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Araştırma Makalesi

Kovid-19 Salgını Döneminde Türk Tersaneleri

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ÖZET

Dünya çapında etkili olabilecek bir salgın tahmin edilemezdi belki, ama Kovid-19 salgını başladığında koruyucu önlemlerde inisiyatif almak başarı için kritikti. Dünya tarihindeki şimdiye kadar bilinen en büyük salgın olan Kovid-19, sosyal, ekonomik ve politik değişimlere neden olacaktır. Ülke yönetimleri, sivil toplum kuruluşları ve firmalar salgından kaynaklanan ekonomik ve sosyal krizi en az hasarla atlatmak amacıyla yeni yetenekler ve yetkinlikler geliştirmişlerdir. Bu makale, GİSBİR ve İstanbul Teknik Üniversitesi Akademik personelinin iş birliği ile Kovid-19 salgınının ilk safhasında Türk tersanelerinde alınan önlemleri ve salgının etkisini araştırmayı amaçlamaktadır. İlk olarak, literatür araştırması yapılarak mevcut akademik çalışmalar gözden geçirilmiştir. Daha sonra, GİSBİR bilgi formları, Baltık Kuru Yük Endeksi, tersane sipariş defteri istatistikleri ve istihdam istatistikleri birincil veri olarak değerlendirilmiştir. Tersanelerin Internet siteleri ve sektör yöneticilerinin raporları ikincil veriler olarak ele alınmıştır. Salgının başlangıç aşamasında yayınlanan kötümser haber, akademik çalışma ve anketlere rağmen, yazarlar Kovid-19'un Türk tersaneleri üzerindeki orta vadeli olumsuz etkisini gösterecek herhangi bir kanıt bulamamışlardır. Baltık Kuru Yük Endeksi 2020'nin ilk çeyreğinde bir düşüş gösterse de ikinci çeyreğin hemen ardından yükselmeye başlamış ve aynı şekilde tersane sipariş defteri istatistikleri de artış göstermiştir. İstihdam istatistiği ise kademeli olarak sürekli yükselmeye devam etmiştir. İyileşme, tersanelerin GİSBİR desteği ile etkin kriz yönetimi ve özel gemi üretimlerine önem vererek, sürekli iyileştirme çalışmalarına, yeşil teknoloji ve sistemlere yatırım yaparak krizin olumsuz etkilerinin üstesinden gelebilmesine bağlıdır.

Anahtar Kelimeler: Türk tersaneleri, gemi inşaatı, salgın esnasındaki önlemler, Kovid-19 salgını etkisi.

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Turkish Shipyards During COVID-19 Pandemic

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ABSTRACT

It might be unimaginable to anticipate the pandemic but taking the initiative in measures when Covid-19 occurred was critical to success. However, the impact of this worldwide pandemic, ever known in World History, was predictable. Covid-19, the largest known pandemic in world history, will cause social, economic, and political changes. Country governments, non-governmental organizations, and companies have developed new skills and competencies to overcome the economic and social crisis caused by the pandemic with minimum damage. This paper aims to investigate the effects of the pandemic and the measures taken in Turkish shipyards in the first phase of the Covid-19 pandemic with the cooperation of GISBIR and Istanbul Technical University Academic staff. Firstly, current academic studies were reviewed by conducting a literature search. Then, GISBIR data sheets, Baltic Dry Cargo Index, shipyard order book statistics, and employment statistics were evaluated as primary data. The shipyards' websites and the sector managers' reports are secondary data. Despite the pessimistic news, academic studies, and surveys published during the outbreak's initial phase, the authors could not find any evidence to indicate the medium-term negative impact of Covid-19 on Turkish shipyards. Although the Baltic Dry Index showed a decline in the first quarter of 2020, it rose right after the second quarter, and the shipyard order book statistics increased. Employment statistics, on the other hand, continued to increase gradually. Recovery depends on the shipyards overcoming the harmful effects of the crisis by investing in continuous improvement efforts, green technology, and systems, with the support of GISBIR, giving importance to effective crisis management and distinctive ship production.

Keywords: Turkish shipyards, shipbuilding, measurements during the pandemic, the impact of Covid-19.

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1. Introduction

The coronavirus (Covid-19) pandemic spread worldwide incredibly fast and brutally. It has caused one of the worst global crises in world history. More than 500 million people have gotten sick, and more than 6 million died worldwide as of 1 April 2022, (WHO, 2022). World Health Organization (WHO) proposed measures to prevent the virus's rapid spread among the people and nominated the virus as a global pandemic. The governments acted rapidly with strict measures to protect public health. However, these measures deteriorated the economies with partial or complete lockdowns those caused to slow down economic activities and resulted in the cancellation or postponement of purchasing orders and deliveries in many economic and industrial sectors. Travel restrictions prisoned people at home or in limited districts. Travels between countries were banned or limited subject to high restrictions or when duly justified. The air transport of passengers stopped, and the numerous aircraft fleets stayed on the ground idle for many months. The governments prohibited people from traveling between cities within the national borders.

This circumstance resulted in a sharp decline in economic growth and forced companies worldwide to revise their forecasts. Governments issued new incentives to overcome the crises and grants to those who did not work or lost their jobs during the pandemic. The local and global supply chains, macroeconomic systems, and transnational trade relations have been interrupted and will take time to return to "normal as usual" (Sarkis, et al. 2020). The interruption caused delays, postponements, and cancellation of demand and consumption. The same effect occurred in the manufacturing and production plants and flashed fears of approaching monetary concern and recession (Nicola et al. 2020). On the contrary, packaging, delivery, and demand for hygiene products increased four times. In addition, the usage of digital technology improved, and all kinds of meetings and education have occurred through digital platforms like Zoom, Google, Skype, and WhatsApp.

The United Nations Conference on Trade and Development (UNCTAD) estimates that commercial ships transported around 11 billion tons of cargo in 2019, 90% of global trade. Maritime trade doubled between 2000 and 2018, assisted by the widespread acceptance of free trade principles, fair competition, and open shipping markets (VanGrasstek, et al. 2021). Any economic crises and drop-in world trade also affect the maritime industry and its related sector. When Covid-19 emerged rapidly, generalized lockdowns, safety requirements, social distancing, personal temperature controls, pre-reporting requirements, sanitation, health restrictions, and remote working to minimize the infection disrupted the maritime industry.

Alamoush et al. (2021) investigated the Covid-19 impact on the maritime supply chain and industry. Ports are considered the central node of the supply chain. More than eight hundred out of 8,292 ports conduct 99 % of seaborne trade (Exportvirginia, 2014). Ports confronted a decline in vessel calls, hinterland transport delays, the shortage of port-related workers, and high capacity utilization of warehousing and storage facilities. The fall in demand and protectionism led shipping to modify its supply and deployed capacity. Changes in port procedures and restrictions resulted in delays for shipping (increases in turnaround time), heightened by disorder in port operations and supply chain disruptions. The cruise ships were blocked in the ports because of the cancellation of reservations. Container ships stayed idle due to decreased demand and port shutdowns (Ozturk & Turan, 2020).

Consequently, shipyards are affected in an operational capacity, supply chain transactions, and demand for new builds. Many shipyards in Europe and East Asia were forced to stop their activities during lockdowns. They had difficulties in delivery since travel restrictions did not allow experts or customer representatives, Kamola-Cieślik (2021). Shipowners cancelled or delayed their new-build

orders, which affects the shipyard's future projections. After that, forecasts decrease, and the shipyards confront financial disruptions and start to lay off workers.

The incidents presented in the above paragraphs indicate that the pandemic occurrence was unpredictable, but taking the initiative in measures was critical to success and survival. It was inevitable that the pandemic would cause social, economic, and political changes. The stakeholders had a pessimistic expectation of the impact of Covid-19 on the world economy and the shipbuilding sector in the start phase. Hence, the administrations and countries confronted the challenge of overcoming the economic and social crisis caused by the expectations and lockdowns. They developed new capabilities and competencies during and post-Covid time.

1.1. The aim of the study

Since the World Health Organization (WHO) named the virus Covid-19 and declared it a global pandemic on 11 March 2020, worldwide governments have taken radical measures. After that time, studies about the new virus began to emerge. The subjects were mainly people's medical and health, including preventive measurements. After a while, some studies started to analyze the impact on the regions, industrial sectors, and economies. However, studies about the impact on shipyards and shipbuilding are rare.

This paper aims at the measures and the pandemic's impact on the Turkish shipyards with collaboration between GISBIR (Gemi İnşa Sanayicileri Birliği, Turkish Shipbuilders' Association) and Istanbul Technical University Academic staff. The output of this paper will contribute to the Covid-19 literature by focusing on the shipyards and shipbuilding sector concerning measures and impacts. This paper is unique and fulfills the research gap in that area. The following section reviews the literature on the research area and is followed by the methodology. The third section presents the analyses and results. Section four discusses the outcomes and section five concludes the findings.

1.2. The literatur review

The authors searched academic databases Scopus, WoS, and Google Scholar with the keywords "shipbuilding, shipyard, and Covid-19" between 1 January 2020 and 1 July 2021. The search queries resulted in a few articles and conference proceedings about mainly maritime-related studies. The studies targeting shipbuilding were rare. The article lists obtained from databases were merged using Endnote software to eliminate duplicates. The abstracts were filtered, and the full papers were sorted out to form the library for the study. The final findings related to shipbuilding and maritime economics are summarized below.

Yazir et al. (2020) reviewed the impact of Covid-19 on the maritime industry and focused on the tanker, dry bulk, cruiser, and container sectors. They discussed recent industries' development directions and revealed further challenges and potential solutions concerning these four sectors. The study reached two findings. Firstly, the stakeholders, especially cruise industries, confronted operational losses and inconveniences because of health and safety considerations like 14 days of quarantines, investigation, and test procedures. Secondly, adequate Port State inspections based on the International Maritime Organization (IMO) conventions and big data applications could lower possible operational hazards after the pandemic and provide successful turnaround opportunities. In addition, according to Baltic and International Maritime Council (BIMCO) data, the pandemic caused a 55% decrease in new shipbuilding contracts and a 16.7% decrease in ship deliveries in the first quarter of 2020,

corresponding to the same period of the previous year. The decline is 43% in product tankers and 49% in crude oil tankers in the same period.

Holy (2020) wrote that Chinese and South Korean yards confronted a 50% and 81% fall. A Bangladeshi company received 52 order postponements. The order fall was expected to be 26% globally. The Association of Export-Oriented Shipbuilding Industries of Bangladesh (AEOSIB) declared a 120 million USD loss in export orders.

In another study, Reza, et al. (2020) analyzed the Covid-19 impact on the Bangladesh shipbuilding sector. The shipbuilding industry asked for three demands: to pay monthly salaries for each employee, waive utility bills for shipbuilding industries until December 2020, suspend income tax on workers' wages and allowances, and 353.22 million USD loan as working capital with a 2% interest rate for keeping shipyards functional.

Menhat, et al. (2021) reviewed the impact of the Covid-19 pandemic on the Malaysian fisheries, shipping, oil, gas sector, and maritime tourism between January and July 2020. The pandemic substantially impacted maritime sectors regarding business operations, economic and social effects (relating to employability), and global business. Despite negatively impacting the economy and the nation's welfare, the pandemic forced the enterprise to accelerate its capability to respond to disturbances, develop better long-term strategies to deal with uncertainties, and embrace more sustainable approaches.

Millefiori, et al. (2021) analyzed the global nautical traffic data accumulated via a worldwide automatic identification system receivers' network. They compared 2020 mobility levels to prior years, supposing that an intact growth rate would have been performed without Covid-19. From March to June were the most severe restrictions in force. The mobility variances for container ships were between −5.62% and −13.77 %. The variance occurred between −19.57 % and −42.77 % for passenger traffic, between +2.28 % and −3.32 % for dry bulk, and between −0.22 % and −9.27 % for wet bulk ships.

Cengiz, et al. (2021) applied a web-based survey among decision-makers in the maritime sector, including shipyard executives and owners. The top three effects of the pandemic were reduced logistics services, reduced investments, and a temporary shutdown. The companies tried to respect the measures but had challenges in maintaining social distancing in the workplace, supplying adequate test kits to test employees, and the absence of personnel who are afraid to be infected in the work area. Teleworking, reducing personnel, and suspension investments were the main strategies of maritime companies. The post-Covid era accelerated the pace of digital transformation, communication skills, and business intelligence. Nearly half of the respondents estimated their revenue would have a decreasing tendency. They emphasized the importance of disaster, crisis management, and the capability to adapt to new normal conditions.

The Covid-19 pandemic period yielded a fall in world trade and subsequent demand for new ships. As a result, only 5 out of 10 Japanese shipyards could receive orders, and the ship recycling volume exceeded the total volume of 2019 in the first half of 2020, (Ilchenko 2021).

Kamola-Cieślik (2021) discovered that the pandemic hit the operational capability of the shipbuilding sector, the supply chain, and the market for ships. Furthermore, the pandemic affected European shipyards that specialized in constructing cruise ships more than Asian shipyards. While compared to

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the previous year, the new ships' orders decreased by 41% worldwide; 906 ships with a value of 38.7 million USD were ordered in 2019, but 532 ships with a total value of 26.7 million USD were ordered until November 2020. In detail, 8.7% in Chinese, 66.7% in Japanese, and 8.4% in South Korean shipyards. The shipyards had to work overtime to arrive at delivery dates because they stopped at the debut of the pandemic. The European shipyards constructing cruise and offshore vessels suffered more than East Asian shipyards. However, the Polish shipyards continued successfully but with a slowdown in their operations due to small companies, diversification in the niche markets, and component producers of the European shipyards. These shipyards extended their production cycles but suffered from disrupting the supply chain of specialized equipment and production material.

The studies referenced above demonstrated that two main research trends have appeared. The first trend is to examine the global effect of Covid-19 by examining the commercial ships' mobility data tracking in dry bulk, wet bulk, passenger, and container ship categories, the executives' future projections and current perceptions based on an online survey, the new build order cancellation and postponement statistics in dry bulk, tanker, container, and cruiser from several secondary data. The second trend is to analyze the micro-level impact on specific regions or countries like European, Asian, Polish, Ukrainian, East Asian, Malaysian, and Bangladesh shipbuilding sectors. The overall view of the preventive measures taken and governmental incentives proposed during the pandemic's start phase. Neither trend contained detailed data or measurement lists. The shipyards' reactions did not exist in the literature too. In addition, the authors determined that none of the manuscripts evaluated Turkish shipyards. Hence, this study positioned in the second trend and fulfills the gap in Turkish shipyard responses, revealing the measurements and the consequences just after the first phase of the pandemic from January to July 2020 with few site cases.

2. Methodology

The methodology depends upon the objective of the study. The empirical analysis depends on evidence acquired through observation or scientific data collection methods. Since the study focuses on the covid-19 pandemic, its measures, and its impacts on the Turkish shipyards, the authors conducted an empirical methodology using both qualitative and quantitative research approaches, as shown in Figure 1. GISBIR took a critical role because 90% of shipyards are a member of this association. GISBIR took a coordinating role in this study to obtain primary data (GISBIR fact sheets, SEA Europe Survey, Baltic Dry Index, Order Book, Employment Statistics). Turkish shipyards' websites provided the necessary information for the measures taken during the pandemics' first phase as secondary data. Then, the authors defined the GISBIR fact sheets, the Baltic Dry Index, ship order books, the Sea Europe survey, and employment statistics as research variables for the quantitative part of the study.

Shipyards' websites and available public reports of the Organization for Economic Cooperation and Development (OECD), International Chamber of Shipping (ICS), and Baltic and International Maritime Council (BIMCO) concerned as secondary data sources.

The Sea Europe survey revealed the executive's recognition and expectation during the first phase of the pandemic. BDI, the shipyard's order book, and employment statistics are determinant factors of this study. BDI describes the direct impact of the current market expectations for the future. The shipyard's order book reflects the current and future workload of the shipyards and is directly related to BDI. Any decrease reflects a recession in the sector. The employment statistics represent the social

effects of the pandemic because shipbuilding is a labor-intensive industry and reacts rapidly to the existing shocks and future expectations in BDI and order books.

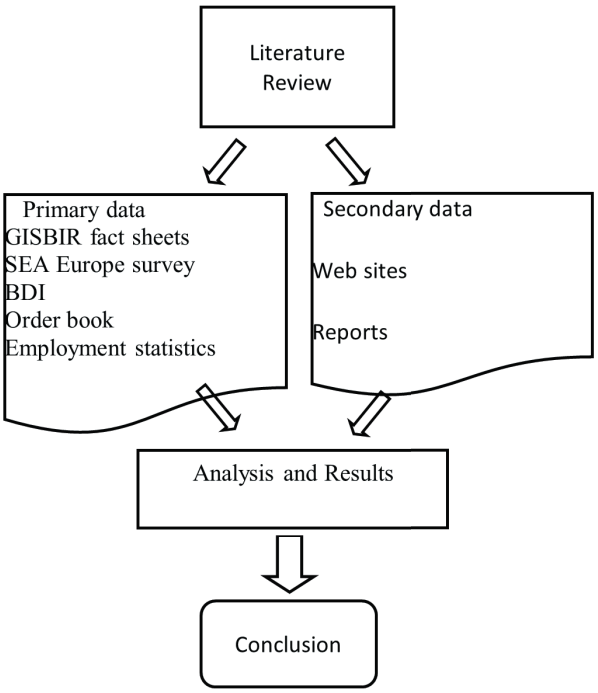

Figure 1. Methodology of the study

3. Analyses and Results

3.1. Turkish shipyard's situation during the pandemic

Turkey formed the Coronavirus Scientific Advisory Board as an advisory committee to the Presidential Government regarding WHO propositions on the pandemic. The Minister of Health and Minister of Interior declared the measurements. Turkey applied a partial and transitional lockdown policy by starting the control measures with thermal cameras and travel limitations to China and Iran. Also, in March 2020, most international flights were suspended, all schools and universities started online courses, and a curfew started for those under 20 years and older than 65. In addition, all religious buildings were closed, (Guner, et al. 2020).

Turkish shipyards are small or medium-sized private companies and work multipurpose. They construct new ships and offer conversion, repair, and maintenance services. In 2019, Turkey was the 11th biggest global shipbuilding industry in nautical vessel completions and reached 268.578 compensated gross tons. Turkish shipyards are constructing a wide range of trawlers, tugs, passenger ferries, tankers, offshore service vessels, gas and bulk carriers, and hybrid-and electric-powered vessels. Furthermore, Turkey has an essential share in the global ship repair, maintenance, and recycling industry (OECD 2021).

The shipyards organized under the GISBIR is the Turkish Shipbuilders' Association. GISBIR was established in 1971 as one of the oldest NGOs in Turkey. GISBIR works as a meditative and coordinative body between the shipyards and other stakeholders. GISBIR has ninety-eight active corporates and actual person members, 90% of all shipyards and owners. The following subsection summarizes the role of this association during the pandemic.

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3.2. Primary data

3.2.1. GISBIR fact sheet

The International Maritime Organization (IMO) circulated several letters and guided member states and their ports and shipping industries to ensure resilient shipping and maritime trade and the safety and security of seafarers, Alamoush, A.S. et al.(2021). They emphasized providing access for ships to port berths, with no restriction on loading and unloading cargoes and facilitating crew changes (IMO., 2020). United Nations Conference on Trade and Development (UNCTAD) secretariat produced a technical note that contained guidelines to enforce and follow a set of measures. The focus was on keeping supply chains, letting continuous maritime trade, and taking other measures to protect all personnel, UNCTAD. (2020). The International Chamber of Shipping (ICS) published many brochures for the hierarchy of control measures to achieve adequate safety control and risk reduction. These brochures were easy to read and explicitly demonstrated the measures with necessary illustrations (ICS, 2020).

In general, guidelines and safety measures were about preventive hygiene measures (handwashing), limitation of physical interaction and contact using radios and telephones, social distancing, personal protective equipment (PPE), sanitation of surfaces, control points to monitor temperature/symptoms, fumigation and disinfection of vulnerable port areas, cargo, and trucks, and boosting the use of digital documentation and other digital technologies to reduce human contact, Alamoush, A.S. et al.(2021).

GISBIR prepared in coordination with the instructions and guidelines published by the WHO, UNCTAD, ICS, IMO, Turkish Ministry of Health, and other administrative bodies and distributed detailed specific Guidelines for Shipyards. Furthermore, during the pandemic, the GISBIR Occupational Health and Safety Commission met regularly to evaluate implementation in shipyards, updated measures, and informed SEA Europe regularly about the latest situation. The main measures in the fact sheets are presented below:

•Social distance

•HES code to follow Covid case and affiliations.

•Teleworking or flexible working hours, especially for the white collars, and shift hours for the blue-collars

•Hygiene, disinfection, and daily cleaning services improvements, especially in closed areas like using the masque

•14 days of quarantine rule and crew control measures for arriving ships from abroad

•Decrease active population in shipyards by increasing shifts

•Extra precautions and limitations on recreation areas

•Personnel service shuttle capacities were reduced to half

•Deployment of thermal measures at entrances and disinfectants at necessary points

•Informative notices are provided on boards and in public areas

•Extra precautions on food supply and shipyard cafeterias include using plastic plates and cups in restaurants and serving pre-packaged meals during lunchtime.

The HES principle is applied; HES stands for "Hayat Eve Sığar" in Turkish, meaning "Life Fits into Home." During controlled social life conditions, the HES code helped track the people and follow the affiliations for the treatment and quarantine issues. The code is usually used in travel, visits, and shopping activities while entering buildings, universities, and schools. Hence, the HES code is applied at the entrances of each shipyard. GISBIR actively followed the relevant publications for Covid-19 measures of several organizations and disseminated them to its members daily from February 2020. These organizations are international and national; WHO, IMO, ICS, Ministry of Transport and Infrastructure, Ministry of Interior, Ministry of Environment and Urbanization, Ministry of Health-Science Committee, and IMEAK Chamber of Shipping.

GISBIR performed additional studies and training activities during the pandemic. The training activities provided the necessary training sessions for the Covid-19 measures to the shipyards. The required documentation was released and circulated to members; it explained the actions to be taken by the shipyards based on the advice released by the Ministry of Health-Science Committee. The fact sheet "Covid-19 Work-Based Employer and Employee Rights" about the legal consequences and the report "Financial Measures on Effects of Covid-19" analyzing the financial impact of the measures declared by National Authorities are the primary studies prepared by GISBIR consultants. These documents notified the shipyard's management and became a reference for the measures inside the shipyards.

The reflections of the measure for shipyards are mostly strict rules about hygiene, social distancing, and flexible working time to reduce the number of personnel in the closed areas. For example, the application in the British Aerospace systems is a form of flexible working called 'smart working on the office side of their naval ships' workplaces. Smart working enabled staff to design their working patterns and manage their working hours around 'the core hours of 10 am-2 pm. Workers on the manufacturing side worked their total contracted hours on adjusted shift patterns, with staff spread across staggered shifts to facilitate social distancing. New health and safety measures include one-way walk systems, ground markings to ensure social distancing, new site induction processes, and cleaning staff's trembling, (Jung, et al. 2020).

3.2.2. SEA Europe survey

SEA Europe prepared an expectation survey in the first phase of the pandemic and provided complementary information about the Turkish shipyard executives' perspectives and recognition. The survey started with demographic questions about the company's core activity and size. Eighteen sub-scales followed two scales. The answers were two types of multiple choices: "moderate, substantial, very strong, I do not know" and "none, below 10%, 10%-30%, 30%-50%, above 50%". The first main scale questioned the tangible impacts experienced in the company, whereas the second one questioned the expected impact for the first half of 2020. The subscales include the supply chain disruption, Production/Repair delay, Labor shortage, Design/production regulatory-related impact due to expected delayed delivery of ships, Contracting and sales anticipated reduction (in March compared to your forecast), and Turnover anticipated reduction and Liquidity.

GISBIR applied the survey to its member through email. Fifty-one shipyards responded to the survey. The response rate is 75% in general but 50% in several subscales. The result was published as descriptive statistics, (GISBIR 2020). In Table 1, 26 of 51 respondent shipyards reported that their main business activity is new shipbuilding. The remaining shipyards have repair, conversion, maintenance, and other activities. Therefore, the order book data reflected only half of the activity of the existing shipyards.

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The authors selected three related figures of eighteen figures from the survey. Gray-colored columns represent the substantial impact and blue for the expected impact of the pandemic. Travel restrictions, quarantine, and curfew halted the suppliers and technical services in the different countries and disrupted the supply chain.

Table 1. Shipyards' business activity

Answer Choices	Responses (%)	Response (qt.)
Newbuilding	51%	26
Ship repair, conversion, and maintenance	35%	18
Others	14%	7

Delays and cancellations occurred in sending and controlling parts and equipment. This concern may force the shipyards and customers to revise the delivery time for the ongoing ship construction projects. Executives faced these substantial disruptions and expected a more challenging situation in the first half of 2020, as shown in Figure 2.

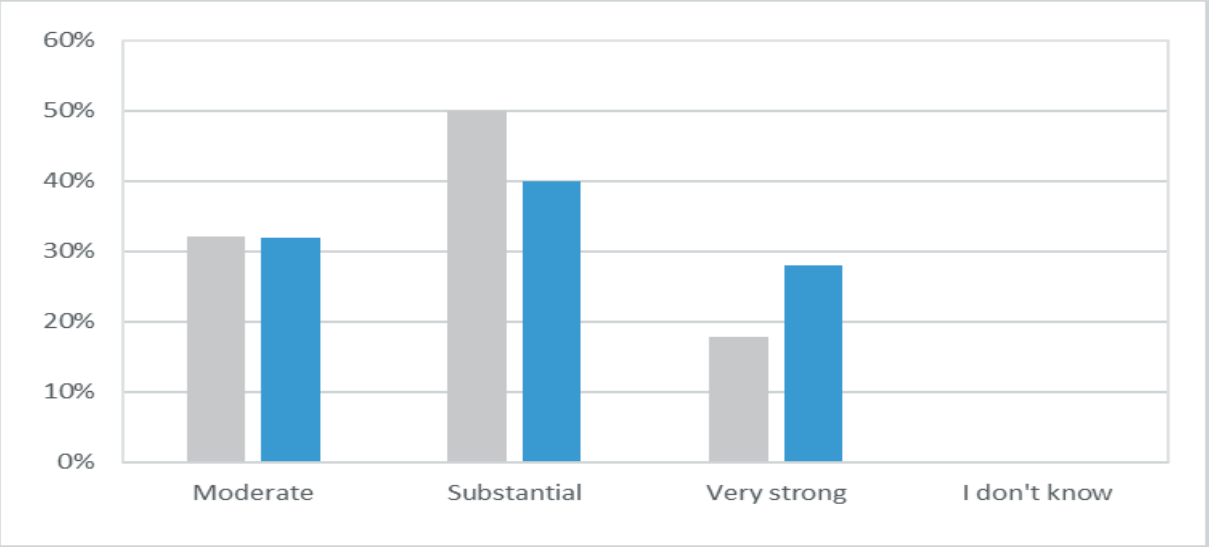

Figure 2. Disruption of the supply chain

If the supply chain does not function well and punctuality disappears, production and repair work delays become a fact. Figure 3 represents this, where executives maintain pessimistic opinions regarding the current situation. There is a shift of concern from the current situation, and future expectations about the delays will become stronger than substantial.

During economic recessions and crises, investors postpone or cancel their orders. Similarly, the pandemic obliged the companies to revise their future contract and sales budgets. Figure 4 depicts this fact accurately in a pessimistic view. The executives have already confronted quite a high contract and sales reduction and expect to continue in the midterm.

The executives had a pessimistic reflection. Generally, that is understandable in the start phase of the pandemic because of uncertainty and many pessimistic scenarios in public. The Baltic Dry Index, the shipyard's order book, and employment statistics are indicators of the market reaction. They will help interpret the Turkish shipyard's performance during the pandemic and compare it with the expectation survey.

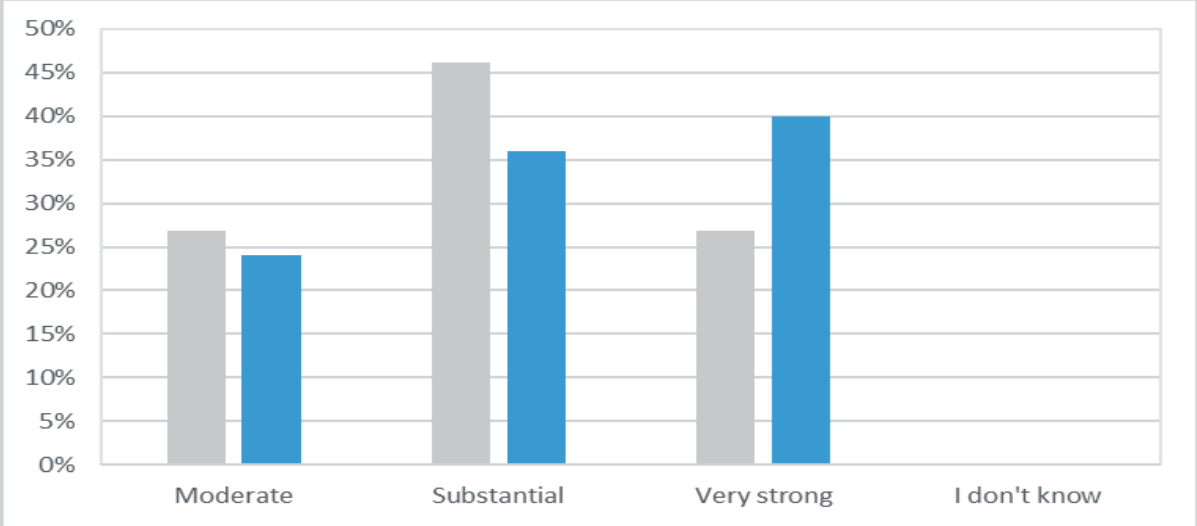

Figure 3. Production / Repair delay

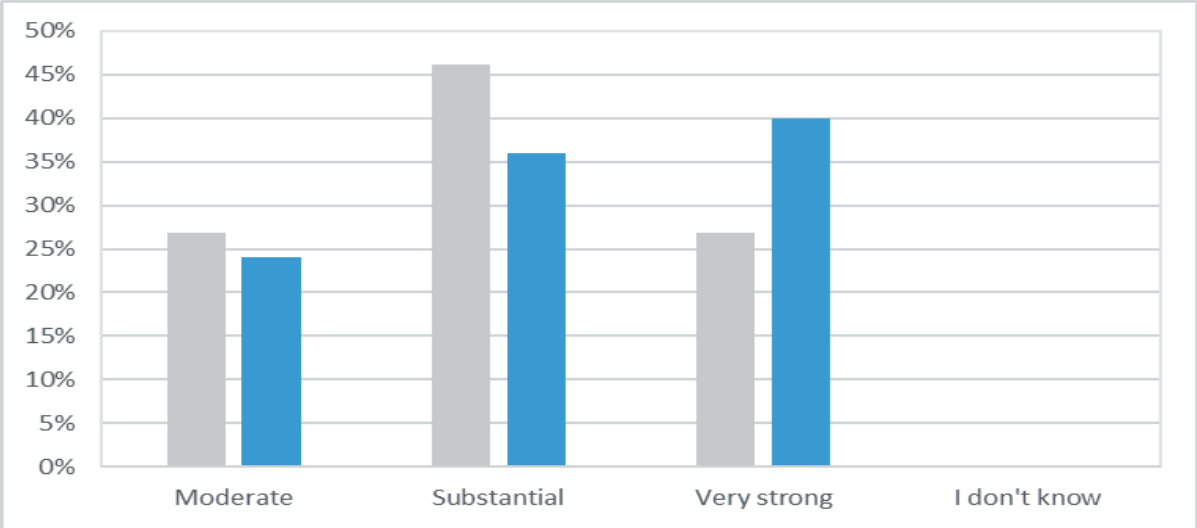

Figure 4. Contracting and sales anticipated reduction

3.2.3. The market behavior, Baltic Dry Index (BDI)

The drop-in world commerce and investments caused economic stagnation and affected the Baltic Dry Exchange Index (BDI), a leading arrow of the economic transaction; shifts in the BDI reveal the supply and demand for basic materials used in manufacturing. A shift in the BDI can provide investors insight into global supply and demand trends. The increase is assumed to be a positive indicator of future economic growth, (Kopp 2021).

The higher freight rates have ensured new ship orders for the shipyards historically. So, BDI is a determinant variable for new shipbuilding. When the BDI increases, the ship owners tend to order new ships, which means the trade increases and demand for further ships increases. When the BDI falls, the trade will decrease, and the supply of the ships will reach the market demand, which means fewer orders for the new ships. The drop may be an opportunity for the ship owners to scrap or recycle/reuse/reduce old ships and renew their fleets, (Hess, et al. 2020).

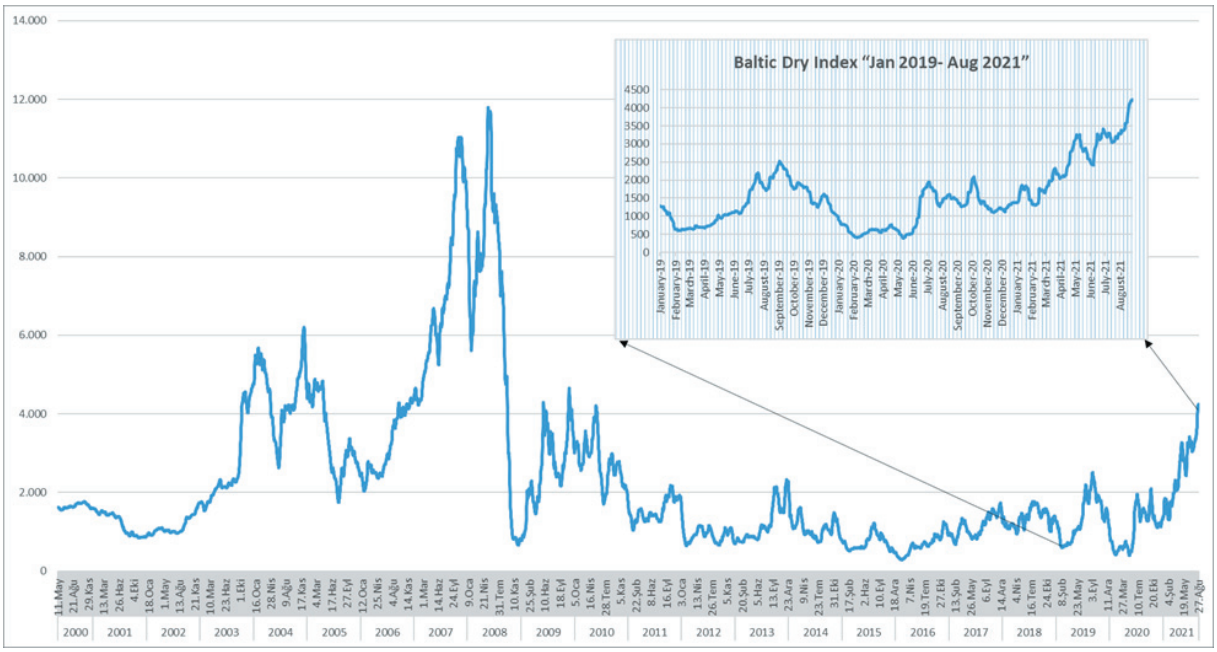

Figure 5. Baltic Dry Index May "2000- Aug 2021", (GİSBİR, 2021)

However, Başer, et al. (2018) questioned the relationship retard of the shipbuilding building with the cargo prices. They selected the total completed tonnage as the indicator of the shipbuilding market and the BDI as an indicator of the cargo prices. They hypothesized a lagged relationship between these indicators, whereas the ship deliveries accumulated for 1 to 3 years, theoretically. Two years later, a relatively high positive correlation was found between the completed tonnage value and cargo prices. Positive relationships were found in correlation and regression models using lagged values. The 10% shift in the cargo prices yielded a 1.2% shift in the two years lagged value of total completed tonnage regarding the regression model.

Xu, et al. (2008) wrote that the shipbuilding design, construction, and commission phases took a long before service. A new vessel delivery time will be between one and a half to two years concerning the different market situations. Therefore, the timing of the investment decisions is critical. Wrong timing of shipbuilding can turn the possibility of profits into heavy losses and lead to the closure of the business.

If the BDI chart in Figure 5 is analyzed, the drop in 2020 was not sharp as in 2008, when the big financial crises occurred in the United States of America (USA). BDI fell sharply from 11.793 on 20/05/2008 to 663 on 5/12/2008. BDI started to recover in February 2009 with a three-month steady increase followed by a month's smooth fall and stayed stable until the end of 2010, around 3.000 but never reaching the peak value of 11.793 went 20 May of 2008. Therefore, it can be concluded that the pandemic's financial impact was not severe as big financial crises, although a curfew was applied in many countries. The main reason may be the governmental support and incentives to the public rather than the financial sector, which was supported during the economic crisis of 2008.

Before the pandemic, BDI started an undulant and decreasing movement at the beginning of September 2019. After the pandemic, BDI decreased to 411 on 10/02/2020, increased slightly to 757 on 20/04/2020, and dropped to 393 on 14/05/2020, the lowest level in 2020. Then BDI faded up undulant, reaching 4.235 on 28/08/2021. The lowest index was 293 on 05/02/2016 since 01/01/2000. The BDI graph justifies that Covid-19 affected the shipbuilding sectors negatively in the short-term but not in the mid-term because BDI reached the peak of 5.650 on 07/10/2021.

3.2.4. The Turkish shipyard's order book

The order book of the shipyards is the second database related to the BDI and reflects the consequent effect of the pandemic. Since order books are not open-access documents, GISBIR provided these data for the article in a quarterly format. However, the order of naval ships, tugs, small fishing vessels, small offshore vessels, and superyachts is considered. Therefore, the order book reflects only a part of the shipyards' activity.

Figure 6 shows the order quantities from the second quarter of 2019 until the second quarter of 2021. The order book quantities increased steadily, although a drop during the curfew in the first quarter of 2020 occurred. After that quarter, order quantity increased and peaked at 44 orders in the second quarter of 2021. The order quantity data show that the pandemic created a shock wave in the industry, but an increasing trend has started. OECD (2021) report similarly stated that the shipyards had not significantly delayed new building and repair projects but a slight slowdown. No order cancellations have been reported during 2020. In the data sheets, some delivery dates have been revised. These revisions were not specified, but each case might have its cause. However, the significant delays caused by main engine and equipment delivery, quarantine procedure of shipyards' personnel, the closure of frontiers, and travel restrictions, blocked specialists and technicians from accessing and controlling the ships during the construction phase.

Turkish shipyards did not stop the activities like those in East Asia and Europe due to the successful application of measurement and coordination between shipyards and administration. As a result, they gained a competitive advantage "to work" during the pandemic and managed to keep the current orders and gain new ones.

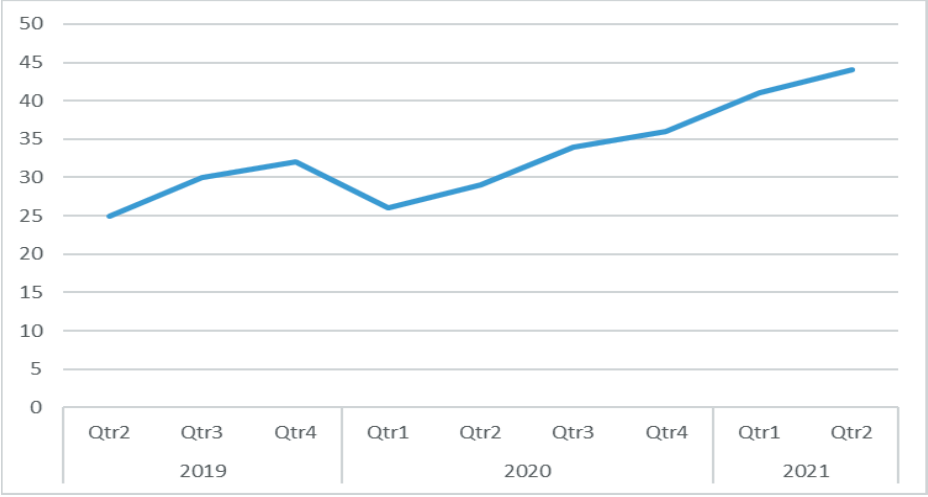

Figure 6. Turkish Shipyards Order Book "Jan 2019- June 2021", (GİSBİR, 2021)

OECD (2021) report indicated that there were 151 vessels in the order book. The difference in quantity between the OECD report and the GISBIR report is the tugboat orders. 70% of the total number of vessels in the order book are the tugboats that are not taken into account in the GISBIR order book.

However, the order book does not support sufficient information for the performance during the pandemic because, firstly, naval ship construction orders do not exist in the list. Secondly, nearly half of the Turkish shipyards worked on repair and conversion projects. In addition, GISBIR informed that in 2019-2020, shipyards completed 350+ Ballast Water Treatment (BWT) systems and 130+ Scrubber

equipment within the scope of the recently increasing retrofit needs related to repair and maintenance, and Turkish shipyards have gained significant success and global awareness.

3.2.5. The employment statistics

The employment statistic has been considered as the complementary variable of this article. When BDI increases, new investment projects like new-build, repair, maintenance, and conversion will increase. Consequently, shipyards will start to work with high utilization and invest in personnel, construction material, and workshop facilities; they will hire new personnel.

So, the increase in BDI will result indirectly in an increase in employment numbers. The relation is positively proportional and does not imply a dependent time lag like new shipbuilding orders. The first and easy part of sacrificing any business activity is the blue-collar and white-collar workers. It should be noted that direct employment was the shipyards decreased from a peak of 34.000s to 19.000s in several weeks of the 2008 big financial crisis. A similar event has never occurred during 2020.

In addition, most Turkish shipyards work with an extensive supplier pool. They keep a core team to sustain the minimum requirements and tasks; other tasks are subcontracted to the suppliers. With this strategy, shipyards can flexibly arrange their workforce according to the existing and forecasting projects and benefit from the suppliers' experience and know-how at a specific task.

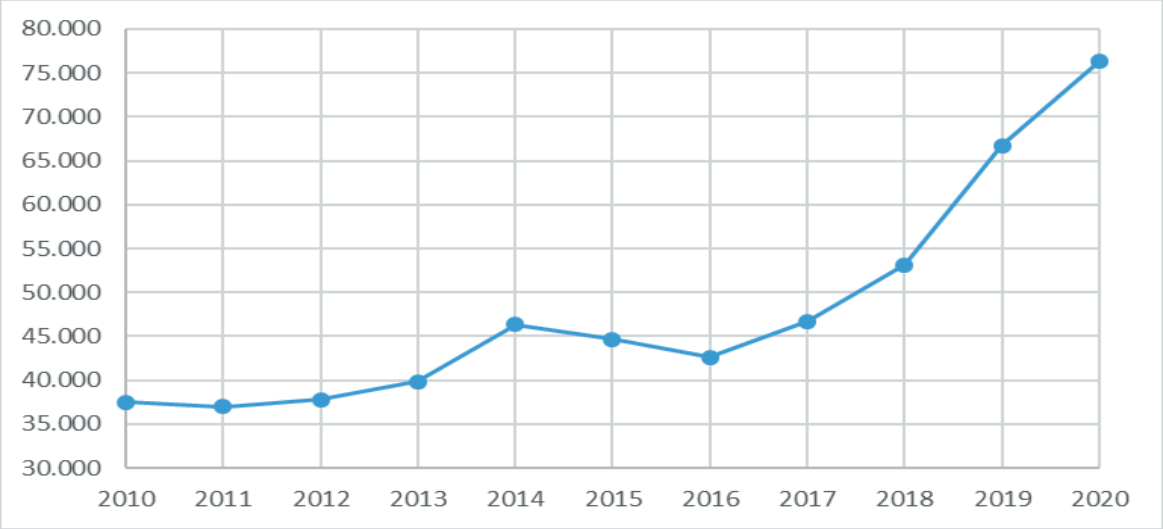

Figure 7. Number of Workers Employed in Shipbuilding and Sub-Industry, (GİSBİR, 2021)

Figure 7 depicts the total number of employees working in the shipbuilding industry. Data include the declared employees of both shipyards and their suppliers, like outsourcing companies, subcontracting teams, consultants, and specialized technicians. Since all employees must be reported to Social Security Institution (SGK), this graph is the most reliable information to justify the impact of Covid-19 on the shipyards. Employment data was obtained by indexing the selected occupational codes of the employees in the SGK database. The chart's x-axis is annualized to eliminate duplicate and overlapping entries. The steady increase in the chart is positively proportional to the BDI index and shows the continued growth in the sector. Therefore, the change in the sector roots the growth in the sector's business activity, and the impact of the Covid-19 pandemic is not seen in the employment statistics.

3.3. Secondary data

3.3.1. Shipyard's web sites analysis

After overviewing the 68 shipyards' websites, the authors found that Cemre shipyard, Ereğli shipyard, Gemak shipyard, Sanmar Shipyard, and Mengi Yay shipyard published the preventive and action plan for Covid-19 measures list with related photos of disinfection and entry control. They stressed the employees' health, re-organization of familiar places like restaurants, work floor, business meetings on the digital platform, 14-day quarantine procedure for the visitor from abroad, and HES code application for employers and visitors. Those actions were by the GISBIR proposed measures lists, (Cemre 2020), (Eregli 2020), (Gemak 2020), (Sanmar 2020), and (Yay 2020). It can be concluded that shipyards had followed the Covid-19 measurements with the coordination of GISBIR and pursued a successful policy, as cited in the (OECD 2021) report.

Furthermore, Sanmar (2020) became a successful Covid-19 measure implementer with its success story of delivering 30 tug boats, a record of all time in 2020. The customers ranged from Turkey, the United Kingdom, Canada, Italy, Germany, Latvia, Oman, Seychelles, the United Arab Emirates, to Panama. Sanmar executives recognized the pandemic threat and took all necessary measures to decrease the impact of Covid-19. They emphasized employee safety as a top priority and ensured the work "continued" without disruption. As a result, the company kept its existing customers and gained new orders in 2020. In the second example, Tersan (2020) reported its successful delivery process of a 74 mt long trawler to its Canadian customer. The delivery process was stuck in the travel restriction during the pandemic's first phase. Both shipyards, and the customer, tackled hard to get permission from the Turkish administration for a crew charter flight. When the crew arrived in Turkey, they were moved to the ship under severe Covid-19 measures and contacted nobody. The ship was evacuated in the same manner before the crew's arrival. That trawler, Calvert, was the first ship exported during the Covid-19 period.

These two examples above indicate how the dynamic Turkish shipyards challenged the pandemic, overcame this threat, and turned it into an opportunity to obtain a competitive advantage in the highly competitive global market.

3.3.2. Reports

The OECD (2021) mentioned that the Turkish shipyards successfully applied the pandemic measures, avoided cross-infection between the vessel and shipyard personnel, and reported fewer issues than similar sectors.

Stopford (2020) overemphasized this circumstance and analyzed long-term scenarios to incorporate the pandemic. He studied the shipping cycles between 1885-2020 and summarized recessions into two categories. The most severe shipping recessions/depressions during that period included a shipbuilding boom followed by a fierce trade slump in the first category. There was no shipbuilding boom in the second category, but the demand side was taken into account from the worst economic issues, and the reasonable recession carried on. This coming recession may be classified as category two because the shipbuilding sector faces this recession at the end of a long-term contraction. Industry 4.0, digitalization initiatives, new greenhouse gas (GHG) emissions measures, and support for research and development primarily for Europe may create new prospects for investors.

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Stopford developed three scenarios of the global sea trade and then derived three related scenarios for shipbuilding. The main assumptions are the three average fleet speeds, 10, 12, and 14 knots, and a 40% increase in the average ship size between 2020 and 2050. Stopford expected shipyards to confront a crash in new-build orders in the short term. In Figure 8, the blue bars indicate the realized ship's delivery in a million deadweight tons between 1960-2020. The estimation after 2020 consists of the expansion demand plus the replacement demand due to the scrap ships older than 25 years old. However, he emphasized that the actual order depends on speculative and policy decisions that affect the shipyard's pricing policies. There are three economic and two technical factors of the downturn and presented below:

1. The impact and timing of the coronavirus pandemic on the ship demand cycle.

2. The ongoing impact of climate change regulations on ship demand.

3. Shipbuilding new orders, prices, and capacity management.

4. The timescale for introducing zero carbon ship propulsion systems.

5. The timescale for digital technology in ships, companies, and logistics.

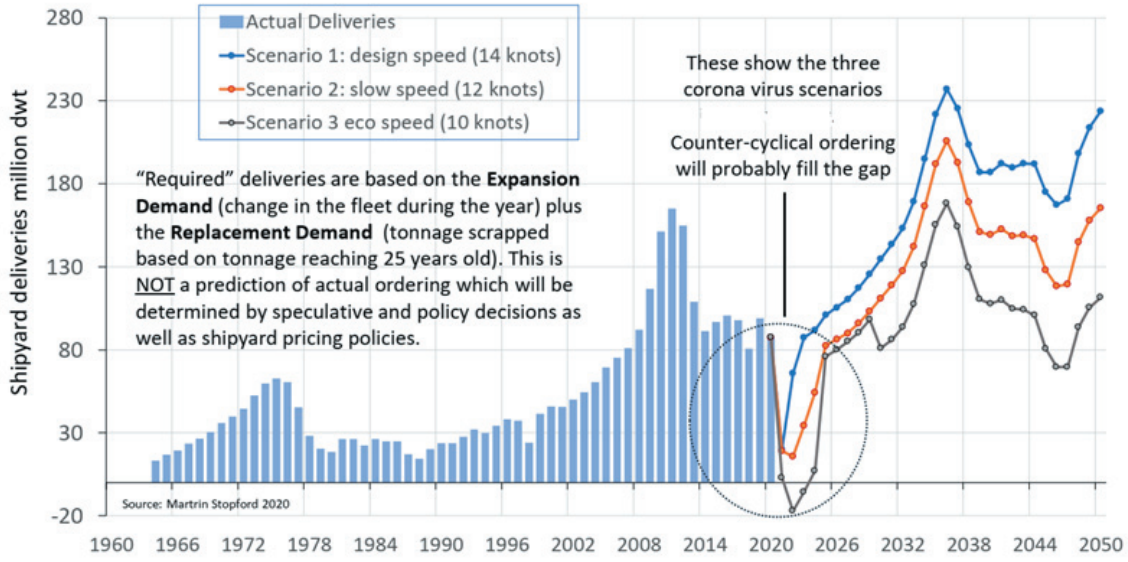

Figure 8. Three shipbuilding scenarios showing actual deliveries to 2019 and "required" deliveries scenarios 2020-2050, Stopford (2020)

4. Discussion

In March-April-May 2020, when the effects of Covid-19 were most intense, difficulties arose regarding working order, communication, and supply chain disrupted by the pandemic conditions. GISBIR reached its members with a detailed survey in April 2020 and studied the current situation and expectations for the near future. Uncertainties and total curfew were the main concerns among GISBIR members. The seriously and properly implemented measures and good coordination with local, national, and international stakeholders gave positive results, such as preventing mass infection of the virus. The measures allowed us to focus on the main activities, rapid adaptation to the usual conditions, and continue to work without any stop like the other shipyards in East Asia and Europe.

It should be noted that shipyards did not get any incentives from the government. The sector omitted the six-month delay in tax and duty payment, (GISBIR 2020). Although in the report of (Stopford 2020), the pessimistic expectation result of the SEA Europe survey and other articles discussed in the literature section, the authors did not find any evidence to justify the short-term negative impact of Covid-19 on the Turkish shipyards. The BDI undulant increased since mid of 2019, and the employment numbers of Turkish shipbuilding (shipyards and suppliers) have increased steadily since the big financial crisis in 2008. The order book fell slightly in the second quarter but rose in the last quarter of 2020. However, the order book has two deficiencies. First, these data do not cover all the shipyard activities, half of which have repair, maintenance, and conversion activities. Secondly, the order of the naval vessel, superyachts, and tug boats was not considered in the order book. In compliance, these factors describe a rapid recovery or continuous improvement.

Özhan Doğan, et al. (2020) stated that Turkish shipyards gave importance to the production of customized ships following the market's demand to overcome the global economic crisis's negative consequences. Shipyards are producing more efficient and faster vessels with continuous improvement efforts. The OECD (2021) report concluded that, like other shipyards worldwide, Turkish shipyards confronted the threat of a decline in new-build orders in 2020. However, environmental regulations encourage the demand for retrofitting ships and eco-friendly vessels. This circumstance provides golden opportunities for Turkish shipyards and marine equipment suppliers.

5. Conclusion

Since shipyards are working in an international environment, the restrictions and measures published by International Organizations and local administrations converged to equivalent levels. The global economic slowdown was an adverse effect that may disrupt the shipyards by order cancellation and halting due to the lockdowns and delays in the supply chain. Governmental subsidies to the shipyards become essential to success during that time. Some shipyards in Europe and East Asia forced temporary stops, but most used distance working and teleworking methods and suffered efficiency losses that caused delivery delays. However, east Asian shipyards, which have been receiving government subsidies for years, are in a better situation than European shipyards, Kamola-Cieślik (2021).

On the contrary, Turkish shipyards did not stop their activities compared shipyards East Asia and Europoe. They successfully delivered new ships to their customers, respecting both local and international measures, Sanmar, (2020) and Tersan, (2020). Furthermore, there is no justification that Covid-19 affected the shipyards in the short term. There was indeed a shock, but they rapidly recovered due to the shipyards' effective crisis management with GISBIR and the ability to overcome the crisis's negative impact. The success factors may be quantitative, qualitative, or intangible, but it lies in the shipyards' independent, dynamic and fragmented structure. Although the shipyards were not supported by governmental incentives like those in East Asia, they could put their presence in that highly competitive global market. In conclusion, there is no justification that Covid-19 affected the shipyards in the short term. There was indeed a shock, but they rapidly recovered due to the shipyards' effective crisis management with GISBIR and the ability to overcome the crisis's negative impact. The success factors may be quantitative, qualitative, or intangible, but it lies in the shipyards' independent, dynamic and fragmented structure. Although the shipyards were not supported by governmental incentives like those in East Asia, they could put their presence in that highly competitive global market.

In future research, the mid−term impact of Covid−19 on Turkish shipyards should be examined. The financial crisis in 2008 and its effects on the Turkish shipyards should be compared to the Covid−19 pandemic. The same study should be the extent to European shipyards respecting the same methodology and compare with this study.

Abbreviations

WHO: World Health Organization; UNCTAD: United Nations Conference on Trade and Development; GHG: greenhouse gas; BDI: Baltic Dry Index; OECD: Organization for Economic Cooperation and Development; ICS: International Chamber of Shipping; BIMCO: Baltic and International Maritime Council; GISBIR: Türkiye Gemi İnşa Sanayicileri Birliği (Turkish Shipbuilders' Association); IMO: International Maritime Organization; HES: Hayat Eve Sığar (Life Fits into Home); SGK: Sosyal Güvenlik Kurumu (Social Security Institution)

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References

Alamoush, A.S., et al. (2021), Ports, maritime transport, and industry: The immediate impact of COVID-19 and the way forward. Maritime Technology and Research, https://doi.org/10.33175/mtr.2022.250092.

Başer, S. Ö., and Açık, A. (2018). The Response of Shipbuilding Activities to Freight Market, Uluslararası İktisadi ve İdari Bilimler Dergisi 4(1), pp.124-136

Cemre, S. (2020). Fighting Against Covid-19: Cemre Shipyard Action Plan. [WWW] <URL: https://www.cemreshipyard.com/en/news/fighting-against-covid-19-cemre-shipyard-action-plan> [Accessed 08/08/2021.]

Cengiz, H., and Turan, E. (2021). Business Impact of Covid-19 Pandemic on Global Maritime Industry, Journal of Naval Sciences and Engineering 17(1), pp.43-75

Eregli, S. (2020). Ereğli Shipyard Covid-19 Measures. <URL: www.ereglishipyard.com/detay-217-eregli-shipyard-covid-19-measures.html> [Accessed08/08/2021.]

Gemak, S. (2020). Gemak Preventive Actions Against Covid-19. <URL: www.gemak.com/newsDetails.aspx?q=46> [Accessed 08/08/2021.]

GISBIR (2020). Covid-19 Measures and Effects on Shipbuilding Industry in Turkey. GISBIR. Istanbul, Turkey: GISBIR

GISBIR (2021). Baltic Dry Index Historical Data, Ship Order Book Statistics, Employment Statistics, GISBIR. Istanbul, Turkey: GISBIR

Guner, R., Hasanoglu, I., and Aktas, F. (2020). Covid-19: Prevention and control measures in the community, Turk J Med Sci 50(SI-1), pp.571-577

Hess, M., Pavić, I. F., Kos, S., and Brčić, D. (2020). Global shipbuilding activities in the modern maritime market environment, Scientific Journal of Maritime Research 34(2), pp.270-281

Holy, I. J. (2020). Beyond Coronavirus: The Next Phase for Shipbuilding Industry. [Accessed 19/07/2021] <URL: www.lightcastlebd.com/insights/2020/07/beyond-coronavirus-the-next-phase-for- shipbuilding-industry>.

Ilchenko, S. V. (2021). Conceptual Aspects of Achieving Competitive Advantages by Shipbuilding Enterprises of Ukraine, Economic innovations 23(1(78)), pp.84-94

IMO. (2020). Circular Letter No.4204/Add.6 - 27 March 2020: Preliminary list of recommendations for Governments and relevant national authorities on the facilitation of maritime trade during the COVID-19 pandemic. International Maritime Organization.

ICS, (2020) Shipping, T.I.C.o., Covid-19-protecting-everyone-during-ship-visits and other brochuers.

Jung, C., Statham, R., and Roberts, C. (2020). The Covid Shift Working Time in Manufacturing, Engineering, Shipbuilding and Aerospace after the Pandemic. The IPPR Centre for Economic Justice. London, England: IPPR

Exportvirginia. (2014). Seaports of the world by country. Retrieved from http://exportvirginia.org/wp-content/uploads/2014/04/Seaports-of-the-World.pdf

Kamola-Cieślik, M. (2021). Changes in the Global Shipbuilding Industry on the Examples

of Selected States Worldwide in the 21st Century, European Research Studies Journal XXIV(2B), pp.98-112

Koop, C.M. (2021). Baltic Dry Index (BDI). <www.investopedia.com/terms/b/baltic_dry_index.asp> [Accessed 22/08/2021]

Menhat, M., Mohd Zaideen, I. M., Yusuf, Y., Salleh, N. H. M., Zamri, M. A., and Jeevan, J. (2021). The impact of Covid-19 pandemic: A review on maritime sectors in Malaysia, Ocean Coast Manag 209(1 August 2021), pp.1-8

Millefiori, L. M., Braca, P., Zissis, D., Spiliopoulos, G., Marano, S., Willett, P. K., and Carniel, S. (2021). Covid-19 Impact on Global Maritime Mobility, arXiv preprint:2009.06960, pp.1-22

Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M., and Agha, R. (2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review, Int J Surg 78, pp.185-193.

OECD (2021). Peer Review of the Turkish Shipbuilding Industry. OECD. Paris, France.

Özhan Doğan, S., Özcan, M., Özşahin, S., and Bayar, E. (2020). In new Ship Building; Review of Production Stages. In: 6th International Congress on Engineering, Architecture, and Design, Conference, Location, pp.434-439

Ozturk, O., and Turan, E. (2020). ”Examination of the Impact of the Covid-19 Outbreak on Sea Freight Transportation”. 2nd International Symposium of Engineering Applications on Civil Engineering and Earth Sciences (IEACES), pp. 40-47

Reza, F., Kawsar, E., and Mahabub, T. B. (2020). Covid-19 impact and responses: Bangladesh. Build Bangladesh. Dhaka, Bangladesh.

Sanmar, S. (2020). Covid-19 Measures at Sanmar Shipyards. <URL: www.sanmar.com.tr/ covid-19-measures-at-sanmar-shipyards/> [Accessed 08/08/2021.]

Sanmar, S. (2020). Sanmar delivers 30 tugs during a challenging year. <URL: www.sanmar.com.tr/sanmar-delivers-30-tugs-during-challenging-year/> [Accessed08/08/2021.]

Sarkis, J., Cohen, M. J., Dewick, P., and Schroder, P. (2020). A brave new world: Lessons from the COVID-19 pandemic for transitioning to sustainable supply and production, Resources, Conservation & Recycling 159, 104894.

Stopford, M. (2020). Coronavirus, Climate Change & Smart Shipping Three Maritime Scenarios 2020-2050. Seatrade Maritime. London, England: S. Maritime

Tersan, S. (2020). A Successful Delivery Despite the COVID-19 Challenging Days NB1091 CALVERT. [WWW] <URL: https://tersanshipyard.com/en/news/a-successful-delivery-despite-the-covid-19-challenging-days-nb1091-calvert> [Accessed 07/08/2021.]

UNCTAD. (2020). How countries can leverage trade facilitation to defeat the Covid-19 pandemic.

In Proceedings of the United Nation Conference on Trade and Development, Geneva, Switzerland.

VanGrasstek, C., and Shepherd, B. (2021). Protectionism in Maritime Economies Study Summary Report. International Chamber of Shipping. London, England: M. Publications.

WHO (2022). WHO Coronavirus (COVID-19) Dashboard. <URL: https://covid19.who.int/>

Xu, J. J., Yip, T. L., and Liu, L. (2008). Dynamic Interrelationships between Sea Freight and Shipbuilding Markets. In: International Forum on Shipping, Ports, and Airports, IFSPA 2008 - Trade-Based Global Supply Chain and Transport Logistics Hubs: Trends and Future Development, Conference, Location, pp.480-494

Yay, S. M. (2020). Covid-19 Safety at Mengi Yay. <URL: https://www.mengiyay.com/covid-19- safety-at-mengi-yay-news> [Accessed 08/08/2021.]

Yazir, D., Sahin, B., Yip, T. L., and Tseng, P. H. (2020). Effects of Covid-19 on the maritime industry: a review, Int Marit Health 71(4), pp.253-264