Covid-19 Pandemisinin Ambarlı Limanının Konteyner Elleçlenmesine Etkisi ve Geleceğe Yönelik Bir Tahminleme Analizi

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ÖZ:

COVID-19 Pandemisi nedeniyle artan küresel ekonomik kriz, büyüme beklenen deniz ticaretini de derinden etkilemektedir. United Nations Conference on Trade and Development'a göre, COVID-19 pandemisi 2020'de deniz ticaretinde yüzde 4,1 düşüşe neden olmuştur. COVID-19 Pandemisi küresel ölçekte, tüm yük gruplarında sefer iptallerinde artışlara neden olurken düşen konteyner taleplerini beraberinde getirmiştir. Konteyner taşımacılığındaki olumsuz etkiler konteyner limanlarına da yansımış, konteyner limanlarının yük elleçleme miktarlarında düşüşler yaşanmıştır. COVID 19 etkisini ile konteyner küresel yük operatörlerinin finans sorunları artış göstermiştir. Türkiye'de elleçlenen tüm TEU'larda düşüş olmasına rağmen, 10 yıl üst üste Türkiye'de elleçlenen TEU'lar açısından en büyük liman Ambarlı liman olmuştur. Bu nedenle bu çalışmada; analiz konusu olarak COVID-19 Pandemisinin etkisinin incelenmesinde Ambarlı Limanı seçilmiştir. Çalışmada analiz yöntemi olarak, Tek Üstel Düzleştirme Yöntemi kullanılmıştır. Makalede konteyner taşımacılığının önemi nedeniyle, sürekli değişen rekabet ortamında Türkiye'nin konteyner elleçlemesinde önemli bir yeri olan Ambarlı limanının konteyner taşımacılığı açısından geleceğe yönelik bir tahminleme analizi gerçekleştirilmiş, uygulanan analizle ve analiz dönemi olan gelecek beş yıl içinde konteyner elleçlemesinde önemli seviyede bir artış ya da azalışın olmayacağı tespit edilmiştir.

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ANAHTAR KELİMELER: Denizyolu taşımacılığı, Denizyolu ticareti, Konteyner taşımacılığı, Ambarlı limanı, COVID-19 Pandemisi

ABSTRACT:

The global economic crisis that increased due to the COVID-19 Pandemic which deeply affects maritime trade, is expected to grow. According to the United Nations Conference on Trade and Development, the COVID-19 pandemic caused a 4.1 percent decline in maritime trade in 2020. While the COVID-19 Pandemic caused increases in flight cancellations in all cargo groups on a global scale, it brought along falling container demands. The negative effects in container transportation were also reflected in the container ports, and there was a decrease in the amount of cargo handling at the container ports. With the impact of COVID 19, the financial problems of container global freight operators have increased. Despite the decrease in all TEUs handled in Turkey, Ambarlı has been the largest port in terms of TEUs handled in Turkey for the last 10 consecutive years. Therefore, in this study, Ambarlı Port has been chosen for analysis in examining the impact of the COVID-19 Pandemic. The Single Exponential Smoothing Method has been used as the analysis method in the study. In this article, due to the importance of container transportation, a future estimation analysis has been carried out in terms of container transportation of Ambarlı port, which has an important place in container handling in Turkey in a constantly changing competitive environment. As a result, there will not be any significant change in TEUs handled by Ambarlı Port in next years.

KEYWORDS: Maritime transportation, Maritime trade, Container transportation, Ambarlı Port, COVID-19 Pandemic

INTRODUCTION

The most important factor for maritime container transportation to be chosen is enabling door-to-door transportation and by enabling this opportunity, it is important that container transportation provides effective transitions between transportation modes. Besides of this advantage of maritime transportation, less transportation costs and less negative effects to the nature can be stated as the other advantages of maritime transportation.

Maritime ports are the first and last points of maritime transportation. Therefore, they have great importance. COVID-19 pandemics has effected container transportation as much as many other sectors. As can be seen in Figure 1, global TEU numbers have been dramatically decreased in 2020.

Figure 1. Global Container Trade Volumes in million TEUs, between January 2013-February 2020, (OECD,2020)

When container transportation in Turkey has been considered in terms of maritime ports; it can be seen easily that Ambarlı Port has a special importance. According to the data of Ambarlı Port in 2020; while it ranks first with the highest amount of container handling and it ranks 7th among the top 10 ports with the highest amount of cargo handling among Turkish maritime ports (UAB General Directorate of Maritime Affairs, 2021). Whether there is a change in the amount of cargo handled in terms of container transportation and to make a prediction for the future, Ambarlı port, that the importance for Turkey mentioned earlier, has been chosen to analyze.

Ambarlı Port, located on the European shores of the Sea of Marmara, 34 km away from Istanbul is one of the fastest growing private container port regions in Turkey handles the rising volume of exports and imports (Kaynak & Zeybek, 2007).

Ambarlı Port is the largest container port in Istanbul. In terms of capacity, it is suitable for handling of large cargo ships. As it is used to transfer cargo to the ports of the countries located in the Black Sea, the cargo shipment to the ports in the continents and regions such as the Middle East, Europe and America is made from the Port of Ambarlı (Ambarlı Limanı, 2021). The port administrative area of Ambarlı Port Authority is the sea and coastal area within the line formed by the following coordinates (Resmi Gazete, 2012).

a) 41º 02´ 54" N – 028º 24´ 00" E (Güvercinlik Cape)

b) 40º 43´ 30" N – 028º 24´ 00" E

c) 40º 43´ 30" N – 028º 43´ 24" E

d) 40º 58´ 18" N – 028º 43´ 24" E (Kefaldalyan Cape)

The fact that 72 of the 276 organized industrial zones operating in Turkey are located in the Marmara Region contributes to the demand for port services in the region and thus to its development. For this reason, Ambarlı Port Authority is one of the busiest port authorities in Turkey in terms of freight traffic (DARGEB, 2021). As can be seen from Figure 2; Ambarlı region includes Marport, Kumport, Altaş, Total Oil, Mardaş, Akçansa and Arpas (Shortsea, n.t.).

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Figure 2. Facilities Directly Related to Ambarlı Port

United Nations Conference on Trade and Development is stated that maritime trade will recover with a growth of 4.8% in 2021 (UNCTAD, 2020). Container transportation, which is integrated with all transportation sectors, will maintain its importance in the future in terms of ensuring the continuity of global trade and product movement in the next period with the pandemic process. In this context, there is a prediction that the role of Ambarlı port, which is in the first place in container transportation in Turkey and in the top 20 among European ports, will come to the fore both in the national and international arena. As in other ports, various measures have been taken to protect citizens from the coronavirus spreading from China to the world in Ambarlı port.

Current Cargo Handling in Turkey

During the period from 2010 to the third quarter of 2020, the cargoes handled at Turkish ports have increased in terms of TEU over the years. While the TEU handled in 2010 was 5.743.455, it increased by 102% in 2019 to 11.591.838 and 11.626.650 in 2020 (UAB, General Directorate of Maritime Affairs Data, 2021).

In 2020, the amount of cargo handled at ports of Turkey increased by 2.6% compared to the previous year and amounted to 496 million 642 thousand 652 tons. Although there was a decrease in the second quarter of this year compared to the same quarter of the previous year due to the COVID-19 global epidemic measures that started in March, ports of Turkey renewed the record by increasing their handling amounts by approximately 12.5 million tons in total this year compared to the previous year (UAB, General Directorate of Maritime Affairs Data, 2020).

In 2020, the number of containers handled at ports of Turkey increased by 0.3% compared to the previous year and amounted to 11.626.650 TEU. According to Clarksons', a 4% decrease is expected in world container transport in 2020. In the light of this information, Turkey's container transportation has performed better than the world container transportation despite the COVID19 global epidemic (UAB, General Directorate of Maritime Affairs Data, 2021).

Importance of Ambarlı Port in Turkey Container Transportation

Marport, which is part of Ambarlı Port Authority, is the most important port for container transportation both in the country and the region. Having a handling capacity of 2.4 million TEU, the port handled 1.7 million TEU containers in 2017 with a performance of 71%. In addition, Marport has a 17% share in the country and 27% in the region. Kumport, which is located in Ambarlı Port Authority, is followed by Marport. The port, which has a handling capacity of 2.1 million TEU, handled over 1 million TEU containers in 2017 with a performance of 51%. Kumport is the second most important port in the region with a market share of 11% across the country and 17% in the region (Can and Karabıyık, 2018).

As shown in Table 1; 99% of the total container handling in 2020 was carried out by the top 10 ports. The facilities connected to Kocaeli Port, which is of great importance for Turkey, carried out 15% of all handling in tons in 2020. Ambarlı Port, which ranks first, carried out 25% of the container handling (UAB, General Directorate of Maritime Affairs Data, 2021).

Ambarlı Port have been the biggest port in terms of TEUs handled in Turkey for consecutive 10 years even though the effect of COVID 10 pandemic such as decrease in the last two years.

Table 1. Top 10 ports by Container Number (2020)

Ranking	Port	Total Handling (TEU)	Ratio in Total Handling	Change Compared to Previous Year (%)
1	Ambarlı	2888	25 (%)	-7 (%)
2	Mersin	1949	17 (%)	5 (%)
3	Kocaeli	1801	15(%)	5 (%)
4	Tekirdağ	1444	12 (%)	2 (%)
5	Aliağa	1276	11 (%)	13 (%)
6	Gemlik	843	7 (%)	-2 (%)
7	İskenderun	711	6 (%)	4 (%)
8	İzmir	436	4 (%)	-19 (%)
9	Antalya	109	1 (%)	-27 (%)
10	Samsun	106	1 (%)	58 (%)
Total		11562	99 (%)	0,3 (%)
	Other Ports	64	1 (%)	-7,6 (%)
Total Handling		11626	100	0,3 (%)

When container handling in Port Authorities is evaluated as export, import, cabotage and transit; Ambarlı Port Authority is in the first place, Mersin is in the second place, then Kocaeli Port Authority and Tekirdağ and Aliağa follow.
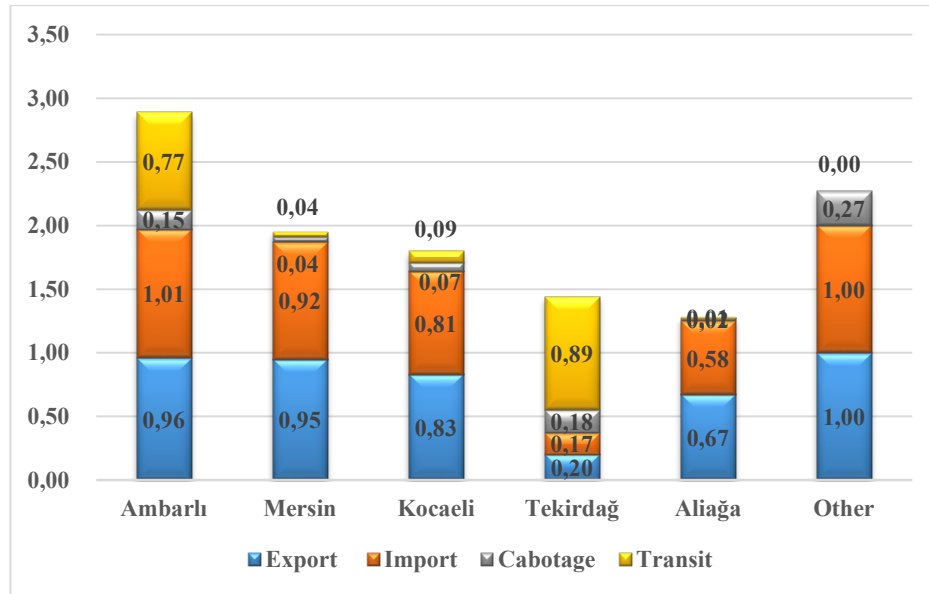
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Figure 3. Top 5 Port Authority with the Most Container Handling, 2020

Ambarlı Port, which is in the fifth place in terms of cargo transportation, is Turkey's largest port in terms of container transportation. In 2020, a total of 2.887.807 TEU container handling was carried out at the port facilities operating within the administrative borders of Ambarlı Port Authority. 1.969.078 TEU (68.2%) of the containers handled at the port facilities within the administrative borders of Ambarlı Port Authority are the containers transported in foreign trade, 765.923 TEU (26.5%) transit cargoes and 152.806 TEUs. The TEU (5.3%) consists of the loads carried in cabotage.

Therefore, Ambarlı Port can be considered as the most important port for container handling in Turkey and it is important to keep an eye on the evolution of container handling in Ambarlı Port. For this purpose, for the next five years, TEU handling of Ambarlı Port has been forecasted by using Single Exponential Smoothing method in this paper.

1. Literature Review

Forecasting has always been in the center of attention by practitioners and academic researchers. As a result of this interest by the academia, forecasting studies can be found in the literature across various sectors such as logistics, supply chain management, health and tourism. Especially demand forecasting can be stated as the one of the most popular forecasting topics as it is critically important for companies. This study also deals with the forecasting of container handling on Ambarlı Port basis.

The transportation industry and trade stand out as areas where forecasting is critically important and forecasting methods are widely used. Bal and Çalışır (2018) estimated the number of import and export containers in Turkey using the Arima method. Seabrooke et al. (2003) estimated demand for the port of Hong Kong using regression and concluded that the demand for maritime transport will increase at a decreasing rate. Özdeşer and Ertaç (2010) tried to estimate Turkey's commercial potential with European Union countries with panel data analysis. Sandalcılar (2012) estimated the commercial potential of Turkey with the BRICS (Brazil, Russia, India, China and Republic of South Africa) countries using the panel gravity model approach. Using the panel shooting model to examine Turkey's dried fig export potential, Işın (2017) estimated which countries were exported more than or less than the potential. Chen and Chen (2010) estimated the container exit quantities of the ports in Taiwan using genetic programming, decomposition approach and SARIMA methods, showed that the genetic programming method gave better estimation results and predicted that the

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container exits from Taiwan's important ports will decrease and increase. Farhan and Ong (2018) estimated container exits at international ports using the SARIMA method with a seasonal approach. Gökkuş et al. (2017) estimated the container traffic in the ports of Istanbul, Izmir and Mersin with four different methods and showed that in 2023, the container traffic will increase to 60%, 67% and 95%, respectively, in these ports. Huang et al. (2015) used a hybrid method consisting of projection tracking regression and genetic programming methods to predict container exit at Qingdao Port and found that this model outperforms artificial neural networks, SARIMA and projection tracking regression models. Min and Ha (2014) estimated the container handling levels of ports in Korea with the SARIMA model. Forecasting studies have also been found important and widely used in other sectors such as the trade and transportation sector. One of the sectors where accurate estimation is of critical importance is the tourism sector. Soysal and Ömürgönülşen (2010) estimated the number of domestic and foreign tourists for 2008 based on the data between 2000 and 2007. Karahan (2015) has shown with an application that the artificial neural network method can also be used in the estimation of the number of tourists in the tourism sector. In another study conducted in the field of health, another sector in which estimation studies are important, demand estimation was made based on the actual data of a hospital between the years 2010-2014 in the health sector, where the purchase of medical supplies is the main cost item (Özüdoğru & Görener, 2015). Özdemir (2021), has proposed an Artificial Neural Network model to estimate the container handling in Turkish Ports. Lertthaitrakul et al. (2021), have compared exponential smoothing and ARIMA methods by forecasting the volume of outbound containers of The Bangkok Port. Darendeli et al. (2020) have used Machine Learning methods to forecast the container demands in Turkish Ports.

It is seen that many different methods are used in estimation studies. Single Exponential Smoothing is one of the most widely used among these methods. In this study, Single Exponential Smoothing method was used. In the literature, Tüzemen and Yıldız (2018) estimated the cement production in Turkey in 2017, 2018 and 2019 based on the data for the years 2000-2016 with the single exponential smoothing method. Uçakkuş and Koçyiğit (2019) estimated the use of surgical gauze in a hospital in Ankara based on historical data using the single exponential smoothing method. Yiğit (2016), who also forecasted the demand for medical supplies in hospitals by using the single exponential smoothing method.

2. Methodology

In this paper, Single Exponential Smoothing method has been used. In the Single Exponential Smoothing method, the most recent observation value in the data pattern is given the highest weight, and the previous observation values are given a decreasing weight. The aim here is to correct the historical data with a mathematical method in order to reduce the randomness. In the single exponential smoothing technique, the estimation is calculated as follows:

$$S_{t+1} = \alpha D_t + (1 - \alpha)S_t \qquad (1)$$

Where:

S_{t+1}: Forecast value of next period

α: Smoothing weighting factor

D_t: Demand for period t

S_t: Forecast value for period t

To illustrate, by using two different weighting factors such as 0.5 and 1 TEUs for Ambarlı Port has been forecasted and error values has been calculated in Table 2.

Table 2. Forecasting Results for Ambarlı Port Using Different Smoothing Weighting Factor

Year	Total TEUs Handled	$\alpha = 0.5$	$⬚_i$	$\alpha = 1$	$⬚_i$
2010	2463866	2463866	0	2463866	0
2011	2624711	2463866	160845	2463866	160845
2012	3023960	2544288	479671	2624711	399249
2013	3318128	2784124	534004	3023960	294168
2014	3444925	3051126	393799	3318128	126797
2015	3061501	3248026	186524	3444925	383424
2016	2780168	3154763	374595	3061501	281333
2017	3122504	2967466	155038	2780168	342336
2018	3169535	3044985	124549	3122504	47030
2019	3104882	3107260	2377	3169535	64652
2020	2887807	3106071	218264	3104882	217075
Total			2629671		2316911

In Table 2, forecasting results for different α values and corresponding error terms can be seen. For example, to calculate the forecast for 2013 year, based on $\alpha=0.5$, TEUs handled have been forecasted by using the formula 1, such as;

$$S_{2013} = 0.5(D_{2012}) + (1 - 0.5)S_{2012}$$

Therefore, it can be calculated as;

$$S_{2013} = 0.5(3023960) + (1 - 0.5)2544288 = 2784124$$

After that, for every forecasting value, error terms have been calculated. For example, error term for 2013-year forecast has been calculated by using the formula 2:

$$⬚_{2013} = |S_{2013} - D_{2013}| \qquad (2)$$

Which is;

$$⬚_{2013} = |2784124 - 3318128| = 534004$$

Total of error terms for different weighting factors have been given in Table 2.

In the next section, analysis of Ambarlı Port has been presented and forecasted handled TEUs values for the next 3 years have been given.

3. Analysis of Ambarlı Port

Ambarlı Port is the biggest port in Turkey and located in İstanbul. Importance of Ambarlı Port for the national and local economics has always been high. More than 25% of the TEUs handled in Turkey, has been handled in Ambarlı Port consecutively 10 years.

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As it can be seen in Figure 4, TEUs handled in Ambarlı Port have raised and decreased in years but the importance of the Ambarlı Port for Turkey and İstanbul remains same, as Ambarlı Port remans as the biggest port in Turkey in terms of TEUs handled.

Figure 4. TEUs Handled in Ambarlı Port by Years
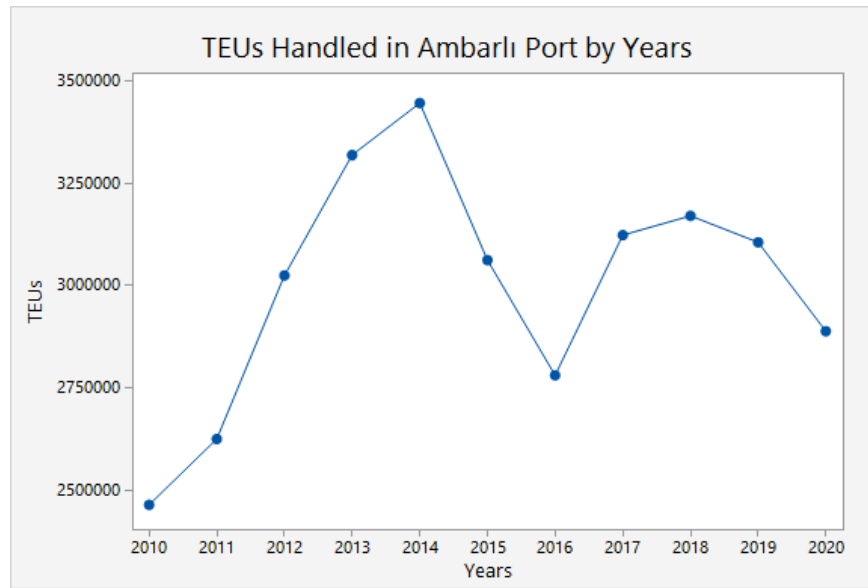
As it can be seen from Figure 3, TEUs handled in 2020 by Ambarlı Port is around 2887806 TEU it shoul be noted that COVID-19 pandemic has also affected this number. Even though there are ups and downs over the years, Ambarlı Port remains as the Turkey's most TEUs handled port which gives Ambarlı Port an enourmous importance. Therefore, it is important to keep an eye on the future possibilities for Ambarlı Port.

For this purpose, forecasting for the next five years for the handling TEUs by Ambarlı Port has been done by Single Exponential Smoothing method with using MINITAB. It should be noted that,other forecasting methods such as Weighted Moving Average, ARIMA and Holt-Winters have also been tried and Single Exponential Smoothing method gave the best result, therefore, Single Exponential Method has been used in the analysis.

Forecast for the next five years of the TEUs being handled by Ambarlı Port has been given in Figure 5. It can be seen from the forecast; trend will be remained same and there will not be a significant increase or decrease. Even though, it should be noted that the last 2 years have been affected by the COVID-19 pandemic. It is expected that, TEUs handled by Ambarlı Port will be around 3029595 TEU in average in the next five years.

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Figure 5. TEUs Handled in Ambarlı Port by Years
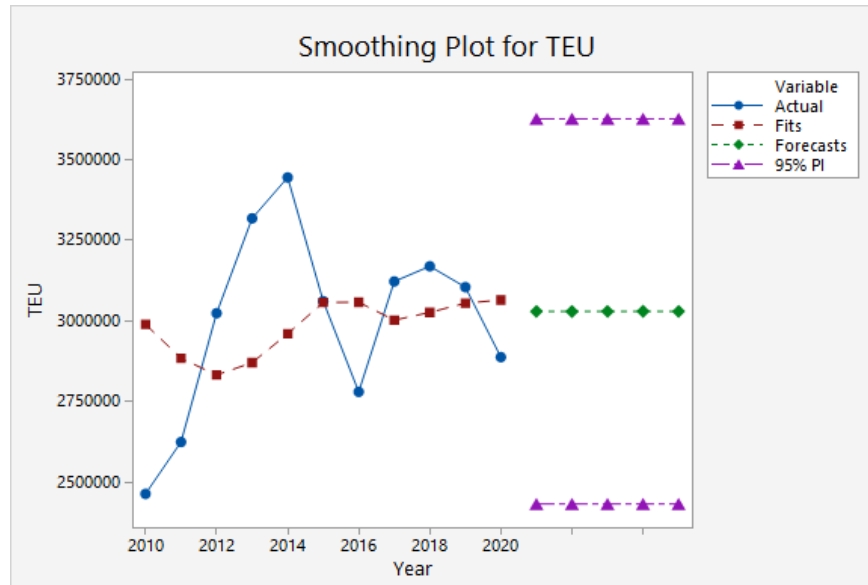
CONCLUSION

Container transportation can be seen as the backbone of international trade. Maritime transportation is the most common transportation mode in international trade. Ports are the most important elements of maritime transport. Ambarlı Port is one of the most important container ports in Turkey which leads the carriage of all TEUs around Turkey. Therefore, it is important to keep an eye on the future container handling numbers. For this purpose, handled TEUs by Ambarlı Port has been forecasted for the next five years by using Single Exponential Smoothing method in this paper. The results showed that there will not be significant increase or decrease in the next five years. Although, it is important to be able to react quickly in an unexpected situation such as COVID-19 pandemic. Results showed that, 2019 and 2020 numbers of handled TEUs by Ambarlı Port has been decreasing slightly. As another result, it is expected that, TEUs handled by Ambarlı Port will be around 3029595 TEU in average in the next five years, which is also around the average number for of TEUs carried by Ambarlı Port for the last 10 years.

In the literature, there have been several studies analyzing the effects of COVID-19 Pandemic by using forecasting methods. Based on the results in the studies can be found literature, complies with our findings which are suggesting that COVID-19 Pandemic has negative effects on international trade and container transportation but there will not be any significant decrease or increase in the next five years. Although, single exponential smoothing method has been used in this study, other methods can be used to forecast the container handling for future research. Also, the effects of COVID-19 Pandemic to the other ports can be examined and compared with the results that have been found in this study.

Compliance with the Ethical Standard

Conflict of Interest: The authors declare that there is no conflict of interest.

Ethics committee approval: Ethics committee approval is not required for this study.

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