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The Impact of Covid-19 Pandemic on Demand for Medan Oranges, Case in E-Commerce Inagri Asia, Bandung, Indonesia

N. Salsabila Rahadatul Aisy[1)], Lies Sulistyowati[2)]
. [1,2] *Department of Socio-economic, Faculty of Agriculture, Padjadjaran University, Indonesia*
Corresponding Author: lies.sulistyowati@unpad.ac.id

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ABSTRACT:
The horticulture sub-sector showed positive growth during the Covid-19 pandemic in Indonesia. One of the fruit commodities that has the highest consumption level in 2020 is oranges. However, the activities of the horticulture sub-sector have been obstructed due to the implementation of policies such as PSBB and PPKM. In addition, demand for horticulture can be disrupted because the hotel, restaurant, and catering (horeca) operations are also closed. One of the agribusiness companies affected by the pandemic with a target market for horeca (hotels, restaurants and catering) is PT Insan Agritama Teknologi (PT INAGRI), which owns Inagri.asia e-commerce. One of the commodities that dominates sales at Inagri.asia is Medan oranges. The purpose of this study was to analyze how much the factors influencing the demand volume of Medan oranges and the impact of the Covid-19 pandemic on the demand volume of Medan oranges. The analytical methods used were multiple linear regression and descriptive analysis. Primary data was sourced from interviews with PT INAGRI. Secondary data was obtained from company archives and documents, BPS and other related agencies. The results showed that the price of Medan oranges, papaya prices, population, community income, and the Covid-19 pandemic simultaneously affected the demand volume of Medan oranges on Inagri.asia e-commerce. Meanwhile, partially only the population and Covid-19 pandemic have a significant effect. Covid-19 pandemic has a positive impact on the demand volume of Medan oranges on Inagri.asia e-commerce can be shown by the increase in demand volume between before the pandemic and during the pandemic.

Key words: Covid-19, Demand, E-Commerce, Medan oranges.

I. INTRODUCTION

The agricultural sector has a major contribution to national economic development. The horticulture sub-sector plays an important role in achieving positive growth in the agricultural sector (Suryana, et al. 2020). The horticulture sub-sector grew positively by 7.85% in the fourth quarter of 2020 due to increased demand for fruits and vegetables (Directorate General of Horticulture, 2020). One of the fruit commodities with the highest per capita consumption level is oranges, which is 3.30 kg/capita/year (Ministry of Agriculture, 2021). West Java Province is in 11th place as the largest producer of oranges, with a total of 60,179 tons (BPS, 2021).

According to Sukirno (2016), there are several factors that can affect the level of demand for a commodity, such as price, community income and its distribution style, people's tastes, population and prediction of the future. However, there are other factors that may affect the level of demand for horticulture, one of which is pandemic. The World Bank (2020) stated that the Covid-19 pandemic could disrupt the production of agricultural commodities because distribution and trade would be hampered. The covid-19 pandemic has a negative impact on the horticulture sub-sector because its existence affects physical accessibility, affordability, and price stability for the level of community food consumption (Mulyawanti, et al. 2020).

The inhibition of activities in the horticulture sub-sector was caused by the limited space for movement during the pandemic. The massive spread of Covid-19 requires the government to enforce policies in the form of social distancing, Large-Scale Social Restrictions (PSBB), and the Enforcement of Restrictions on Community Activities (PPKM). This policy affects the smooth performance of the food supply chain, especially in horticulture and poultry farming

(Suryana, et al. 2020). Horticultural demand can be disrupted because hotel, restaurant and catering (horeca) operations have to be discontinued (Darwis, et al. 2020).

One of the agribusiness companies affected by the pandemic with a target market for horeca is PT Insan Agritama Teknologi. This company is worked in agricultural e-commerce named Inagri.asia. Horticultural commodities marketed consist of vegetables, fruits, and processed products. One of the horticultural products with the second largest sales dominance is Medan oranges with a sales percentage of 23% so that it can represent horticultural commodities in Inagri.asia e-commerce. Inagri.asia is well known for its Business to Business (B2B) entities. However, over time along with the emergence of the Covid-19 pandemic, causing Inagri.asia shifted its business focus to Business to Consumer (B2C). Indirectly, the Covid-19 pandemic phenomenon can affect the sustainability of Inagri.asia's business as an agricultural digital platform that relies on the horticultural commodities demand, especially from horeca. The purpose of this study was to analyze the influence of the factors that influence the demand volume of Medan oranges on Inagri.asia e-commerce and analyze the impact of the Covid-19 pandemic on the Medan oranges demand on Inagri.asia e-commerce.

II. RESEARCH METHODS

This research was conducted in Bandung, West Java, with the object is the demand volume of horticultural products in the Inagri.asia e-commerce owned by PT INAGRI and the factors that influence it. The location was chosen purposively based on the consideration that Bandung City is one of the cities affected by the Covid-19 pandemic and has the largest contribution to internet user penetration in West Java Province, which is 82.5% (APJII, 2020). The research design used is quantitative research. In this research design, the researcher decides what to research, formulates specific and limiting questions, collects measurable data from participants, analyzes numbers using statistics, and conducts investigations in an objective manner (Creswell, 2008).

Table 1. Variable Operationalization

Variable	Indicator	Size	Scale
Medan oranges price (X_1)	Average price of Medan oranges per month in Rupiah per kilogram (IDR/kg)	The average price of Medan oranges per month from 2019-2021	Ratio
Papaya price (X_2)	Average price of papaya per month in IDR per kilogram (IDR/kg)	Average price of papaya per month from 2019-2021	Ratio
Population (X_3)	The number of residents per month domiciled in Bandung (people)	Total population of Bandung city per month from 2019-2021	Ratio
Community income (X_4)	The average income earned by Bandung City's people per month in IDR	The average income of Bandung City's people per month from 2019-2021	Ratio
Covid-19 pandemic (X_5)	The time before and during the pandemic which is rated 1 and 0	The time before the pandemic is from 2019 – February 2020 (14 months) and during the pandemic which is March 2020 – December 2021 (22 months)	Nominal

The primary data used was sourced from interviews with PT Insan Agritama Tekonologi. Meanwhile, secondary data was obtained from company archives and documents, publications from the Central Statistics Agency (BPS) of West Java Province and other agencies related to the data needed in the study. The data used is monthly time series data from 2019 to 2021 (36 months). Data collection techniques used are interviews, secondary data recording, and literature study. The analytical technique used in this study is multiple linear regression using Stata 14 software. The multiple linear regression equation used in this study is:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + e_t$$

Information:
Yt = demand volume Medan oranges in t month (kilograms)
β_0 = constant
X_{1t} = Medan oranges price in t month (IDR/kg)
X_{2t} = papaya price in t month (IDR/kg)
X_{3t} = total population in t month (people)
X_{4t} = community income in t month (IDR)
X_{5t} = dummy variable of Covid-19 pandemic in t month
e_t = standard error

To obtain the best regression model, the classical assumption test is carried out with the condition that it must meet the Best Linear Unbiased Estimator (BLUE) criteria.

a) Normality was tested using Shapiro-Wilk.
b) Multicollinearity was identified by the value of Variance Inflation Factor (VIF)
c) Autocorrelation was tested with the Durbin alternative.
d) Heteroscedasticity was tested by the White test.

R^2 or the coefficient of determination can show how big the percentage of Y can be explained by the variation of X. If the value of R^2 is closer to 1, the greater the independent variables used can explain the dependent variable.

F test is used to identify whether the independent variables simultaneously have a significant effect on the dependent variable (Gujarati and Porter, 2015). The proposed hypothesis is as follows.

H_0: the variables of Medan oranges price, papaya price, population, community income, and Covid-19 pandemic simultaneously have no significant effect on the demand volume of Medan oranges
H_1: the variables of Medan oranges price, papaya price, population, community income, and Covid-19 pandemic simultaneously have a significant effect on the demand volume of Medan oranges

F test criteria are:
If the F-count is significant ≤ significance α = 5%, then H_0 is rejected.
If the F-count is significant > significance α = 5%, then H_1 is accepted.

The T-test is used to determine whether each independent variable partially has a significant effect on the dependent variable. The proposed hypothesis is as follows.

H_0: the variables of Medan oranges price, papaya price, population, community income, and Covid-19 pandemic partially have no significant effect on the demand volume of Medan oranges
H_1: the variables of Medan oranges price, papaya price, population, community income, and Covid-19 pandemic partially have a significant effect on the demand volume of Medan oranges

T test criteria are:
If the t-count is significant ≤ significance α = 5%, then H_0 is rejected.
If the t-count is significant > significance α = 5%, then H_1 is accepted.

III. OVERVIEW OF PT INSAN AGRITAMA TEKNOLOGI

PT Insan Agritama Teknologi (INAGRI) is located at OSA Quarter Building 3rd floor, Reog street No. 6A, Turangga, Lengkong District, Bandung City, West Java Province, Indonesia. Since its establishment in 2016, the company has been engaged in website-based agricultural e-commerce under the name Inagri.asia. The products marketed are obtained from a number of farmers and partner cooperatives in West Java, consisting of horticultural commodities such as vegetables and fruits, plantation commodities such as coffee beans, processed products, and livestock products such as chicken and eggs. These products are marketed on a B2B basis to several hotels and modern retailers.

In 2019, PT INAGRI experienced a number of management problems such as limited manpower and trading problems that affected B2B operations. Therefore, the company decided to vacuum in May - August 2019 to improve management. The company also expanded sales targets with a B2C system. In 2020, the company collaborated with various organizations and the Social Service for a basic food-sharing program. In addition, the company cooperated with Agrosurya to open a "qurban program" and open a reseller program.

In 2021, the company opened an offline agent partnership in Bandung Raya. Then the company developed applications in the West Java Digital Village program and the waste management program (Used cooking oil Application). The company also provides agricultural education facilities for the community through various social media and blogs. In addition, the company is focusing on developing the brand shift to the Internet of Things (IoT) because there are prospective opportunities and wants to develop agricultural digitization in Indonesia.

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IV. RESULTS AND DISCUSSION

4.1. Demand Volume of Horticultural Commodity in Inagri.asia

Several commodities with the highest demand volume were first marketed in 2020. Some of them came from the fruit group, such as Cavendish-bananas, Medan-oranges, century pears, Fuji-apples, and crystal guavas.

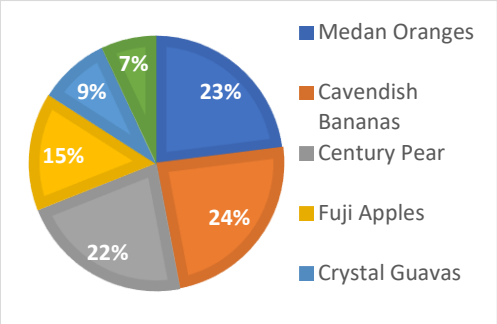

Figure 1. Pie Chart of Horticulture Demand Volume at Inagri.asia
Source: PT Insan Agritama Teknologi

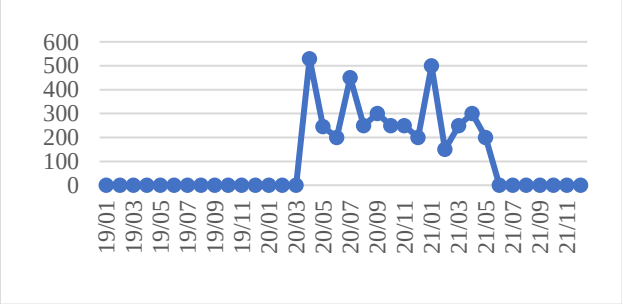

Figure 2. Graph of Medan Oranges Demand Volume (Kg) (2019-2021)
Source: PT Insan Agritama Teknologi

The sale of Medan oranges began in April 2020, with a total requested until May 2021 being 4,075 kg. There were no sales from January 2019 – March 2020. 2,657 kg of Medan oranges were sold in 2020. In 2021, the demand decreased by around 52.3%, so only 1400 kg were sold. The average demand for Medan oranges per month is 291 kg with an average selling price around IDR 19,250/kg. The highest demand occurred in April 2020, with a total of 530 kg at a price of IDR. 22,500/kg. Meanwhile, the lowest demand for Medan oranges occurred in February 2021, with an amount of 150 kg at a price of IDR. 18,500/kg.

4.2. Classical Assumption Test

1).Normality test

Table 2. Shapiro-Wilk Test Results

Variable	Prob>z
inverse_sq~X_1	0.55059
X_2	0.43845
X_3	0.67155
inverse_sq~$_4$	0.00007
X_5	0.96102

Source: STATA data processing results

The variables X_1 and X_4 are transformed. The results of the analysis show that the inverse_square_X_1, X_2, X_3, and X_5 variables are normally distributed, while the inverse_square_root_X_4 is not normal because the probability value is < 0.05.

2) Multicollinearity

Table 3. Correlation Value Between Variables

Variable	VIF	1/VIF
X_3	3.80	0.263304
X_5	3.19	0.313313
X_4	1.30	0.769866
X_2	1.27	0.786995
X_1	1.07	0.937173
Mean VIF	2.13	

Source: STATA data processing results

The results of the analysis above show that the VIF value of each independent variable is less than 10 (VIF < 10), and the value of 1/VIF is more than 0.10 (1/VIF > 0.10). So there is no symptom of multicollinearity.

3) Autocorrelation

Table 4. Durbin Alternative Test Results

lags (p)	chi2	df	Prob > chi2
1	0.072	1	0.7883

Source: STATA data processing results

The results show a probability value of 0.7883, which means the value is more than 0.05. So there is no autocorrelation in the regression model.

4) Heteroscedasticity

Table 5. White Test Results

chi2 (19) =	22.87
Prob>chi2 =	0.2433

Source: STATA data processing results

From the test results above, the value of Prob>chi2 shows 0.2433, which means it is more than 0.05. So, the regression model is free from heteroscedasticity problems.

4.1 Multiple Linear Regression Test Results

Based on the results of multiple linear regression analysis, the following regression equation model was obtained.

$$\mathbf{Y = 11116.62 + 1.40X_1 + 0.0025944X_2 - 0.0045896X_3 + 413506.4X_4 + 354.9008X_5}$$

Table 6. Multiple Linear Regression Analysis Results

Source	SS	df	MS	Number of observe	=	36
				F (5, 30)	=	5.55
Model	434882.726	5	86976.5453	Prob > F	=	0.0010
Residual	469774.912	30	15659.1637	R-squared	=	0.4807
Total	904657.639	35	25847.3611	Adj R-squared	=	0.3942
				Root MSE	=	125.14

Y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
inverse_square_X_1	1.40e+10	5.43e+10	0.26	0.798	-9.69e+10	.1.25e+11
X_2	.0025944	.0086438	0.30	0.766	-.0150586	.0202474
X_3	-.0045896	.0019978	-2.30	0.029	-.0086696	-.0005096
inverse_sq~_X_4	413506.4	643565.4	0.64	0.525	-900829.4	1727842
X_5	354.9008	76.59317	4.63	0.000	198.4766	511.3249
_cons	11116.62	5106.961	2.18	0.038	686.8104	21546.42

Source: STATA data processing results

Based on these equations, it can be seen that:

1. The constant value of 11116.62 indicates that if X_1, X_2, X_3, X_4, and X_5 are worth 0, then the demand value of Medan oranges is 11,116.62.
2. Variable X_1 has a coefficient of 1.40, meaning that every 1% increase in the price of Medan oranges will increase the demand volume of Medan oranges by 0.014, assuming other variables are constant.
3. Variable X_2 has a coefficient of 0.0025944, meaning that every 1% increase in the price of Medan oranges will increase the demand volume of Medan oranges by 0.000026, assuming other variables are constant.
4. Variable X_3 has a coefficient of -0.0045896, meaning that every 1% increase in population will decrease the demand volume of Medan oranges by 0.000046, assuming other variables are constant.
5. Variable X_4 has a coefficient of 413506.4, meaning that every 1% increase in the community's income will increase the demand volume of Medan oranges by 4,135, assuming other variables are constant.
6. Variable X5 has a coefficient of 354,9008 meaning that every 1% increase in Covid-19 cases will increase the demand volume of Medan oranges by 3.55 assuming other variables are constant.

4.2 Coefficient of Determination (R^2)

The coefficient of determination obtained is 0.4807. This means that the independent variables such as Medan oranges price, papaya price, population, community income, and the Covid-19 pandemic can explain the dependent variable, namely the demand volume of Medan oranges by 48.07%. The remaining 100% - 48.07% = 51.93% is influenced by other variables that are not explained in this model.

4.3 F test

Based on the test results, the F value is 5.55 with Prob>F of 0.0010 and less than 0.05 (0.0010 < 0.05), which means H_0 is rejected. In other words, the variables of Medan oranges price, papaya price, population, community income, and the Covid-19 pandemic simultaneously have a significant effect on the demand volume of Medan oranges.

4.4 T test

Based on the results of the t-test analysis, it can be seen that each independent variable has various p-values at a significance level of 5%.

1) Medan oranges price (X_1)

The Medan oranges price variable has a p-value of 0.789 which means it is greater than 0.05 (H_0 is accepted). This variable partially does not have a significant effect on the demand volume of Medan oranges. The results of this study are in line with the results of Arsifa's research (2021), which states that the price of ginger during the

Covid-19 pandemic does not partially affect the number demands for red ginger. However, the results of this study contradict the demand theory, according to Sukirno (2016). In fact, the higher price of Medan oranges, the higher quantity demanded of Medan oranges. It can be caused by the high public awareness of the importance of maintaining body immunity during the Covid-19 pandemic by consuming fruits that contain vitamin C, such as Medan oranges, even though the price has increased.

2) Papaya price (X_2)

The papaya price variable has a p-value of 0.766 which means it is greater than 0.05 (H_0 is accepted). This variable partially does not have a significant effect on the demand volume of Medan oranges. The results of this study are in line with the results of research by Rahmawati et al (2018), which shows that the demand of Pamelo oranges is not influenced by star fruit price. However, the results of this study contradict Sukirno's demand theory (2016).

3) Total population (X_3)

The population variable has a p-value of 0.029 which means it is smaller than 0.05 (H_0 is rejected). This variable partially has a significant effect on the demand volume of Medan oranges. The results of this study are in accordance with Sukirno's demand theory (2016). When the population of Bandung City increased from 2.49 million people to 2.50 million people in the third quarter of 2020, the demand volume of Medan oranges also increased from 975 kg to 1,000 kg. The results of this study are in line with the results of Sipayung's research (2015), which proves that if the population increases, the demand for a commodity also increases.

4) Community income (X_4)

The community income variable has a p-value of 0.525 which means it is greater than 0.05 (H_0 is accepted). This variable partially does not have a significant effect on the demand volume of Medan oranges. The results of this study are not in accordance with Sukirno's demand theory (2016). Medan oranges are mostly distributed outside Bandung City, such as Cimahi. Therefore, when the income of the Bandung City's people increases, the demand volume of Medan oranges is not affected because only a small portion of Medan oranges is distributed in this area. The results of this study are in accordance with the results of research by Arsifa (2021), which states that the demand for ginger is not significantly affected by consumer income because when income increases, the demand for ginger decreases.

5) Covid-19 pandemic (X_5)

The Covid-19 pandemic variable has a p-value of 0.000 which means it is smaller than 0.05 (H_0 is rejected). This variable partially has a significant effect on the demand volume of Medan oranges. Medan oranges commodities had no demand in the pre-pandemic period (2019 to February 2020). Meanwhile, during the Covid-19 pandemic, demand for Medan oranges fluctuated but tended to increase. Based on this phenomenon, it can be concluded that the Covid-19 pandemic has a significant influence on the demand volume of Medan oranges on Inagri.asia e-commerce. This study is in line with the results of research by Ferdiansyah et al (2022), which states that the demand for fruit in the city of Jember Regency increased by 1.07% (traditional markets) and 31.57% (modern markets) during the Covid-19 pandemic. In addition, the results of this study are in accordance with Arsifa's (2021) research which states that the demand for red ginger during the Covid-19 pandemic has increased by 273%.

4.5 The Impact of Covid-19 on Demand Volume of Medan Oranges

It can be seen that there was no demand for Medan oranges in the pre-pandemic period. It happened because the company was in a vacuum to improve management and began to focus on B2C. Therefore, some of the agricultural products at Inagri.asia, such as Medan oranges, did not have sales. However, several other horticultural commodities, such as avocados, had a fairly high interest in the pre-pandemic period. It was proven by sales of 254 kg in 2019.

Table 7. The Growth of Medan Oranges Demand Volume Before and During Covid-19 Pandemic

Description	Before Covid-19 Pandemic (Kg)	During Covid-19 Pandemic (Kg)
Total demand	0	4,075
Average demand	0	185.22
Total increase		4,075

Source: PT Insan Agritama Teknologi

During the pandemic (March 2020 - December 2021), the demand for Medan oranges fluctuated quite a bit. From April 2020 - May 2021, the total demand for Medan oranges reached 4,075 kg. Meanwhile, from June – December 2021, there was no demand. However, the demand for Medan oranges during the pandemic dominated horticulture sales on Inagri.asia e-commerce by 23%.

Although in fact, the demand volume of Medan oranges has increased during the pandemic, it does not mean that the increase is only influenced by the Covid-19 pandemic. According to the company's statement, the increase in demand for Medan oranges was accompanied by an increase in demand for other horticultural commodities, especially from the fruit group. The reason is due to management improvements that have been carried out quite well and the increasing interest in B2C consumers along with high public awareness to increase body immunity during the Covid-19 pandemic by consuming horticulture.

V. CONCLUSION AND SUGGESTION

5.1 Conclusion

1) The factors of Medan oranges price, papaya price, population, community income, and the Covid-19 pandemic simultaneously affect the demand volume of Medan oranges on Inagri.asia e-commerce. While partially, only the population and the Covid-19 pandemic factor that has a significant influence.
2) The Covid-19 pandemic had a positive impact on the demand volume of Medan oranges on Inagri.asia e-commerce as indicated by an increase in demand volume between before and during the Covid-19 pandemic.

5.2 Suggestion

1) The company is expected to pay attention to factors such as the population and the Covid-19 pandemic because these two factors have a significant effect on the demand for Medan oranges so that the company can anticipate the surge in demand that occurs. The company is expected to increase the number of human resources to suit the needs so that the company's activities can operate smoothly. In addition, even though the Inagri.asia e-commerce is no longer operating, it is hoped that the company will continue to innovate in other fields such as those currently being pursued, namely digitalization and agricultural education, especially during the Covid-19 pandemic, seeing the prospective opportunities to be developed.
2) The government, especially the Ministry of Agriculture, is expected to use this research as additional information and consideration in making policies related to horticultural commodities, both during the pandemic or post-pandemic.
3) Further researchers are expected to examine more deeply by adding variables that are suspected to be significant, using primary data, adding a longer and more detailed period of time, and expanding the scope of areas such as West Java Province in order to get better research results.

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