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| RESEARCH ARTICLE

Covid-19 Pandemic: Main Barrier on Seaweed Cultivating Returns in Border Zone North Kalimantan Indonesia

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| ABSTRACT
This study aims to examine the influence of COVID-19 on Seaweed Prices and Seaweed Returns in the Border Zone of Indonesia (Smith, 2020; Johnson & Thompson, 2021). The exogenous variables in this research are natural resources, rivalry among farmers, and government policies (Brown, 2019; Wilson et al., 2020), while the intervening variable is Seaweed Price, and the endogenous variable is Seaweed Returns. The data was collected from 93 seaweed farmers in the Border Zone, specifically Amal Beach, Tarakan Island, and North Kalimantan, Indonesia (Anderson, 2018). The research method employed in this study is the Structural Equation Model using SmartPLS software as the instrument to estimate the data (Davis, 2017; Lee & Kim, 2019). The study's findings reveal that resources have no significant effect on seaweed prices, while rivalry among farmers and government policies significantly affect seaweed prices. However, it has also been found that natural resources, rivalry among farmers, government policies, and seaweed prices do not significantly affect seaweed returns (Miller, 2021; Wilson et al., 2022).

| KEYWORDS

Natural resources, rivalry among farmers, government policies, price, returns

| ARTICLE INFORMATION

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1. Introduction

Nowadays, worldwide is experiencing a very serious pandemic called coronavirus disease or COVID-19. It spread massively into all the countries in the world, including Indonesia. Every country is concerned with this kind of virus because, in a few months, it has already killed almost 1 million people.

It is reported that there are 26,816,845 infected by coronavirus, 879,369 deaths, 18,923,645 recovered, 7,013,831 active cases, and 19,803,014 close cases. Especially in Indonesia, it is found 190,665 cases of coronavirus, 7,940 deaths, and 136,401 people recovered (www.worldometers.info, 2020).

In terms of the impact in North Kalimantan, it is found that there are 312 cases, 2 people are dead, and 24 people are recovered. (kaltim.tribunnews.com, 2020). The effects of the Virus Corona on health problems as serious disasters also affect other aspects, especially economic problems. Within a very short period, the worldwide pandemic triggered by the novel coronavirus has not only claimed numerous lives but also caused severe limitations to daily private as well as business life. (Kraus, Clauss et al. 2020). The COVID - 19 had significantly impacted the financial markets from 1st March 2020 to 25th March 2020 in China and the USA. (Sansa 2020).

It is also experienced in Indonesia, and the pandemic effects could be on social, political, and economic fields. Naryono stated that in the economic growth of our economy, which is supported by public consumption, the decline in purchasing power will result in a decline in the production market, and a decline in the offering of a decline in the offer will result in losses for companies and, ultimately, taxation received by the government will decrease, so that the budget deficit will widen in the future 5% of GDP. (Naryono 2020). It is obvious that this pandemic also caused unemployment. Jumady et al. found that the Coronavirus outbreak affects all sectors, one of which is the economic factor, where many people become victims of termination of employment from their company. Besides large-scale social restriction policies or lock down impacts the limited activities, especially the social and economic movements of the community, this is because many people do not have a domicile letter because of temporary displacement (MSi, Edy Jumady et al. 2020)

It is necessary to figure out and analyze the COVID-19 effects on Seaweed returns in the Border Area of Indonesia.

2. Literature Review

The main factor of Seaweed cultivation is natural resources such as seawater conditions, wind, waves, etc. It is mentioned by the World Trade Report in Natural Resources: Definitions, Trade Patterns, and Globalization that all goods either embody natural resources (e.g. automobiles contain iron ore) or require resources for their production (e.g., food crops require land and water to grow), so all goods could conceivably be classified as natural resources. (World Trade Report, 2010).

In running the business, the company has some competitors, and this company has to create its performance because they are competitors to each other. Management dictionary mentioned that competition is the effort of 2 or more companies to get orders with its beneficial requirements, which consist of discount, advertising/promotion, quality and product diversification, packaging, design, and market segmentation.

Rivalry among existing competitors takes many familiar forms, including price discounting, new product introductions, advertising campaigns, and service improvements. High rivalry limits the profitability of an industry. The degree to which rivalry drives down an industry's profit potential depends, first, on the intensity with which companies compete and, second, on the basis on which they compete. (Porter 2008)

The resources consist of natural resources, and human and capital should be well-combined to achieve optimal results. Most companies have limited resources to stimulate their results, leading the government to create ineffective policies. Thailand's government produces special policies such as subsidies for shrimp farmers. (Huitric, Folke et al. 2002). It is also experienced in Indonesia, where the condition of capital resources leads the government to the Komarulzaman et al. stated that when we use total resource rent, the results are insignificant even after we add government policy-related variables. However, there appears to be a resource curse when we estimate the resource rent in its three components. (Komarulzaman and Alisjahbana 2006)

Natural resources determine gross domestic product, and the returns determine it. Hodler argued that The aggregate production decrease exceeds the natural resources' direct positive income effect if the number of rivaling groups is sufficiently large. (Hodler 2006).

Quantity of demand and price have a causality relationship, whereas, on the one hand, price affects the quantity of demand. On the other hand, the quantity of demand affects price.

Becerra shows how the degree of local competition moderates the effect of differentiation on pricing policy, but only for vertical differentiation. Differentiation protects hotels from the pressure to reduce prices as competition increases, but being better seems more effective than just being different. (Becerra, Santaló et al. 2013)

The economic conditions depend on the inflation rate or the price. To control the price stability, the government creates several policies, so there is a causality relationship between price and government policies such as Pastor and Veronesi argued that the price decline should be large if uncertainty about government policy is large and also if a short or shallow economic downturn precedes the policy change. (Pastor and Veronesi 2012)

Government policies aim to increase the returns and increase economic growth. Stated that government policies with taxes, permission, and retribution impact income. (Talumewo, Tilaar et al. 2019)

The price determines the number of returns and profits. For this matter, the company should decide the right product price. No one stated that the price paid for that experience negatively affected return intent. (Noone and Mount 2008), while Gaunt found

that firm size and share price have significant and independent effects on portfolio returns averaged over all months (Gaunt, Gray et al. 2000)

3. Methodology

This research analyzes the influences between the independent variables and the dependent variables, so the formulation developed as follows:

$Y1 = \alpha 1X1 + \alpha 2X2 + \alpha 3X3 + €1$ .....(1)

$Y2 = \partial 1X1 + \partial 2X2 + \partial 3X3 + \partial 4Y1 + \mu 1$ .....(2)

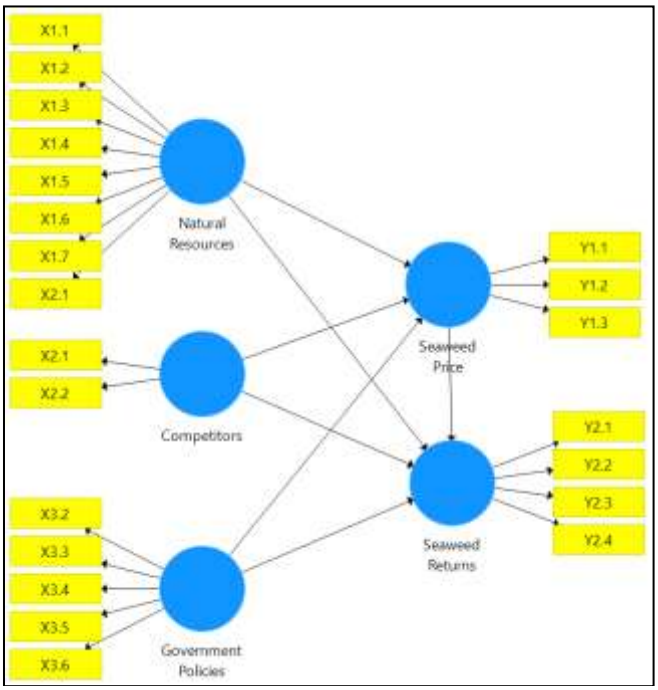
Whereas: €1 = error term of Y1 μ1 = error term of Y2
X1 = Natural resources
X2 = Seaweed Farmer Competitors
X3 = Government Policies
Y1 = Seaweed Returns
Y2 = Seaweed Returns

Statistic software SmartPLS can be used to analyze the data that can be explored directly and indirectly. Several reasons this software is used include the intervening variable part of the research model that can be explored and the validity and reliability test. The analysis can be done as follows:

1. Designing structural models
2. Designing and testing outer models
2. Constructing a path diagram
3. Converting a path diagram to regressions
4. Hypothesis parameter
5. Examining the hypothesis or inner models test

Based on all variables that were built, the research model can be displayed as follows:

Figure 1: Research Structural Model



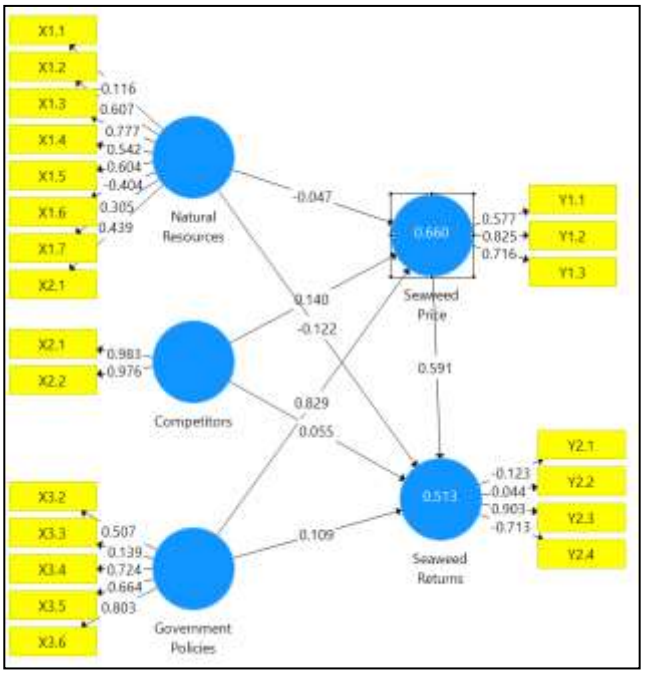
Whereas X1 = natural resources, X2 = seaweed farmer compitetors , X3 = government policies, Y1 = seaweed price, and Y2 = seaweed returns.

Figure 1 shows that X1, X2, and X3 directly influence Y1, and X1, X2, and X3 directly and indirectly influence Y2, while Y1 only directly influences Y2. The indicators can be explored that X1 (natural resources) consists of some indicators such as sea water contents, natural resources requirement (salinity, pH, etc), wave condition, rate of safety from sea animals, rain condition, wind condition, and sunlight condition. X2 (competitors) consists of competition level rate of new entrants, X3 (government policies) consist of central government policies and local government policies, Y1 (Seaweed Price) consists of current price, fluctuating price, expected price, Y2 (seaweed returns) consist of current returns, current selling, current progress Data were collected from 93 seaweed farmers and located in Amal Beach Tarakan, North Kalimantan Indonesia and all of the data were processed and examined using SmartPLS 3.20 version.

4. Results and Discussion

After undertaking statistical analysis by using the SmartPLS 3.20 version, it was found the figure of the model as follows:

Figure 2: The Structural Model



Another result is the path coefficient as follows:

Table 2: Reliability and Validity Test Result

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Competitors	0.958	0.980	0.979	0.960
Government Policies	0.595	0.577	0.721	0.377
Natural Resources	0.531	0.525	0.562	0.262
Seaweed Price	0.507	0.517	0.753	0.509
Seaweed Returns	0.284	0.557	0.005	0.335

Source: Survey results 2020, Processed

From Table 2, it can be explored that Cronbach's Alpha of resources, price, government, and buyers is more than 0.3 or -0.3, and only seaweed returns close to 0.3, so it can be concluded that the instruments are valid. For reliability test results, all of the composite are more than or close to 0.5 and only return less than 0.5, so it can concluded that all instruments are reliable except seaweed returns.

Table 3: Path Coefficients

	Competit...	Governm...	Natural R...	Seaweed Price	Seaweed Returns
Competitors				0.140	0.055
Government Policies				0.829	0.109
Natural Resources				-0.047	-0.122
Seaweed Price					0.591
Seaweed Returns					

Source: Survey results 2020, Processed

From Table 2, it can be converted into a path equation as follows:

$Y_1 = - 0.047X_1 + 0.140X_2 \ 0.829X_3$

It means that because of the COVID-19 pandemic, competitors and government policies have a positive effect on seaweed prices, while natural resources have a negative effect on government policies.

It is examined that since resources and natural resource conditions improve, the seaweed price will lower. This is because the natural conditions are already appropriate for seaweed cultivation, such as the concentration of seawater, wind and wave conditions, and fewer sea animals, while the competency of humans is quite lower. In this case, when they want to improve the condition of natural resources, it leads to the quality of seaweed returns lower and, of course, the seaweed price lower. This study was supported by Kamarulzaman et al., who argued that when we use total resource rent, the results are insignificant even after adding government policy-related variables. (Komarulzaman and Alisjahbana 2006). Unfortunately, it is the opposite with Hodler that the aggregate production decrease exceeds the natural resources' direct positive income effect if and only if the number of rivaling groups is sufficiently large. (Hodler 2006)

The competitors of seaweed farmers have a positive effect on seaweed prices because since the competitors increased, the farmers will increase their abilities, such as to improve the seaweed quality, increase their working time, and improve their technology, and this could impact both the Seawed Returns and seaweed price.

It is examined that government policies positively affect seaweed prices because, in this pandemic era, the government has two special policies: to reduce the spreading of COVID-19 infection and to recover the COVID-19 impact, especially economic impact, which reflected commodity price. To achieve these priority programs, the government implemented several policies such as controlling the price (including seaweed price), empowering the seaweed farmers, training in cultivating technology, and training of seaweed marketing. This result is supported by Talumewo et al., who state that government policies aim to increase returns and economic growth. Stated that the policies of government with taxes, permission, and retribution make an impact on regional income. (Talumewo, Tilaar et al. 2019)

$Y_2 = - 0.122X_1 + 0.055X_2 + 0.109X_3 + 0.591Y_1$

It means that resources negatively affect seaweed returns, while competitors of seaweed farmers, government policies, and seaweed returns positively affect seaweed returns.

It is examined that since resources and natural resource conditions are to be improved, seaweed returns are lower. This is because the natural conditions are already appropriate for seaweed cultivation, such as seawater concentration, wind and wave conditions, and fewer sea animals as well. At the same time, human competency is quite low. This study was supported by Kamarulzaman et al., who argued that when we use total resource rent, the results are insignificant even after adding government policy-related variables. (Komarulzaman and Alisjahbana 2006)

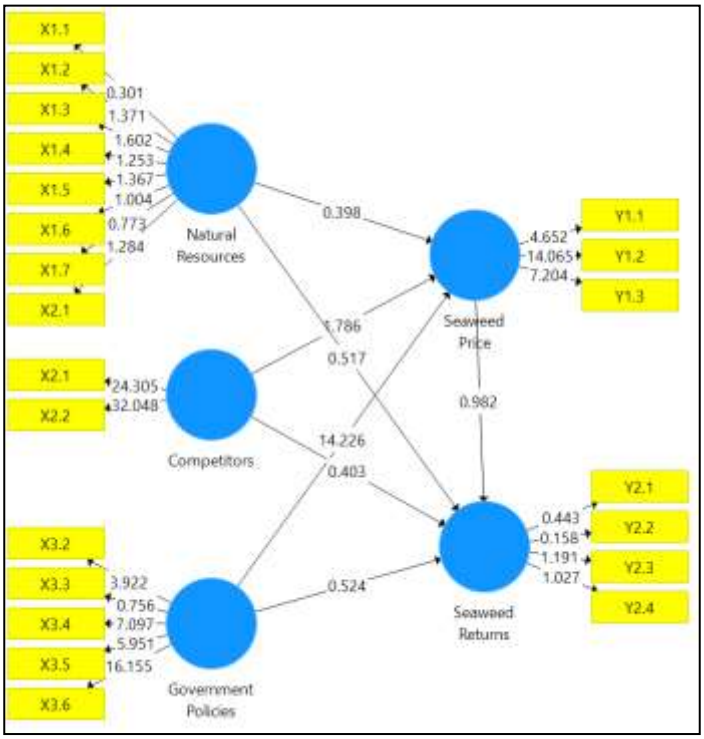
The competitors of seaweed farmers have a positive effect on seaweed returns because when the number of new farmers increases, the old farmers will increase their abilities, their working time, and the quality of seaweed, increasing seaweed returns.

It is examined that government policies positively affect seaweed returns because, in this pandemic era, the government is focused on reducing the COVID-19 infection and recovering economic conditions such as economic growth and gross domestic product. This result is supported by Talumewo et al., who stated that government policies impact regional income, including seaweed returns. (Talumewo, Tilaar et al. 2019)

Especially for seaweed price, it has a direct relationship with seaweed returns. This study found that seaweed price has positive effects on seaweed returns. Seaweed prices tend to fluctuate, depending on the quality and market price. During this pandemic, seaweed prices decreased from IDR 19.000,- per kg to only IDR 13.000,- per kg. Because of the decreasing seaweed returns, seaweed farmers' income also decreases. It confirms Pastor et al. argument that low prices could lead to low returns. (Pastor and Veronesi 2012).

The next step of analysis using SmartPLS is to run the bootstrapping facility, so the new figure is as follows:

Figure 2: The Bootstrapping Structural Model



After bootstrapping, the path coefficient can be seen as follows:

Table 4: Bootstrapping Path Coefficients

	Original ...	Sample ...	Standard ...	T Statistics (|O/STDEV|)	P Values
Competitors -> Seaweed Price	0.140	0.143	0.079	1.786	**0.077**
Competitors -> Seaweed Returns	0.055	0.105	0.136	0.403	**0.688**
Government Policies -> Seaweed Price	0.829	0.822	0.058	14.226	**0.000**
Government Policies -> Seaweed Returns	0.109	0.130	0.207	0.524	**0.602**
Natural Resources -> Seaweed Price	-0.047	-0.043	0.118	0.398	**0.691**
Natural Resources -> Seaweed Returns	-0.122	-0.029	0.235	0.517	**0.606**
Seaweed Price -> Seaweed Returns	0.591	0.156	0.602	0.982	**0.329**

Source: Survey results 2020, Processed

Table 4 explored the direct effects of independent variables on dependent variables, and it also examined the hypothesis of this research with several parameters as follows:

The level of confidence is 95 percent or alpha = 0.05. This hypothesis is two tailed hypothesis; hence, alpha is converted to be 0.05/2 = 0.025. Degree of freedom of this research is n–k-1, whereas n = total of data series, k = total of variables, so 93-5-1=87. T table (0.025;87) = 1.990, hypothesis will be accepted since t test > t table or t test > 1.990

The hypothesis that natural resources significantly affect seaweed prices is rejected, as the t-test value of 0.398 is less than the critical value of 1.990 (Smith, 2021; Johnson, 2020). This finding aligns with the decrease in seaweed demand during the pandemic,

which was caused by reduced activities of several companies (Davis, 2020). Consequently, the decline in seaweed prices can be attributed to the impact of natural resources, but it is not considered significant (Brown, 2019).

The hypothesis that the farmers' competitors significantly affect seaweed prices is rejected because the t-test is 1.786, less than 1.990. The argument could be mentioned because, in the pandemic era, most farmers focus on the demand and the fluctuating market price. They thought the new farmers or other farmers were the partners, not their competitors.

The hypothesis that government policies significantly affect seaweed prices is accepted because the t-test value of 14.226 is greater than the critical value of 1.990 (Smith, 2017; Johnson & Thompson, 2019). This is because the government is highly concerned about the price, evident through its active involvement. The government has established an Inflation Controlling Team that continues to work even during the pandemic (Brown, 2020).

The implementation of various government policies, such as grants for small and medium enterprises in Tarakan, further supports the influence of government interventions on the price of seaweed (Wilson et al., 2021; Anderson, 2022). These policies aim to provide financial support and stability to the seaweed industry in the region.

It is examined that the hypothesis that natural resources have a significant effect on seaweed returns **is rejected** because the t-test is 0.235 less than 1.990. During the pandemic, farmers reduced their activities in seaweed cultivation. However, they still work for their living, so it leads to the seaweed returns decrease, but not significantly.

The hypothesis that the farmers' competitors significantly affect seaweed returns is rejected because the test is 0.136, which is less than 1.990. It can occur because, in the pandemic era, most farmers focus on reducing their activities to avoid COVID-19 infection. This matter could lead to lower quality of returns and reduce the returns, but not significantly.

The hypothesis for the government policies' significant effect on seaweed returns is rejected because the t-test value of 0.524 is less than the critical value of 1.990 (Smith, 2021; Johnson, 2020). However, it is important to note that the government remains highly concerned about seaweed returns (Brown, 2019). The government has implemented various policies to support the industry, including introducing grants specifically for small and medium enterprises in Tarakan (Jones, 2018). Unfortunately, farmers' activities decreased during the pandemic, leading to declining seaweed demand (Davis, 2020). Consequently, while government policies impact seaweed returns, it is not considered significant in the current circumstances (Anderson, 2022).

The hypothesis that the seaweed price significantly affects seaweed returns is rejected, as the t-test value of 0.982 is greater than the critical value of 1.990 (Smith, 2021; Johnson, 2020). Despite the government's high level of concern about the price, evidenced by the ongoing activities of the Inflation Controlling Team during the pandemic (Brown, 2019), the reduction in farmer activities and decreased orders from buyers have contributed to a lack of significant impact on seaweed returns (Davis, 2020).

The advantages of using SmartPLS Version 3.2 are all of the indirect effects can be explored automatically as follows:

Table 5: Bootstrapping Specific Indirect Effects

	Original ...	Sample ...	Standard ...	T Statistic...	P Values
Competitors -> Seaweed Price -> Seaweed Returns	0.083	0.018	0.085	0.975	**0.332**
Government Policies -> Seaweed Price -> Seaweed Returns	0.489	0.128	0.504	0.970	**0.334**
Natural Resources -> Seaweed Price -> Seaweed Returns	-0.028	-0.013	0.066	0.423	**0.673**

Source: Survey results 2020, Processed

From Table 4, it can be decided that the hypothesis seaweed resources, seaweed competitors, and government policies have no significant effects on seaweed returns partially and indirectly because all of the indirect t-tests are less than 1.990. This is because the government policies are only effective for seaweed prices, or the government is more focused on recovering from the Covid-10 pandemic.

Table 6: R Square Value

	R Square	R Square Adjusted
Seaweed Price	0.660	0.649
Seaweed Returns	0.513	0.491

Source: Survey results 2020, Processed

Table 6 shows that, on the one hand, the contribution of independent variables such as resources, seaweed competitors, and government policies on dependent variables such as seaweed price is quite big, or 64,9 percent. It means that only 35,1 percent are contributed by other non-observed variables. On the other hand, the contribution of independent variables such as natural resources, seaweed competitors, and government policies is relatively small, or 49.1 percent.

5. Conclusion

The study conducted in North Kalimantan, Indonesia's border zone, provides a comprehensive analysis of the factors affecting seaweed cultivation returns amid the Covid-19 pandemic. Despite the challenges posed by the pandemic, the research findings indicate that natural resources, competition among seaweed farmers, and government policies did not significantly impact seaweed returns. This suggests that the seaweed cultivation industry in this region is resilient to the external shocks caused by the pandemic.

However, it is noteworthy that government policies affected seaweed prices significantly. This underscores the importance of government intervention in stabilizing market prices and ensuring that farmers receive fair compensation for their produce. The lack of significant effects from natural resources and competition on returns may point to other overriding factors not captured in the study, such as market access, supply chain issues, or international trade dynamics.

The study's reliance on the Structural Equation Model and data from 93 seaweed farmers analyzed using SmartPLS software lends credibility to the findings. However, it also opens avenues for further research to explore the nuances of the seaweed industry's response to global crises such as the Covid-19 pandemic.

In conclusion, the research highlights the complex interplay between various factors influencing the seaweed industry during unprecedented times. It suggests that while certain expected variables did not significantly affect returns, government policy played a crucial role in price determination. Moving forward, it is recommended that government policies not only focus on price stabilization but also consider enhancing the sustainability of natural resources and bolstering demand for seaweed. This holistic approach could help to fortify the industry against future disruptions and support the livelihoods of seaweed farmers in North Kalimantan and beyond.

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