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Developing Business Strategy for Indonesian Government Covid-19 Specimen Testing Laboratory through Scenario Planning

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Abstract

The COVID-19 pandemic is a public health emergency, and COVID-19 specimen testing laboratory plays a critical role in containing the pandemic. This ongoing pandemic has provided an opportunity to assess the preparedness, reaction, and resilience of Indonesia's laboratory systems. Numerous constraints, including population size, geographical fragmentation, staff and equipment distribution, and the uneven capacity of consumables in many areas, have contributed to Indonesia remaining one of the countries with insufficient diagnostic laboratory readiness. The purpose of this study is to navigate the uncertainty of the future by analyzing the potential business impacts of future events and considering alternative possible outcomes for Indonesian government COVID-19 specimen testing laboratory. Four scenarios were developed to serve as a framework for laboratory's strategy due to overcoming obstacles and capitalizing on possibilities over the next five years.25 experts participated in this scenario planning research, including COVID-19 analyst and biomolecular experts from several Covid-19 testing laboratories, health policymakers from various institutions, virologist, researcher and physicians. 19 driving forces identified in this study from a political, economic, social, technological, environmental, and legal perspective that would shape future COVID-19 testing systems and laboratories. Government policy and the emergence of the SARS-CoV2 variant were identified as critical uncertainty variables with the biggest impact and level of uncertainty in the COVID-19 pandemic situation.The implications and options of each scenario are examined, along with recommendations for the Indonesian government and Covid-19 testing laboratories.

Keywords
COVID-19; scenario planning; testing laboratory; Sars-Cov-2 variant; government policy

I. Introduction

COVID-19 was confirmed in December 2019 in Wuhan, China (N. Zhu et al, 2019) and has since spread throughout the world (Yu Kurahara et al, 2021). COVID-19 was declared as Public Health Emergency of International Concern (PHEIC) by the WHO in January 2020 (World Health Organization, 2020) and was upgraded to a global pandemic in March 2020 (World Health Organization, 2020). In March 2020, Indonesia declared COVID-19 as national catastrophe (BNPB, 2020). In light of the daily increase in COVID-19 cases, the laboratory's role in determining the certainty of the diagnosis is important (Nyaruaba, R, 2021). Testing laboratories play a critical role in COVID-19 prevention by detecting, tracing, and treating the virus using a rapid and accurate DNA amplification process called the Polymerase Chain Reaction (PCR) to break the virus's chain of transmission. Among some of

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the efforts to expand laboratory capacity, all government and commercial institutions must participate.

The Indonesian President also emphasized the importance of the role of the Covid-19 testing laboratory, especially those based on molecular (PCR) as the front line to map and identify the number of victims and the invading virus as well as a basis for tracking to stop the spread of the virus. This was confirmed by the meeting for the Acceleration of Handling Covid-19, on July 13, 2020 at the State Palace (Badan Standardisasi Nasional, 2020)

The Covid-19 pandemic caused everyone to behave beyond normal limits as usual. One of the behaviors that can change is deciding the decision to choose a college. The problem that occurs in private universities during covid 19 is the decrease in the number of prospective students who come to campus to get information or register directly to choose the department they want. (Sihombing, E and Nasib, 2020)

Meanwhile, since COVID-19 began worldwide at the end of January 2020, the readiness of the Indonesian government to prevent its spread has been in the spotlight. Since reporting its first COVID-19 case on March 2nd, as of August 12, 2021 Indonesia has tested 28,761,080 suspected cases, a mere 0.1% of the total population or 103.932 test per million, This places Indonesia at the second lowest among South East Asian countries. To draw a comparison, Singapore and Malaysia have nearly 2.815.409 and 605.926 tests per million residents, respectively (Worldometer, 2021). This gap had continuously existed due to the limited capability of laboratories, personnel, reagents, and cost (Harimat et.al. 2020). The daily average of the test was 100 persons per case, which is less than 1000 recommended by WHO. More testing is required to describe the disease epidemiology. It is also crucial to increase laboratory capacity to ensure the testing of all suspected cases, while the RT antigen could be used to scale up the testing capacity for COVID-19.

Figure 1. *COVID-19 Daily New Cases in Indonesia (Worldometer, 2021)*

According to the Figure above, the increase in cases from the lowest point in January-February 2021 was 283 percent and reached a peak in 13 weeks. While at the second peak, the increase in instances from the lowest point reached 381 percent, or nearly five times, and peaked within six weeks. Since the initial peak, which lasted 15 weeks, Indonesia has seen a reduction in cases of up to 244 percent (Worldometer, 2021) The primary reason for the increase in cases was Lebaran's back and forth behavior. Then there's the emergence of various novel Covid-19 variants that have made their way into Indonesia, which is compounded by the population's great mobility. (Satgas Covid-19, 2020)

In its latest recommendations as of June 25, 2021, WHO updated the guidance on testing strategies to consider the emergence of new virus variants and updated the test

methods used to anticipate them. WHO also recommends that countries should have national testing strategies with clear objectives that can be adapted to changes in the epidemiological situation, as well as available resources and tools. According to WHO, the nucleic acid amplification test (NAAT) is the reference standard for the diagnosis of acute SARS-CoV-2 infection. So far the mutation-detecting NAAT test can be used as a screening tool for SARS-CoV-2 variants, but the presence of certain variants must be confirmed by sequencing. Such a test must be properly validated for its purpose (WHO, 2021)

There are currently 909 laboratories participating in the Covid-19 testing network including Indonesian FDA Biohazard Laboartory, but as the epidemic progresses, Covid-19 sample testing in Indonesia continues to face capacity constraints, both in terms of human resources and limited testing techniques and reagents. Indonesia is hindered by a scarcity of BSL3 support facilities capable of completing Whole Genome Sequencing, particularly in light of the recent spike of covid-19 virus mutations (Litbangkes, 2021). According to Minister of Health Budi Sadikin, Indonesia presently has just 21 laboratories capable of actively participating in the Covid-19 whole genome sequencing project, and the network will continue to be extended in order to rapidly identify new variations of the virus (IDXChannel, 2021)

The primary obstacle to the pandemic is uncertainty, not only about the infectious virus itself, but also about the interconnected human, social, and political aspects that co-evolve and keep the pandemic's future uncertain. To deal with the pandemic's tremendous uncertainty, a heuristic approach and exploratory mentality are required (Jianxi Luo, 2021) Thus, scenario planning is an effective tool for developing future strategies and solutions. Organizations can use scenario planning to have a better understanding of the future.

II. Research Method

This research uses a scenario planning approach which according to Adam Kahane (2012) is the most suitable approach for planning future conditions that are full of uncertainties and applies David A. Garvin's (2006) five-stage scenario planning approach, which is applicable to a wide range of situations. These methode include orientation, exploration, scenario creation, options consideration, and integration. Business issue has investigated through internal and external analysis techniques in order to gain a better understanding of the biohazard laboratory's business environment. PESTEL analysis is used to determine the impact of external elements on a business, whereas SWOT analysis is used to determine the impact of internal factors. Data gathering procedure include a review of the literature (to get an understanding of the business environment), expert interview and small discusission. Primary data has collected through interview sessions and small discussion with selected respondents who will represent actors and policy makers in the field of COVID-19 testing including Covid-19 analyst, policy maker, biomolecular experts various institution to gain insight into user views on COVID-19 specimen testing. Secondary data will be collected by literature review from journals, reports, news, statements and government regulations.

Table 1. Garvins's Scenario Planning Stages

No	Stage	Activity and Output
1	Orientation	Background research, interview and others to determine key focal issue
2	Exploration	Identify driving forces and critical uncertainties surrounding the focal issue
3	Scenario	Selecetion of critical uncertainties as framework of scenario

	Creation	matrix, then create narrative on each scenario
4	Option Consideration	Discussion on implication and the available options for the organizattion
5	Integration	Developing early warning signals and uses of scenario part of management processes

III. Result and Discussion

3.1. Orientation

At this orientation stage, based on the results of a literature review and expert interviews, the question "How will the emergence of Covid-19 variants affect the Covid-19 testing laboratory in the next five years?" was selected as the study's primary focal point. While knowledge about the COVID-19 virus remains a mystery, the COVID-19 testing laboratory that is directly involved will undoubtedly be impacted, both in terms of technical testing and the political, economic, social, environmental, and legal ramifications. As a continuation of this critical focal point issue, an exploration stage is conducted.

3.2. Exploration

The critical step in scenario planning is identifying the most uncertain and impactful drivers and critical variables (Chen, K et al, 2020). During the scenario planning stage, it was discovered that there are 19 major drivers affecting the future of the Covid-19 testing laboratory in Indonesia from a political, economic, social, technological, and legal standpoint (Table 1). The PESTEL approach is extremely beneficial in providing a snapshot of the macroenvironment during a pandemic (Thakur, V, 2021)

Table 2. The Driving forces of Covid-19 testing Laboratory and its categorization (Source: Expert interview analysis)

Category	Driving Forces
Politics	Government policy The political dynamic in Indonesia International politics concerning vaccines and pharmaceuticals
Economic	Economic growth/ GDP National pandemic response budget Public purchasing power/ economic level Medical business growth Biomolecular/ Covid-19 testing cost and investment
Social	Public health awareness and vaccination compliance Public behavior Government communication strategy
Technology	Technology advancement in Covid-19 testing Telemedicine service Vaccine technology advancement Technology advancement in ICT
Environment	Emergence of Sars-Cov2 variant Laboratory/medical infectious waste
Legal	Legal certainty in epidemic rule enforcement Rules for Covid-19 testing facilities

According to the participants, the two most influential drivers among these nineteen driving forces are government policies and the emergence of new variants of the COVID-19 virus and will be translated into Government Policy regarding Covid-19 testing Laboratory and Prevalence of Sars-Cov2 variants.

3.3. Scenario Creation

Using these two critical uncertainties, four possible scenarios were developed to describe what might happen to a covid-19 testing laboratory in the next five years. The first scenario is “In Harmonia Progressio” where the pandemic condition continues with repeated waves of attacks due to the emergence of increasingly risky virus variants and the government's condition strongly supports the covid-19 testing line and is considered a strategic step in handling covid-19. The second scenario “Metamorphose” where government support is very high for the development of biomolecular laboratories and the pandemic conditions are getting more under control due to the declining trend of the emergence of new virus variants. The third scenario “Back to Nature” is in which the pandemic condition is under control and has the potential to change to endemic status so that the government feels it no longer needs to carry out COVID-19 tests and begins to change priorities to other sectors. The fourth and worst scenario “The Survivor” is when the pandemic conditions get worse, the virus variants that appear are increasingly dangerous and cause many victims, while the government itself has difficulty in making policy priorities due to very difficult economic and political conditions (figure 2)

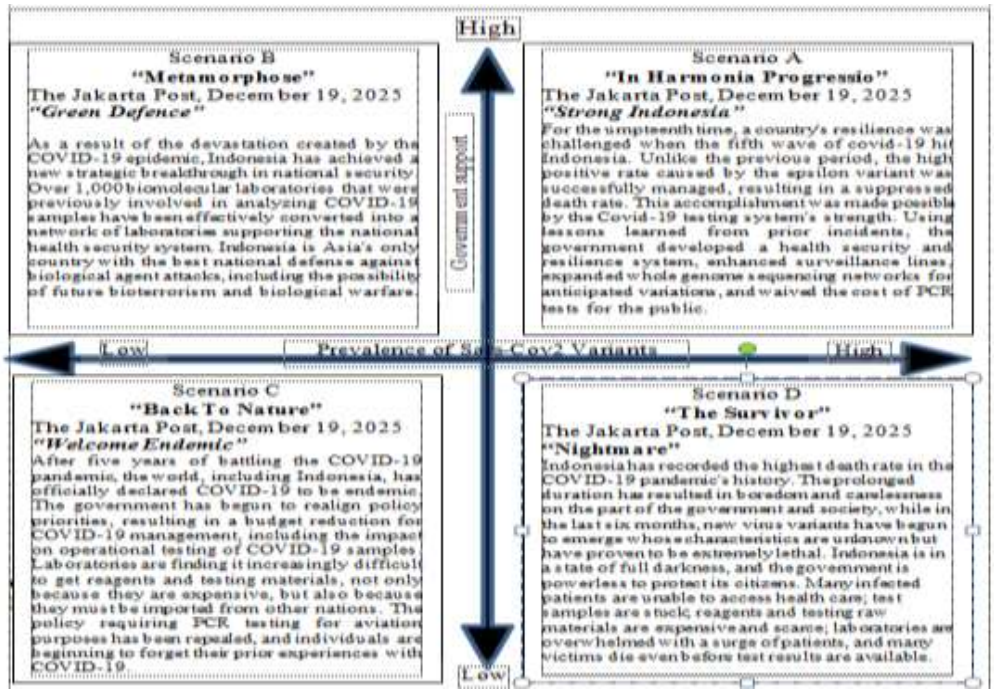

Figure 2. *Four Possible Scenarios for the Future Covid-19 Testing Laboratory*

3.4. Option Consideration

Each scenario has implications for the laboratory and government. Additionally, it details available options for the laboratory. Figure 3 summarizes both the implications and the options.

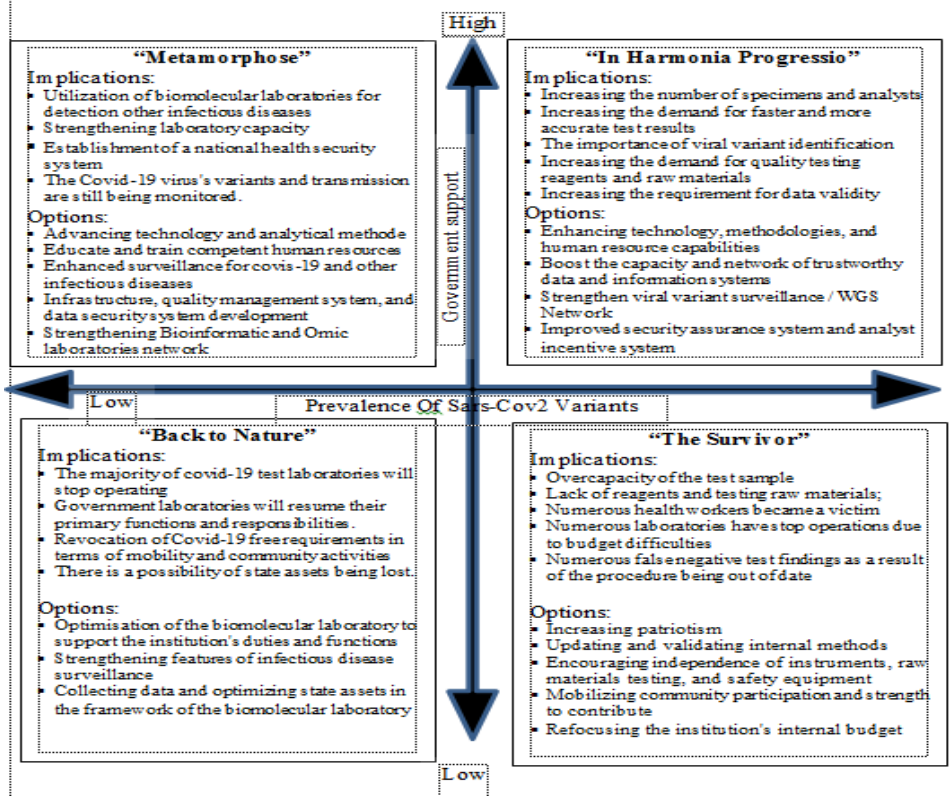

Figure 3. *Implication and Options of Four Possible Scenarios for the Future Covid-19 Testing Laboratory*

Four scenarios are constructed by a combination government policy related covid-19 testing and the the prevalence of Sars-Cov2 Variants. The "In Harmonia Progressio" demonstrates the emergence of a dangerous new variant with widespread government support, enabling collaboration and cooperative action to combat the pandemic. In general, the condition that will occur is an increase in positive COVID-19 cases, which will increase the demand for sample testing and may result in the bottleneck phenomenon due to a lack of laboratory capacity. Accuracy and test time are critical. Logistical issues, the demand for reagents and testing equipment has increased significantly as well. In this scenario, the mutated virus variant poses an additional challenge, necessitating the establishment of a surveillance system to monitor the virus variant's presence, risk, and level of spread

Fortunately, the government is at the forefront and bears full responsibility for meeting the aforementioned needs. The government has calculated that the COVID-19 pandemic's impact may continue for several years. As a result, various forms of government intervention, including the strengthening of test labs and the implementation of vaccinations to achieve herd immunity, must be maintained.

With these conditions of opportunity and challenge, laboratories have the opportunity to expand their capacity in terms of human resources and facilities, as well as the flexibility to develop COVID-19 testing methods and implement cutting-edge technology. Strengthening the surveillance aspect through genome sequencing also contributes significantly to the improvement of the Covid-19 testing line.

To continue growing, the laboratory organization must cultivate a proactive and innovative mindset. Because, thus far, the impediment for government agencies has been a lack of initiative and innovation. However, as time passes, reality demonstrates that government organizations are becoming more adaptable and responsive to environmental changes. Government organizations attempt to break free from bureaucracy's negative effects by becoming more responsive to changes and environmental demands. This is also what McKenna, Garcia, and Bridgman (2010) refer to as the post-bureaucracy era in government organizations.

The "Metamorphosis" scenario refers to the point at which the pandemic has stabilized and the level of infection has been reduced to endemic. On the other hand, the government believes that the laboratory line is critical in establishing the national health security and resilience system, as well as ensuring that laboratory strengthening occurs in a systematic manner. The COVID-19 pandemic is being viewed as a catalyst for strengthening the country's health system through increased health security and resilience. The government places a high premium on the development of biomolecular laboratories for the surveillance of other infectious diseases, including tuberculosis, malaria, DHF, and HIV. In this scenario, the government and laboratories could pursue alternative strategies such as advancing technology and analytical methods, developing human resource competency development programs, expanding the scope of testing for endemic infectious disease surveillance needs, improving laboratory infrastructure and Quality Management Systems (QMS), as well as data security and validity results of tests. The focus on developing a "Omics"-based laboratory ecosystem is also extremely beneficial in terms of national health security and resilience. To get there, laboratories equipped with cutting-edge equipment capable of high throughput, data processing software and hardware, and dependable experts are required, as well as a systematic 'omics' data analysis and management system that enables this facility to be complete, independent, efficient, and effective in order to catch up with other countries. (BRIN, 2019)

The "Back to Nature" scenario has implications for the loss of the function and critical role of Covid-19 testing in situations where conditions are stable and pandemic indicators such as case total number, positivity rate, and Bed Occupancy Ratio (BOR) do not increase. The government has begun to phase out COVID-free requirements for public activities and community mobility. This has resulted in the majority of the covid-19 test labs ceasing operations and concentrating their efforts on their assigned duties and functions. It is critical to anticipate the potential abandonment of assets and facilities previously used for COVID-19 testing if each government agency does not have a long-term plan for the development of biomolecular laboratories.

The the last and most terrible scenario, "The Survivor," reflects the conditions of the struggle for survival. Where the pandemic is worsening as a result of newly formed virus variants, the faster the transmission, the greater the risk and resistance to vaccine-induced immunity. Because herd immunity did not develop in society, many victims died at a time when the government was already feeling overwhelmed by the pandemic's protracted effects, which included economic recession and political turmoil. The covid testing laboratory and other lines appear to be struggling on their own, resulting in the following: a backlog of samples in almost all covid-19 testing labs, a shortage of reagents and testing raw materials, and a high number of health workers becoming victims due to the lack of a system that ensures safety. This circumstance also resulted in the discontinuation of laboratory services due to a lack of funding to support their operations. Numerous tests resulted in false negatives as a result of poor quality and quality control, as well as the impact of virus variants that had already mutated beyond the detection range of previously used methods. These various

consequences have resulted in the maximum non-operation of the Covid patient handling system, which will exacerbate the pandemic situation in the future.

To prepare for this, the government and testing laboratories can take several actions, including continuing to validate the analytical methods used to determine their relevance and reliability, encouraging the development of the domestic biomolecular industry to ensure the independence of reagents and testing materials, and increasing component participation. other communities to become involved and work cooperatively to form a government to deal with the pandemic, and, perhaps more importantly, to continue to build patriotism among all segments of society to do what is best for the nation and state.

3.5. Integration

The developed options will be effective in the appropriate scenario; however, an early warning signal indicating which scenario is most likely to occur is required. The following are early warning signs for each scenario:

Table 3. Early Warning Signals

Factor	Indicator	Source	Scenario			
			In Harmonia Progressio	Metmorphose	Back to Nature	The Survivor
Government Policy	COVID-19 testing policies	Government regulation	Stenghten	Stenghten	Weaken	Weaken
	Trend of Budgetary allocations for COVID-19	Ministry of Finance	increasing	increasing	decreasing	decreasing
	Government health security initiatives	Gov Policy and Regulation	published	published	unpublished	Unpublished
	Test/population ratio	Ministry of Health	>1%	**<1%**	**<1%**	**>1%**
	Vaccination Rate	Ministry of Health	< 70%	>70%	<70%	<70%
Prevalence of Sars-Cov 2 Variant	The emergence of new Sars-Cov-2 Variant	Ministry of Health / WHO	Emerging	Not Emerging	Not Emerging	Emerging
	Positivity rate	Ministry of Health /WHO	>5%	<5%	<5%	>5%
	Bed Occupancy Ratio (BOR	Ministry of Health	> 60%	<60%	<60%	>60%
	Total case	Ministry of Health	> 3.9 M	< 1.9 M	< 1.9 M	> 3.9 M

IV. Conclusion

Governments and organizations can use scenario planning to gain a better understanding of their environment's complexity. By placing the organization in each of the scenarios described, leaders can assess threats and opportunities, increase environmental awareness, and foster the organization's business agility as it navigates today's uncertainties.

Government policies that support the development and strengthening of Covid-19 testing laboratories will contribute to the strengthening of the national health security and resilience system, both in terms of the threat posed by COVID-19 and other infectious diseases, as well as the possibility of bioterrorism and biological warfare. If it is associated with the threat of new virus variants, enhancing surveillance through the Whole Genome Sequencing network has significant benefits for simulating and forecasting future viral mutation trends, as well as providing a foundation for developing vaccine technology (Ansori et al, 2020). Positively, the COVID-19 pandemic may provide the impetus necessary to realize this potential.

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