

Influence of the Coronavirus Pandemic on Execution of Tasks by the Coast Guard of the Republic of Croatia

M. Dedo², T. Sunko¹, L. Matijašević² & I. Šantić²

¹ Croatian Defence Academy, Zagreb, Croatia

² Croatian Navy, Split, Croatia,

ABSTRACT: COVID-19 Pandemic, or better known as Coronavirus pandemic, is a current new disease of respiratory ways, and adjustment to life and work in the pandemic conditions is a challenge all organisations in the world, including military ones, have to face with. This paper analyses the influence of the COVID-19 pandemic on the intensity and implementation of surveillance and protection of national interests of the Republic of Croatia within the jurisdiction of the Coast Guard of the Republic of Croatia. A special attention is dedicated to determining how capable the Coast Guard of the Republic of Croatia is in executing all tasks in the pandemic circumstances. The analysis is carried out by comparing selected activities the Coast Guard of the Republic of Croatia carried out in 2020 with activities carried out in the period from 2015 to 2019. In the analysis of the effects which the COVID-9 pandemic had on the intensity and implementation of surveillance and protection of national interests of the Republic of Croatia within the jurisdiction of the Coast Guard, the following performed activities were observed: number of airplane flights, airplane fuel consumption, number of flight hours, number of engaged vessels, number of nautical miles sailed by vessels, number of registered vessel engine working hours, vessel fuel consumption, number of issued mandatory misdemeanour warrants. This paper has a goal to prove that the Coast Guard of the Republic of Croatia, having adjusted to a great extent to new operational circumstances, carries out all its tasks, and this can be best seen through a number of issued misdemeanour warrants, which means that the pandemic didn't have a decisive negative impact on the work of the Coast Guard of the Republic of Croatia.

1 INTRODUCTION

The Coast Guard of the Republic of Croatia (hereinafter referred to as CGRC) is a military organisation authorised to deal with civilians at sea and is a part of the Croatian Navy (hereinafter referred to as CN). In October 2007 the Act on the CGRC was passed which entered into force on 1 November 2007. The Act consists of 11 parts and the total of 48 articles and establishes the CGRC and determines the organisation and scope of work, authorisations, jobs and tasks thereof [1]. The CGRC is an autonomous vessel unit whose headquarters and

first division are stationed in the barracks "Admiral flote Sveto Letica-Barba" in Split, and naval forces of the second division are operationally stationed in Pula. The CGRC carries out its activities through its operational naval forces composed of, as it was mentioned above, the first and second division [14].

The surface of the Adriatic Sea under the sovereignty of the Republic of Croatia (hereinafter referred to as RC) (inland waters and territorial sea) amounts to 31,757 km², whereas on a great part of the Adriatic Sea, outside of the state territory, the RC exercises certain sovereign rights and jurisdiction (the

area over which the RC exercises certain sovereign rights and jurisdiction amounts to 25,207 km²). It is necessary to supervise such a huge area which is an important economic resource of the RC in an organised and efficient way, and CGRC's basic jobs and tasks are to protect interests, sovereign rights of the RC and implementation of the Croatian jurisdiction in the mentioned area [4]. In the context of COVID-19 Pandemic, control over this area had to be increased since the disruption of internal movement was nonetheless accompanied by a more robust collective closure of the EU's external borders, with incoming travel banned for non-EU citizens/residents [11]. The CGRC is the main force in the protection of interests over the part of the sea, sea bed and underground where the RC exercises its sovereign rights and it can provide assistance in the maritime area under the sovereignty of the RC to harbour masters, maritime police and customs if it is considered necessary [3].

The CGRC is an integral part of the CN (Article 3, paragraph 1 of the Act on the CGRC) [16]. Its organisation was passed by the President of the RC at the proposal of the Government of the RC (Article 3 paragraph 2 of the Act on the CGRC) [2]. The Minister of Defence of the RC stipulates the organisation of work and other issues related to the work of the CGRC by way of an ordinance. Provisions of the acts laying down the service in the Armed Forces of the Republic of Croatia (hereinafter referred to as CAF) as well as provisions of the acts laying down rights, obligations and responsibilities of civil servants will be applied on members of the CGRC in issues not regulated by the Act on the CGRC. In the defence system, the chain-of-command goes from the supreme commander to the CAF, and through the Ministry of Defence to the CN command. Then it goes down through the CGRC command to the first division of the CGRC in Split and to the second division of the CGRC in Pula, and also to Croatian Air Force units based in Zemunik and Divulje which are under the command of the CGRC's operational command. Pursuant to the Act on the Coast Guard of the Republic of Croatia and the Decision of the Republic of Croatia, the Central Coordinating Committee for Surveillance and Protection of the Maritime Rights and Interests of the Republic of Croatia was set up within the system for protection and surveillance of maritime interests, as well as the Central Coordination Expert Body and Regional Coordination Units at the level of seven littoral counties. Considering technical assets having at its disposal, the CGRC should be taken as the most adequate component of that authorised body, capable of implementing the Croatian jurisdiction for the purpose of surveillance of maritime fisheries in the economic zone [6].

Within the system of surveillance and protection of Croatian maritime interests, at the bottom of the chain-of-command there are Regional Coordination Units headed by harbour masters and they also include representatives of the CGRC. These units are supervised by the Expert Body which is subordinated to the Central Coordination, and the Government of the RC is at the top. The chairperson of the Expert Body is the CGRC commander, whereas the role of the Central Coordination chairperson rotates annually between the Minister of Defence of the RC, Minister of

the Sea, Transport and Infrastructure and Minister of the Interior. Depending on tasks it carries out, the CGRC is responsible to different ministries and state administration bodies [15].

1.1 *COVID-19 Pandemic*

The COVID-19 pandemic appeared for the first time at the end of December 2019 in the city of Wuhan in the Chinese province of Hubei. In January 2020 an epidemic developed in the P.R. China and spread all around the world. It was actuated by until then little known SARS-CoV-2 coronavirus. In order to prevent spreading in countries without efficient healthcare systems, on 30 January 2020 the World Health Organisation (hereinafter referred to as WHO) declared a global emergency, on 9 February 2020 the number of registered deaths exceeded the total number of deaths in the SARS 2002-2003 pandemic. In the WHO's report of 26 February 2020, it was for the time reported that there were more new cases of infection registered out of China than in China itself.

United States of America's (hereinafter referred to as U. S.) Centers for Disease Control and Prevention received notification of the first case of laboratory-confirmed COVID-19 in the United States on January 22, 2020. As of May 30, an aggregate 1,761,503 U.S. COVID-19 cases and 103,700 deaths had been reported [13]. Starting from 28 February 2020 the WHO reported evaluated risks at the global level as "very high", in comparison to the previously reported "high" risk. On 11 March 2020 the WHO declared the previous epidemic a pandemic, which was the first one after the swine flu pandemic. By the end of March 2021, in the world there were 136 million confirmed cases of infected people, and over 2.9 million of confirmed deaths. The virus caught the global community off guard, and its future course is still highly unpredictable [7]. The first patient infected by SARS-CoV-2 virus was detected in Croatia on 25 February 2020. According to the Croatian Health Insurance Fund since 25 July there have been 362,621 registered cases in the RC, and so far 2,264,668 people have been tested for the coronavirus [18].

1.2 *Armed Forces of the Republic of Croatia in pandemic conditions*

On 27 January 2021 the Chief of Defence of the CAF and the Military Representative at the NATO and EU attended the NATO Military Committee meeting. The meeting was presided by the Chairman of the NATO Military Committee, and the Chiefs of Defence of the Member States discussed about NATO operations, missions and activities, NATO's strategic concept and responses to the COVID-19 pandemic.

On this occasion, the NATO Secretary General stressed the importance of further strengthening of allied capabilities, modernisation and boosting readiness of the Member States armed forces so that they could respond to all kinds of challenges in the near future [17].

Military forces across Europe have scaled back operations and imposed stricter rules on personnel to try to stem the spread of the coronavirus among staff.

Preventing the virus' proliferation among the military is important both for national security and because specialist army, navy and airforce units are being drafted in to help governments tackle the virus in many countries. Germany mobilised 15,000 soldiers to help local authorities tackle the crisis, for example, while Poland activated thousands of troops to patrol streets under lockdown, disinfect hospitals and support border control, its defence ministry said [12].

Since the society in its entirety had to adapt to new conditions of life and work, and this has become an on-going process, the military's response, either in providing support to other state institutions or in carrying out its regular tasks, to the coronavirus pandemic thus far highlights the continuing durability of longstanding notions of civilian control of the military and the military's ability to provide aid [9]. The CAF and CN also had to issue several instructions and orders intended to reduce the possibility of spreading the virus to the minimum when carrying out regular tasks. The CGRC, as an integral part of the CN, has also adapted to carrying out of its basic tasks (protection of sovereign rights and jurisdiction of the RC, spreading of mass destruction weapons, suppression of piracy and other types of usage of the open sea for contentious purposes, navigation safety, search and rescue at sea, protection of marine environment, habitats and cultural goods and control of sea fishery) to the pandemic conditions, so the surveillance and protection of rights and interests of the RC at sea is being conducted in line with the new circumstances. In other words, the stress has been put on new vessels having fewer crew members and bigger effectiveness in one-day or shorter sailings regardless of distance and sea conditions. With continuous and targeted training of soldiers (in accordance with the new work circumstances in the pandemic conditions and reduced intensity of overall CAF's activities), the focus has been shifted from quantity to quality of conducted activities. Also fewer crew members reduced possibility of accumulating stress of possible exposure, by forgoing stay-at-home recommendations and engaging with support missions, these service members increased their risk of infection [8] and experienced the psychosocial stress of possible exposure. Given that some worked in environments where social distancing was difficult, the anxiety regarding possible exposure was noteworthy [10]. The abovementioned smaller vessels, concerning the type and autonomy at sea, are the right solution for carrying out a part of CGRC tasks in this new situation. The COVID-19 pandemic reduced a number of sailings and tasks in 2020. However, the CGRC showed a high level of capability and swiftly adapted to the new work circumstances in a way that the number of issued misdemeanour warrants increased, and the pandemic in this regard didn't have a decisive negative impact on the work of the CGRC, although significant challenges for deployed service members in the face of this pandemic remain [5]. In short, it had an impact on the reduced number of sailings and tasks, but not on the number of executed inspections, which will be proved and presented later in this paper.

2 DATA AND METODOLOGY

In the analysis of the influence of the COVID-19 pandemic on the intensity and implementation of surveillance and protection of national interests of the Republic of Croatia within the jurisdiction of the CGRC the following data were observed: number of airplane flights, airplane fuel consumption, number of flight hours, number of engaged vessels, number of nautical miles sailed by vessels, number of registered vessel engine working hours, vessel fuel consumption, number of issued mandatory misdemeanour warrants. Annual data from the period from 2015 to 2020 were used in this analysis. The data were collected from the Annual Reports on the implementation of the established policy, plans and regulations in relation to surveillance and protection of rights and interests of the RC at sea made by the Central Coordinating Committee for Surveillance and Protection of the Maritime Rights and Interests of the RC for the years 2015, 2016, 2017, 2018, 2019 and 2020 and are shown in Table 1 [19–24].

Table 1 Annual data on the activities conducted by the CGRC

	Year					
	2015	2016	2017	2018	2019	2020
Conducted activity	2015	2016	2017	2018	2019	2020
Number of 54 airplane flights	54	57	109	52	50	50
Airplane fuel consumption in litres	16,350	17,004	55,318	20,775	14,938	15,736
Number of 82.07 flight hours	82.07	73.10	176.90	82.70	70.70	70.70
Number of 101 engaged vessels	101	93	92	75	103	88
Number of 5341.5 nautical miles sailed by vessels	5341.5	5834.9	4981.1	5687.5	4336.9	8661.0
Number of 603.56 registered vessel engine working hours	603.56	592.40	528.95	520.75	465.70	798.00
Vessel fuel consumption in litres	205,046	186,918	154,767	201,365	150,558	241,997
Number of --- ¹⁾ issued mandatory misdemeanour warrants	---	22	28	15	32	79

¹⁾ --- means that the information was not available

The activities conducted by the CGRC in the period from 2015 to 2020 are divided into the activities in the air, activities at sea and number of issued mandatory misdemeanour warrants. The activities in the air comprise the number of airplane flights, airplane fuel consumption, number of flight hours, whereas activities at sea include the number of engaged vessels, number of nautical miles sailed by

vessels, number of registered vessel engine working hours and vessel fuel consumption,

The influence of the COVID-19 pandemic on the intensity and implementation of surveillance and protection of national interests of the RC within the jurisdiction of the CGRC was analysed by comparing the selected activities the CGRC carried out in 2020 with the activities conducted in the period from 2015 to 2019.

While analysing the activities the CGRC conducted in the period from 2015 to 2020, we used graphs of the observed time series, and a rate of change in relation to the base period as a relative dynamics indicator, and the year 2020 was selected as the base period (2020=100).

Furthermore, by using the exponential smoothing method we forecast values of the observed activities carried out by the CGRC (except for the number of issued mandatory misdemeanour warrants) for the period from 2016 to 2021 and we calculated mean absolute percentage errors (MAPE). The same method was used to forecast values for the number of issued mandatory misdemeanour warrants for the period from 2017 to 2021 since data for 2015 were unavailable.

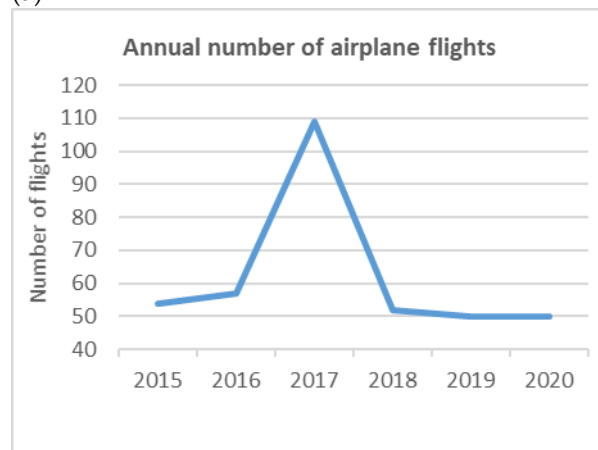
3 RESULTS

The graphs of the activities the CGRC carried out in the air in the observed period, given in Figure 1, show that all of the three observed activities carried out in the air had similar dynamics in the observed period. The number of airplane flights, airplane fuel consumption and number of flight hours in 2015 and 2016 remained at approximately the same levels, in 2017 a significant growth of the observed activities in the air was present, but in 2018 they decreased to the levels similar to those from 2015 and 2016. In 2019 and 2020 the levels of the observed activities in the air were approximately the same as those from 2018.

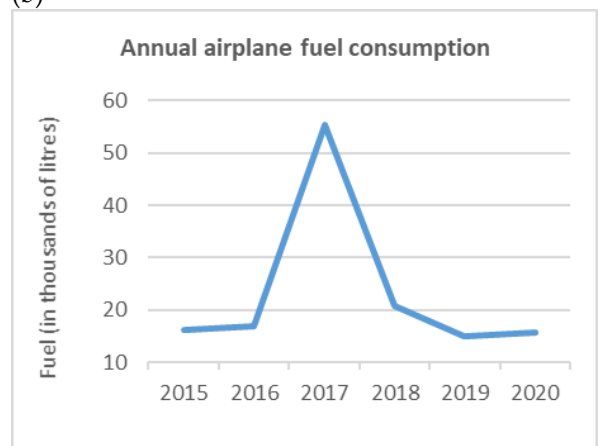
The rates of changes of the activities the CGRC carried out in the air in relation to the base year of 2020 are shown in Table 2.

If we compare the activities the CGRC carried out in the air in 2020 with the activities in the period from 2015 and 2019 on the grounds of the rates of changes in relation to the base period (2020=100), it can be concluded that in the pandemic 2020 the number of airplane flights and the number of flight hours remained at the same level as in 2019, whereas the airplane fuel consumption in 2019 was lower by 5.07% in comparison to 2020. If we compare these activities from 2020 to those from 2018, in 2018 the number of airplane flights was higher by 4%, the number of consumed airplane fuel by 32.02% and the number of flight hours by 16.97% in relation to 2020. In 2016 the number of airplane flights was higher by 14%, consumed fuel by 8.06% and the number of flight hours by 3.39% in relation to 2020. The number of airplane flights, consumed fuel and flight hours in 2015 was higher in the respect to the ones in 2020 by 6%, 3.9% and 16.08%, respectively.

(a)



(b)



(c)

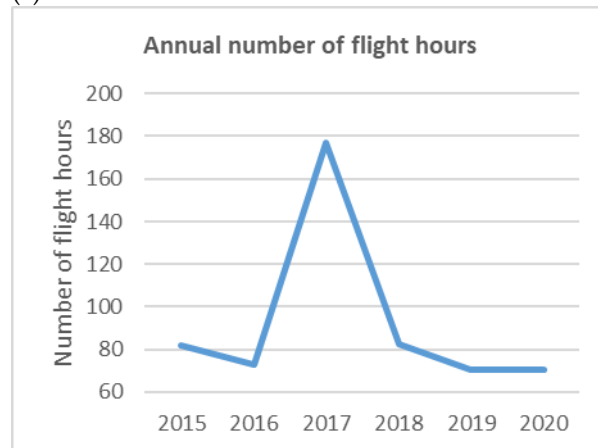


Figure 1 Graphs of the activities the CGRC carried out in the air from 2015 to 2020: (a) annual number of airplane flights; (b) annual airplane fuel consumption; (3) annual number of flight hours

Table 2. Rates of changes of the activities CGRC carried out in the air (2020 = 100)

Rates of changes (2020 = 100)			
Year	Number of airplane flights	Airplane fuel consumption	Annual number of flight hours
2015	8.00	3.90	16.08
2016	14.00	8.06	3.39
2017	118.00	251.54	150.21
2018	4.00	32.02	16.97
2019	0.00	-5.07	0.00
2020	0.00	0.00	0.00

The rates of changes of the activities the CGRC carried out in the air in relation to the base year of 2020 show that the levels of the conducted activities in the air in 2019 were roughly the same as those from 2020, but the level of the activities in the air in 2015, 2016 and 2018 was slightly higher than it was in 2020. An exception was 2017 when the level of the activities in the air was significantly higher than in 2020 (in 2017 the number of airplane flights increased by 118%, consumed fuel by 251.54% and number of flight hours by 150.21%).

Table 3 Forecasted values of the activities the CGRC carried out in the air in the period from 2016 to 2021

Forecasted values (exponential smoothing method)			
Year	Number of airplane flights	Airplane fuel consumption (in thousands of litres)	Number of flight hours
2016	54.00	16.35	82.07
2017	54.30	16.42	81.17
2018	59.77	20.31	90.75
2019	58.99	20.35	89.94
2020	58.09	19.81	88.02
2021	57.28	19.40	86.29
MAPE ¹⁾	0.21	0.28	0.26

¹⁾ MAPE - mean absolute percentage error

For the purpose of the further analysis, by using the exponential smoothing method when the weight factor is 0.1 the forecasted values of the activities the CGRC carried out in the air were calculated for the period from 2016 to 2021 and are given in Table 3.

The forecasted values of the activities carried out in the air and the corresponding mean absolute percentage error were calculated for several different weight factors, and eventually the weight factor of 0.1 was selected in order to minimise the mean absolute percentage error. The graphs of the actual and forecasted values of the conducted activities in the air are shown in Figure 2.

On the grounds of the graphs of the actual and forecasted values the CGRC carried out in the air from 2015 to 2021, it is possible to conclude for every single activity the CGRC carried out in the air from 2015 to 2021 (Figure 2) that the actual values in 2018, 2019 and 2020 were lower than the forecasted values, and the only exception was the actual consumption of fuel which was slightly higher in 2018 than the forecasted consumption. In 2016 and 2017 the actual values of the observed activities were higher than the forecasted values, and the only exception was the actual number of flight hours which was lower in 2016 than the forecasted number.

The comparison of the forecasted values from Table 3 to their actual values from Table 2 shows that in 2020 the actual number of flights amounted to 50 which was by 13.93% lower than the forecasted value which amounted to 58.09. Furthermore, the actual airplane fuel consumption was 15,736 litres, which was by 20.57% lower than the forecasted value of 19,810 litres, and the actual number of airplane flight hours amounted to 70.70 and in comparison to the forecasted number of flight hours which amounted to 88.02, it was lower by 19.68%.

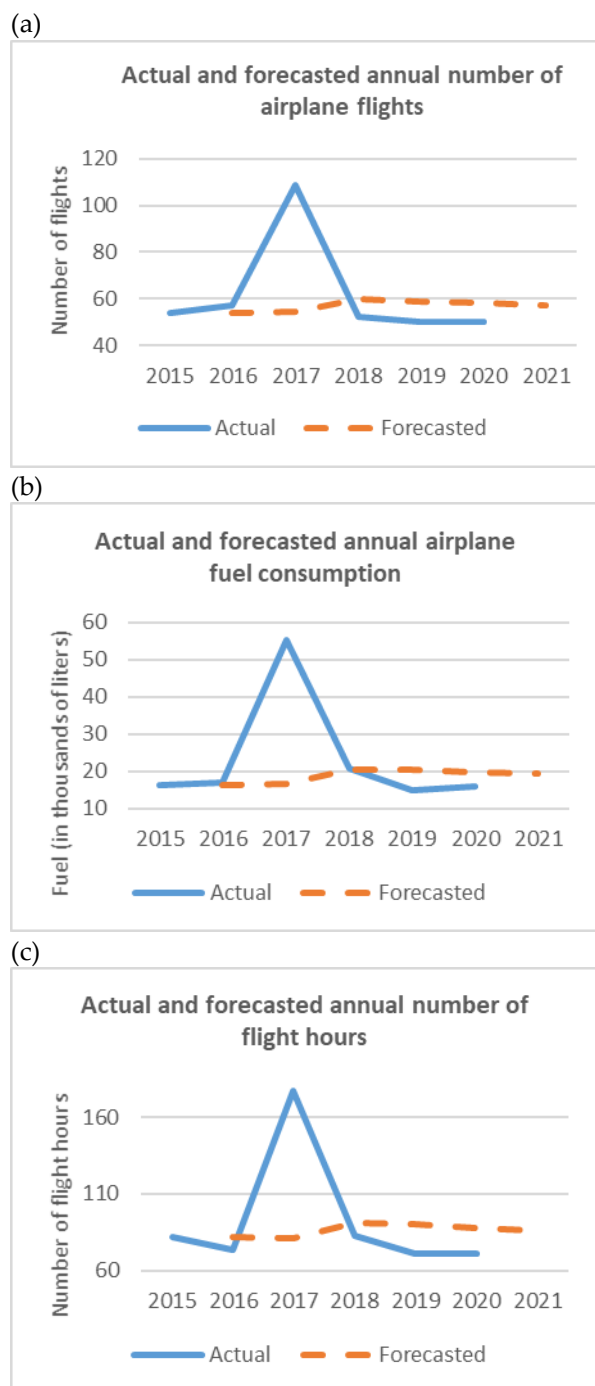


Figure 2 The graphs of the actual and forecasted values of the activities the CGRC conducted in the air from 2015 to 2021: (a) annual number of airplane flights; (b) annual airplane fuel consumption; (3) annual number of flight hours

By using the exponential smoothing method when the weight factor is 0.1, the following values of the activities the CGRC carried out in the air for 2021 were forecasted: 57.28 flights, 19,400 litres of consumed fuel and 66.29 of flight hours.

Below are the results of the analysis of the activities the CGRC carried out at sea in the period from 2015 to 2021.

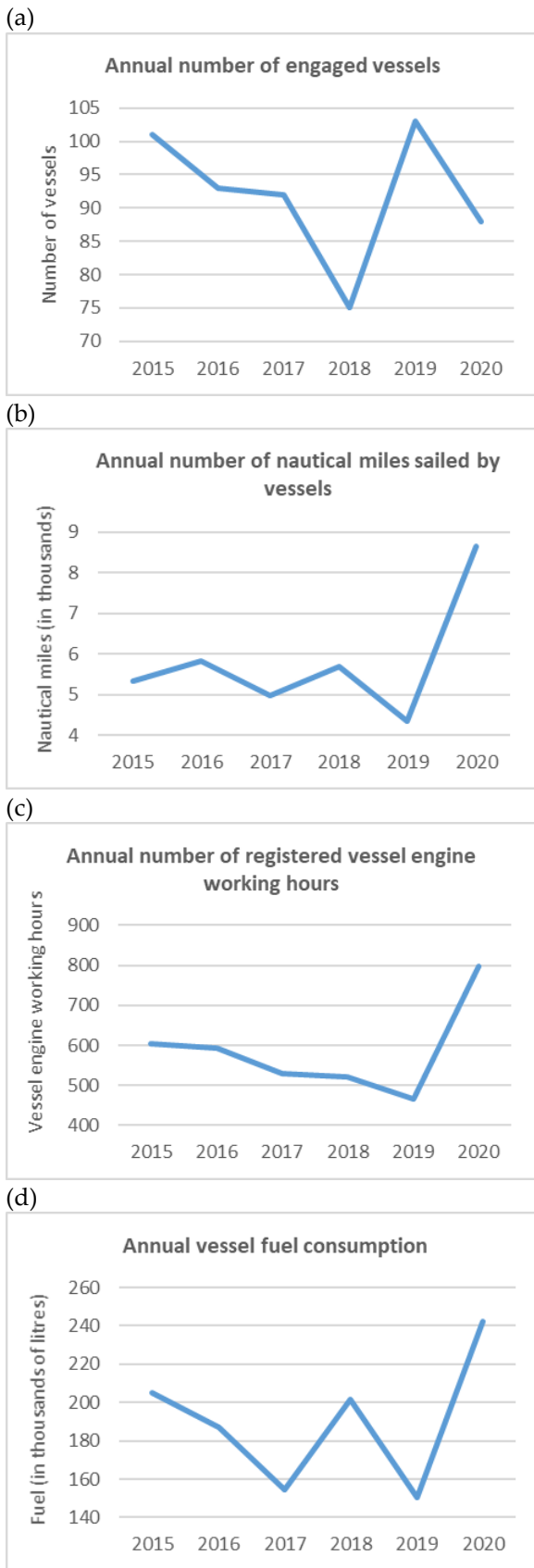


Figure 3 The graphs of the activities the CGRC conducted at sea from 2015 to 2021: (a) number of engaged vessels; (b) number of nautical miles sailed by vessels (c) number of registered vessel engine working hours; (d) vessel fuel consumption.

Figure 3 (a) clearly shows that the annual number of the engaged vessels decreased in the period from 2015 to 2018 when it reached its lowest level, in 2019 there was a significant growth of the number of

engaged vessels, but in 2020 this number decreased to a level slightly lower than it was in 2018. The annual number of registered vessel engine working hours in Figure 3 (c) shows a constant decline in the period from 2015 to 2019, but in 2020 it was considerably higher and reached the highest level in the observed period. The graphs of the numbers of nautical miles sailed and vessel fuel consumption given in Figure 3 (b) and (d) show that these activities carried out at sea had somewhat similar dynamics in the observed period. The number of nautical miles sailed alternately increased and decreased in the period from 2015 and 2019 and in 2019 they reached the lowest level in the observed period. In 2020 there was a significant increase of nautical miles sailed, which was in fact their highest level in the observed period. In the period from 2015 to 2017 the annual vessel fuel consumption decreased, then it increased in 2018, and in 2019 it decreased again and reached again its lowest level in the observed period. In 2020 the annual consumption of vessel fuel grew significantly and reached its highest level in the observed period.

Table 4. Rates of changes of the activities the CGRC carried out at sea (2020 =100)

Rates of changes (2020 =100)				
Year	Number of engage vessels	Number of nautical miles sailed by vessels	Number of registered vessel engine working hours	Vessel fuel consumption (in thousands of litres)
2015	14.77	-38.33	-24.37	-15.27
2016	5.68	-32.63	-25.76	-22.76
2017	4.55	-42.49	-33.72	-36.05
2018	-14.77	-34.33	-34.74	-16.79
2019	17.05	-49.93	-41.64	-37.79
2020	0	0	0	0

On the basis of the rates of changes of the activities the CGRC carried out at sea in the period from 2015 to 2020 in relation to the base year of 2020, given in Table 4, it can be concluded that the number of nautical miles sailed, number of registered vessel engine working hours and vessel fuel consumption were at a lower level in the period from 2015 to 2019 in comparison to 2020, the year of the pandemic. The number of nautical miles sailed by vessels was lower than in 2020 by 38.33% in 2015, 32.36% in 2016, 42.49% in 2017, 34.33% in 2018 and 49.93% in 2019, the number of registered vessel engine working hours was lower by 24.37% in 2015, 25.76% in 2016, 33.72% in 2017 and 34.74% in 2018 and 41.46% in 2019, whereas the vessel fuel consumption was lower by 15.27% in 2015, 22.76% in 2016, 36.05% in 2017, 16.79% in 2018 and 37.79% in 2019. The number of engaged vessels in the period from 2015 to 2017 was higher than in 2020, that is, by 14.77% in 2015, 5.68% in 2016 and 4.55% in 2017. The number of engaged vehicles was lower by 14.77% in 2018 and higher by 17.05% in 2019 in comparison to 2020.

Table 5. Forecasted values of the activities the CGRC carried out at sea in the period from 2016 to 2021

Forecasted values (exponential smoothing method)				
Year	Number of engaged vessels	Number of nautical miles sailed by vessels (in thousands)	Number of registered vessel engine working hours	Vessel fuel consumption (in thousands of litres)
2016	101.00	5.34	603.56	205.05
2017	100.20	5.39	602.44	203.23
2018	99.38	5.35	595.09	198.39
2019	96.94	5.38	587.66	198.68
2020	97.55	5.28	575.46	193.87
2021	96.59	5.62	597.72	198.68
MAPE ¹⁾	0.13	0.17	0.17	0.19

¹⁾ MAPE - mean absolute percentage error

We have, in this case as well, by using the exponential smoothing method with the weight factor of 0.1, forecasted values of the activities carried out at sea and corresponding mean absolute percentage errors (MAPE). The forecasted values were calculated for several different weight factors, and eventually the weight factor of 0.1 was selected in order to minimise the mean absolute percentage error. The forecasted values of the activities the CGRC carried out at sea for the period from 2016 and 2021 are given in Table 5, and the graphs of the actual and forecasted values are shown in Figure 4.

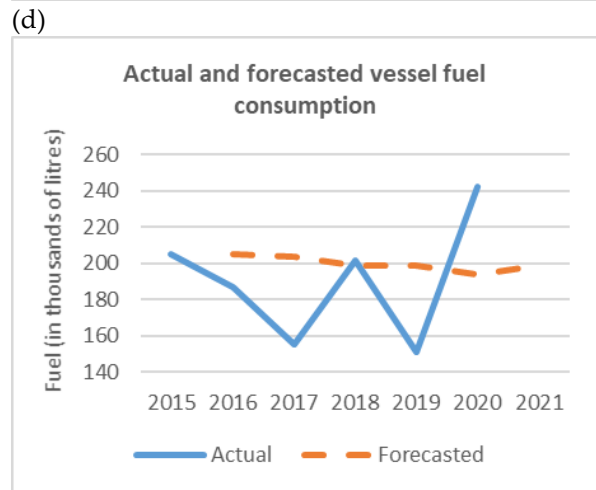
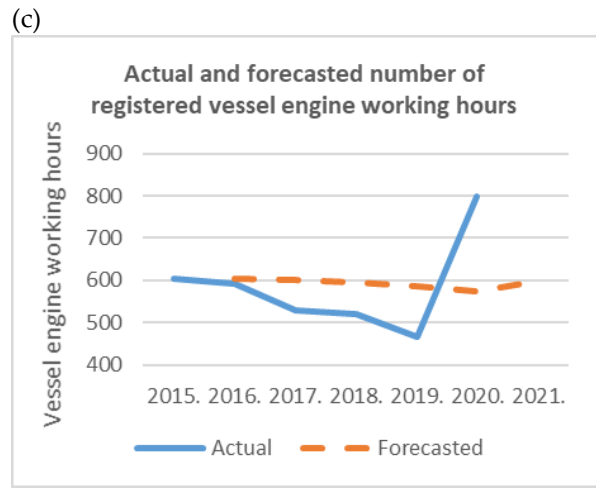
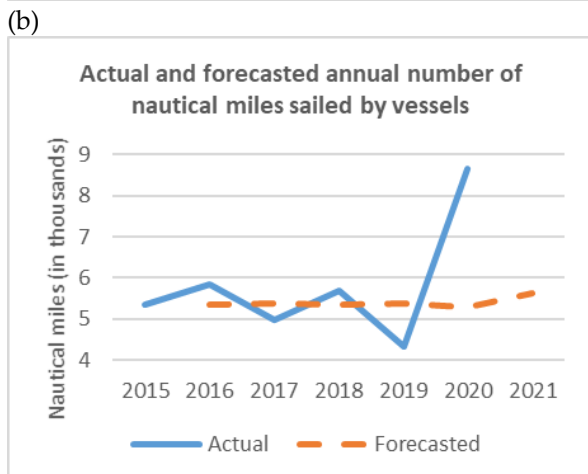
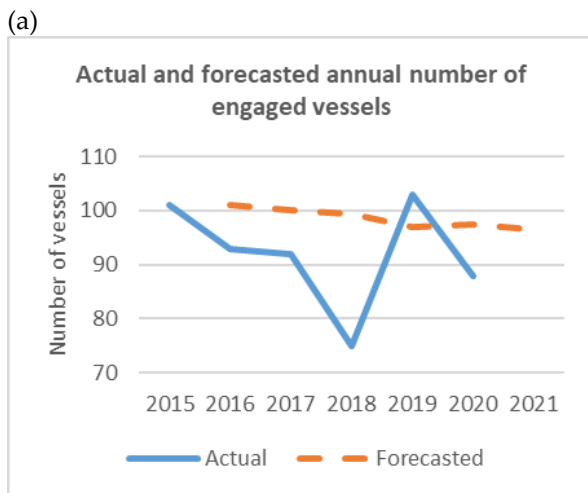


Figure 4 The graphs of the actual and forecasted values of the activities the CGRC conducted at sea from 2015 to 2021: (a) number of engaged vessels; (b) number of nautical miles sailed by vessels (c) number of registered vessel engine working hours; (d) vessel fuel consumption.

The graphs of the actual and forecasted values of the number of engaged vessels show that in the period from 2016 to 2018 and in 2020 the forecasted values were higher than the actual values, and the only exception was in 2019 when the situation was reversed. The forecasted values of the number of nautical miles sailed by vessels, Figure 4 (b), were lower of the actual values in 2016, 2018 and 2020, but in 2017 and 2019 they were higher. When it comes to the number of registered vessel engine working hours, the forecasted value for 2020 was lower than the actual one, whereas in all the remaining years of the observed period the level of the forecasted values was higher than the level of the actual ones, which can be seen in Figure 4(c). Figure 4(d) clearly shows that the forecasted values of the vessel fuel consumption were higher than the actual ones in 2016, 2017 and 2019, and lower in 2018 and 2020.

If we compare the forecasted values of the activities carried out at sea for 2020 (Table 5) with their actual values (Table 1), it can be seen that in 2020 the actual number amounting to 88 engaged vessel was by 9.78% lower than the forecasted one which amounted to 97.55. As regards the three other activities carried out at sea in 2020 results are as follows: the actual distance sailed by vessels was 8,661 nautical miles, which was by 64.03% longer than the forecasted value of 5,280 nautical miles. The actual

number of registered vessel engine working hours amounted to 798 and was by 38.67% higher than the forecasted number of registered vessel engine working hours which amounted to 575.46. The actual vessel fuel consumption was 241,997 litres which was in comparison to the forecasted consumption of 193,870 litres higher by 24.82%.

The same as in case of the activities carried out in the air, by using the exponential smoothing method with the weight factor of 0.1, the following values of the activities carried out at sea were forecasted: 96.59 engaged vessels, 5.62 thousand nautical miles sailed, 599.72 registered vessel engine working hours and 198,680 litres of consumed vessel fuel.

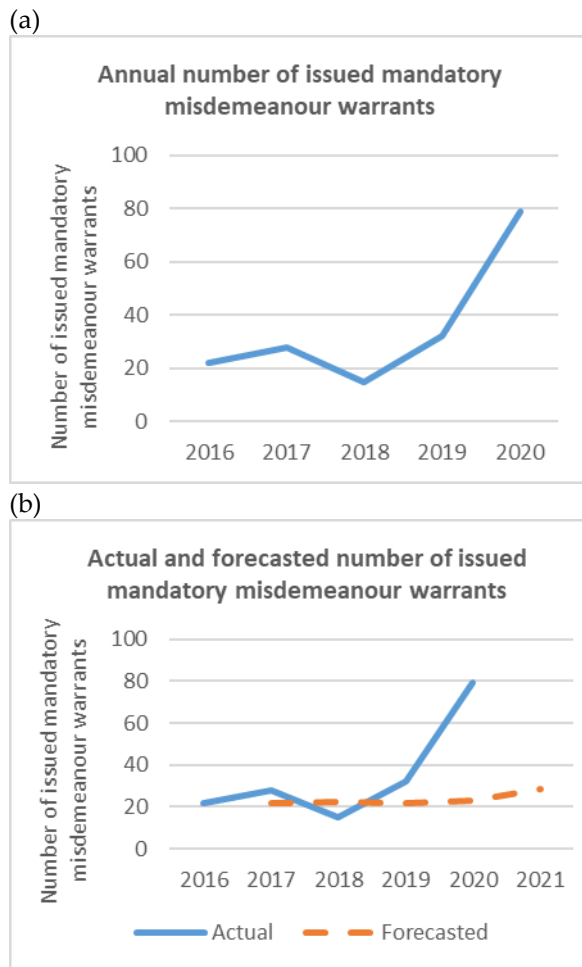


Figure 5 The graphs of the number of issued mandatory misdemeanour warrants: (a) annual number of issued mandatory misdemeanour warrants from 2016 to 2020; (b) actual and forecasted number of issued mandatory misdemeanour warrants from 2016 to 2021.

The last activity carried out by the CGRC that we will analyse in this paper is the number of issued mandatory misdemeanour warrants in the period from 2016 to 2020.

The number of issued mandatory misdemeanour warrants, shown in Table 5 (a), first increased then decreased and in the end it increased again. In 2020 there was a significant growth of issued mandatory misdemeanour warrants. The lowest level of the annual number of issued mandatory misdemeanour warrants was in 2018, whereas the highest one was in 2020.

The graph of the actual and forecasted values of the number of issued mandatory misdemeanour warrants in Figure 5 (b) shows that the forecasted values were lower than the actual values in 2017, 2019 and 2020, but in 2018 the forecasted value was higher than the actual one.

The rates of changes of the number of issued mandatory misdemeanour warrants in relation to the base year of 2020 (2020 = 100), given in Table 6, show that the number of issued mandatory misdemeanour warrants was by 72.15% lower in 2016, 64.56% in 2017, 81.01% in 2018 and 59.49% in 2019.

Table 6 Rates of changes of the activities CGRC carried out in the air (2020 = 100)

Year	Rates of changes of the number of issued mandatory misdemeanour warrants (2020 = 100)
2016	-72.15
2017	-64.56
2018	-81.01
2019	-59.49
2020	0

By using the exponential smoothing method when the weight factor is 0.1, the values of the numbers of issued mandatory misdemeanour warrants for the period from 2016 to 2021 were also forecasted and the mean absolute percentage error was calculated (Table 7).

The same as for other activities carried out by the CGRC, the forecasted values were calculated for several different weight factors, and eventually the weight factor of 0.1 was selected in order to minimise the mean absolute percentage error.

Table 7. The forecasted values of the number of issued mandatory misdemeanour warrants in the period from 2016 to 2021

Year	forecasted values of the number of issued mandatory misdemeanour warrants
2017	22.00
2018	22.60
2019	21.84
2020	22.86
2021	28.47
MAPE ¹⁾	0.44

¹⁾ MAPE - mean absolute percentage error

By comparing the forecasted values of the number of issued mandatory misdemeanour warrants in 2020, which amounted to 79 (Table 1) with the forecasted number of issued 22.86 mandatory misdemeanour warrants (Table 7), it can be seen that the actual value was higher than the forecasted one by 245.58%.

The forecasted value of the number of issued mandatory misdemeanour warrants was, by using the exponential smoothing method when the weight factor is 0.1, 28.47 for the year 2021.

4 CONCLUSION

The results of the conducted analysis show that the activities the CGRC carried out in the air in 2020, the year of pandemic, were at a lower level than in the period from 2015 to 2018. However, if the level of

these activities is compared to those from 2019, which preceded the pandemic, it is noticeable that the number of airplane flights and number of flight hours were at the same level, whereas the airplane fuel consumption in 2020 was at somewhat higher level than in 2019. As regards the activities the CGRC conducted at sea in the period from 2015 to 2020, the results show that in the period from 2015 to 2020 the number of nautical miles sailed, number of registered vessel engine working hours and vessel fuel consumption reached their peak in 2020, but the number of engaged vessels in 2020 was lower than in 2019. The number mandatory misdemeanour warrants the CGRC issued in the period from 2015 to 2020 was at the highest level in the pandemic times of 2020.

In 2020, the forecasted values of the activities the CGRC carried out in the air had a slightly higher value than the actual values, whereas the forecasted values for 2021 were somewhat higher than the actual values in 2020. When the activities the CGRC conducted at sea are concerned, the forecasted values of the number of nautical miles sailed by vessels, number of registered vessel engine working hours and vessel fuel consumption had a lower level than the actual ones, and the forecasted number of engaged vessels in was higher than the actual value. The forecasted values of the number of nautical miles sailed by vessels, number of registered vessel engine working hours and vessel fuel consumption for 2021 were significantly lower than the actual values for 2020, but in case of engaged vessels the forecasted value for 2021 was higher than the actual values in 2020. Similarly to most of the activities carried out at sea, the forecasted number of issued mandatory misdemeanour warrants for 2020 was also significantly lower than the actual number in 2020, and the forecasted number for 2021 was quite lower than the actual number in 2020.

Therefore, it is quite safe to say that, despite the COVID-19 pandemic, the CGRC continues to carry out not only all the planned activities but also some extraordinary ones within the framework of the Central Coordinating Committee for Surveillance and Protection of the Sea, and that the intensity of surveillance was not reduced, but on the contrary, the number of performed inspections and issued mandatory misdemeanour warrants in 2020 was significantly higher in comparison to the previous years analysed in this paper.

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