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# The Urgency of Policy Formulation: Dynamics of Covid-19 Handling and Big Data

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**Abstract:** This paper attempts to discuss the role of big data to formulate policies in responding to social and economic threats due to Covid-19 pandemic in Indonesia. The use of big data as a primary source is based on the dynamic of spreading cases in other countries that were suddenly flared. Those primary resources are online or open data such as population, social economic condition and infection case. In related indicators, population is a big portrait of the countries, thus we observed the number of new infection per day, month and how it impacts the economy. The research problem is how big data is used to formulate policy during the Covid-19 time. We use Decision Theory under Uncertainty to explain three indicators that influence decision-making under Covid-19. This research applied Machine Learning R and SIR Model to obtain the latest data. The argument is that big data can be used as a base resource for the policy formulation and decision-making. In this case, base resource refers to first input in the policy formulation process as well as input and output information in the decision-making process.

**Keywords:** Big Data, Decision Making Process, Policy Formulation, SIR Model, COVID-19

## 1. Introduction

Infection cases of Covid-19 in Indonesia, per August 4, 2020, have reached 115,056 cases from February 15, 2020. As shown by worldmeter [1], the global Covid-19 level is trending. This substantial increase is far from the Indonesian government's prediction that it will decline in July. The addition, the number of cases currently exceeds that of the United States, where previously there were many cases of Covid-19 infection.

Based on data from Worldmeter [1], total deaths in Indonesia reached 5,388 people spread across the region. In accordance to the distribution map, 34 provinces in Indonesia are infected with the Covid-19 virus and the majority has experienced an increase, especially in capital areas such as East Java, DKI Jakarta, Central Java, South Sulawesi, and other provinces with large populations [2].

When looking at the distribution map and the latest case data, the authors consider that there is a discrepancy between the policies and actions taken by the government in projecting the handling of Covid-19 in Indonesia. This variance can be seen from the distribution of cases that occur in almost all regions of Indonesia. Therefore, it can be said that the policies taken by the Indonesian government are not well-targeted. These inaccuracies include the actuality of data, field facts, and the slow response to changes.

The actuality of the information can be seen from the first time the Covid-19 infection case in Indonesia was detected in early May. The reaction to the spread of Covid-19 should have been taken since its first spread outside of China's territory which occurred in March 2020 [3]. Study facts, through an interview conducted by Jayani [3] conveyed by Amin Soebandrio, professor of Clinical Microbiology, FKUI, showed that Indonesia was not included a small number of Covid-19 sample data in GISAIID because the grouping of samples and types of viruses were grouped in case data tracing per country region. Whereas according to Amin [3] of the 10 samples sent, there was one that



was proven to be included in the Covid-19 group, namely the *A2a* virus type group on May 11, 2020. Based on field facts, tracing sample data was found in Surabaya on April 14 and later on March 27 in Jakarta [3].

The sluggish response is that the Covid-19 virus is an ordinary disease that can heal itself, said the Minister of Health of the Republic of Indonesia, Dr. dr. Terawan Agus Putranto "... this is a self-limiting disease ..." [4]. Before that, the data on cases of the spread of Covid-19 from China had spread to several regions of countries such as Europe, America, the western Pacific, the East Mediterranean, Africa, and East and South Asia [5].

## **2. Big Data as a Basis for Policy Formulation**

As a consequence of the information technology revolution, big data makes the retrieval and implementation of public policy to have accuracy, sophistication, and high speed [1] [2]. Big data produces strong decision quality because it can produce one good decision from complex information [3]. In the health sector, every government that adopts big data methods and technologies will need to create proactive and durable policies to protect individual health data, including confidentiality, privacy, and security, addressing possible pressures to commercialize data and promote interoperability and use of data for the public good. We consider that the focus should be on three priority areas: access and benefit-sharing; accountability and transparency; and quality and safety [4]. Big data promises to change public decision-making for the better by making it more responsive to real needs and policy impacts. [5]. The government can be more self-governing and autonomous.

Big data is a great concept, which includes a broad range of recent developments operations in the production and processing of data. Big data are often defined in the term 'V', an initial definition that focuses on three V's by describing big data as a high volume, high-velocity, and high-variation information asset that demands a cost-effective configuration of innovative information, the process to improve insight and decision-making. Over the years, this definition has been proposed, with different definitions that enlarge different features. Each catches the idea that big data is relevant for decision-making, and extracts some aspects of the concept of big data. In this paper, we follow Klievink [6] which defines big data, not in terms of its data characteristics, but in terms of its usage characteristics [6]. Laney's conceptual use of big data [7] has three model types, namely Volume, Velocity, and Variety. Later, Lomotey and Deters [8] developed Laney models [9] into five Big Data models namely Volume, Veracity, Velocity, Value, and Variety [10]. Volume refers to the quantity of data, veracity is related to the quality of data in the linkup of the object studied, velocity is a measure of the speed of data change for analysis, value is to decrypt the relevance of the data set and the information obtained, and variety is the difference of types and data sources obtained. These five models are then widely used to analyze data from various internet sources to find out the purpose and intent of the use as well as the interests related to strategy and steps in determining policy [11].

We show how big data provides important and timely granular data in extremely volatile situations, and we argue that organizations should improve their big data analytics and evidence-based decision-making skills. Otherwise, Nada [12], the problem of big data lies in the limitations of supporting information data as late and less comprehensive decisions [13]. The review of large data-driven studies shows that big data favorably complete surveys and censuses, encourages policymaking, and highlights specific policy effects in real-time. For the public, data generated by public and private authorities to provide services has become digital [14]. Common types of social media include collaborative projects (e.g., Wikipedia), blogs and micro-blogs (e.g., Twitter), content communities (e.g., YouTube), social networks (e.g., Facebook), virtual game worlds, and the virtual social world of companies utilizing social media.

## **3. Public Policy Stages Model and SIR Model**

In line with the focus and locus of the research process policy formulation, this phase is to get possible solutions to be taken from the policy. The scope of the formulation of this policy includes the identification of the relationship between institutions, individuals, economic, political, and policy

direction to be taken. The five-step public policy-making model provides a desirable frame of thought and explanation for use in policy formulation analysis. The physical body of thinking can provide an interesting illustration to understand together so that the results of the policies taken can be measured and used as a foundation to implement the policy. One of the five steps used in this study is Policy Formulation. The following is the scheme of policy formulation steps:



Figure 1: Step of Formulation Policy Process

**4. Policy formulation with Big Data SIR Model**

The first step in policy formulation in this study is the identification of case, suspect, death, and goals and target to handle Covid-19 in Indonesia which relies on the character of the heterogeneous society and each region has different social characters, thus the target should pay attention to the character of the people in each region because they require different approach. Both produce a cluster of policies that can be implemented in each region with different techniques, but still implement one-door policies. These benchmarks include the number of cases, infections, and death rates from the Covid-19 virus. Third, specifications of the relationship between actors include institutional relationships and political relationships in each region both in the center and in the region.

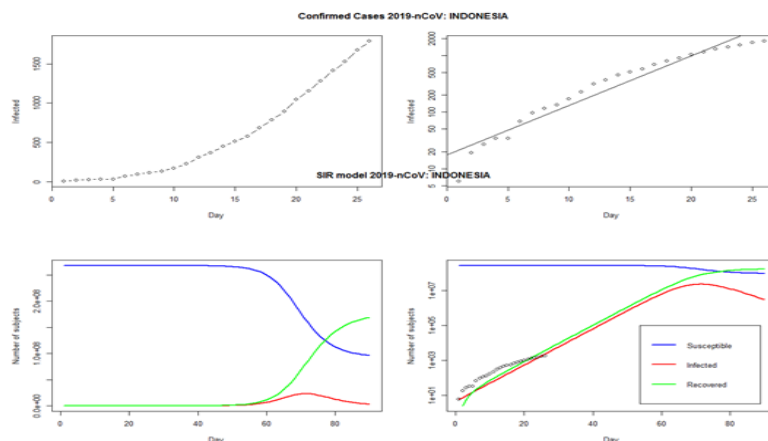


Figure 2: Confirmed cases by SIR Model

Through SIR Model, it can be known that, in Indonesia, the top right and left of the tables are the numbers of infected data that increased within 25 days (top left of the table) and data in linear, log

coverage (top right of the table) is used to see the alignment between data variables or infected objects with time susceptible. Meanwhile, the bottom left table with a blue line is the number of COVID-19 suspects calculated from population data and the red line is the number of people infected. From the table, it is seen that, for a period of 0 to 80 days in Indonesia, 60 people are infected with COVID-19. Next is the green line which displays the amount of people who have recovered. In the bottom-right table, we can see a linear, log table showing that the COVID-19 handling process is improving in 20 days.

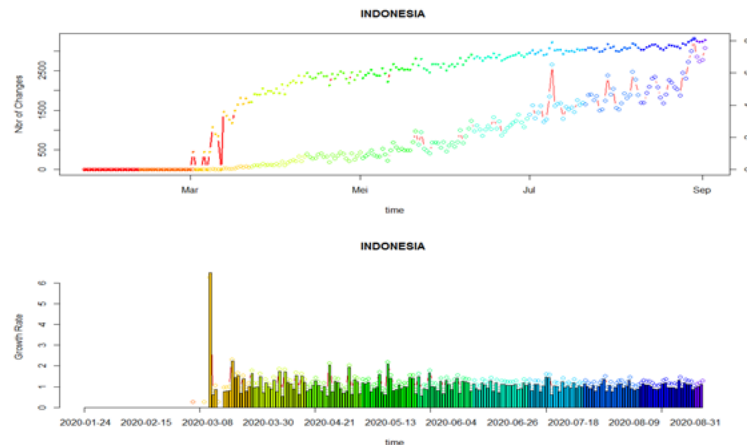


Figure 3: Growth and Case Rate in Indonesia

From the chart above, it can be seen that COVID-19 cases appeared in Indonesia since March 2020 and increased significantly in May to June. Until the last month when this data were taken on September 2020, the number was still increasing. It can be visualized in the chart below that the global death toll reaches 863,028 people and Indonesia reaches 7616 people. The following is the data series of COVID-19 cases on a global scale and Indonesia:

By generating the data above, we can see the two actors are caused by political and structural relations that each region has different regulations and a decentralized system, which makes the policy taken by the state sometimes biased and unsuitable if applied in the region. The fourth synchronizes the existing policy measures between the central and local governments. The fifth is to develop a benchmark of the policy, in this instance, the benchmark can be seen from the number of populations in each region infected with the Covid-19 virus. The sixth evaluates the differences in the effects of the policies that have been implemented in each region. This evaluation is useful to understand the development in terms of the spread of the Covid-19 virus in the region, the effect of policy in the economic realm, and measuring the synchronization of political actors in response to policies implemented by central governments throughout Indonesia and the possibility of policy alternatives.

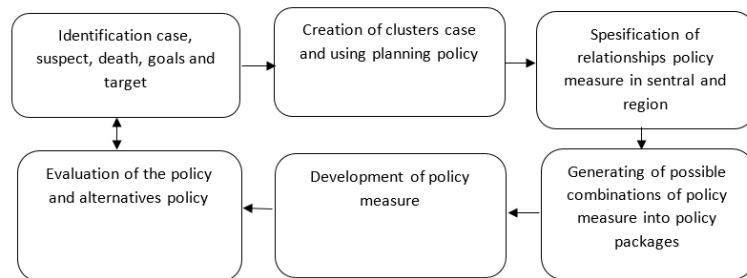


Figure 4: Scheme of Policy Formulation Process

The above policy formulation stage can set off from the first case identification, the number of infections from the SIR Model and determine the initial steps for prevention of the spread of Covid-19 in some areas through the determination of goals and targets. This process is the initial identification of the formulation of policies under crisis based on the widespread case of global diffusion. Second, after experiencing the amount of infected case data, then it is necessary to plan a national policy and case clustering based on the number of cases that exist in each region. Third, policy will be adjusted in the handling of Covid-19 based on policy characteristics at the regional level. This is imputable to the social homogeneity of society and refers to the decentralized system that exists in Indonesia. This point can mean that measurements in the determination of actions and policies must be based on data obtained at an early stage so that the handling in the territory can be measured. Fourth, synchronize regional data with the categorization and social characteristics of the community through the consolidation of central and local governments. Fifth, develop policy benchmarks that have been implemented thoroughly by stakeholders. This benchmark is obtained from the development of up-to-date cases obtained from the SIR Model and/or data from other valid sources. Sixth, the evaluation process of implementation is founded on data obtained from the implementation of policies in each region. These evaluations include high and low coverage, successful prevention, and/or handling measure that has been exercised so that it will later produce an accurate policy or action alternative.

## 5. Conclusion

Based on conceptual analysis and the use of big data through the machine learning R program and the use of the SIR model, it is concluded that big data, in policy formulation, is very likely to be utilized. Such use is based on the actuality of data that grows continuously. The actuality of such data can be employed to formulate policies and actions in a period of crisis. Data limitations or initial data can be tracked through global distribution. This distribution is the initial or basic data in the formulation of policies in times of crisis. The use of big data can be performed first by identifying data from Program R using Cran or Packages covid19. These coding packages are open, of which includes global cases and data of the regions exposed to viruses. Second, identify the regional distribution in different states. Third, identify potential fatalities of the virus spread throughout Indonesia. The fourth is an analysis using the SIR Model to track information on rate of case, suspect, recovery, and death. Through this five steps, there will be a pattern of steps that the country can put into consideration for policy formulation and decision making.

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