine needs in the world. Since 1997, many Bio Farma vaccine products have received prequalification recognition (PQ) from WHO. In providing needs and fulfilling vaccines globally, Bio Farma is also assisted by international organizations to distribute to countries that need vaccines and support vaccine programs in the target country. These international organizations include the *United Nations Children's Fund* (*UNICEF*), *Pan American Health Organization* (*PAHO),* and *the Global Alliance of Vaccine and Immunization (GAVI).* Even Bio Farma has become a *center of excellence* in an Islamic cooperation organization or often referred to as the OIC. It is recorded that as many as 140 countries have used Bio Farma products and 50 of them are Islamic Countries, with 2,300,000,000 doses per year (Seda, 2021).

[2] https://datatopics.worldbank.org/sdgatlas/goal-3-good-health-and-well-being

Although the UN document on *Goal* number 3 does not explicitly mention the Covid-19 pandemic, the document states that by 2030, the UN targets the end of epidemics of AIDS, tuberculosis, malaria, hepatitis, and other infectious diseases. So the logical consequence of this is making COVID-19 an infectious disease included in the category listed in Target Number 3[3]. On May 5, 2023, WHO Director-General Tedros Adhanom Ghebreyesus declared the end of the COVID-19 pandemic or the end of the "*global health emergency"* period. According to the WHO in May 2023, cumulative cases worldwide now stand at 765,222,932, with 6,921,614 deaths. As of April 30, a total of more than 13.3 billion vaccine doses had been administered worldwide. In the *Outlook Assessment* conducted by the ASEAN Bio Diaspora Virtual Center, as of October 8, 2021, there were 12,523,399 confirmed cases of COVID-19 in ASEAN, with a total of 268,669 deaths. It also stated that 80% of ASEAN's population is at high risk of being vaccinated.[4]

Efforts to provide Covid vaccines are a concern for many parties, including ASEAN *(The Association of Southeast Asian Nations)*. Since the beginning of the pandemic, ASEAN has been active in carrying out various efforts, cooperation, and assessments on this pandemic. On April 14, 2020, ASEAN held a "*Special ASEAN Summit"* specifically discussing the response to the Covid-19 pandemic. Among the important things agreed upon are:

Facilitate and promote cooperation for the production of and access to medicines and vaccines used for COVID-19 medical treatment, using appropriate TRIPS flexibilities, to protect public health from negative impacts of the pandemic; be willing and ready to share with other AMS the supply sources of raw materials for production of the medicines and vaccines used for COVID-19 treatment, when possible. [5]

Thus, since the beginning of the pandemic, ASEAN has had a desire to produce its own vaccines. The benefits obtained because the independent production of vaccines can encourage the achievement of a country's health independence, reduce dependence on donors, the possibility of faster and more precise access to vaccines, vaccine variations that are closer to the needs of people with certain geographical conditions, capacity and skill development, opening access to employment to negotiation skills in a global context. The ability to produce vaccines, especially to meet common needs in a particular regional region, is closely related to the achievement of SDGs Target 3.b., namely the provision of vaccines. In the WHO document, the explanation of Target 3.b.ini is stated as follows.

Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries. Provide access to affordable essential medicines and vaccines in accordance with the Doha Declaration on TRIPS and Public Health, which affirms the right of developing countries to the fullest use of the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS agreement) regarding flexibilities to protect public health and, in particular, provide access to medicines for all.[6]

Therefore, this research aims to explain how Indonesia's role in achieving SDGs Target 3.b.ini, especially related to the provision of COVID-19 vaccines in the ASEAN region. Some previous research relevant to this research has been conducted by Tarigan & Hafandi (2021). They said that for vaccines to be accessed more equitably and affordably, it is important to increase vaccine production capacity in low- and middle-income countries. However, obstacles arose in this effort, namely related to patent rights monopolized by the large pharmaceutical industry. As a result, poor and developing countries find it difficult to produce the same vaccine (Tarigan &; Hafandi, 2021)[7]. This patent issue was also examined by Situmeang & Muniarti (2021) which discussed that among the problems faced by ASEAN countries in producing vaccines is patent issues.[8] Pratiwi et al. (2022) found that among Indonesia's ability to provide sufficient vaccines is the result of international cooperation and relations, where Indonesia has received various assistance in dealing with the COVID-19 pandemic.[9]

Meanwhile, research conducted by Subsittipong et al. (2022) found that the limited availability of vaccines in ASEAN is also related to licensing. The result of the research is that ASEAN countries are slower in granting

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3 https://www.who.int/europe/about-us/our-work/sustainable-development-goals/targets-of-sustainable-development-goal-3

4 https://asean.org/wp-content/uploads/2021/10/COVID-19_Situational-Report_ASEAN-BioDiaspora-Regional-Virtual-Center_11Oct2021.pdf

5 https://www.oecd.org/southeast-asia/ERIA%20COVID19%20and%20ASEAN%20Connectivity.pdf

6 https://www.who.int/europe/about-us/our-work/sustainable-development-goals/targets-of-sustainable-development-goal-3

7 Tarigan, M.I., Hafandi, R. (2021). Equal Access to the Vaccination of Covid-19 in Southeast Asia: Can ASEAN be a Catalyst?. Hasanuddin Law Review, 7(2): 119-132. doi: 10.20956/halrev.v7i2.2875

8Tomson Situmeang &; Erni Murniarti (2021) ASEAN ATTITUDES TOWARD PATENT PROTECTION OF THE COVID-19 VACCINE VERSUS HUMANITARIAN INTERESTS http://dx.doi.org/10.25216/jhp. 10.2.2021.255-276

9 Fadhila Inas Pratiwi, M. Muttaqien, Muhammad Samy, Jilan Hanifah Fadli, Angelique Angie Intan, Nugraha Ryadi Kusuma. (2022). International cooperation during COVID-19: Case study vaccine cooperation and its impact in Indonesia. https://doi.org/10.1111/aspp.12643

approval or approval of vaccines than European Union countries and the United States. [10] Meanwhile, Rollet (2022) found that ASEAN's capacity as a regional institution is still limited in carrying out effective cooperation in dealing with health issues, especially the COVID-19 pandemic.[11] Since only a few countries can produce their own COVID-19 vaccines, it is critical to ensure their availability to every corner of the world. The sustainability of vaccine supply is one of the significant factors in global vaccine availability. Research on the vaccine supply chain was among others carried out by Chowdhury et al (2022) who used a multi-objective mixed-integer programming (MIP) model to develop VSCs[12]. Alam et al (2021) identified 15 challenges in VSC and linked their implications to SDGs to provide recommendations to countries in VSC development. [13]

From a review of various previous studies, it has not yet been studied in more depth, what is Indonesia's role in producing its vaccines, which is part of SDGs Target 3.b. In addition, Indonesia has a leadership position in ASEAN, namely as chair of the ASEAN Health Ministers (2020-2022). In this paper, we hypothesize that Indonesia is one of the leading countries in ASEAN in conducting research in the field of vaccines, especially the Covid-19 vaccine and this is very significant in efforts to achieve SDGs Target 3b. This research was carried out by means of literature studies and field observations, namely by interviewing a number of parties involved in vaccine production in Indonesia.

METHOD

This study uses a qualitative approach, where researchers describe the understanding of the results of data analysis obtained on the data owned (Cresswell et al., 2003). The qualitative approach provides flexibility for researchers to explore data sources more deeply and provides space to interpret the meaning of the data they have. This study uses qualitative interpretation in reading official reports and government records, as well as from secondary data derived from books, print and online media and journals. Furthermore, this study uses data analysis techniques introduced by Miles and Huberman (2014), where the process of interpretation of the data owned goes through the process of data reduction, data presentation and conclusion drawing and ends with data verification (Miles &; Huberman, 2014). This analysis technique helps researchers to answer their research questions.

RESULTS AND DISCUSSION

1. Vaccine Needs and Production in ASEAN

The Minister of Health of Indonesia who is the chair of the *ASEAN Health Ministers* for the 2020-2022 period, which was the time of the COVID-19 pandemic crisis. However, this position actually gives Indonesia the opportunity and responsibility to encourage ASEAN countries to help each other and cooperate in dealing with the Covid-19 pandemic. One of the successes of Indonesia's role in the two-year period was the establishment of the ASEAN *Center for Public Health Emergencies and Emerging Diseases* (ACPHEED) and the establishment of *a health protocol harmonization* in ASEAN. ACPHEED is an institution that conducts supervision or detection, response, and risk management in dealing with the Covid-19 pandemic[14]. The establishment of the ASEAN *Center for Public Health, Emergencies and Emerging Diseases* encourages centralization of pandemic policies and handling between countries in ASEAN. This also encourages a joint settlement mechanism between member countries related to the pandemic that occurs, and Indonesia is one of the leading actors in the formation of ACPHEED.

Although Indonesia is a leading actor in the ACPHEED formulation process, if examined further, the Indonesian government from the beginning has focused attention on the provision and production of vaccines independently. This can be seen from Indonesia's target to vaccinate 70 percent or 181.5 million of its population by 2021. To meet the national COVID-19 vaccination needs, Indonesia has two strategies, the first is a short-term strategy, namely obtaining vaccine supplies through multilateral cooperation. Second, the medium-term or long-term strategy, which is to try to produce vaccines independently. To achieve this goal, Indonesia has conducted research and development of vaccines by research institutions and universities. Each of these research institutes developed a different vaccine platform.

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[10] Nilubon, Subsittipong et al. (2022). Delay in Vaccine Access in ASEAN Countries. https://doi.org/10.3390/ijerph19073786

[11] Vincent Rollet. (2022). ASEAN's "actorness" and "effectiveness" regarding the COVID-19 pandemic. *Regions and Cohesion*. doi: https://doi.org/10.3167/reco.2022.120103

[12] Naimur Rahman Chowdhury et al (2022). Modeling a sustainable vaccine supply chain for a healthcare system
https://doi.org/10.1016/j.jclepro.2022.133423

[13] Shahriar Tanvir Alam et al. (2021). Challenges to COVID-19 vaccine supply chain: Implications for sustainable
development goals. https://doi.org/10.1016/j.ijpe.2021.10819

[14] https://en.antaranews.com/news/229689/minister-sadikin-hands-over-asean-health-ministers-leadership-to-laos

In the early days of the COVID-19 vaccine and drug development process in Indonesia, collaborative research was carried out on a regional cooperation scale. This cooperation involves at least three countries and one non-state actor, where China, the United Arab Emirates (UAE) and South Korea are part of the countries that cooperate with Indonesia. Through this collaboration, Indonesia initiated business travel rules during the pandemic period that were applied with China, the United Arab Emirates (UAE) and South Korea. This regulation encourages mutual agreement related to access in and out of partner countries during the pandemic. Meanwhile, together with COVAX, Indonesia received two cooperation agreements were signed between Bio Farma and Sinovac for the supply of 40 million doses of vaccine from November 2020 to March 2021, and Sinovac's priority to supply vaccines to Bio Farma for the period April - December 2021 (Setiawan, 2020).
Based on data from the ASEAN *Vaccine Baseline Survey (AVBS*) which is part of the ASEAN *Vaccine Security and Self-Reliance (AVSSR)* initiative in 2019, it determines the categorization of the capacity of ASEAN member countries in the aspect of vaccine production consisting of only four countries, namely Indonesia, Thailand, Myanmar, and Vietnam (ASEAN, 2019). However, when confirmation of positive cases of COVID-19 in ASEAN member countries in early 2020 was found, it caused dynamics over the need for vaccines and production capabilities of each country to overcome the COVID-19 pandemic.

1. Indonesia

As one of the countries in Southeast Asia that can be able to produce vaccines in its own country, Indonesia is a leading country in collaborating or collaborating with researchers or manufacturers of COVID-19 vaccines. China became the first country to cooperate with Indonesia in the research and development of vaccines and special COVID-19 drugs. In this regard, China also supports Indonesia in establishing regional vaccine production centers and is one of the largest suppliers of COVID-19 vaccines to Indonesia (Yunyi et al., 2022).
Then there is technological assistance from China to help increase the production capacity of COVID-19 vaccines in the country. Starting with the third phase clinical trial of the Chinese-made vaccine, Sinovac in Bandung on July 21, 2020, Sinovac China has supplied more than 280 million doses of vaccines to Indonesia, with more than 100 million doses being *semi-finished products* which are then filled and finished) by Bio Farma, which is the only State-Owned Enterprise responsible for COVID-19 vaccine production (Zhao &; Li, 2023). Bio Farma also obtained permission to produce the CoronaVac vaccine based on an agreement with China which in January 2021 had produced 15 million doses of the CoronaVac vaccine (Bio Farma, 2021). This shows that Indonesia through Bio Farma is able to produce COVID-19 vaccines.
Indonesia through Bio Farma has also developed a domestically made vaccine called IndoVac whose development has been carried out since November 2021 in collaboration with Baylor College of Medicine, United States. The IndoVac vaccine uses recombinant protein technology that can be quickly adapted for possible new variants in the future. After completing phase 1 and phase 2 clinical trials, it was found that the IndoVac vaccine was of good quality and safe to use (Bio Farma, 2022). The IndoVac vaccine began to be massively produced and the first injection of the vaccine was carried out in November 2022 which was intended as a booster vaccine for the elderly (Bio Farma, 2022).

2. Malaysia

In November 2021, the Malaysian Government launched the National Vaccine Development Roadmap (PPVN), as part of efforts to make Malaysia a hub for vaccine production and increase public confidence in vaccine use and reduce dependence on other countries. In the policy, there are three vaccine development projects, of which two projects are the development of two types of COVID-19 vaccines using mRNA and inactivated viruses (Channel News Asia, 2021).
During the Covid-19 pandemic, Malaysia depended on vaccines from other countries as it was unable to produce its own vaccines due to lack of manufacturing capabilities, so it had to rely on Covid-19 vaccines imported from other countries. Previously, the Malaysian Government also tasked NIBM-MGVI to simplify collaboration and efforts in the field of human vaccine research and development in November 2021. For the development of the Covid-19 vaccine, the Institute of Medical Research and the University of Malaya are working together. Some of the latest actions from the Malaysian government are the result of various previous initiatives that failed to materialize so the hope is that the vaccine development process can continue to the next phase of clinical trials which shows that it will take years to ascertain the effectiveness and side effects of the covid-19 vaccine to be produced. To investigate possible collaborative projects for the establishment of a regional vaccine ecosystem, the National Institute of Biotechnology Malaysia (NIBM), the Malaysian Institute of Genome and Vaccines (MGVI), MVP Healthcare, and Pfizer Malaysia signed a memorandum of understanding (MOU) on January 30, 2023 (Aziz, 2023).
In July 2023, Malaysia's Ministry of Health replaced its nearly expired supply of Covid-19 vaccines with 2.7 million doses of the new generation (bivalent) vaccine. Malaysia's National Covid-19 Immunization (PICK) program did not go as planned and additional purchases and receipts of vaccine donations from other countries contributed to the excess stock of vaccines. As of June 1, 2023, vaccine storage facilities and warehouses at Malaysia's health ministry contain 8.5 million expired vaccines from various vaccine brands (The Straits Time, 2023).
This causes a problem because as of May 30, 2023, the Malaysian population who have received all primary doses is only 27,550,124 people or equivalent to 84.4 percent. Then 16,335,715 people or equivalent to 50

percent have received a booster dose, and 823,495 people or 2 percent have received a second booster dose (The Star, 2023).

3. Vietnam

Ho Chi Minh City-based Nanogen Pharmaceutical Biotechnology developed Nano Covax, a COVID-19 vaccine candidate that uses recombinant protein technology. The phase 2 clinical trial began in February 2021, with two trial sites located in Ho Chi Minh City and Hanoi. With a total of 560 volunteers who are in good health given second injections in March to April 2021. The company claims that its vaccine is safe, boosts immune response and is effective against the COVID-19 variant first discovered in the UK. Vietnam is trying to produce vaccines domestically, but has also faced obstacles in obtaining vaccine supplies during the pandemic. Many rich countries are seeking agreements that leave low- and middle-income countries with few vaccine doses. However, Vietnam is one of the few countries that has the ability to produce its own vaccine. A large number of low- and middle-income countries rely on donations or global vaccine distribution networks through COVAX, or actively enter into agreements with pharmaceutical companies, and sometimes make larger payments than high-income countries (Ravelo, 2021).

Following a request from the Vietnamese government to create an alternative to locally produced vaccines, the company Nanogen Pharmaceutical Biotechnology entered the COVID-19 vaccine development process in 2021. According to Si, Director of Research and Development, the company was initially asked by the Vietnamese government to work on a COVID-19 monoclonal antibody therapy in 2020. However, the company has had difficulty conducting clinical trials in Vietnam due to the small patient population. According to Si, the company has invested 400 billion to 500 billion Vietnamese dong and received some financial assistance from the state in the process of developing vaccines. However, as production increases to 50 million doses per year, more funding is needed, by 2021, the company can only produce up to 10 million doses annually which is certainly not enough to meet the needs of the nearly 100 million people living in Vietnam (Ravelo, 2021).

4. Thailand

In November 2020, Thailand signed a preliminary agreement to procure an undisclosed number of doses of the AstraZeneca/Oxford vaccine and authorization for local production is held by Siam Bioscience, a drugmaker with no previous experience in producing vaccines. Thailand is also involved in negotiating vaccine production. Under the agreement, Thailand is one of the countries producing vaccines in Southeast Asia, producing up to 200 million doses annually. About one-third of those doses are set aside by the Thai government, and the rest are exported to neighboring countries such as Vietnam, the Philippines, Indonesia and others. Astrazeneca selected Siam Bioscience to produce COVID-19 vaccines for ASEAN countries, and the WHO has approved the decision. Although most American and European companies such as Moderna, Pfizer/BioNTech, and Curavac still control most vaccine development using the latest mRNA technology, some intend to set up manufacturing facilities in developing countries (Postigo, 2023).

The Chula Vaccine Research Center at Chulalongkorn University and King Chulalongkorn Memorial Hospital in Thailand have partnered with BioNet to create and manufacture the ChulaCov19 BNA 159 vaccine, which is Thailand's first mRNA vaccine for COVID-19. Australia has been the site of phase 1 and phase 2 clinical trials of the vaccine (Postigo, 2023). Using AstraZeneca technology, Siam Bioscience began producing the country's first COVID-19 vaccine in June 2021. However, the emerging problems led to production shortages that impacted Thailand's exports as well as the estimated number of doses available to the country. By September 2021, Thailand had become a significant producer of the Oxford/AstraZeneca vaccine, producing 52.5 million doses from 8.4 million doses in August 2021 (Yean, 2022).

5. Singapore

Although Singapore uses sub-unit vaccine platforms to produce pharmaceutical active ingredients for various vaccines, it lacks fill-finish capacity and is currently not producing ready-to-use vaccines (Mukherjee et al, 2023). However, approval for the use of the Pfizer-BioNTech and Moderna covid-19 vaccines was recently renewed, Singapore's Ministry of Health announced that it will begin distributing new doses in phases on October 30, 2023. On November 20, 2023, there is also a revised formulation intended to counter newer variations of COVID-19. Singapore's Ministry of Health also stated that until September 30, 2023, the reported rates of adverse events and serious adverse events for monovalent and bivalent mRNA vaccines are still very low at 0.10 per cent and 0.007 per cent respectively (Channel News Asia, 2023).

6. Filipina

The Asian Development Bank's (ADB) Asia Pacific Vaccine Access Facility (APVAX) approved a $400 million loan to the Philippines, making the country the first country to receive financial support in Southeast Asia for the purchase of safe and effective COVID-19 vaccines (Asian Development Bank, 2021). COVID-19 vaccination in the Philippines began in March 2021, and as of March 16, 2023, approximately 14.34 million residents of the National Capital Territory (NCR) have received all authorized doses of COVID-19 vaccines (Statista, 2023).

7. Lao People Democratic Republic (Lao PDR)

On July 19, 2021, Laos received a new shipment of COVID-19 vaccines donated by the United States through the COVAX framework. The shipment contained 1,008,000 doses of Johnson & Johnson/Janssen's COVID-19 vaccine. As part of ongoing international efforts to stop this pandemic, the United States supports Laos' goal of vaccinating 50% of its population by the end of 2021. In accordance with the National Vaccination and Implementation Plan, the Lao Government will use the J&J/Janssen doses to vaccinate priority groups, such as residents over the age of 60 and those with accompanying medical conditions, as well as health workers. The Lao government is also using the vaccine doses to vaccinate additional target populations, such as residents living in remote and hard-to-reach areas. In addition to the Johnson & Johnson/Janssen vaccine shipment, Laos has received 132,000 doses of Astra Zeneca/Oxford COVID-19 vaccine in March 2021 and 100,620 doses of the Pfizer-BioNTech vaccine in early June 2021, both of which were also obtained through the COVAX framework (USAID, 2021).

On January 2, 2022, Laos again received 799,110 doses of Pfizer BioNTech vaccine donated by the United States through the COVAX framework (USAID, 2022). On March 16, 2023, Laos received 50,000 doses of Covovax (Novavax) vaccine. As such, Laos has received more than 21.2 million doses of COVID-19 vaccines overall with a utilization rate of about 65% of those doses. The percentage of Lao residents of the priority group who have completed the primary series (all recommended doses) is 75.8% for the elderly group over 60 years and 99.0% for health workers. Laos uses the Pfizer, Sinopharm, and Sinovac vaccines to immunize children and adolescents between the ages of 5-17. As of May 31, 74.0% of children and adolescents between the ages of 12-17 had taken all recommended doses. 66.7% of children between the ages of 5-11 have received all prescribed doses. Overall, as of May 2023, 86.2% of Laotians who have received at least the first dose and 33.3% have received the first booster vaccine and 6.7% of the population have received the second booster vaccine (World Health Organization, 2023).

8. Brunei Darussalam

The Brunei Darussalam Drug Control Authority (BDMCA) approved a wide range of vaccines under the Emergency Use Authorization to produce *herd immunity*. The four vaccines that have been authorized for use are Covilo from Sinopharm, SpikeVax from Moderna, Vaxzevria from AstraZeneca, and Comirnaty from Pfizer. To investigate and assess the usefulness, safety, and quality of COVID-19 vaccine candidates that received permission for use, the Brunei Darussalam government established a COVID-19 Vaccine Technical Committee. There is a national vaccination strategy starting on 3 April 2021 that allows Bruneians to receive free COVID-19 vaccinations. Sinopharm and AstraZeneca vaccines were used in the early stages of the vaccination program. On July 5, 2021, the entire adult population received mass vaccination and on October 19, 2021, the vaccination program is scheduled to be expanded to include the younger age group of 12 to 17 years. Health workers and elderly groups began receiving booster doses in November 2021. Adults who received all recommended vaccinations could receive an mRNA vaccine booster shot after the Omicron variant emerged in late 2021 (Ang et al, 2023).

In May 2023, 79.2% of Brunei Darussalam's population has received the third dose of COVID-19 vaccine, and 12.1% have received the fourth dose (Ministry of Health Brunei Darussalam, 2023). As of June 29, 2023, a total of 1,293,100 vaccine doses have been administered to the community as part of the National Vaccination Program (World Health Organization, 2023).

9. Cambodia

In the early days of the COVID-19 pandemic, the Cambodian Government made a policy to use Chinese-made vaccines and vaccinations began in February 2021. After that, vaccine purchasing activities by the government, international donations, and procurement through the COVAX Facility were actively carried out until March 2022, 44,454,860 doses have been successfully obtained, of which 64.1% were purchases of Chinese-made vaccines (Nozaki et al, 2023).

As of February 2022, 80% of Cambodia's 16.7 million people have received all recommended vaccinations since the country's vaccination campaign began on February 10, 2021. About 21.8% of the population, or more than one in five people have gotten a booster shot. However, the healthcare system in the country is still vulnerable to a surge in new infections found to be linked to variants such as Omicron and Delta. In this regard, the Cambodian government received a $95 million loan from the Asian Development Bank (ADB) to help run the COVID-19 vaccination program from 2022 to 2023 (Asian Development Bank, 2022).

According to the Cambodian Ministry of Health, In October 2023, Cambodians who have received at least one dose of the Covid-19 vaccine are 15 million or 94% of the country's total 16 million population with details that 14.3 million or 89.4% of the population have received the second dose of the Covid-19 vaccine. More than 15 million people, or 94% of the country's 16 million people, have so far received at least one dose of a COVID-19 vaccine, according to the health ministry. Of these, 14.3 million, or 89.4% of the population, have received both doses of the vaccine. In addition, 2.58 million 16 percent of the population has received the fourth dose, and 9.25 million or 58 percent have received the third dose. In addition, 2.58 million people or 16 percent have received a fourth dose, and 9.25 million people or 58 percent have received a third dose (Khmer Times, 2023).

10. Myanmar

On January 27, 2021, health workers at the Mon State Department of Public Health received 1.5 million doses of the Covishield/AstraZeneca vaccine donated by India. The Ministry of Health and Sports Myanmar also reported that 30 million doses of the Covishield/AstraZeneca vaccine had been purchased and delivered in February 2021. Mon State Department of Public Health reports that 3,987 health workers in the state have received COVID-19 vaccine shots (Myanmar National Portal, 2021).
Myanmar began producing a domestic COVID-19 vaccine called Myancopharm vaccine at Ywathagyi Pharmaceutical Factory, Yangon on March 24, 2022. Efforts are being made to produce COVID-19 vaccines domestically to ensure that every resident who requires COVID-19 vaccination will receive a COVID-19 vaccine injection by the end of April or early May 2022. The need for vaccines to inject booster doses is also one of the reasons Myanmar produces vaccines domestically. To produce the Myancopharm vaccine, the Myanmar government purchased a large quantity of Sinopharm's COVID-19 vaccine from China National Biotech Group as a *ready-to-fill* vaccine. In the 2022–2023 financial year, Myanmar's Ministry of Industry will produce 10 million doses of vaccines to be used in community vaccination programs (Myanmar National Portal, 2022).
On March 30, 2022, Myanmar received a donation of 2,242,800 doses of the Sinovac vaccine through the COVAX framework (Myanmar National Portal, 2022). As of August 21, 2023, 93,477,104 doses of COVID-19 vaccine have been administered to residents of Myanmar (World Health Organization, 2023).

Despite the cooperation of the ASEAN *Center for Public Health Emergencies and Emerging Diseases,* this does not necessarily facilitate vaccine production in ASEAN. The existence of obstacles related to patent rights makes vaccine production limited, one of which is the obstacle to patent rights from major vaccine manufacturers. Regarding patent rights barriers, according to Health Minister Budi Sadikin, the solution taken by Indonesia is to join the *WTO TRIPS waiver program*. In this program, Indonesia encourages a *temporary waiver of intellectual property protections* for COVID-19 vaccine production so that vaccine production capacity around the world can be increased. According to Sadikin, through this effort Indonesia hopes to build vaccine factories domestically and in the ASEAN region.[15]
In addition to ACPHEED and the establishment of *health protocols, harmonization* ASEAN has mechanisms that run in "the ASEAN Health *Development Agenda*" and "*ASEAN Health Clusters"* that assist member countries in dealing with the pandemic. Among the assistance are the ASEAN *Emergency Operations* Centre (ASEAN EOC), Network for Public Health Emergencies, ASEAN Risk *Assessment and Risk Communication* (ARARC), ASEAN *Plus Three Field Epidemiology Training* Network (ASEAN+3 FETN), *Regional Public Health Laboratories Network*, and ASEAN *BioDiaspora Virtual Centre* (ABVC). In addition, there are 11 initiatives carried out by ASEAN to solve various issues surrounding the COVID-19 pandemic, including the ASEAN *Centre for Public Health Emergencies and Emerging Diseases* (ACPHEED), which was mentioned earlier.[16]

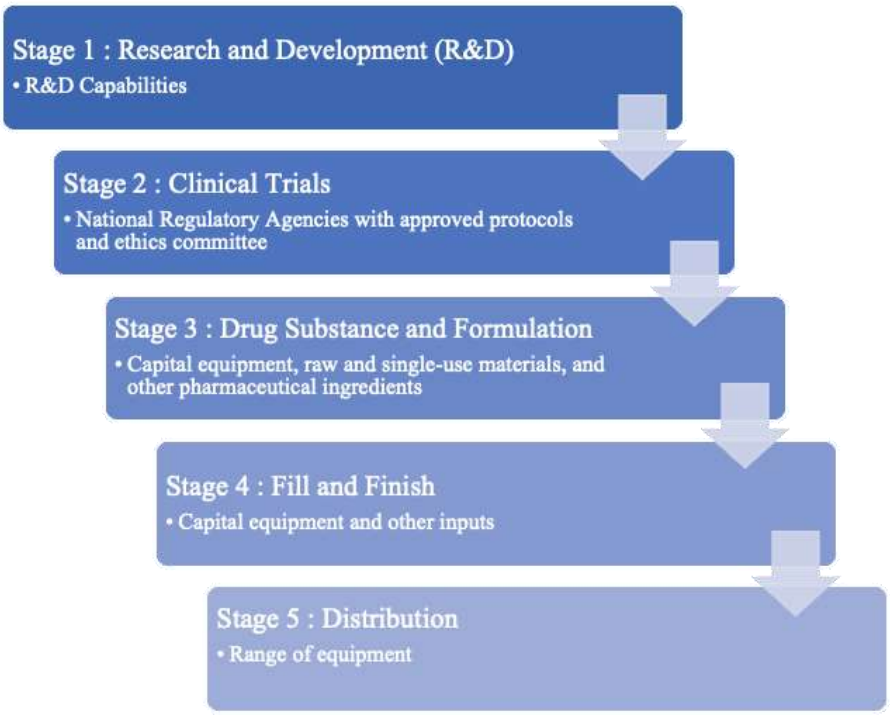
Indonesia's Opportunity as a Vaccine Producer in ASEAN

Access to vaccines is a crucial aspect due to the uneven distribution of vaccines between developed and developing countries. This will certainly have an impact on health and the economy which will harm all countries. The head of the *International Monetary Fund (IMF)* stated that uneven recovery efforts from Covid-19 between developed and developing countries could create a "*dangerous divergence*". Unequal access to vaccines for developing countries can lead to inequality in economic growth that will be harmful to global stability and security. Therefore, the Government of Indonesia continues to strive to accelerate domestic vaccination and increase vaccine access in the region. This effort began by making Indonesia a COVID-19 vaccine production hub in the Southeast Asian region.
In the *Global Health Summit* Forum attended by G20 member countries last May, President Joko Widodo expressed Indonesia's readiness to become a vaccine hub in the region. Indonesia's readiness to become a Covid-19 vaccine hub is also shown through PT Bio Farma (Persero) which currently has a Covid-19 vaccine production capacity of 20 million doses per month. In the production aspect, referring to Kontan's article (2021), Biofarma has prepared production facilities for the COVID-19 vaccine. Bio Farma has realized a production facility for the fill and finish of the COVID-19 vaccine which then becomes a finished *product* of 6.4 to 6.5 million doses. Based on the article published on Bio Farma's official website, as a company that carries out the duties of the Indonesian government as a provider of Covid-19 vaccines, Bio Farma continues to be committed to maintaining the supply of Covid-19 vaccines in Indonesia (Muhammad, 2021).
Based on statistical data as of July 27, 2021, Indonesia has received 173.1 million doses of COVID-19 vaccines consisting of 144.7 million portions in bulk form from Sinovac, and 28.6 million doses in the form of finish products from AstraZeneca Covax, Sinopharm, and Moderna. For mass bundling as many as 144.7 doses and there are 117.3 million servings of finish product. As of July 29, 2021, the mass portion of the COVID-19 vaccine

15 https://en.antaranews.com/news/229689/minister-sadikin-hands-over-asean-health-ministers-leadership-to-laos
16 https://en.antaranews.com/news/229689/minister-sadikin-hands-over-asean-health-ministers-leadership-to-laos

has been processed at Bio Farma as many as 117.1 million portions, so that the finished items are around 92.1 million doses, with 74 million doses of which have received reset parts from the POM Agency and 18.1 million doses in the quarantine process. In its own distribution cycle, Bio Farma has the responsibility of providing antibodies from Bio Farma to the Government / City.

Referring to SDG target no. 3, vaccine development is generally carried out through five basic stages (Bown &; Bollyky, 2022). The first stage determines the *research and development* of the country that will develop the vaccine, where the R&D will produce the vaccine formula. The second stage is the existence of clinical trials, at this stage then the vaccine formula that has been produced is carried out clinical trials in accordance with the rules and guidelines of the ethics committee. At the next stage if clinical trials have been completed, it will continue with mass vaccine production. After mass production is carried out, the next stage is to ensure the availability of vaccine distribution readiness by preparing equipment and needs during distribution. Until the final stage, vaccine distribution is carried out according to protocols and SOPs determined by each actor involved (see figure 1).



Picture 1 The five stages of vaccines development and manufacturing (Bown & Bollyky, 2022)

Indonesia's commitment in an effort to strengthen domestic health during covid-19 is by creating an independent covid-19 vaccine. This was then realized by the government by cooperating with Bio Farma. In 2022, President Joko Widodo has inaugurated a vaccine produced by Indonesia called the Indovac vaccine. Indovac has also collaborated with various universities in clinical trials of the vaccine. The primary IndoVac vaccine, which is for adults, has received emergency *authorization* (EUA) or emergency use authorization from the Food and Drug Control Agency (BPOM) on September 28, 2022. Bio Farma has also completed IndoVac clinical trials for follow-up vaccinations or boosters that can increase antibody titers and neutralization of Omicron.

Indonesia certainly has a considerable opportunity if it produces the Covid-10 vaccine independently. With its strategic geographical position, Indonesia is an attractive market for the vaccine industry. According to World Bank trade statistics, Indonesia is listed as the largest vaccine exporter in Southeast Asia. As discussed earlier, Indonesia is also a distributor of vaccines from China so that they can be distributed to Southeast Asian countries. If Indonesia participates in making vaccines independently, this will certainly reduce foreign exchange for vaccine imports from other countries, and will help improve Indonesia's trading country. Another thing that is a great opportunity for Indonesia is that by involving Indonesia in distributing the Covid-19 vaccine with local ingredients to other Southeast Asian countries, then of course these antibody products will bring benefits to Indonesia. The independent entry of the COVID-19 vaccine will not only save the Indonesian people and the economy, but Indonesia can also expand its role as a vaccine production hub for Southeast Asia, and reduce dependence on other countries (Nugroho, 2020).

Indonesia's Potential Role in Meeting Target 3b SDGs

The Covid-19 pandemic has accelerated in achieving the SGDs 3.b. Target (provision of medicines and vaccines). Many global initiatives have been undertaken to accelerate vaccine production. About the vaccine production capability owned by PT. Biofarma, Indonesia can take several roles related to the alleviation of

conditions of pandemics and other infectious diseases in the ASEAN region. Referring to *The Sustainable Development Goals* (SDGs) it was agreed to be a joint commitment of UN member states based on the fact that there is still a large number of the world's population living in conditions of deprivation. The ideal of SDGs is the realization of human life where there is no longer poverty, hunger, suffering from various diseases and living in poor conditions, experiencing poor sanitation, and so on. Therefore, the 17 *SDGs Goals* are closely related to various aspects of human life that will bring humans to prosperity.

The first role that can be done by Indonesia is to be a pioneer in the production of halal vaccines, this has been done by Indonesia previously which accommodates OIC member countries to provide vaccines with halal certification for countries in need. Through multilateral cooperation, Indonesia has the opportunity to become a vaccine exporter in OIC countries. This has been pioneered since 2017, Indonesia already has halal vaccine certification obtained by Biofarma, so this opportunity should be utilized by Indonesia as the only halal vaccine producer in Southeast Asia. The second opportunity that can be pursued by Indonesia is to become a vaccine *hub* in Southeast Asia to meet the needs of countries in Asia, Indonesia's geographical location is very strategic to encourage vaccine distribution appropriately and evenly. In the future, Indonesia can produce ready-to-use vaccines and no longer accept vaccine parents. With strategic geographical conditions, Indonesia's role is to play a role as an actor that encourages the achievement of SDGs point 3b.

CONCLUSION

Efforts to provide vaccines independently are one of the steps needed to reduce the rate of spread of infectious diseases including the Covid-19 pandemic quickly and appropriately in the future. The capabilities and potentials possessed by Indonesia through PT. Biopharma can be encouraged to implement SDGs point 3b, especially in the ASEAN region. With the fulfillment of point 3b, it can realize ASEAN as a health-independent region and encourage the achievement of national independence of countries in ASEAN. This implementation also has a positive impact on Indonesia, especially in terms of *bargaining position* between vaccine-producing countries and the OIC by providing certified halal vaccines. Indonesia can also become a vaccine hub country for the Southeast Asian region.

Indonesia continues to encourage collaborative and collective action between countries to produce vaccines based on equality. Vaccine production based on the principle of equality will encourage developing countries to achieve health independence which leads to the achievement of sustainable world health in accordance with the target in point 3b.

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