The Impact During of Pandemic COVID-19 on Property Sector Case Study: DKI Jakarta Province

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Abstract

Since the COVID-19 pandemic in Indonesia, economic conditions have declined, especially in the property sector but if we look at the distribution value of the real estate sector in 2020 during the pandemic, its contribution has increased to 6.31% after falling by 5.94% in 2019. Another impact is that the Property Price Index growth value decreases over the years, but in a big city like DKI Jakarta, it does not affect the pandemic condition. Big Data has the potential to produce useful and useful statistics and assist in the collection of Official Statistics data. This study aims to see the condition of the number of advertisings on the property side and the selling price of houses and apartments that can be impacted by the pandemic COVID-19. Based on data from one property site in Indonesia, the condition of ad serving during the pandemic is very influential, with the highest serving during the Micro Indonesia large-scale social restrictions (PSBB).

Keywords: pandemic; property site; Big Data; property price
JEL Classification: R33; R38

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1. Introduction

Infrastructure development and construction are one of the supporters of a nation's economy. Currently, the economy in Indonesia is still in an unstable condition due to the COVID-19 virus pandemic. The outbreak of COVID-19 has impacted lives and businesses across the globe, with many billions of the world's population and much of industry having been under strict lockdown for some time (Uchehara et al., 2020). Since the beginning of the COVID-19 pandemic set by the WHO (World Health Organization) on March 9, 2020, the impact that has been felt has been in several sectors such as tourism, accommodation, transportation, retail, and construction, a decline in economic growth and property. One of the activities of selling, buying, and leasing property also plays an important role in becoming a source of Indonesia's GDP, according to the Central Bureau of Statistics, the Real Estate category is a fairly constant source of GDP from year to year, such as in the last 5 years the distribution of GDP in the real estate category. Indonesia shows numbers ranging from 2.74% to 2.94% (BPS, 2021a), and during the pandemic in 2020 the distribution value is at the highest level.

In addition, several cities also showed a declining IHP (Property Price Index) value due to the pandemic, but on the other hand, big cities such as Surabaya and DKI Jakarta showed an increasing IHP (Property Price Index) value and did not falter due to pandemic (Nurpita & Wardhani (2021), when viewed from the GRDP of DKI Jakarta Province, the development of the contribution of the real estate sector tends to decrease as in 2017 its contribution decreased by 6.16% and 6.03% in 2018. However, in 2020, during the pandemic, the contribution experienced a decline. increased to 6.31% after falling by 5.94% in 2019. However, the real estate sector is one sector that can grow positively amid the pandemic in the economic sector and the growth of self-owned housing rentals is still supporting the growth of the real estate category (BPS, 2021b).

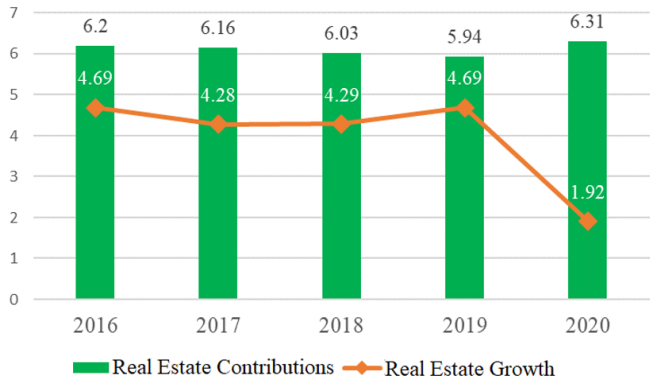

Figure 1: Contribution and GRDP Growth of Business Fields in the Real Estate Category of DKI Jakarta Province

Then as the resulting data grows, Big Data plays a very important role in producing useful statistics. Big Data can overcome today's information-related challenges, with data being spread across multiple systems and helping to make decisions (Lumbantoruan, 2017). Furthermore, some of the research studies on Big Data that have been produced about impact of COVID-19 pandemic include: Impact of COVID-19 pandemic on tourism in Indonesia by Pramana et al. (2022), this study explains investigate the different impacts of the COVID-19 pandemic on Indonesia's tourism industry, as this and its supporting sectors are the most affected by the COVID-19 pandemic worldwide, by clustering the provinces based on the room occupancy rate (ROR) to understand provinces specific impacts (Pramana et al., 2022). Other Big Data studies that is The Impact of Globalization, Inequality, and Financial Sector Policies During the Pandemic in Indonesia by Riris Aishah Prasetyowati, this study explain that is, the level of globalization which greatly affects the level of inequality in population income and government policies in the financial sector during the observation period with the COVID-19 pandemic (Prasetyowati, 2021). Other impact of COVID-19 study that is about market, MSMEs' Coping Strategy, Recovery Path, and Business Transformation (Gunadi et al., 2022), and the last is impact of COVID-19 to The Sustainability of Women's SMEs, this study shows that environmental competence and support have a consequential effect on organizational flexibility, while personality does not influence organizational flexibility. This study also finds that organizational flexibility significantly affects company performance (Genoveva, 2021).

Big Data has great potential to support Official Statistics (Pramana et al., 2017). One of big data sources digital coentent from a website. To get the information of property advertisement, we scraped data from the website of one of the largest online properties in Indonesia (rumah123.com). The site displays more than 182,000 quality and up-to-date listings from all over Indonesia (Saputra, 2020). Province with the most advertising servings on that website is DKI Jakarta. Hence, this study is limited to using data from website scraping in the DKI Jakarta province.

DKI Jakarta is the province with the largest population density in Indonesia (Christiani et al., 2014). According to BPS Statistics Indonesia, the density of statistical centers in 2019 reached up to 15,900 people/km^2. The population density of DKI Jakarta is increasing from 2013 to 2019. Population density affects the quality of people's lives. In areas with high density, efforts to improve the quality of the population will be increasingly difficult which can have an impact on economic problems, welfare, security, necessities of life (Christiani et al., 2014).

Population density also affects the number of settlements in an area, as the population density increases, the number of buildings in an area also increases and the impact on residential needs will also increase (Setyorini, 2012). Other researchers approve that revealed the tenant and real estate supply chains are impacted on by both socio-economic and macroeconomic severity due to COVID-19 (Uchehara et al., 2020) and other research say that the pandemic reduced the housing demand in central city neighborhoods and neighborhoods with higher

population density. The decreased demand for density is partially driven (Liu & Su, 2021).

Based on the background that has been described, the objective of the research is to show the display of online buying and selling property conditions on certain dates or times during government policies related to the pandemic.

2. Methodology

2.1. Data

This study uses property data from one of the advertising sites for selling and buying property in Indonesia. The data available is data from January 2020 to December 2021, especially on important events that occurred such as the pandemic in March 2020 and policies related to stop the pandemic. From web scraping data, there are 26 variables obtained. We used in this research are as follows: (1) *channel*: transaction type for property advertisements, (2) *property_type*: there are 5 categories of property types displayed, (3) *subdistrict*: subdistricts in Jakarta and advertisements are served, (4) *built_up*: building area of the property, (5) *land_area*: land area of the property, (6) *bedroom*: number of bedrooms in the property, (7) *bathroom*: number of bathrooms in the property, (8) *certificate*: description of property certificate, (9) *condition*: condition of the building, i.e. used or new, (10) *completion_date*: date the advertisement was broadcast, (11) *price*: property price, (12) *price_unit*: description of the price paid per day, month, or year, and (13) *transacted*: advertising description has been sold or is still active and not.

2.2. Analysis Method

This research was conducted using a quantitative approach with data analysis starting with preprocessing, and descriptive analysis. The research flow is as illustrated below, starting from data collection carried out by Mariel et al. (2021) to be used in this study. After getting the data from the scraping done monthly, the data is processed first, namely the preprocessing data , in this study it is divided into two data, namely data for the construction of a visualization dashboard and data for the formation of a predictive price model for selling houses and apartments.

2.2.1. Data Preprocessing

In this research, data preprocessing includes variable selection, checking the type of data used, checking for missing values, checking data duplication, and data that is not reasonable. Before the data is processed descriptively, because the data collected is all of Indonesia, so for this study, the data is filtered by DKI Jakarta province and unsold properties until the date a scraping is done, and then data is filtered according to the date advertisements are in January 2020 to

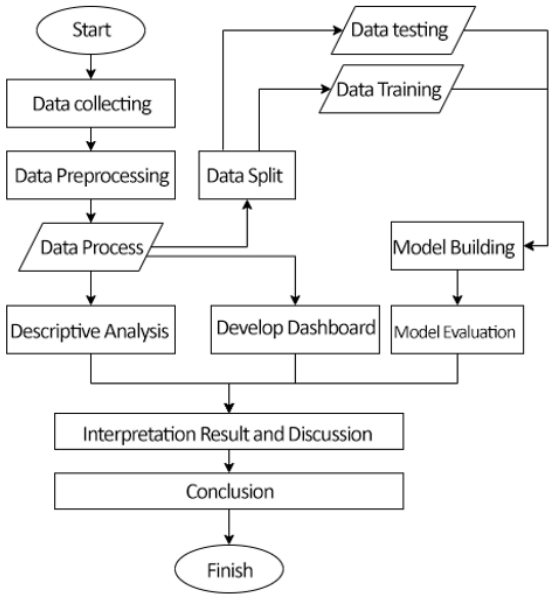

Figure 2: Flowchart/Flow Diagram of Research

December 2021. Data preprocessing begins by combining all the data that has been processed and scraped monthly (August 2021 to January 2022). After that is checking data duplication by looking at the variables, by looking at double data or data at the same one. Where characteristics of these variables are unique for each value.

The researcher defines the categories of inappropriate data into 3 of them:

1. Unreasonable building area
   This unreasonable building area uses the ideal building area value of houses and apartments, namely by referring to existing data by removing outliers or outliers. For example, the data found a land area of 100,000 m^2.
2. Unreasonable price
   The price is not fair using the standard price reference per sub-district and identifying the outlier value.
3. An unreasonable number of rooms
   Researchers calculate the number of rooms that are not reasonable by calculating the area of a standard bathroom and bedroom and compared with the value of the building area. The standard area used is 12 m^2 for the bathroom and bedroom.

We, then, categorizes the important events of each data with the following criteria (see Table 1).

Table 1: Chronology of Names and Dates of Government Policies related to the COVID-19 pandemic

Event Name	Policy Date
The first Indonesia large-scale social restrictions (PSBB) in Jakarta	10–23 April 2020
Indonesia large-scale social restrictions (PSBB) Continued	24 April–4 June 2020
Indonesia large-scale social restrictions (PSBB) Transition	5 June–10 September 2020
Indonesia large-scale social restrictions (PSBB) Continued transition, weak cases	12 October 2020–11 January 2021
Indonesia large-scale social restrictions (PSBB) and implementation of PPKM	11– 25 January 2021
Community Activities Restrictions Enforcement (PPKM) Java and Bali island	26 January–8 February 2021
Micro Community Activities Restrictions Enforcement (PPKM)	9 February–28 June 2021
Emergency Community Activities Restrictions Enforcement (PPKM)	8–25 July 2021
Community Activities Restrictions Enforcement (PPKM) extended for level 3 and 4 areas	26 July–2 August 2021

2.2.2. Descriptive Analysis

Descriptive analysis is summarizing or quantitatively describing the variables from the data set, the variable is the column in the dataset (Pramana et al., 2017). Descriptive analysis can also be said to look at the characteristics of a variable to explain the data. In this study, descriptive analysis methods were used, including looking at the distribution of data by using the number and average, trend data.

3. Result and Analysis

3.1. Data Preprocessing

By combining all the data from the scraping from August 2021 to January 2022, raw data is obtained from as many as 1,276,462 rows and 26 columns. Then the next step is that researchers filter data according to DKI Jakarta province, obtaining as many as 375,232 rows of data. To eliminate duplicate data, check the "property_id" variable, which is a unique type of variable for each ad impression. Obtained as many as 156.632 rows of data after the data duplication checking process.

The next stage is re-coding the name of the sub-district in the "subdistrict" variable in which the researcher re-codes to see the sub-district area from which the advertising is shown, for example there is data that is planted not by sub-district but by place in the area, for example the Blok M area. The researcher replaced it with the name of the sub-district where Blok M was in the Kebayoran Baru sub-district and the researcher checked all the data and so on as many as 296 unique data in the "subdistrict" variable. The data is filtered again with the condition of advertising serving that airs in 2020 and 2021, which is where at the beginning of the pandemic and post-pandemic, the results of this data filtration are 35,155 rows of data.

After that, the researcher divided the data into 7 types of property categories including houses, apartments, land, warehouses, business spaces, offices, and factories to eliminate outlier data related to the price of each property type and then gave new categorical attributes for prices by making quantiles of each property type. From the above categories, data obtained are 7,556 rows of house data, 5,846 rows of apartment data, 4,536 rows of land data, 3,833 rows of warehouse data, 2,818 rows of business space data, 3,272 rows of office data, 6,538 rows of shophouse data, and 258 rows of factory data with a total a total of 35,155 rows of data for dashboard visualization.

After re-coding the sub-districts, the date is filtered from 2020 to 2021, then the data is filtered again, which is only sales data. After that, the researcher examined the unnatural data based on the 3 categories mentioned in Chapter 2 and obtained 1,309 house sales data and 2,026 apartment sales data.

3.2. Result Descriptive Analysis

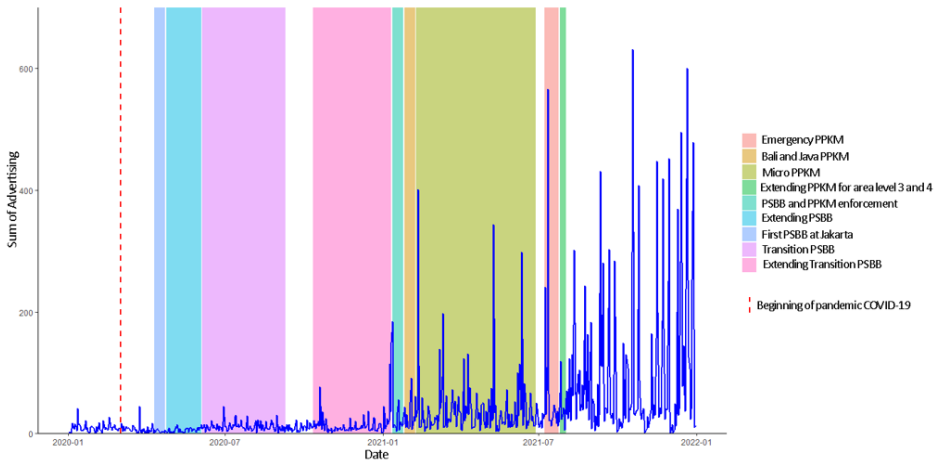

Figure 3: Number of Property Advertising Impression During the Pandemic COVID-19

3.2.1. Descriptive Analysis Number Advertising Property Offer

First Indonesia large-scale social restrictions (PSBB) in Jakarta (10–23 April 2020)

On April 10 to April 23, 2020, which is related to the Indonesia large-scale social restrictions (PSBB) policy, which was first carried out in DKI Jakarta province, which looks like the picture above, the number of advertising offers that occurred

was still small when compared to sales on other policy dates. Reporting to the news site Kompas.com, at the beginning of the pandemic, many developers planned to develop digital marketing immediately for survival tactics in the midst of the COVID-19 pandemic. If developers continue to carry out sales activities and do not choose to stop production, then the results of the Indonesia large-scale social restrictions (PSBB) will be felt after being revoked by the government. It's like a company or property developer is aware of the effect and then spends land on a new project for later when this pandemic crisis has passed.

Continued Indonesia large-scale social restrictions (PSBB) (24 April–4 June 2020)

Furthermore, from April 24 to June 4, 2020, it looks like the picture, the trend of bidding on the rumah123.com property site advertising continues to increase until early June 2020. It can also be seen from the picture that there is a fairly consistent and seasonal increase every week in May 2020

Indonesia large-scale social restrictions (PSBB) Transition (5 June–10 September 2020)

It can be seen from the graph of property advertising impressions during the transitional Indonesia large-scale social restrictions (PSBB) period, it is said to be quite constant every month, where there is a fairly high spike at the end of June 2020, and every month there is a spike as well as in July, August, and September 2020. The increase is quite high available on July 16, 2020, which is up to 49 advertising offers

Indonesia large-scale social restrictions (PSBB) Continued transition, weak cases (12 October 2020 – 11 January 2021)

During the Continued Transition Indonesia large-scale social restrictions (PSBB), the number of offers increased at the beginning of the policy, namely at the end of October 2020. On October 20 and October 24, the highest increase occurred, reaching 103 and 120 the number of advertising offers that occurred. Then continued the number of offers which were quite constant thereafter until the end of the Indonesia large-scale social restrictions (PSBB) Continued Transition policy period, namely at the beginning of January 2021 there was an increase again until the total was 90 offers.

Indonesia large-scale social restrictions (PSBB) and implementation of Community Activities Restrictions Enforcement (PPKM) (11–25 January 2021)

In the next policy, the implementation of Community Activities Restrictions Enforcement (PPKM) throughout Indonesia as well as Indonesia large-scale social restrictions (PSBB) is being extended. The resulting trend is that it is getting higher at the beginning of the policy, when compared to the number of offers in

previous policies, the highest number of offers is during the Indonesia large-scale social restrictions (PSBB) policy period in early 2021.

Community Activities Restrictions Enforcement (PPKM) Java and Bali Island (26 January–8 February 2021)

In the Java and Bali Community Activities Restrictions Enforcement (PPKM) policy, it can be seen that there is an up and down pattern of sales, but in early February 2021 there was a significant increase and at the end of Java and Bali Community Activities Restrictions Enforcement (PPKM) it rose again.

Micro Community Activities Restrictions Enforcement (PPKM) (9 February–28 June 2021)

Community Activities Restrictions Enforcement (PPKM) with a micro scale is very influential when viewed from the picture of this advertising offer trend. The number of advertising offers was up to 456 impressions. In mid-February, May, and June the number of offers increased significantly. In addition, in February the Governor Regulation No. 118/2020 concerning Space Utilization Permits which contain policies for accelerating and simplifying property licensing

Emergency Community Activities Restrictions Enforcement (PPKM) (8–25 July 2021)

At the beginning of this policy, there was a very high increase to more than 600 property ad offers on July 12, 2021, of which the highest number of ad impressions was during the Emergency Community Activities Restrictions Enforcement (PPKM) period. Then it decreases the next day until it is constant until the end of the policy

Community Activities Restrictions Enforcement (PPKM) extended for level 3 and 4 regions (26 July–2 August 2021)

On 27 July 2021 there was a considerable increase then at the end of the policy it decreased and on 2 August 2021 it increased again

3.2.2. Descriptive Analysis Price per Property Type

Apartment

The median apartment price trend on data from the rumah123.com property site showed the highest figure in February 2020, which was Rp10,671 million per m^2 and the second highest in February 2021 at Rp9.438 Million per m^2. Then the trend saw a very significant decline, namely in March and April 2020, when the COVID-19 pandemic occurred in Indonesia. Then in May and June 2020 prices rose again and again decreased until the end of 2020 when the transitional

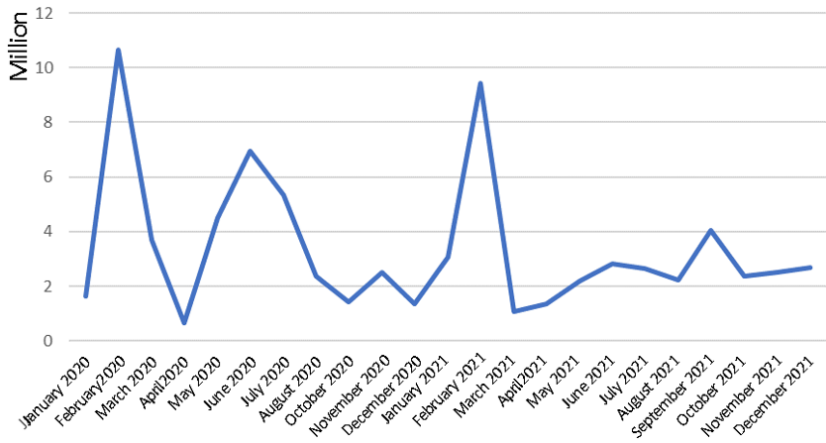

Figure 4: Trends in Median Apartment Prices During the Pandemic

Indonesia large-scale social restrictions (PSBB) policy was carried out and the weak case of COVID-19 until early 2021 experienced a significant increase in the median price, then until January 2021 it rose again which where the transitional Indonesia large-scale social restrictions (PSBB) policy ends and continues with the Micro Community Activities Restrictions Enforcement (PPKM) policy.

It is observed that the trend of apartment prices experiences ups and downs, from April 2021 to August 2021, which ranges between Rp1.37 million per m^2 2.809 million per m^2, then experienced a fairly high increase in September 2021 and returned to a fairly constant price until the end of 2021.

House

For the median price for the type of home property, the trend shows that from the beginning of 2020 to the end of 2021 it tends to continue to decline even though in certain months the median price of home property tries to rise again like in October 2020, during which the transitional Indonesia large-scale social restrictions (PSBB) policy was carried out, then back down in the following months. The median house price ranges between Rp1,877–Rp6.8 Million per m^2. However, in 2020 the median house price is different from 2021, in 2021 prices tend to experience constant increases and decreases than in 2020

Land

The median price trend based on Figure 14 shows that at the beginning of the first COVID-19 case in Indonesia, in February 2020, the median land price rose significantly, then in December or the end of 2020 it increased again which

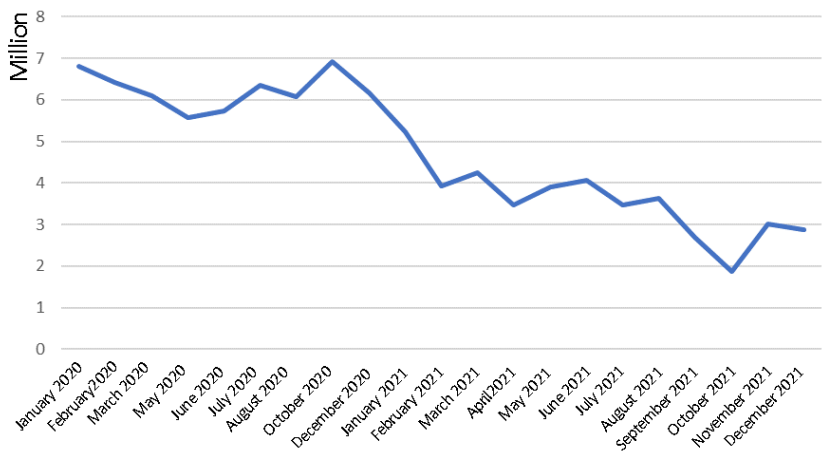

Figure 5: Trends in Median House Prices During the Pandemic

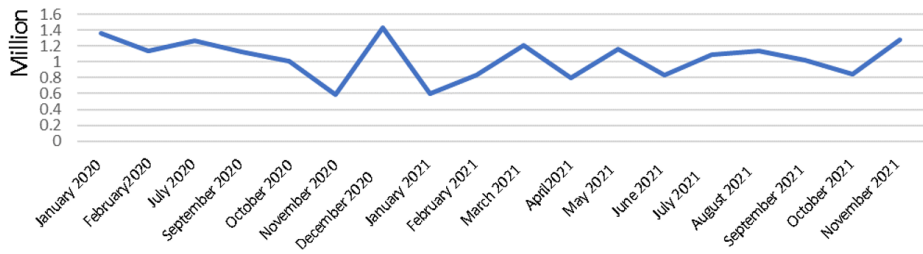

Figure 6: Trends in Median Land Prices During the Pandemic

resulted in the highest median land price, namely of Rp1.431 million per m^2 and further shows a constant up and down price trend until the end of 2021.

Warehouse

The warehouse property type also shows a downward price trend in February 2020 when viewed from the price trend. Then, until 2021 again, prices will rise and fall and are constant until the end of the year.

Office

The office property type also experienced a constant price from the beginning of 2020 to the end of 2021. If you look at the trend in March 2020 there was a fairly high decline, namely from Rp1.1 Million m^2 up to Rp794 thousand per m^2.

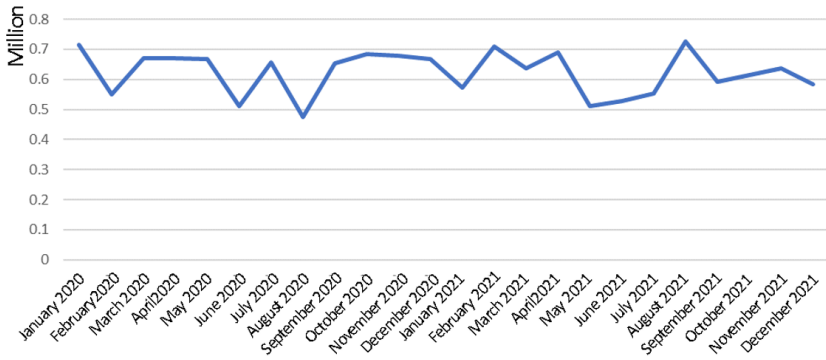

Figure 7: Trends in Median Warehouse Prices During the Pandemic

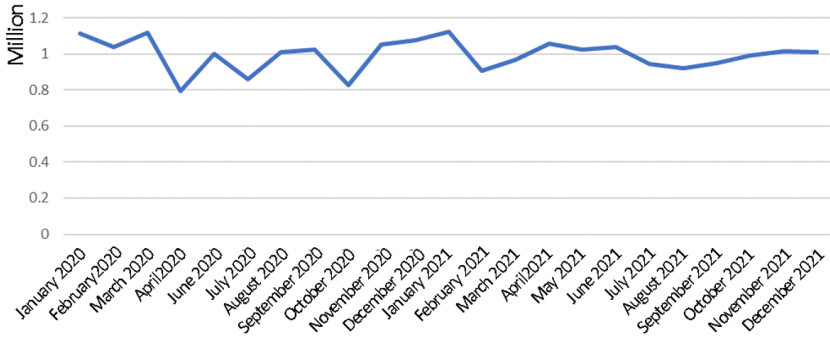

Figure 8: Trends in Median Office Prices During the Pandemic

Factory

For factory property types, the median trend of constant prices from the beginning of 2020 to the end of 2021 is around Rp2.15 Million per m^2 to Rp3.15 Million per m^2. However, in the factory property type, there is a lot of data that doesn't exist every month, so a lot is missed

Business Room

In the type of business space property, the price trend experienced a very high increase in April 2020, which was Rp3.63 Million per m^2 then dropped significantly in the following month. At the end of 2020 there was also a fairly high price increase which resulted in the easing of policies.

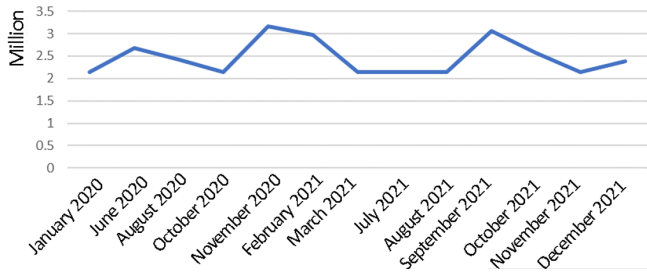

Figure 9: Trends in Median Factory Prices During the Pandemic

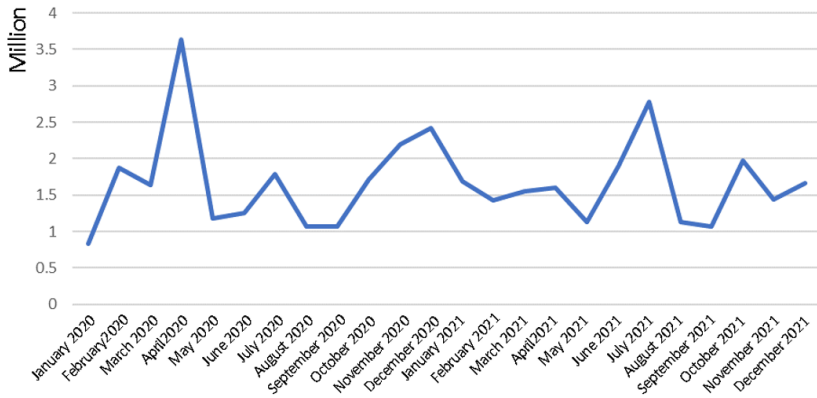

Figure 10: Trends in Median Business Room Prices During the Pandemic

Shop

For shop-house property types from early 2020 until the 2nd quarter of 2020 the median price increased and decreased until it experienced a very significant decline in August 2020 and rose again the following month and reached the highest median price in October 2020, which was Rp6.8 million per m^2, then until the end of 2021 the median price shows a constant number.

4. Conclusion and Implication

Based on the results and discussion in this study, there are several conclusions that can be concluded including conditions for the number and price of advertising impressions on property sites resulting in the condition of advertising serving during the pandemic was very influential, which was the highest serving during the Micro Indonesia large-scale social restrictions (PSBB). Then for the condition of property prices during the pandemic, many of the property types showed a

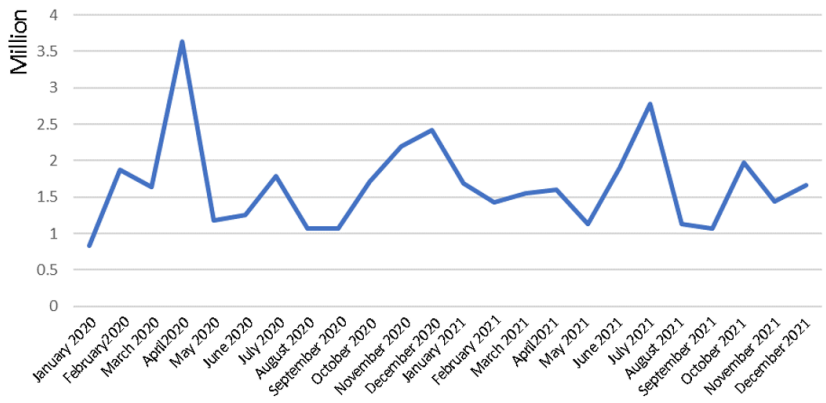

Figure 11: Trends in Median Shop Prices During the Pandemic

constant median price in 2021, and had an up and down trend in 2020. Sales of primary residential properties in the second quarter of 2021 show a decline on an annual basis. Proved also in the press release that house sales during this period contracted -10.01% (yoy), down from 13.956% (yoy) in the previous quarter, but better than the -25.6% (yoy) contraction in quarter II-2020. The decline in sales volume in the second quarter of 2021 occurred in small (-15.4%, yoy) and large (-12.99%, yoy) house types, while medium-sized house types recorded slower growth (3.63%, yoy) (Christiani et al., 2014).

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