The Evolution of Inland Navigable Waterways and Maritime Ports in Romania

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Abstract

The larger context of our research is the impact of the Romanian transportation infrastructure development on the nation's economy. In this paper we focus on presenting the inland waterways, canals and maritime transportation infrastructure, the volume of goods transported and some economic implications. The scope of the present study is to analyze data regarding the volume of goods transported on the inland waterways and maritime transportation infrastructure. The considered time-frame for this paper is from 1990 to 2019 and the data was collected from sources such as annual reports of Governmental Agencies, Eurostat and the National Institute of Statistics. We found that there is severe lack of reported data or even data inconsistency between authorities. As economic policy implications we mention the need for investments in maintenance, development, and modernization of infrastructure to stimulate the positive trend in volumes of goods transported.

Key words: Romania; transport infrastructure; economic development; transport policies, investments
J.E.L. classification: F63; F68; L92

1. Introduction

The wider context of our research is extended over all sectors of the transport infrastructure, road, railway, air and water in Romania after 1990, highlighting the economic implications of the transport infrastructure development. In this paper we shall focus on Romanian inland navigable waterways and maritime ports.

The transport of goods on inland waterways represents one of the three main terrestrial means of transportation and due to the large cargo capacity of vessels compared to coaches, trucks or lorries, it is considered as an alternative that could reduce gas emissions, pollution and road congestions (ECA, 2019).

The motivation for this topic comes from the fact that Romania has been going through a period of massive change in the past decades, from political orientation to economic models and consequently shifting trends in the society. The transportation infrastructure influences the economy and the economy has a direct impact on the general wellbeing of the population hence it influences society's every day activity, way of life, habits, even traditions and culture, so we believe our research is important both from the economic and social point of view.

Romania has changed its political orientation in 1989 after the Communist Revolution and it naturally opened its borders to the global market. This left Romania to operate on a transport infrastructure that was previously built with a different vision. Many large infrastructure projects had the role of generating jobs for as many people as possible and as consequence, in 1990, Romania had one of the most extensive transport infrastructure in Europe. In the years to come, the country was struggling with instability, unfortunately having to deal with corruption which has been shown to hinder the economic development process (Cieslik & Goczek, 2017, pp.323-335). In 2007 Romania became member of the European Union and immediately after, it started benefiting from Cohesion Funds that were intended to help the development of the country in a direction that was more inclusive with the European vision and strategy.

The aim of this paper is to analyze the evolution of the inland navigable waterways and maritime transport infrastructure over the period of 1990 to 2019 (the beginning of the COVID-19 pandemic) with some focus to the years after 2007 when foreign investments were absorbed by the national economy.

This paper is structured as follows. After framing the current topic in our overall research, we present a short review of the specific literature, we briefly describe the inland navigable waterways and ports in Romania and we show the data gathered and the methodology used in order to draw conclusions and make some suggestions for the future.

2. Literature review

Previous research has extensively debated the topic of transportation infrastructure development and its impact on the economy and the economic growth (Rothengatter, 2017, pp.124-133; Fedderke et. al., 2006, pp.1037-1059; Meersman & Nazemzadeh, 2017, pp.316-324).

A well thought network and good quality transport infrastructure can provide benefits in two main directions. Socially, people are granted access to jobs, medical aid through access to hospitals, clinics or doctors' private practices, some people are offered access to education and others can simply spend their spare time in a more pleasurable environment, etc. (Pradhan et. al. 2021; Churchill et. al., 2021, pp.1-12; Medeiros et. al., 2020). Enhanced mobility has been shown to improve the general wellbeing of society but on the other hand a good quality transport infrastructure stimulates business, the flow of goods and economic competitiveness overall (Purwanto et. al., 2016, pp. 2877–2888).

There are clear benefits from infrastructure investments and their impact on macroeconomic results (i.e., Gross Domestic Product per capita) but the environmental factor is always in debate as well (Erdogan, 2020). Is it good or bad for the environment to have a larger transport infrastructure? Some argue that larger networks relieve traffic of congestions, hence decreasing pollution, other argue that it stimulates increasing numbers of means of transportation, but it is clearly a subject to be debated in the future.

As Romania became a member of the European Union it attracted foreign direct investments and as is stated by Wang (2020) this led not only to more economical relations with neighboring countries but also to social connection. Even so, as mentioned earlier, the Romanian authorities and staff in the administration have proven to be corrupt, unreliable and unpredictable so after exhibiting various development plans before 2007, they failed to implement them later and they managed to achieve one of the lowest Cohesion Funds absorption rate in the European Union (Popescu & Fistung, 2014, pp 304-312).

3. Research methodology

The present article is a descriptive study of the Romanian transportation infrastructure, aiming to present the inland waterways, canals and maritime transportation infrastructure and to provide evidence of the implications on the nation's economy. With this purpose, our focus was to analyze the data regarding the volume of goods transported on the inland waterways and maritime transportation infrastructure between 1989 and 2019 gathered from annual reports of Governmental Agencies, Eurostat and the National Institute of Statistics.

The paper is using the quantitative method of research based on the systematization of bibliographic information and the evolution of economic indicators which characterize Romanian transportation infrastructure. Since our paper presents the case of Romanian waterways, canals and maritime transportation infrastructure, the main research method used was the method of the case study. Other research methods applied were the bibliographic study for theoretical documentation of the approached topic; synthesis of all the data found relevant for the research purpose; comparison of the research results and data with the results presented in other studies.

4. Findings

4.1. Navigable inland waterways classification and presentation and maritime ports infrastructure

The inland navigable waterways are classified according to EUROSTAT into artificial waterways such as navigable canals, and natural waterways such as rivers and lakes (IWW_IF_INFRASTR). The total length of the navigable canals in Romania is 182 km out of which almost 95.6 km belong to the Danube – Black Sea Canal. The remaining 86.4 km are distributed between shorter canals such as Sulina Canal, Tatanir Canal, Saint George Canal, Mile 34 Canal, Crișan-Caraoman Canal, Călărași Canal and the Bega Canal (GD. No.665, 2008).

The Bega Canal is the first one to be built on the territory of Romania and it is uniting the city of Timisoara with the neighboring country Serbia with a total length of 116 km out of which 44 km are on Romanian territory (Iliesu, 2003).

The Danube – Black Sea canal is comprised of the main artery which is 64.4 km in length and the north branch which is 31.2 km long. The primary role of this canal is to facilitate transportation of goods from the Port of Constanta to the Danube River. This canal shortens the transportation route of goods from Asia to Central Europe by approximately 4.000 km, this has been possible once the Main-Rhine Canal was finalized in 1992, and hence a navigable inland waterway was connecting the Port of Constanța with the Port of Rotterdam (NCNCA, CN. 2019).

The volume of goods transported through this canal has surpassed the forecasted volumes for year 2019, with a total of 35.802 thousand tons. The volume of internal goods transported has risen slowly over the past years but there is 38.4% increase in the volume of external goods transported compared to year 2018 (NCNCA, AR. 2019).

Romania's natural navigable waterways have a total length of 1.647 km, 1.075 km of this is represented by the Danube River (IWW_IF_INFRASTR). The importance of the navigable inland waterways is undeniable and the Romanian and European authorities have been recently addressing the issue of investments in this type of transport infrastructure. Project DANTE is proof of such initiative, a project financed by the European Union that united the efforts of 10 countries to improve the administrative environment, develop a book of lessons learned and reduce bureaucracy in order to stimulate the transportation of goods on the Danube River (European Commission, 2019).

Since the Danube River stretches extensively on the borders of Romania, we shall present in Table 1, some of the main Ports that are to be found on the bench of the river and in the proximity of the Black Sea and centralize data regarding location, length of quays, berths, capacities and ways of access.

If we analyze the commercial routes in the Black Sea we shall observe that on an international level, the only visible Romanian maritime port is the Port of Constanța. The main competition amongst the international ports is measured in the volumes of goods that transit their premises. The business on the Black Sea is not only provided by the natural opportunity on the market but it is also set in place by the multilateral agreements signed between countries such as the Black Sea Economical Collaboration Zone. This agreement does not only facilitate cooperation between maritime ports located in the Black Sea but also with those in the Mediterranean Sea and the Adriatic Sea. The Port of Constanța has a competitive advantage against its competitors because it has an intermodal transport system. It has direct connections to the road and railway infrastructure, it has access to an international airport, but also it has a direct connection to the inland navigable waterways, through the Danube - Black Sea Canal, which goes straight to Central Europe.

Table 1. Main Ports Characteristics on the Danube River and the Black Sea, in Romania

Name of Port	Quays	Berths	Platform capacity	Access
Moldova Veche – Danube 1048 KM	550 m	300 m – ore 150 m – commercial goods 100 m – passengers	3.000 square meters	Road
Cetate – Danube 810-813 km	1000 m	1000 m	Total Port surface 95.689 square meters	Road
Corabia – Danube 628+600 km Danube 630 km	1470 m	150 m – cereals 120 m – ships 120 m – general goods	20.000 square meters 6.000 to silo for cereals	Road Railway
Bechet - Danube 679 km	670 m	100 m – cereals 200 m – general goods 300 m – oil terminal	12.000 square meters Oil terminal	Road
Drobeta T. Severin – Danube 930-934 km	1.937 m	530 m – passengers 200 m – containers 375 m – hibernal 432 m – waiting 300 m – commercial goods 100 m - cereals	Shipyard Silo for cereals	Road Railway
Orșova - Danube 955 km	500 m	500 m – general goods with Railway access	25.000 square meters	Road Railway
Călărași – Danube 370 km	P. Industrial	400 m – steel 135 m – slag	Silo for cereals	Road Railway
	P. Commercial	100 m – cereals 250 m – commercial goods 100 m – passengers	213.000 square meters Warehouse – 3.000 square meters	Road Railway
Borcea b. 94 km	P. Modelu			Road Railway
Oltenița - Danube 430 km	750 m	250 m – passengers 300 m – commercial goods	31.000 square meters	Road Railway
Calafat – Danube 795 km	600 m	100 m – waiting 350 m – commercial goods 150 m – non operational	Place for coaches reload	Road Railway
Cernavodă – Danube 300 km	1469 m	300 m – passengers 580 m – commercial goods 250 m - waiting	90.000 square meters	Road Railway
Danube Black Sea Canal 64+400 km		Waiting Passengers		Road Railway
Giurgiu – Danube 493+800 km	P. Ramadan – 1400 m	Waiting Commercial goods Passengers Bunkering		
	P. Cioroiu – 710 m	Waiting Commercial goods		
Tulcea – Danube 73,05 km	330 m	Mainly used for raw material supply for the metallurgical plants in Tulcea 7 berths – 2.500 m	12.600 square meters	
Brăila River - Maritime Danube 170 km	2.900 m	14 berths – 1.200 m maritime ships 5 berths – 400 m passengers 1 berth – 750 m general goods River-Maritime Berths – 550 m	Warehouse – 11.560 square meters	
	Docs Basin	1.475 m of waiting		
Galați Mineral Sector	2.200 m	16 berths dedicated to minerals		Road Railway
Galați Commercial Sector	1.677 m	18 berths for operations		Road Railway
Galați Bazinul Nou Danube 79 Mm	1.847 m	4 berths – between 90-110m each 1 berth - 130m – cereals	Total surface of 334.464 square meters Platform 131.105 square meters	Road Railway

			Warehouses 46.303 square meters	
Galați Docuri Danube 80 Mm	1.365 m	12 berths	Platform 67.137 square meters Warehouses 17.940 square meters	Road Railway
Constanța		Two satellite shipyards Midia and Mangalia with 3 docs each 140 functional and operational berths Largest container terminal in the Black Sea	Total surface of the Port is 3.926 hectares 3 Shipyards Container capacity of 1.000.000 TEU / year	Road Railway

Source: Author's construction based on data from (RUIP, 2022).

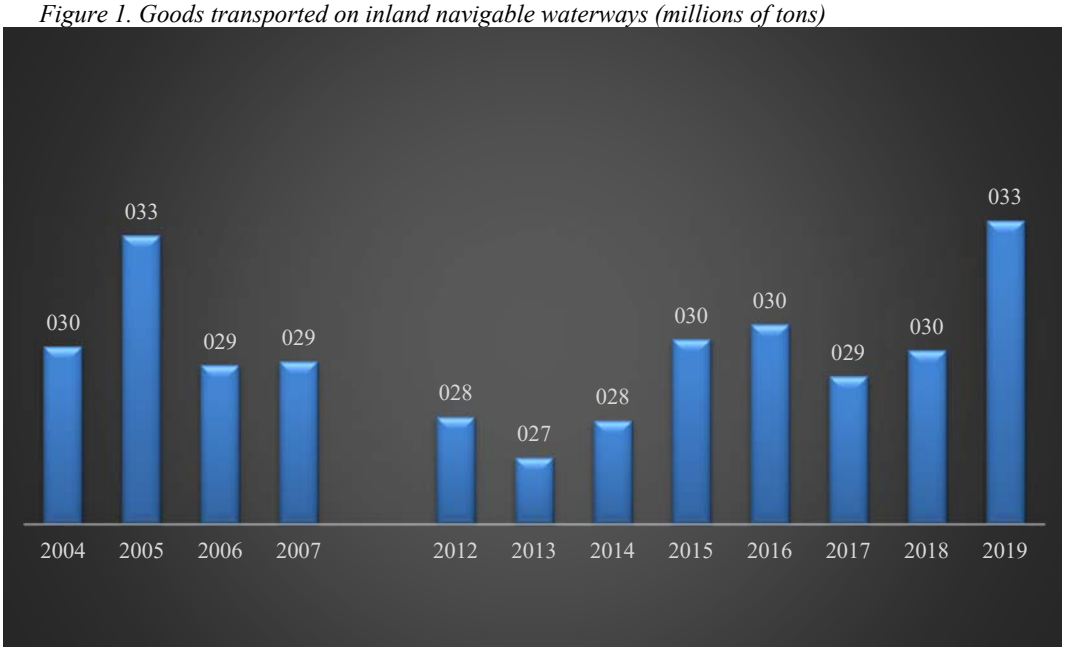
Another advantage is that it has a large hinterland, a term with Germanic origins that refers to areas with a small number of inhabitants that has been adopted internationally by Italians to refer to the rural area around larger cities and by the British who used it when talking about the area surrounding the maritime ports. This large hinterland creates the largest operational capacities in the region, enabling the movement of goods from maritime vessels to inland vessels, and allows access inside the Port of Constanta to all categories of vessels that go through the Suez Canal (Simileanu and Sageata, 2009).

The political changes from 1990 have severely impacted the volume of goods traded in the Black Sea, the most affected ports being those in the West, hence the Port of Constanța suffering one of the hardest hits with volumes decreasing from 62 million tons in 1988 and 1989 to 42.4 million tons in 1990, 28.4 million tons in 1991 and 26.8 million tons in 1992 (Sageata, 2014).

4.2. Volumes of goods transported by inland navigable waterways and maritime infrastructure

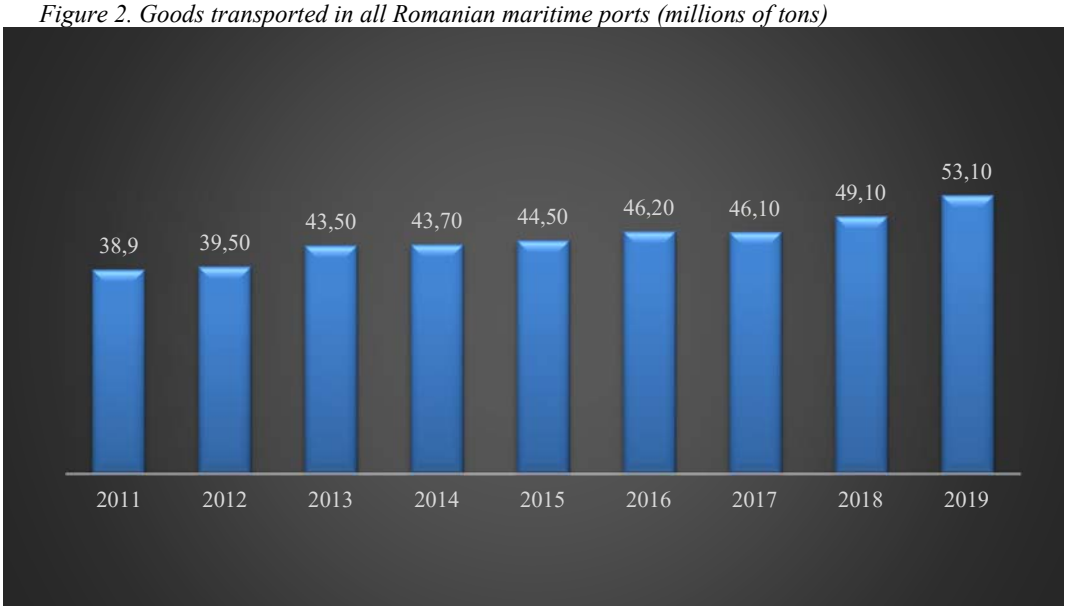
Having a clear image of Romania's navigable inland waterways and ports we now look at the volumes of goods transported on this type of infrastructure. Figure 1 displays the volumes of goods transported on inland navigable waterways in two periods of time: between 2004-2007 and 2012-2019, due to availability of times series in the EUROSTAT database and Figure 2 shows the volumes of goods in all maritime ports after 2011.

Figure 1. Goods transported on inland navigable waterways (millions of tons)



Source: Authors' computation based on Eurostat

Figure 2. Goods transported in all Romanian maritime ports (millions of tons)



Source: Authors' computation based on Eurostat

We analyzed further the administrative structure of the navigable waterways and ports that lie under the management of the Ministry of Transport. The Ministry of Transport has divided the responsibilities for this sector in nine smaller state owned companies. Two of these companies are in charge with training specialized personnel and interventions in case of environmental accidents or human injuries. In the following section we shall present the ones in charge with operations. The first on this list is the National Naval Authority (NVA) which, according to their internal organization chart, is in charge with the following ports: Constanta, Galati, Tulcea, Giurgiu and Drobeta Turnu Severin. We analyzed the annual reports from this organization and fond that the reporting has started in 2015 and the volumes of goods or total volume of ships is never mentioned (NNA, 2022).

The second company under the Ministry of Transport is the Maritime Ports Administration Constanta (MPAC). This company is dealing with operations in Port of Constanta and fortunately the administration prepares a yearly report that is made public on their official website. Hence we collected all data regarding volume of goods beginning with year 2001, this data can be observed in Table 2 (MPAC, 2022).

Table 2. Volumes of Goods Transported in the Port of Constanța from 2001 to 2019 (mio to)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Volume	33.8	40.5	43.2	50.4	60.6	57.1	57.7	61.8	42
2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
47.5	45.9	50.5	55.1	55.6	56.3	59.4	58.3	61.3	66.6

Source: Authors' computation based on MPAC Annual Reports 2001-2019

The National Company of Navigable Canals Administration (NCNCA) is a public company under the Ministry of Transport that has initially been one of the first financiers of the Danube - Black Sea Canal in 1975. Currently it is in charge with operations on the main canal and all smaller adjacent canals in the region. The statistics section on their official web page provides some data regarding the total volumes of goods that have been transported on the Danube - Black Sea Canal as seen it in Table 3 (NCNCA, 2022).

Table 3. Volumes of Goods Transported in the Danube - Black Sea Canal 1990 to 2019 (mio to)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Volume	5.0	4.3	3.6	5.1	6.3	9.2	10.3	11.1	12.2
1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
10.5	11.2	10.1	11.1	10.7	13.2	15.3	13.3	12.4	13.1
2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
9.2	12.3	11.6	13.7	13.9	14.4	14.0	14.5	13.7	14.1
2019									
16.7									

Source: Authors' computation based on NCNCA Report

The Lower Danube River Administration Galați (LDRAG) and Bega Navigable Canal Administration (BNCA) are public companies in charge with ensuring the navigation conditions on the lower stream of the Danube and the Bega Canal through maintenance dredging, maintaining the coastal and floating signaling operational, carrying out maintenance works and repairs of hydro technical constructions. After analyzing their annual reports we observed that they can provide useful information regarding the vessels and ships that navigate in their waters and information regarding the infrastructure. Unfortunately they only provide public reporting beginning with 2018 or even more recent, but for future references they could be a potential source of data (LDRAG, 2022; BNCA, 2022).

The Danube River Ports Administration Giurgiu (DRPAG) is a company responsible for activities that are auxiliary to naval transportation. In some way this company is similar to the Lower Danube River Administration and the Bega Canal Administration because they are responsible with ensuring the basic operational conditions of the infrastructure through activities such as dredging, maintaining the signaling system, assisting ships carrying dangerous goods, collecting waste, etc. This Company is responsible for the administration of the following ports: Bechet, Călărași, Calafat, Cernavodă, Cetate, Corabia, Drobeta Turnu Severin, Giurgiu, Orșova, Oltenița and Moldova Veche. They provide data regarding volumes of goods transported beginning with year 2013, we centralized this data from their annual reports in Table 4 (DRPAG, 2022).

Table 4. Volumes of Goods Transported on the Danube River from 2013-2019. (mio to)

Year	2013	2014	2015	2016	2017	2018	2019
Volume	2.9	3.2	2.9	3.6	3.4	3.2	3.5

Source: Authors' computation based on DRPAG Annual Reports

The Danube Maritime Ports Administration Galați (DMPAG) is a company that manages the port infrastructure located on the maritime Danube, thus is responsible for the operations in the following ports: Galați, Brăila, Tulcea, Hârșova, Isaccea and Mahmudia and also is responsible for the secondary maritime canals Măcin, Chilia and Sfântul Gheorghe. According to their consolidated report about the transported goods in their three main ports Galați, Brăila and Tulcea, we present the data in Table 5 (DMPAG, 2022).

Table 5. Volumes of Goods Transported in the Danube - Black Sea Canal 1990 to 2019 (mio to)

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Volume	8.8	7.3	9.1	10.4	10.6	10.8	12.2	11.2	11.1
2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
11.2	9.9	12.1	12.4	14.2	14.8	15.2	14.3	12.7	7.7
2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
11.7	10.5	8.3	8.0	7.8	9.0	8.7	7.9	8.4	9.4

Source: Authors' computation based on DMPAG Report accessed at 18.06.2022

The National Institute of Statistics (NIS) provide some Annual Reporting regarding volumes of goods transported on inland navigable waterways as well as goods going through Romanian maritime ports. We collected this data and present it Table 6 and Table 7, unfortunately the data reported only spans over six years (NIS, 2022).

Table 6. Volumes of Goods Transported in Romanian maritime ports 2014 to 2019 (mio to)

Year	2014	2015	2016	2017	2018	2019
Volume	43.7	44.5	46.2	46.1	49.1	53.1

Source: Authors' computation based on NIS Annual Reports

Table 7. Volumes of Goods Transported on Inland Waterways 2014 to 2019 (mio to)

Year	2014	2015	2016	2017	2018	2019
Volume	27.8	30	30.4	29	29.7	33.2

Source: Authors' computation based on NIS Annual Reports

5. Conclusions

Following our data collection we observe an inconsistency in the reporting of volumes of goods transported on the Romanian waterway infrastructure over the time-frame established in our research. Not only we do not have enough data, but some data reported by various Romanian authorities are in contradiction with each other. Even so, we observe a slow but constant increase in the volumes of goods transported over the past years. In Table 5 we see that the volumes of goods transported in the Danube - Black Sea Canal have been at their highest around the year 2007, but the volumes have been growing again in the past years.

In Table 6 we see a clear positive trend in the volume of goods passing through Romanian maritime ports, while the Port of Constanta has the largest inter modal capacity in the Black Sea which provides a competitive advantage specially when the transport industry is heading towards more intelligent and durable inter modal and multi modal solutions. To support this, the Ministry of Transport from Romania is undergoing four major projects financed from local and European Cohesion Funds that are focused on the development of the infrastructure, modernization of operational technology, improvement of safety regulations and specialized training. Considering that the sector is already on a positive trend, we can assume that projects such as DANTE, DAPhNE or DIONYSUS shall further accelerate the increase of traffic on the Romanian navigable waterways. Higher volumes of goods transported generate effects on the market such as creation of specialized jobs in logistics or infrastructure maintenance, it stimulates the construction industry for large infrastructure, generates income from taxes and supports business development by creation of opportunity.

The purpose of our research was to present the inland navigable waterways and maritime ports infrastructure in the case of Romania and the volume of goods transported on this type of infrastructure. From the data collected we managed to observe that Romania has a high potential in maritime and inland waterways transport because it has access to the Black Sea, to the Danube River and it has an extensive network of navigable canals, natural and artificial, that connect the Danube to the Black Sea.

Romania also has the advantage of an already extensive list of river ports and maritime ports and a long history in operation on waterway transport infrastructure. This experience has generated a considerable know how in the sector and work force tradition in the towns and cities in close vicinity of ports or navigable waterways.

With the desire for a thriving Romanian economy, we recommend that the authorities invest in the modernization and maintenance of the existing river and maritime infrastructure to further support the increasing volumes of goods transported. The bureaucracy should be minimized, good practices booklets should be set in place, as well as quality and safety standards, to attract businesses in this sector and to facilitate an environment where they can grow and influence the nation's economy.

The limits of the present study are connected to the limited times series under examination due to the lack of data for longer time period, as well as inconsistencies of data recorded.

As further directions of research, authors intend to widen the area of research and analyze the evolution of air traffic in Romania. We wish to centralize data regarding Romanian airports infrastructure, the amount of goods transported by airplanes and future development plans in this sector.

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