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Research Article

THE IMPACT OF THE COVID-2019 ON MINING EXPORT REVENUE IN TURKEY

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ABSTRACT

The Coronavirus (Covid-19) global pandemic has not only affected people health, but it has also wreaked the global economy and it has the potential to destroy industries and entire economies. Economic effects have shown themselves all over the world as well as in Turkey. But, the mining sector has not been effected by this pandemic according to other industries. In this study, The mining export sector was investigated and the Covid 19 effect of whether or not has been examined in the sector. In addition, In the event that the covid 19 pandemic continues, its impacts on the mining export industry were estimated by time series. Understanding these impacts, and forecasting is important for the sector. Because this study will lead the way for sector representatives so they will be able to plan the measures to be taken.

Keywords: *Covid 19, mining export, economic impact, Turkey*

INTRODUCTION

The coronavirus, which became a global epidemic weeks after it started in Wuhan, China, has been seen in nearly 176 countries worldwide and as of March 2022, the number of dead in coronavirus has exceeded nearly 6 million. With the global epidemic, countries have taken many measures, such as closing schools, shopping malls, and quarantine practices. Measures were taken together caused economic stagnations and all sectors were affected by this situation. Especially; Sector which has collective action such as tourism, airline, transportation, education, the restaurant has come to a standstill and many sectors. These sectors have shown an economic downward trend. If the pandemic continues, the effects that will start with layoffs will continue in the form of firm bankruptcies. Even if the epidemic is stopped, it is thought that economic recovery will take a long time.

Many researchers have studied how different sectors are affected by Covid 19 in different countries. Laing [1] was investigated the economic impact of the Covid-2019 on the mining industry. His study shows that reduction in demand caused dramatic falls in the prices of a range of metals and minerals across March and April 2020. Dinarto et al [2] were investigated the effect of COVID-19 impact on Bintan's tourism sector. Their study indicated the outbreak impacted Bintan Island, the fourth most visited tourist destination, especially from China. Brewin [3] evaluated COVID- 19 impact on

the production of grains and oilseeds in Canada. His study shows that estimates of grain and oilseed production and prices suggest a near- normal year for production. Jain [4] indicated that people will still be avoiding ordering food or dining out for a long time to come though corona disappeared. He was surveyed on 10346 respondents via Twitter. Their reactions showed that 53% of the respondents people saying no to ordering food while 13 % said that they may order and the rest 34% said they will continue to order food. He emphasized that the service industry has some problems because of Covid 19 effects. Nasseh and Vujicic [5] evaluated the effects of the COVID-19 pandemic on the US dental care industry. Their modeling predicted that U.S. dental care spending could decline by up to 66 percent in 2020 and 32 percent in 2021. Hoque et all [6] focused on measuring the impact of the occurrence of coronavirus on the tourism industry in China. The research showed that the occurrence of Coronavirus in China has significant impacts all across the globe and the Coronavirus is being thought to cause a long-term impact on the tourism industry of the country China. Hart et all [7] estimated the COVID-19 outbreak's revenue impacts on some of Iowa's largest agricultural industries. They estimated overall annual damages for corn, soybean, ethanol, fed cattle, calves and feeder cattle, and hogs.

The mining industry has an important place in Turkey. Especially the export made within the mining sector has an important place in the country's economy. With this study, exports in the mining sector were examined and the effect of covid 19 was evaluated. In addition, in the event that the covid 19 pandemic continues, the impact on the sector was estimated by the time series.

MATERIALS AND METHODS

Exponential Smoothing

The sequence of numbers obtained by the observation results based on time is called the time series. The time series review covers the estimation processes that are carried out by arranging the observation results on the subject, taking into account a certain time period (day, week, month, year, etc.) [8]. Import and export values by year, monthly sales of a business, weekly or daily cash inflows in a business, prices in the stock exchange can be expressed as a time series [9].

There are many methods used in the analysis of time series. Some of those; simple average, moving average methods, exponential smoothing, can be expressed as Holt-Winters methods. Brown [10] and Holt [11] developed exponential smoothing. Exponential smoothing is a predicting method that weights the time series data.

The exponential smoothing method is still one of the most practically used prediction methods [12]. The most important reasons for being the most used method are the method is clear, understandable, transparent, and has the ability to adapt to many different situations. Error, trend, and seasonality variables are the three main components of this method [13]. The working principle of the method is that very old observation or according to the effect of the data, the data and observations obtained recently are more important [14]. Accordingly, the exponential smoothing method uses exponentially decreasing, predominantly moving average data. Based on this basic idea, exponential smoothing improves the modeling of different components. These different components are the remaining variables, such as seasonal variations, trends, or long-term variation of the series, repetitive components in the series in detected periods, or

other unpredictable components. Components of the method are a combination of the duration and growth of the current condition.

The exponential smoothing method can be applied to all series that have both deterministic and stochastic trends. Holt Exponential Smoothing Method, one of the exponential correction methods, is a method used for the estimation of data without seasonal changes. The Holt-Winter model is used for the application of existing data at a certain weight and for the estimation of future data by evaluating the error rates of current data received in the specified range [15]. Another method is Winters Exponential Smoothing Method. This method is evaluated in the series with trends and seasonal fluctuations. The simple exponential smoothing method applies to series that have not undergone any trend or seasonal changes, only changing around an average level. The simple exponential smoothing method is a very popular, practical, and generally accepted method among smoothing techniques used to reduce changes in time series data. In this method, the data obtained depending on a time series can be handled in equal time intervals, and their order in time can be defined physically or financially [16]. It is used when there is no trend or seasonal power in demand.

Exponential smoothing is one of the time series methods and forecasting the future trend for time series data. The general form of this method is shown in Equation (1).

$$F_{t+1} = \alpha X_t + (1 - \alpha) F_t \quad (1)$$

where

F_{t+1}= prediction one period ahead

X_t = actual data at period t

F_t = prediction at period t

α= smoothing parameter ($0 < \alpha < 1$)

Implications of exponential smoothing can be seen better when equation (1) expands the Ft substitution with components. If the substitution process is repeated by replacing the F_{t-1}, F_{t-2}, and so on with its components, obtained that the weighting for X_t, X_{t-1}, and so decreases exponentially.

As a quality-control check for the model, the study employs the Goodness-of-Fit statistics that comprises R^2, Stationary R^2, RMSE, MAE.

RESULTS

This paper offers a perspective on the Covid 19 effect in mining export in Turkey. The Istanbul Mineral Exporters' Association (IMIB) [17] database has been examined export data in Turkey during the period from 2013 to 2022 (until January 2022) month by month and years by year. In addition to, export data has been divided into two categories as mineral and natural stone. In this study was used this database.

In the study, firstly, descriptive statistics of natural stone and mineral exports were obtained. The descriptive statistical analysis of the study variables is presented in Table 1.

Table 1. *Descriptive statistical analysis*

Statistic	Natural Stone	Mineral
Mean	162235774	204714567
Median	163533169	206636537
Std. Dev.	30016354.6	36519004.1
Skewness	0.022	-0.004
Kurtosis	-0.581	0.432
Kolmogrov-Smirnov	0.047	0.048
Probability	0.200	0.200
Observations	98	98
Correlation		
Natural Stone	1	0.306
Mineral	0.306	1

As can be seen in Table 1, the natural stone export revenue is 163974628 FOB $ monthly average and the average monthly mineral export revenue is 217864910 FOB $. There is a weak relationship between natural stone and mineral exports revenue (0.320). It can be said that natural stone and mineral exports revenue do not affect each other much.

Kolmogorov-Smirnov statistic of normal distribution was tested before econometric analysis to ascertain the normal distribution condition of the variables. The null hypothesis can not be rejected based on the 5% significance level for natural stone export revenue meaning that natural stones are normally distributed. However, the null hypothesis can be rejected based on the 5% significance level for mineral export revenue meaning that natural stone and mineral export value are not normally distributed Based on these data sets, the trends of the natural stone and mineral exports are shown in Figure 1.

Figure 1 shows the monthly natural stone and mineral exports between 2013-2022(until January 2022). Autocorrelation and partial autocorrelation function graph (ACF-PACF) should be examined in order to determine whether the series has a stationary structure.

In Figure 2, graphs of the autocorrelation function and partial autocorrelation function plotted for observation values are given.

When Fig. 2 is examined, it is seen that the ACF and PACF coefficient values calculated for 24 delays are within the confidence limits. This shows that the stationary condition has not deteriorated.

In this study, ETS is employed for natural stone and mineral exports revenue, to estimate the accuracy of the forecast, the study employed the goodness of fit measures such as R^2, RMSE, MAE presented in Table 3.

R^2, Stationary R^2, RMSE, MAE values of the analyzes made by estimation methods were compared to determine the appropriate model. As a result of the comparisons made, the best estimation method was chosen as the simple smoothing method. Parameter estimates of the model are given in Table 2.

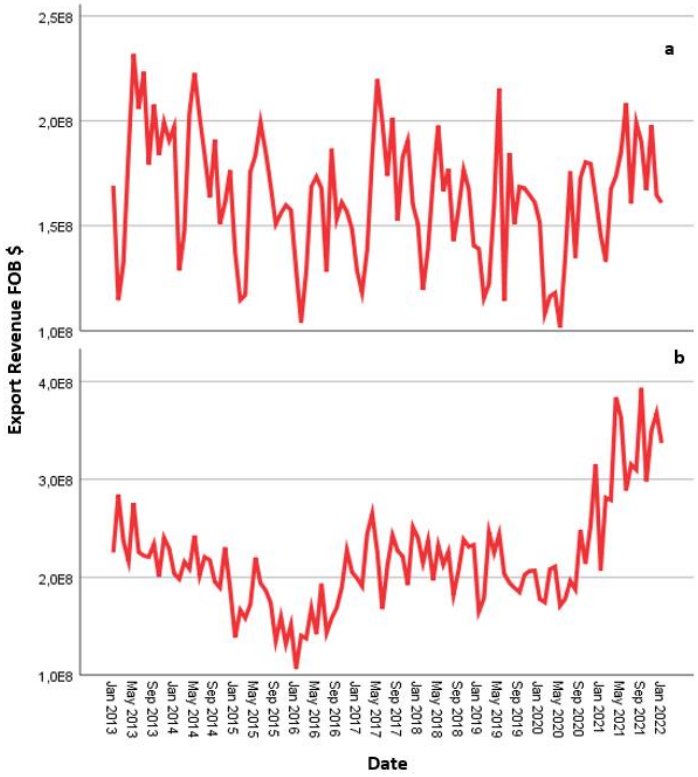

Figure 1. *Observed Natural stone export (a) and mineral exports revenue (b)*

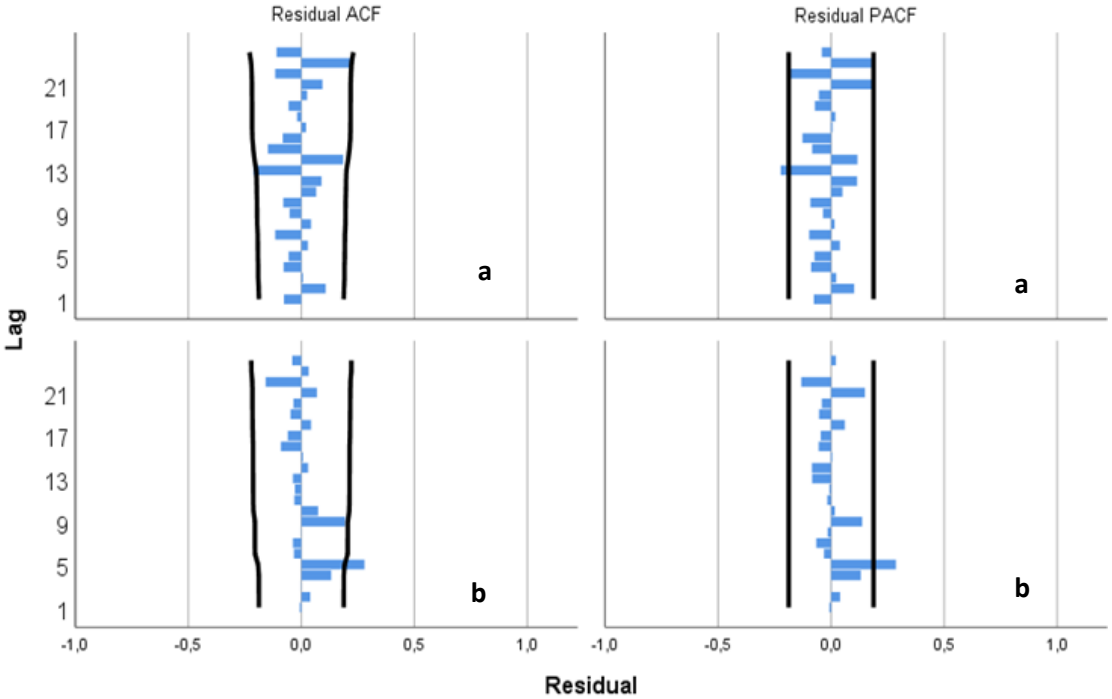

Figure 2. *ACF-PACF for natural stone (a) and mineral (b) export*

Table 2. *The ETS model analysis for natural stone and mineral export revenue*

Model Simple Seasonal	Coef.	R^2	Stationary R^2	RMSE	MAE	Ljung-Box
Natural Stone	α: 0.300 p: 0.000	0.568	0.615	19402058.72	14504212.55	21.424 p: 0.163
Mineral	α: 0.401 p: 0.000	0.720	0.583	28639206.58	21214778.94	19.160 p: 0.260

The basic assumption in simple exponential smoothing methods is that the structure observed in the past will continue in the future. Deviations from this structure are corrected with the α coefficient of the error margins, and they are included in the model and the value that minimizes the error values is determined (Benli and Yıldız, 2014: 214-218). According to the results obtained in simple exponential smoothing method, the correction coefficient for natural stone export revenues were determined as α = 0.3 and R^2 = 0.568, Stationary R^2= 0.615, RMSE = 19402058.72 and MAE = 14504212.55. For mineral export revenues, α = 0.401, R^2 = 0.720, Stationary R^2 = 0.583, RMSE = 28639206.58 and MAE = 21214778.94.

The prediction results are presented in Table 3, Table 4 and Figures 2. Evidence from Table 3 shows three scenarios (forecast, lower 95%, and higher 95%) in ETS models.

Table 3. *Forecasting for natural stone export renevues (FOB $)*

Date	Predicted	LCL	UCL
February22	127066532.93	88604214.38	165528851.49
March 22	144010039.89	103855230.89	184164848.89
April 22	180752894.49	138974102.95	222531686.03
May 22	202076701.57	158734733.93	245418669.21
June 22	187224193.67	142373498.07	232074889.27
Jully 22	186698344.38	140388047.12	233008641.64
August 222	179388009.01	131662728.82	227113289.20
September 2022	181262226.42	132162724.32	230361728.51
October 2022	179258624.58	128822329.68	229694919.47
November 2022	184926854.54	133188294.65	236665414.42
December 2022	172244656.05	119235814.19	225253497.92

Table 4. *Forecasting for mineral export renevues (FOB $)*

Date	Predicted	LCL	UCL
February22	330517357.61	273743470.75	387291244.46
March 22	345487662.82	284324098.36	406651227.27
April 22	354848712.30	289590080.65	420107343.95
May 22	362530285.48	293418807.47	431641763.50
June 22	334563693.17	261803100.95	407324285.40
Jully 22	340309245.08	264074009.33	416544480.82
August 222	336397444.83	256839173.37	415955716.28
September 2022	348679623.03	265931656.62	431427589.44
October 2022	340015304.49	254196114.72	425834494.26
November 2022	356567405.46	267783168.57	445351642.36
December 2022	366160574.32	274507161.35	457813987.30

Figure 3 represents the forecasts from the ETS model. For brevity, only the forecast in both models will be discussed.

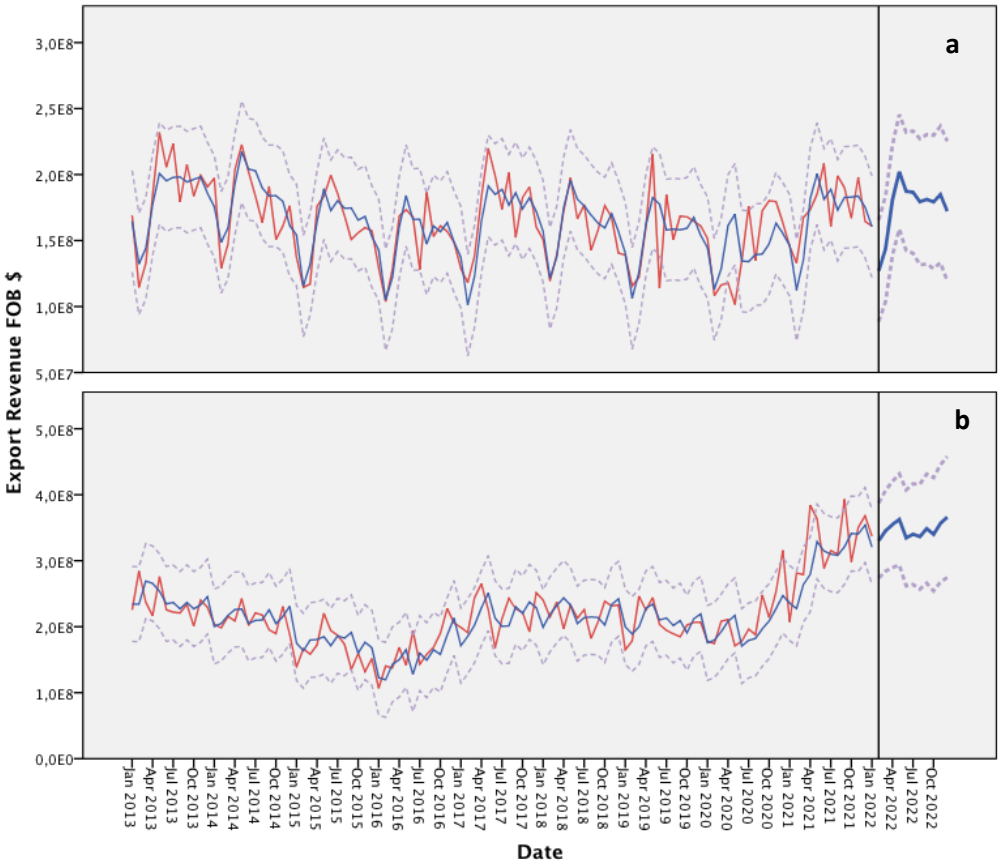

Figure 3. *Forecasts from ETS for natural stone and (a) mineral exports (b) Revenue*

In 2020 and 2021; While natural stone export revenue is approximately 1.7 million and 2 million FOB$; mineral export revenue is approximately 2.5 million and 3.82 million FOB$, respectively. According to forecasting in 2022; While natural stone export revenue is approximately 2 million FOB$; mineral export revenue is approximately 4.2 million FOB$.

DISCUSSION

In this study, we aimed to investigate the effect of Covid-19 on the natural stone and mineral exports in Turkey. For this purpose, natural stone and mineral exports data set of Turkey were obtained from Istanbul Mineral Exporters' Association (IMIB) for the period 2013-2022 (until January) monthly data. Natural stone and mineral exports were estimated for the 2022-February-2022-December period by analyzing the time series. natural stone mineral export revenues increased in 2021 compared to 2020. With the predictions made in 2022; It is anticipated that this increase will continue. this shows that the mining industry is not affected by Covid 19 in terms of income. Due to the demand in the supply chain, the sector's revenues were slightly affected for a period and then showed a tendency to recover again.

The findings indicated that the Covid 19 pandemic has not to affect negatively affected natural stone and mineral export revenues. Here, all authorities have a key role to play: by providing financial, health, and policy, they can decrease of economic effects of Covid 19.

In sum, according to the time series analysis results, the covid 19 pandemic will eventually lower economical levels in all countries. Therefore, policymakers and authorized institutions focusing on economical issues should absolutely put emphasis on innovative ideas and technological progress. Although it seems that the mining sector is not affected much, it should not be forgotten that this is due to the fact that mines are the basis of the industry.

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