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Recent Patents for Handling Covid-19: Snapshot from Indonesian Patent Database

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Abstract. In recent years, the world in fear due to covid-19 outbreaks which impacted to the all aspect of life. As a many other countries, Indonesia with huge population consider to handle the spread the covid-19 through develop the innovation and technologies that highly related to the patent. This study aims to present the descriptive examination of the patent landscape related to the Covid-19 in Indonesia. Furthermore, the information of patent application obtains from Indonesian patent database and classified by the selected categories. This study reveals that the Research, Development, and Innovation (RDI) activities dominated by the Indonesian higher education. The highest filling date in December 2020 highly correlated with the obliged research outcome that funded research by the Indonesian Government. Additionally, the patent classifying by the type of method, process, tools, and products and there's no significant distinction number among the types.

INTRODUCTION

At the beginning of 2020, COVID-19 was declared a pandemic which forced all countries to contribute to the prevention and control of the virus. Various strategies are carried out through the mandatory use of masks, the application of physical distancing, and limiting mobility. On the other hand, research activities are also carried out which are expected to contribute to the development of innovation and technology to prevent and overcome the impact of Covid-19. For instance, China at the beginning of the emergence of COVID-19 took the initiative to focus on the development of artificial intelligence (AI) to detect the faces of infected people with travel history, robots to deliver food and medicine, drones to disinfect public places. In Indonesia, Setiyo tried to redesign seat of public transport buses to implement physical distancing [1]. In addition to the government, the prevention of Covid-19 infection has also been responded to by companies and private research institutions. A smart bracelet developed by Carepredict that can monitor contacts between patients in the United States. Scripps research innovated with its smart bracelet to detect heart rate correlated with influenza outbreaks.

Indonesia, as a country with huge population has about 5,9 million cases of Coronaviruses and reported as 152.000 people died [2]. This situation impact to the all aspect and emerge the Indonesian Government to have a mitigate strategy. The distinctive efforts have been taken, for instance, Indonesian researcher was granted by the Government to create an innovation and technologies related to handle the Covid-19 pandemic. As a result, Indonesian Government also provide a distinctive incentive for the new invention.

Innovation and technology are highly correlated with patents as a form of intellectual property protection [3]. The resulting patent can reflect the quality of innovation and technology of a country, especially during a pandemic [4]. A rigorous assessment of technical knowledge generation is critical for comprehending the global innovation system around human coronaviruses and for informing researchers and policymakers worldwide. Patents are a highly promising indicator for characterizing the global landscape of technological knowledge production, according to innovation research, because they provide systematic information on new technological knowledge, disaggregated

by extremely detailed hierarchies of technological fields, geographically and temporally attributed. Kunmeng [5] research try to identified and examined a global landscape regarding the patent in a comprehensive way. We propose a descriptive examination of the coronavirus patent landscape from Indonesian Intellectual Property Database (PDKI) to identify the current development innovation and technology regarding the effort to handling the Covid-19. The authors propose a descriptive examination of the coronavirus patent landscape from Indonesian Intellectual Property Database (PDKI) to identify the current development innovation and technology regarding the effort to handling the Covid-19.

MATERIALS AND METHOD

We used Indonesian Intellectual Property Database (PDKI-<https://pdki-indonesia.dgip.go.id/>) to browse and identify the patents related to the Coronaviruses. PDKI is a web-based IP data and information retrieval system that was built and managed independently by the Directorate General of Intellectual Property, Indonesian Ministry of Law and Human Rights. This tracing system was created to make it easier for the public to obtain information on IP information. The authors obtain information by searching for the term "Covid-19" based on patent applications from January 2020 to March 11, 2022. Afterwards, the authors eliminated rejected inventions and evaluated the data using Microsoft Excel. Additionally, this study used a variety of descriptive ways to illustrate the patent indications and their relationships.

RESULT AND DISCUSSION

Data Overview

Over the past three years, a total of 40 inventions with 134 inventors (see Figure 1.) were produced to control the spread and counter measurement of coronaviruses in Indonesia.

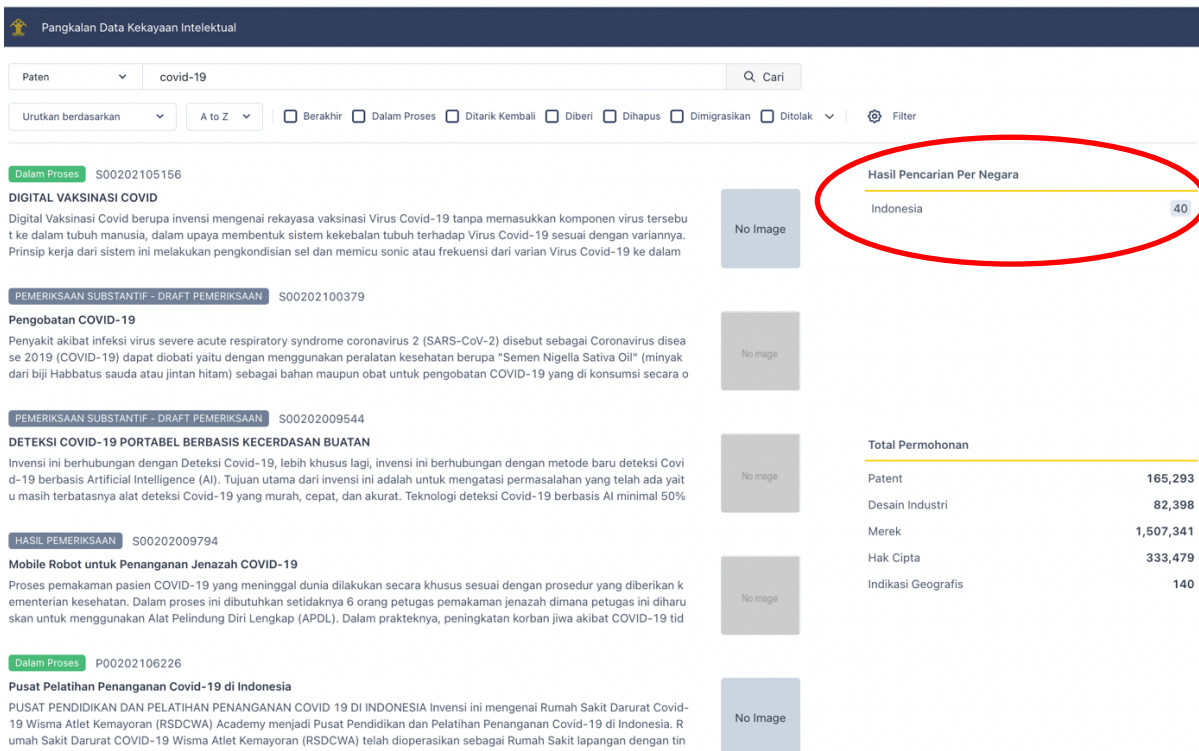


FIGURE 1. Indonesian current patent application for Covid-19 prevent and counter measurement from January 2020 – March 11, 2022

However, from the total patent application refer to the Figure 1. found that one invention has been rejected and two granted inventions based on the consideration from Indonesian Directorate General of Intellectual Property. The comprehensive data after classifying patent application describe as follows.

Filling date

From the inventor of patent, we analyzed distinctive result of period to trace the knowledge creation, which is a common method in innovation research (see Figure 2.) From 39 invention, the highest period can be seen on December 2020 (8 invention). While, in several period of outbreaks, shows zero number of applicants. The highest number of filling date is associated with the research outcome obliged by the Government for the funded researcher.

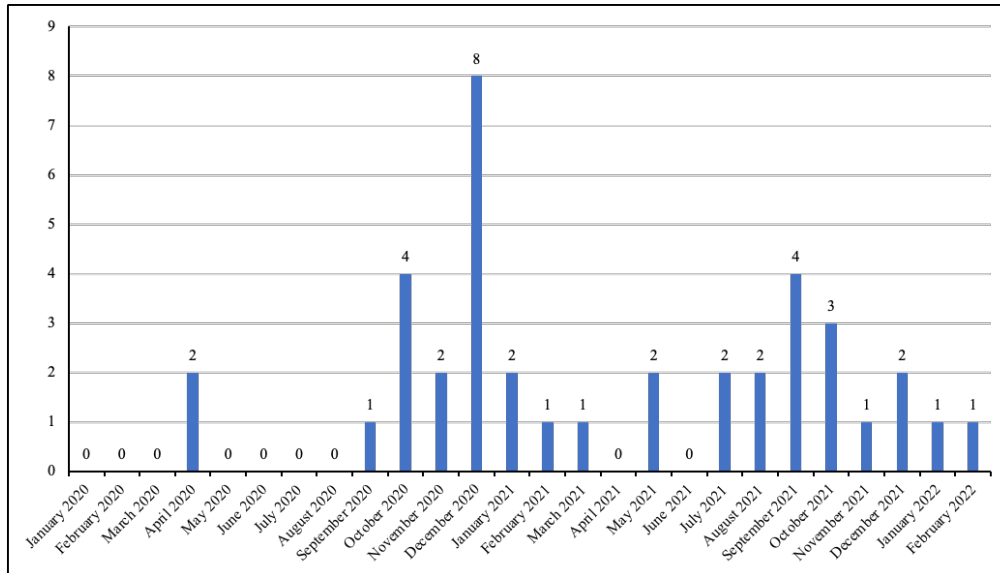


FIGURE 2. Filling date of Patent application

Patent assignee

We classified the patent assignee based on data searched and found 4 categories of patent assignee dominated by the Higher Education and Government (see Figure 3). Salomaa [6] describe the Covid-19 doesn't have a significant impact to research, development, and innovation (RDI) activities in higher education. Previous research from [7–15] required the higher education to take a part and building more sustainability through developed innovation during outbreaks. Bernd [16] stated that the University have to collaborate with the enterprises to develop the innovation and technology with the purpose of strengthening the innovation policy and process.

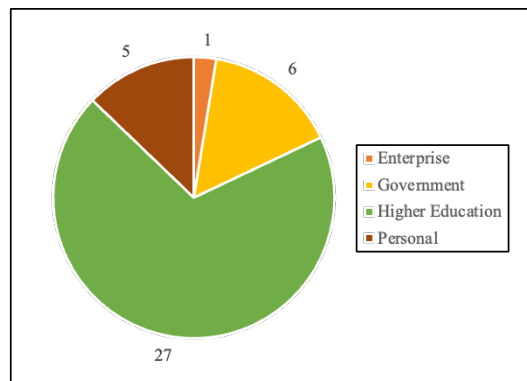


FIGURE 3. Patent assignee

The detail of involvement of Higher Education assignee presented in Table 1.

TABLE 1. Number of Invention from Indonesian Higher Education

No	Higher Education Name	Total Application	Status
1.	Universitas Sebelas Maret	1	State University
2.	Universitas Muhammadiyah Yogyakarta	1	Private University
3.	Universitas Andalas	2	State University
4.	Politeknik Negeri Medan	1	State University
5.	Universitas Islam Bandung	1	Private University
6.	Universitas Riau	1	State University
7.	Universitas Negeri Malang	6	State University
8.	Universitas Sam Ratulangi	1	State University
9.	Universitas Negeri Semarang	1	State University
10.	Universitas Ahmad Dahlan	1	Private University
11.	Universitas Airlangga	2	State University
12.	Universitas Diponegoro	2	State University
13.	Universitas Gadjah Mada	1	State University
14.	Universitas Halu Oleo	1	State University
15.	Universitas Indonesia	2	State University
16.	Universitas Jenderal Achmad Yani	1	Private University
17.	Universitas Padjadjaran Bandung	1	State University
18.	Universitas Pembangunan Nasional “Veteran” Yogyakarta	1	State University

In Figure 3, it can be seen that the Indonesian Higher Education play its function for the research and innovation. Moreover, patent assignee contributed by the Government conducted by National Police of Republic of Indonesia (POLRI), Indonesian Research Institute for Biotechnology and Bioindustry (PPBBI), and RSDCWA Academy.

Patent Application Status

Each patent application shall be for a single invention and filed in the prescribed form with the patent office [17]. Figure 4. shows the status of patent application of invention for handle Covid-19 and found that 2 granted application and majoring of substantive examination. Refer to the Indonesian Patent Law, substantive examination conducted for about 30 months for patent and 12 months for simple patent. Indonesian DGIP authorized to examine the patent application through selected patent examiners.

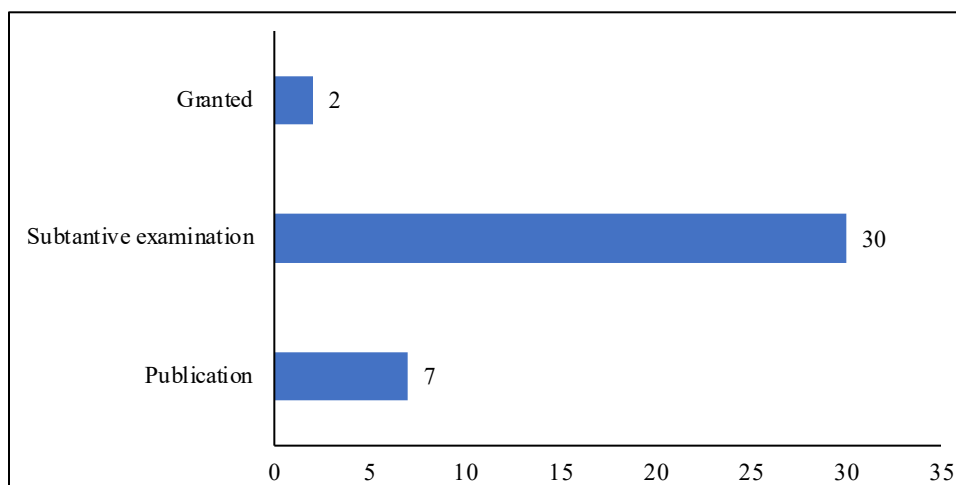


FIGURE 4. Patent Application Status

From Figure 4. substantive examination status majored due to Indonesian Patent Regulation which provide 6 months examination. However, to response the outbreak, in 2021, Indonesian Government try to reform the process of patent application through Job Creation Law (UU Cipta Kerja) and mandated to Minister of Law and Human Rights Regulation Number 13 of 2021 concerning Amendments to Regulation of the Minister of Law and Human Rights Number 38 of 2018 concerning Application for Patents (Permenkumham 13/2021).

The substantive examination is carried out after the completion of the announcement period. Article 87 of the Permenkumham 13/2021 states that the substantive examination begins no later than 2 months from the date of receipt of the application. Whereas, the previous regulation stated that a substantive examination was only carried out 6 months from the date of receipt of the application. Then, the Ministerial Decree decide to approve or reject a simple patent application is made no later than 6 months from the receipt of a simple patent application (Article 88 of the Minister of Law and Human Rights 13/2021). In the previous regulation, a decision can be made no later than 12 months from the date of receipt of the application. Permenkumham 13/2021 eliminate the processing time period for a simple patent application from 12 months to 6 months.

Patent Classification

Classification of patent in this article not refer to International Patent Classification (IPC) due to limited of information in Indonesian Patent Database. Furthermore, the registration number of applications doesn't reflect the classification of patent. However, we identify the patent application and arguing the classification into 4 categories as well as method, process, product and tools. The patent classification based on the summarized in Figure 5.

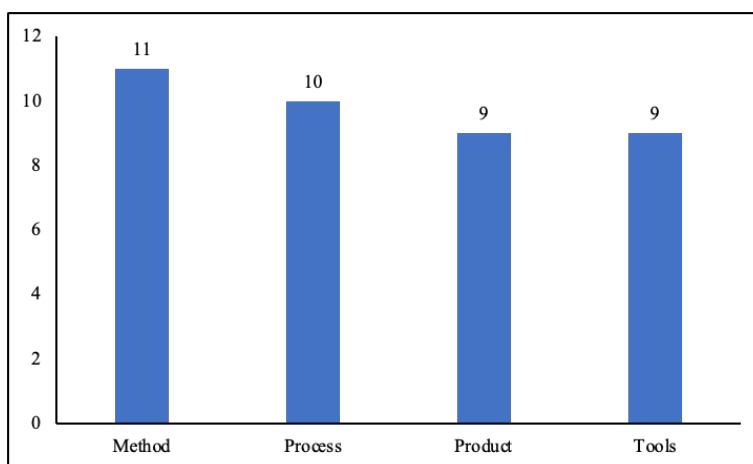


FIGURE 5. Classified patent applications

Figure 5 shows that the number of classifications which have no significant distinction. The most related technologies to handle Covid-19 in patent application categorized as patent tools, invented in several type which describe in Table 2.

TABLE 2. Related patent tools

No	Invention	Description
1.	Wheelchairs for Covid-19 patients	The innovation of the wheelchair facility as a bed for Covid-19 patients integrates the concept of EFD and anthropometry with a high level of comfort made of the main material, namely a wheelchair that is not functionally used and additional material, namely stainless which consists of a head support, an adjustable infusion pole with 2 hooks. and can be adjusted in height, hand guards from wheels, angle adjusters at the ankles, angle adjusters at the legs, patient file storage behind the backrest, synthetic leather mattresses, pedestals, reinforcing frames.
2.	Mobile robot corpse infected with covid-19	The mobile robot for handling COVID-19 corpses is a modification of a wheeled coffin. Where the coffin wheel is mounted a DC motor so that the movement of the wheel can be controlled by a microcontroller with the

No	Invention	Description
		principle of turning on and off the current flowing to the DC motor. The DC motor is capable of directing the coffin to go forward and backward, while for navigating the movement to the left and right of the coffin, a stepper motor will be installed. To make it easier for users to control movement, this coffin is equipped with an Arduino joystick.
3.	Temperature scan portal	This invention relates to a non-contact thermometer in the form of a portal scan that works by using a sensor array of the IR thermal type embedded in the gate portal scan wall, as an early detection of fever symptoms of infectious diseases (such as COVID 19). The sensor array allows reading the body temperature of people who pass through the portal with a height of up to 190 cm, a gate wall width of 70 cm to 80 cm, and a thickness of about 30 cm, so that people with varying heights of up to 185 cm can traverse this portal comfortably. This invention is more practical, convenient and does not need an operator, so it is very appropriate to place it at the entrance/exit of a building, mosque or other building, to reduce the risk of the officer (operator) being infected. The maximum formula is used to select the body temperature reading of people who pass through the portal and is displayed on the display, where a "beep" sound can be sounded automatically if someone is detected as having a high fever.
4.	Tooth pain application	online "ClickDent" is an online application with a simple and practical design, so it can be used anywhere when people feel a toothache and don't know what to do. This application is made by conducting several surveys first, then formulated in the form of questions that will be asked in the involve.me online application. The questions that exist will ask several things about the symptoms that are passed, and will then determine what actions the application user should take.
5.	Nurse robot	Robotic inventions that function to help nurses and doctors as well as other medical staff to serve Covid-19 patients in a simple way, among others; bring medicine and food for patients, bring doctors medical equipment, communicate with patients and doctors and carry patient records and this robot can maintain a safe distance from objects around it. The ability to maneuver this robot in various positions such as turning left, right and turning can be done. The load that can be carried is about 30 kg. Its ability to operate with existing power is 6-8 hours, and the battery can be replaced easily.
6.	Covid-10 test sampler	The present invention relates to a Covid-19 sampling device in an electronic nose unit comprising: a connector set for a breath sample connected to a valve and a valve in an electronic nasal unit; HEPA filter holder at the front (5) for placement when the HEPA Filter is connected to the breather bag; ventilation holes as an effort to prevent overheating of the engine; and HEPA filter sets (4); which is characterized by a set of HEPA filters on the rear of the electronic nose unit (A) which is connected to the exhaust of the engine and uses only a tube connected by a set of connectors to be connected directly to the breather bag.
7.	Temperature check	This invention is to overcome the problem of the human body monitoring system that cannot be accessed in real-time via the internet. For this reason, this prototype was developed with an IoT (Internet of Things)-based system and is equipped with GPS so that the location can be known in real-time and the results of body temperature measurements can be accessed on mobile phones via the blink application. The hardware design uses Arduino UNO microcontroller technology, AMG8833 Thermal Sensor, US-105 Ultrasonic Sensor, SIM800L Module, GPS Module, LCD (Liquid Crystal Display) and buzzer. The design of the software uses the C++ programming language and for the monitoring display using the blink application.

CONCLUSION

To tackle the covid-19 impact, Indonesian Government have to response immediately through RDI activities. Higher education plays its function as a center of knowledge and innovation. As a process of patent application, substantive examination majoring the status of application due to the period of examination. However, the Government simplify the process by reform the regulation from 12 months to 6 months. The classified patents, the not refer to International Patent Classification (IPC) due to limited of information in Indonesian Patent Database. Moreover, the registered number of applications doesn't reflect the International Patent Classification (IPC). The Indonesian Government shall to add the patent classification information in Indonesian Patent Database applications.

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