

Investigation of the Effects of the Covid-19 Pandemic on Chartering and Brokering Activities

Covid-19 Pandemisinin Gemi Kiralama ve Brokerlik Faaliyetlerine Etkilerinin İncelenmesi

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ABSTRACT

Maritime transport is an important part of the supply chain network and logistics services in international trade. As a result of the negative situation in the economy and trade due to the Covid-19 pandemic, the maritime freight transport market was also affected. In this context, the aim of the research is to evaluate the factors that affect the general operation of ship chartering and brokerage activities and company performance due to Covid-19. In the study, a survey was applied to 141 brokers by convenience sampling method. Data were gathered between 27 January and 30 July 2021. Correlation and regression analysis were conducted by using the IBM SPSS 22 program to evaluate the questionnaires. According to the results obtained, it is seen that the variable with the highest relationship on the general operation of chartering and brokerage activities is the freight market ($p=0.000$, $r= 0.477$), and the second variable is the psycho-social status of the brokers ($p=0.000$, $r= 0.445$). It is seen that the variable with the highest relationship on the profitability level of the charter and brokerage businesses is the freight market ($p=0.000$, $r= 0.366$), and the second variable is the ship and voyage planning ($p=0.000$, $r= 0.342$).

Keywords: International trade and logistics, Covid-19, maritime business, chartering and brokerage

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ÖZET

Denizyolu taşımacılığı uluslararası ticarete tedarik zinciri ağının ve lojistik hizmetlerin önemli bir parçasıdır. Covid-19 pandemisi nedeniyle ekonomi ve ticarete ortaya çıkan olumsuz durum sonucunda denizyolu yük taşımacılığı piyasası da etkilenmiştir. Bu kapsamda araştırmanın amacı Covid-19 nedeniyle gemi kiralama ve brokerlik faaliyetlerinin genel işleyişi ve firma performansı üzerinde etkili olan faktörlerin neler olduğunu değerlendirmektir. Çalışmada kolayda örnekleme yöntemiyle 141 brokere anket uygulanmıştır. Veriler 27 Ocak – 30 Temmuz 2021 tarihleri arasında toplanmıştır. Anketleri değerlendirmek için IBM SPSS 22 programı kullanılarak korelasyon ve regresyon analizleri uygulanmıştır. Elde edilen sonuçlara göre gemi kiralama ve brokerlik faaliyetlerinin genel işleyişi üzerinde en yüksek ilişkiye sahip değişkenin navlun pazarı ($p=0,000$, $r=0,477$), ikinci değişkenin ise brokerlerin psiko-sosyal durumları ($p=0,000$, $r=0,445$) olduğu görülmektedir. Gemi kiralama ve brokerlik işletmelerinin karlılık düzeyi üzerinde en yüksek ilişkiye sahip değişkenin navlun pazarı ($p=0,000$, $r=0,366$), ikinci değişkenin ise gemi ve sefer planlamaları ($p=0,000$, $r=0,342$) olduğu görülmektedir.

Anahtar sözcükler: Uluslararası ticaret ve lojistik, Covid-19, deniz işletmeciliği, gemi kiralama ve brokerlik

1. INTRODUCTION

World trade is increasingly based on long, large and complex supply chains, and maritime transport and associated logistics services form the backbone of these operations (Berle *et al.*, 2011; Balık *et al.*, 2015). Maritime transport is a set of interrelated activities involving different interrelated stakeholders, in which the transport, transshipment and distribution processes are integrated (Osobajo *et al.*, 2021). In maritime transport, the planning is made by considering international, regional and local economical, commercial, socio-cultural, political, legal, technological etc. applications and regulations. (Demirel, 2019). The diversification of port services, the development of integrated transport operations and the change in the traditional role of maritime transport through sectoral collaborations have made it one of the strategic elements focused on supply chain and logistics services (Yıldırım and Deveci, 2016; Yorulmaz and Birgün, 2017; Wendler-Bosco and Nicholson, 2020).

Due to the Covid-19 epidemic that emerged on 1 December 2019 in the Wuhan region of the People's Republic of China, countries were adversely affected in terms of health and economy. As a result of the rapid spread and lethal effect of the epidemic, transmitted from person to person all over the world, it was

declared a pandemic by the World Health Organization (WHO) on March 11, 2021 (Budak and Korkmaz, 2020; Özlü and Öztaş, 2020). The change in the global supply-demand structure as a result of the pandemic has revealed visible changes in the structure of the international trade network (Vidya and Prabheesh, 2020).

The rate and severity of the spread of Covid-19 caused a contraction in production, employment, trade and consumption in the global economy, and this situation also affected the maritime sector. Taşkın (2020) addressed the measures for ships calling at ports in order to prevent the spread of the epidemic and to minimize its effects. In this context, measures have been taken such as disinfection of ships, obtaining a health permit indicating that there is no medical problem at the entrance to the port, preventing the entry of ships that have recently entered the ports that have been described as risky ports, quarantining them, if necessary, delivery of physical documents and notifications online, etc. Clasen and Olesen (2020) mentioned that the process of joining and disembarking the seafarers takes a lot of time due to the precautions and negatively affects the operation processes. In her study, Doumbia-Henry (2020) reported the serious difficulties faced by seafarers (quarantine requirements, border crossing restrictions, crew changes, disembarkation, certificate renewal, supply and ship surveys, etc.) during the

pandemic period. Zhu *et al.* (2020) tracked the movements of ships using the Automatic Identification System (AIS) and quantitatively investigated the effects of the Covid-19 pandemic on China's container ports. It was reported that the pandemic did not significantly affect the number of container ships arriving at Chinese ports but affected the average berthing times of container ships and significantly reduced the number of containers loaded and unloaded at ports. Ece (2020) examined the impact of the Covid-19 pandemic on container ports and transportation and stated that dry cargo and container ships were the ones most affected by the pandemic. Notteboom and Haralambides (2020), in their study on port operation and management after the Covid-19 pandemic, stated a decrease in the number of ships calling at the world ports, moderate-to-strong decreases in cargo volumes, and a complete decrease in activity in the industrial environments and logistics in the ports and surrounding areas because of the pandemic.

The aim of the present study is to reveal the factors that affect the general operation and profitability of ship chartering and brokerage activities during the Covid-19 pandemic, and to reveal the relationship in between. Since there is no similar study in the literature for chartering and brokerage activities, it is anticipated that the results of the research will contribute to ship brokers, ship brokerage companies and shipowners or chartered companies that have a chartering department in order to see the shaping of the market structure in unexpected crisis periods. In the research, first of all, the scope of ship chartering and brokerage services in maritime transport is explained in the theoretical framework. Afterwards, the sub-factors and relationship levels that are effective in the general operation of ship chartering and brokerage activities during the Covid-19 crisis were evaluated. Then, the sub-factors and relationship levels that affect the company performance (profitability) of chartering and brokerage businesses during the Covid-19 crisis were evaluated.

1.1. Chartering and Brokering Services at Maritime Transportation

Chartering a ship is the use of a ship in maritime transport by the active commercial enterprises involved in the maritime market through legal contracts and can be expressed as "charter", "vessel chartering", "ship chartering"(Özer, 2010). Chartering, which is an agreement for the commercial operation of a ship, is made between the ship owner and the charterer, and in return, the charterer undertakes to pay a fee called "freight" or "charting cost", depending on the type of charter (Bristow and Coutroubis, 2001). There are several types of chartering of ships. Factors such as the commercial area of the charterer, the conditions and connections of the cargoes, and the preferences of the ship owners play a decisive role in how the ship will be chartered (Öztürker, 2009). After determining the type of charter between the parties, the type of contract is also determined (Özer, 2010).

The person who operates his/her ship in maritime trade and responds to the transportation demand of her customer (charter) with her tonnage / carrying capacity is defined as the ship owner. According to Article 106 of the Turkish Commercial Code No. 6102, the ship owner is the owner of the ship who uses his/her ship in water for the purpose of gaining profit. In this context, it is seen that the requested carrying capacity in some cases does not belong to the registered owner of the ship and may be available to the lessee who chartered the ship according to the terms of the carriage contract. Accordingly, the charterer is considered to be the owner of the carriage contract (Göklergil, 1993). In this context, ship owners or operators assume the role of carriers due to the transportation of cargo by ship (Orhon, 2019).

Ship chartering is carried out through charter parties, which are mutually agreed upon by the parties. The charterer is the person who charters a part or whole place on the ship or ship for a fee, including the service of the personnel of that ship, based on time or voyage charter (Bayırhan and Nas, 2014). The charterer may also charter the ship to others, unless otherwise stated in the contract of carriage. The charterer can chart the agreed ship on a voyage or time basis, or he can carry his own cargo with the ship (Özdemir,

2009).

In practice, intermediaries called “brokers” are used in order to arrange the conditions that will be the basis of the contract between the ship owner/disponent owner and the charterer according to the consent of the parties and to bring the parties together (Öztürker, 2009). Ship brokers try to bring the parties they serve through mediation to a common point and to reach an agreement between the parties as a result of negotiations (Yorulmaz and Tonguç, 2021). Ship brokers are not a party to the freight contract, they are in the position of intermediary, and the commission and percentage they will receive in return for the service they provide are specified in c/p and are paid on the agreed freight. When the ship broker provides the agreement of the parties it represents, it will be entitled to receive the commission fee (Nomer, 2014).

It is important for the ship broker to have full knowledge of all leasing matters and processes and to protect all the rights of the party they represent by knowing a foreign language (Öztürkoğlu and Çalışkan, 2016). In the brokerage profession, besides the knowledge and experience, the person also needs to be able to make strategic, fast and correct decisions (Şendur, 2019). The most important reason for this is that brokers can make great contributions to the parties they represent with the right decisions they make, and they can cause serious losses in the slightest mistake they make (Öztürkoğlu and Çalışkan, 2016).

1.2. Effects of Covid-19 on the Maritime Transportation Market

Maritime trade is carried out in a high-risk market (Koray and Çetin, 2019). The maritime transport market fluctuates depending on the global economy, ship supply-demand changes and unexpected events or crises (Arslan, 2008). Maritime freight demand is a derived demand that is directly affected by economic cycles and international trade. Due to the imbalance in production and consumption as a result of Covid-19, the maritime sector is also adversely affected by the period (UNESCAP, 2020).

Production and supply chain activities have been adversely affected worldwide due to the Covid-19 pandemic in 2020. In this period, both global

maritime trade and gross product growth decreased, and it is seen that the negative effects of the pandemic continue in 2021 (Oğuz, 2021). According to the International Money Fund (IMF), the Covid pandemic and associated quarantines resulted in the worst recession since the Second World War. Trade growth by sea fell from 1.7% in 2019 to -3.0% in 2020. Dry bulk trade growth fell from +0.5% in 2019 to -2.1% in 2020. The decline in tanker trade growth was -2.5% in 2019, compared to -9.6% in 2020. Finally, container shipping growth decreased from +2.0% in 2019 to -1.4% in 2020. The Baltic Dry Index (BDI) remained significantly stable with an average of 1,352 and 1,353 on an annual basis in 2018 and 2019, respectively, but fell more than 20% to 1,066 in 2020 (BRS, 2021).

In terms of ports, when 2019 and 2020 are compared, it is seen that fewer port visits were made by most ship types in the first half of 2020 (Oğuz, 2021). The slowness experienced in the discharge of import loads due to the pandemic has also caused problems in obtaining empty equipment at the ports (Özkal, 2021). The most obvious change was observed in the port service processes of container ships at the beginning of the pandemic (Cengiz and Turan, 2021). As a result of the stoppage of production in China due to Covid-19, the decline in North American demand, and the decisions of countries to quarantine the containers at the destination port for 14 days, a shortage of empty containers has emerged in returns to Asia (Gray, 2020). In addition, when production operations halted in China at the beginning of the pandemic, the first strategy of the ship owners was blank sailing, that is, the cancellation of the voyages, and then they positioned empty equipment in the Far East, which they saw more profitable. The lack of sufficient capacity to be allocated to North Africa, especially to Europe, has led to backlogs. As a result of all these developments and high demand, freight rates have increased in the market (Özkal, 2021).

As demand for all ship sizes increased in the dry cargo market, freight rates also increased. Supramaxes were the biggest winners, with demand increasing by 10.6% in the first four months of this year compared to 2020. Capesize demand increased by 6.0%, while Panamax

increased by 1.5%. Demand for Handysize vessels has generated 7.3% growth from the beginning of 2020 (Sand, 2021).

Contracts of carriage (charter parties) were also affected in the Covid-19 pandemic. There have been some questions about demurrage during the Covid-19 period. In cases when the port is not suitable for loading/unloading due to quarantine or pandemic disease, questions have arisen as to whether the working periods will be counted as demurrage. Whether it is possible for the carrier to change route or berth at a different port due to Covid-19 varies according to the applicable law. It is seen that the Covid-19 outbreak is also closely followed by Protection and Indemnity (P&I) Clubs. In this context, the problem arises whether the ship's P&I club will cover what kind of expenses and at what stage it will be engaged (Tilegal, 2020).

In addition, in the Pandemic, restrictive measures like lockdown, social distancing, fear of catching illness etc. have psychologically and socially affected workers in all sectors (Osofsky *et al.*, 2020; Pietrabissa and Simpson, 2020; Yılmaz *et al.*, 2020). Reasons such as remote work, increased workload, and dismissals have negatively affected employee motivation, causing them to have emotional, physical, and social difficulties (Tuna and Türkmendağ, 2020).

1.3. Research Hypotheses

It is thought that Covid 19 has an impact on the general operation of ship chartering and brokerage activities and business profitability because of the decrease in vessel traffic in 2020 and the change of voyage plans (Millefiori *et al.*, 2021), maritime companies' need for global financial support (Cengiz and Turan, 2021), and the return of the ships they rented in order to fill the empty capacities of their own ships, (ITF, 2021), the fluctuation of freight rates (UNCTAD, 2020), and the psycho-social negative effects of people (Osofsky *et al.* 2020). In this context, the hypotheses of the research are as follows:

H1: There is a statistically significant relationship between the effect of the pandemic on charter contracts and articles and the general operation of ship chartering and brokerage activities.

H2: There is a statistically significant relationship between the effect of the pandemic on the freight market and the general operation of chartering and brokerage activities.

H3: There is a statistically significant relationship between the psycho-social impact of the pandemic on brokers and the general operation of ship chartering and brokerage activities.

H4: There is a statistically significant relationship between the effect of the pandemic on ship and voyage planning and the general operation of ship chartering and brokerage activities.

H5: There is a statistically significant relationship between the effect of the pandemic on the marketing and financial management of enterprises and the general operation of chartering and brokerage activities.

H6: There is a statistically significant relationship between the effect of the pandemic on the charter party contracts and their articles and the profitability of the business.

H7: There is a statistically significant relationship between the effect of the pandemic on the freight market and the profitability of the business.

H8: There is a statistically significant relationship between the psycho-social impact of the pandemic on brokers and business profitability.

H9: There is a statistically significant relationship between the effect of the pandemic on ship and voyage planning and operating profitability.

H10: There is a statistically significant relationship between the effect of the pandemic on the marketing and financial management of businesses and business profitability.

2. MATERIAL AND METHOD

In the study, data were collected through convenience sampling. Convenience sampling is collecting data from the most easily, quickly and economically accessible participants of the population (Saruhan and Özdemirci, 2016; Coşkun *et al.* 2017). Data collection was carried out between 27/01/2021-30/07/2021 via Google Forms URL access link. In order to reach the

brokers in Turkey, the Ship Brokers Association was contacted, and the survey access link was shared with the members of the association by sending a mass e-mail. In order to reach foreign brokers, the Federation of National Associations of Ship Brokers and Agents (FONASBA) was contacted. The survey access link was shared with its members via FONASBA official social media accounts.

In order to achieve the aims of the research, quantitative research method and questionnaire technique was used. Five-point Likert scale questionnaire was prepared by consulting the opinions of 4 academicians and 8 experts. The questionnaire consists of 39 questions under 7 headings.

The first part of the questionnaire includes questions about some demographic characteristics (gender, age, education level, occupation). Other sections include questions about the effects of the pandemic on chartering and brokerage activities, business performance, charter contracts and articles, freight market, psycho-social situation on ship brokers, ship and voyage planning, financial and marketing activities of businesses. In these sections, 1=strongly disagree, 2=disagree, 3=neither agree or disagree, 4=agree, 5=strongly agree.

The information of the scales used in the study is given in Table 1.

Table 1. Information about scales

Scale	Developed and Adapted to Turkish
Motivation	Developed by Dündar <i>et al.</i> (2007).
Burnout	Developed by Maslach and Jackson (1981) and adapted to Turkish by Ergin (1992).
Life Satisfaction	Developed by Kaba <i>et al.</i> (2017).
Job Satisfaction	Developed by Mueller and McCloskey (1990) and adapted to Turkish by Bayrakçı and Türkmen (2020).
Turnover Intention	Developed by Cammann <i>et al.</i> (1979) and adapted to Turkish by Gül <i>et al.</i> (2008).

General names/concepts of main themes of the abovementioned scales were utilized in the questionnaire and, the impact of the pandemic on the brokers' internal factors regarding work-social life (psycho-social factors) was named as the main factor. These factors are concepts that are dealt with in social psychology as well as in industrial/organizational psychology and organizational behavior studies (Lawler and Porter, 1967; Cribbin, 1972; Lloyd and Hamner, 1979; Davis, 1982; Feldman and Arnold, 1985; Parnell and Crandall, 2003; Judge *et al.*, 2009).

In order to test the reliability of the variables that are the subject of the research, Croanbach Alpha coefficient determination analysis was performed and the results are given in Table 2. Depending on the alpha coefficient, the reliability of the scale was graded as follows (Kalaycı, 2006).

- If $\alpha < 0.40$, the scale is unreliable,
- If $0.40 \leq \alpha < 0.60$, scale reliability is low,
- If $0.60 \leq \alpha < 0.80$, the scale is quite reliable,
- If $0.80 \leq \alpha < 1.0$, the scale is highly reliable.

Table 2. Reliability analysis

Cronbach's Alpha	N of Items
0.893	39

In addition, exploratory factor analysis was performed to test the validity of the variables that were the subject of the study, and the results in Table 3 were obtained.

Table 3. Validity analysis

Main Factors	Kaiser-Meyer-Olkin Measure of Sampling Adequacy	Approx. Chi-Square	Bartlett's Test of Sphericity df	Sig
The effect of the pandemic on charter contracts and articles	0.570	18.329	6	0.005
Impact of the pandemic on the freight market	0.646	114.014	15	0.000
Psycho-social impact of the pandemic on ship brokers	0.690	198.250	10	0.000
The effect of the pandemic on ship and voyage planning	0.864	479.994	55	0.000
The impact of the pandemic on the financial and marketing activities of businesses	0.704	170.827	55	0.000

The Skewness values of the main factors (independent variables) and dependent variables, which are the subject of the research, ranged between -0.753 and 0.104, and Kurtosis values between -1.163 and +1.386. The cause-effect relationship between the main factors and dependent factors and the direction and severity of the relationship between the two variables were examined. Data analysis was done using SPSS package program. The findings obtained after the statistical analysis were interpreted in tables.

3. RESULTS

3.1. Demographic features

Demographic characteristics of the participants are shown in Table 4. while calculating the percentages, each broker group was evaluated on its own number of participants.

A total of 61.43% of the participants were men. While the proportion of men is 85.9% for Turkish brokers, it is 23.2% for foreign brokers. While the participation rate of women was 75% for foreign brokers, it was 14.1% for Turkish brokers.

Although one person from each group did not answer the question regarding age information, it is seen that the participation in both groups is high in the 26-35 and 36-45 age ranges. In Turkish brokers, the age profile of the majority of the participants was in the 36-45 age range with 36.5%, while in foreign brokers, it was in the 36-45 age range with 30.4%.

When the education level of the participants is examined, it is observed that 72.9% of the Turkish brokers have a bachelor's degree, while 39.3% of the foreign brokers have a master's degree. While the lowest participant education level in Turkish brokers was high school with 3.5%, it was primary school with 1.8% in foreign brokers.

Looking at the brokerage fields of the participants, it was found that 45.9% of the Turkish brokers work as shipowners' brokers, while 44.6% of the participants in foreign brokers work as independent brokers. In general, 35.46% of the 141 participants were independent brokers, followed by 33.33% by ship-owner brokers and 31.21% by chartered brokers.

Table 4. Demographic characteristics of the participants

Gender	Turkish Brokers		Foreign Brokers	
	Frequency	%	Frequency	%
Male	73	85.9	13	23.2
Female	12	14.1	42	75.0
Prefer not to disclose			1	1.8
Total	85	100	56	100.0
Age	Turkish Brokers		Foreign Brokers	
	Frequency	%	Frequency	%
18-25	1	1.2	1	1.8
26-35	26	30.6	11	19.6
36-45	31	36.5	17	30.4
46-55	20	23.5	14	25
56 and above	7	8.2	12	21.4
Total	85	100.0	56	100.0
Education	Turkish Brokers		Foreign Brokers	
	Frequency	%	Frequency	%
Primary Education			1	1.8
High School	3	3.5	9	16.1
Associate degree	6	7.1	3	5.4
Undergraduate degree	62	72.9	17	30.3
Graduate	14	16.5	22	39.3
PhD			3	5.3
Total	85	100.0	56	100.0
Brokerage Ares	Turkish Brokers		Foreign Brokers	
	Frequency	%	Frequency	%
Shipowner Broker	39	45.9	8	14.3
Charterer Broker	21	24.7	23	41.1
Independent Broker	25	29.4	25	44.6
Total	85	100.0	56	100.0

3.2. Investigation of the Relationship Between the General Operation of Chartering and Brokering Activities and Sub-Factors in the Covid-19 Crisis

Correlation analysis was conducted to determine whether there is a significant relationship between the general operation of ship chartering and brokerage activities and sub-factors during the Covid-19 crisis, and the results in Table 5 were obtained.

When Table 5 is examined, it is seen that there is a statistically significant relationship at the 95% confidence interval between the variables that are the subject of the research and affected by the pandemic crisis and the general level of negative impact.

In this context, hypothesis H1 was accepted since $p < 0.005$. There is a significant relationship between the effect of the pandemic on charter contracts and articles and the general operation of ship chartering and brokerage activities.

Hypothesis H2 was accepted since $p < 0.005$. There is a significant relationship between the effect of the pandemic on the freight market and the general operation of chartering and brokerage activities.

Hypothesis H3 was accepted since $p < 0.005$. There is a significant relationship between the psycho-social impact of the pandemic on brokers and the general operation of chartering and brokerage activities.

Hypothesis H4 was accepted since $p < 0.005$. There is a significant relationship between the effect of the pandemic on ship and voyage planning and the general operation of ship chartering and brokerage activities.

Hypothesis H5 was accepted since $p < 0.005$. There is a significant relationship between the effect of the pandemic on the marketing and financial management of enterprises and the general operation of charter and brokerage activities.

It was found that the variable that has the most negative impact on the general operation of chartering and brokerage activities is the freight market. It is thought that the freight markets have been adversely affected due to the uncertainties experienced with the Covid-19, interruptions in supply chains, the decline in imports and exports, and reduction in the volume of maritime

transport because of the increase in the waiting period at the ports.

It was found that the second variable, which has a negative effect on the general functioning of ship chartering and brokerage activities, is the psycho-social situation of the brokers. It is thought that the rate of transmission of Covid-19, the risk of death and the social restrictions of people affect the brokers psycho-socially.

Table 5. The relationship between the general operation of ship chartering and brokerage activities and sub-factors during the Covid-19 crisis

General Operation	The effect of the pandemic on charter contracts and articles	Impact of the pandemic on the freight market	Psycho-social impact of the pandemic on ship brokers	The effect of the pandemic on ship and voyage planning	The impact of the pandemic on the financial and marketing activities of businesses
Pearson Correlation	0.277	0.477	0.445	0.335	0.364
Sig. (2-tailed)	0.001	0.000	0.000	0.000	0.000
N	139	139	139	139	139

3.3. Sub-Factors Affecting the General Operation of Chartering and Brokering Activities in the Covid-19 Crisis

Regression analysis was conducted to determine the sub-factors that affect the general operation of ship chartering and brokerage activities during the Covid-19 Crisis, and the results in Table 6 were obtained.

When Table 6 is examined, it has been determined that the freight market and psycho-

social factors, which are thought to have an effect on the pandemic, have a statistically significant effect on the general functioning of ship chartering and brokerage activities. In addition, it is seen that the VIF and Tolerance values, which are the necessary conditions for the regression analysis, are within the desired limits. It is understood that the independent variables subject to regression explain the effect on the dependent variable (general functioning) at the level of 33%.

Table 6. Sub-factors that affect the general operation of ship chartering and brokerage activities during the Covid-19 crisis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-0.060	0.493		-0.121	0.904		
The effect of the pandemic on charter contracts and articles	-0.038	0.143	-0.023	-0.265	0.791	0.649	1.542
Impact of the pandemic on the freight market	0.503	0.139	0.308	3.605	0.000	0.691	1.446
Psycho-social impact of the pandemic on ship brokers	0.351	0.098	0.285	3.570	0.000	0.793	1.261
The effect of the pandemic on ship and voyage planning	0.237	0.133	0.161	1.778	0.078	0.616	1.622
The impact of the pandemic on the financial and marketing activities of businesses	0.050	0.216	0.024	0.233	0.816	0.495	2.022

ANOVA F:13.010

R:0.573 R²:0.328

Dependent Variable: General Operation

Predictors: (Constant), Effects on finance and marketing activities of businesses, Effect on charter contracts and articles, Psycho-social effect on ship brokers, Effect on freight market, Effect on ship and voyage planning.

There are values to be considered when performing multiple regression analyzes. The existence of multiple correlations between independent variables is a serious problem that can significantly affect regression models. A VIF value greater than 10 indicates a serious multicollinearity problem (Montgomery *et al.*, 2013). The fact that the tolerance values are greater than 0.10 reveals that there is no problem of multicollinearity between the variables (Çokluk *et al.*, 2012).

3.4. Investigation of the Relationship between Firm Performance (Profitability) and Sub-Factors of Chartering and Brokering Businesses in the Covid-19 Crisis

Correlation analysis was conducted to determine whether there is a significant relationship between the company performance of charter and brokerage companies and sub-factors during the Covid-19 crisis, and the results in Table 7 were obtained.

Table 7. The relationship between firm performance (profitability) and sub-factors of charter and brokerage firms in the Covid-19 crisis

Decline in operating profitability	Pearson Correlation	The effect of the pandemic on charter contracts and articles	Impact of the pandemic on the freight market	Psycho-social impact of the pandemic on ship brokers	The effect of the pandemic on ship and voyage planning	The impact of the pandemic on the financial and marketing activities of businesses
		Sig. (2-tailed)	0.203	0.366	0.228	0.342
N		0.017	0.000	0.007	0.000	0.000
		138	138	138	138	138

When Table 7 is examined, it is seen that there is a statistically significant relationship between the variables affected by the pandemic crisis and the profitability level of the enterprises at the 95% confidence interval.

In this context, hypothesis H6 was accepted since $p < 0.005$. There is a significant relationship between the effect of the pandemic on the charter party contracts and their articles and the profitability of the business.

Hypothesis H7 was accepted since $p < 0.005$. There is a significant relationship between the effect of the pandemic on the freight market and the profitability of the business.

Hypothesis H8 was accepted since $p < 0.005$. There is a significant relationship between the psycho-social impact of the pandemic on brokers and business profitability.

Hypothesis H9 was accepted since $p < 0.005$. There is a significant relationship between the effect of the pandemic on ship and voyage planning and operating profitability.

Hypothesis H10 was accepted since $p < 0.005$. There is a significant relationship between the effect of the pandemic on the marketing and financial management of businesses and profitability.

It was found that the variable that has the most significant relationship with the profitability level of the charter and brokerage businesses is the freight market. This is thought to be due to the fluctuation in the freight market during the times when the supply and demand in the market was severely affected by Covid-19.

The second variable that has an effect on the profitability of charter and brokerage businesses is ship and voyage planning. The reason is thought to be due to personnel changes, long waiting period at anchor and port areas negatively affecting voyage planning.

3.5. Sub-Factors Effective on Firm Performance (Profitability) of Chartering and Brokering Businesses in the Covid-19 Crisis

Regression analysis was conducted to determine the sub-factors that affect the company performance of chartering and brokerage activities during the Covid-19 crisis, and the results in Table 8 were obtained.

When Table 8 is examined, it is seen that the unfavorable conditions regarding the freight market and ship and voyage planning, which are among the factors thought to be affected by the pandemic, have a statistically significant effect on the profitability of the business at the 95% confidence interval. According to this result, it can be said that as the level of negativity in the freight market and ship and voyage planning increases, the profitability of the business is negatively affected.

In addition, it is seen that the VIF and Tolerance values, which are the necessary conditions for the regression analysis, are within the desired limits. It is understood that the independent variables subject to the regression explain the effect on the dependent variable (business profitability) at the level of 19.5%.

Table 8. Sub-factors that affect the firm performance (profitability) of chartering and brokerage businesses during the Covid-19 crisis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	0.169	0.657		0.258	0.797		
The effect of the pandemic on charter contracts and articles	-0.146	0.198	-0.073	-0.735	0.464		
Impact of the pandemic on the freight market	0.516	0.178	0.269	2.906	0.004		
Psycho-social impact of the pandemic on ship brokers	0.100	0.127	0.068	0.791	0.430		
The effect of the pandemic on ship and voyage planning	0.483	0.201	0.259	2.398	0.018		
The impact of the pandemic on the financial and marketing activities of businesses	0.064	0.279	0.025	0.230	0.818		

ANOVA F: 6.411

R:0.442 R²:0.195

Dependent Variable: Decreased operating profitability

Predictors: (Constant), Effects on finance and marketing activities of businesses, Effect on charter contracts and articles, Psycho-social effect on ship brokers, Effect on freight market, Effect on ship and voyage planning

4. CONCLUSIONS

The Covid-19 pandemic, which emerged on December 1, 2019 in the Wuhan region of the People's Republic of China, spread rapidly around the world and caused economic and sociological problems in countries. In addition, the fears of getting sick and dying that dominated people during this period also affected people psychologically. The Covid-19 pandemic has negatively affected the maritime sector as well as many sectors, and these effects have been felt on the freight, ship trading, new construction, and shipbreaking markets. Due to the lethal effect and rapid spread of the pandemic, the creation of a panic atmosphere and the declaration of a global pandemic forced the countries to take some preventive restrictions.

Many activities, such as curfews, partial or complete curfews, the shift of office workers to work from home, the cancellation of flights by road and air or subjecting them to special

permits, have been restricted or temporarily suspended. Countries have taken various measures according to their own conditions for ships coming to their ports, shipyards and shipbreaking facilities. Agencies have started to request various documents related to Covid-19 in addition to the standard documents they request before the ships arrive at the ports. Due to quarantine measures, the entry and exit times of ships with suspected Covid-19 to ports, shipyards and shipbreaking facilities have been prolonged. Depending on these factors, there were also effects on ship chartering and brokerage activities. Questions arose as to who would be responsible for the costs incurred as a result of waiting due to Covid-19, and a sample clause was prepared by BIMCO and recommended to be added to the concluded contracts. The shock effect at the beginning of the pandemic and the restrictions applied afterwards had a negative impact on the supply and demand balances and affected the freight in

the market. In this period, it was observed that large container line operators reduced their flights. In addition, the ports of the countries that keep the ships in anchor as a quarantine application were not preferred by the shipowners as they cause freight loss. Brokers have taken these issues into account in their chartering and brokerage activities.

Uncertainties experienced in the first place with Covid-19 caused negativities in supply chains, decrease in imports and exports, and consequently a decrease in ship connections, negatively affecting the freight markets. It has been observed that these negative effects have decreased after the vaccination studies against Covid-19 and the easing of restrictions. In addition, the risk of transmission and fatality of the disease affected people psycho-socially. In this context, the Covid-19 pandemic has affected many sectors as well as negatively affecting ship chartering and brokerage activities, which are one of the sub-branches of maritime management.

The aim of the research is to reveal the impact of the Covid-19 crisis on ship chartering and brokerage activities, and when we examine the results, it is noteworthy that there is a statistically significant relationship between the general operation of charter and brokerage activities in this period and the psycho-social factors affecting the freight market and ship brokers. In addition, it has been observed that there is a statistically significant relationship between the general operation of ship chartering and brokerage activities and the financial and marketing activities of enterprises, ship and voyage planning, and charter contracts and articles.

In addition, it has been determined that there is a significant and positive relationship between the profitability of the charter and brokerage companies and the freight market and ship-voyage planning. It has been revealed that a similar relationship is seen between the psycho-social effect on the ship brokers. In addition, the fact that a significant relationship was determined between the decrease in business profitability and the effect of the pandemic on leasing and contract clauses and the financial and

marketing activities of businesses is among the other important findings of the study.

As a result, it has been observed that the freight market has a statistically significant effect on both the general operation of charter and brokerage services and the profitability of the companies in periods when the supply and demand in the market are severely affected, as seen during the Covid-19 pandemic. In this period, it is recommended to carefully monitor the current freight rates, the behavior of charterers and shipowners in chartering, which charter types are preferred more, and to watch online webinars and weekly reports about the freight market. In these periods, it is important to make the right ship and voyage planning. In addition, factors such as the problems experienced in personnel changes, the length of waiting times at the anchor and port areas, waiting in quarantine, difficulties in agreements for cargo/ship etc. are thought to have a negative effect on firm profitability. It is recommended for companies that carry out chartering and brokerage activities and for ship brokers to follow the freight market regularly, to make the right ship and voyage planning, and to analyze the psycho-social effects of the measures to be taken for the employees.

CONFLICT OF INTERESTS

The author(s) declare that for this article they have no actual, potential or perceived conflict of interests.

ETHICS COMMITTEE PERMISSION

Author(s) declare that this study was conducted in accordance with ethics committee procedures of human or animal experiments. The study received ethics committee approval from Istanbul University with file number 2021/06.

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