"Assessment of the economic security of Baltic port cities' competitiveness"

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NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
41	1	9

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ASSESSMENT OF THE ECONOMIC SECURITY OF BALTIC PORT CITIES' COMPETITIVENESS

Abstract

City competitiveness is a complex product of local and international conditions, local characteristics, social and economic superstructure, and the actions of individual companies. Although many scientific studies have examined the country's and urban competitiveness, the competitiveness of port cities still needs to be assessed comprehensively, taking into account their crucial economic role. The purpose of this paper is to evaluate the competitiveness and economic security of the Baltic port cities (Klaipėda, Riga, and Tallinn). Statistical processing and multi-criteria evaluation methods (SAW, COPRAS, and TOPSIS) were chosen to achieve this goal. The comparative analysis showed that the population change in port cities is not significant for the final result of the competitiveness assessment, and the unemployment rate in port cities is lower than in the country. The assessment of the competitiveness of port cities from the point of view of economic security shows (after checking such indicators as unemployment rate, company income, and infrastructure) that Tallinn is the most competitive port city according to the three multi-criteria evaluation methods, while Klaipėda is the least competitive. The assessment was carried out in three stages to monitor changes in the situation of port cities, compared to changes in a certain indicator and the costs of timely solutions or the improvement of the city's position in relation to other cities.

INTRODUCTION

Seaports can be named as one of the engines of the country's economy. The changes in the port population are insignificant compared to the changes in the country's population; the unemployment rate in port cities is lower compared to the country's indicators. Ports are essential to the global and regional transport and freight supply chain. Investments in the port infrastructure create the conditions for the arrival of larger cargo ships. As a result, the country's exporters have the opportunity to significantly reduce their transportation costs. Cruise ship tourists arriving at the port affect the country's income and jobs. The experience of Western European ports shows that one job in the port creates an additional 5-7 jobs outside the port (Vasiliauskas & Misiūnas, 2000). The expansion and development of maritime cities are often associated with the development of their ports. However, the question arises of whether it is possible to compare the competitiveness of port cities with the competitiveness of ports? After all, a port city is not only about ports but also where social capital, knowledge, science, innovation, and culture are concentrated, various ideas and new solutions are generated. The scientific literature usually evaluates ports and their competitiveness, but a comprehensive assessment of port cities' competitiveness is lacking.

1. LITERATURE REVIEW

The impact of ports and their activities on the regional economy has been studied quite extensively in the literature (Capobianco-Uriarte et al., 2019; Nyga-Łukaszewska & Napiórkowski, 2022; Kahler, 2004). Economic benefits tend to shift from a port region to distant regions (Krośnicka, 2018; Brooks & Cullinane, 2007; Musso et al., 2000), though the social costs are still largely borne by inhabitants of a port region (Hoyle & Hilling, 1984).

Zhu et al. (2022) analyzed economic security in the context of national and transnational regions. The regionalization process in port cities has been extensively studied in terms of transport links and load flows through the peripheries of the ports (Notteboom et al., 2009; Notteboom & Rodrigue, 2005). In the latter case, the study researched a port city periphery (covering about 200 km in diameter) in terms of the dynamic changes in functional boundaries caused by political, economic, and technological determinants, as well as transformation processes (caused by the determinants mentioned above) that also affect neighboring cities and their network, for example, by changing the hierarchy of connections, modifying the role of a particular city in the entire neighborhood system and increasing competitiveness (Krośnicka et al., 2021).

Thus, when assessing the economic security of port cities, the ports' benefits should be considered. Ports play a key role in international supply chains, facilitating trade between regions and countries (OECD, 2014). They also generate value added through economic activities conducted by port corporations and port-related companies. This economic value is linked to the employment generated by the port. Ports and port-related industries can generate significant value added. Ports can have a significant indirect economic impact (backward linkages).

Industries directly related to ports can be divided into 1) those that provide necessary services to ensure trade at sea (port-dependent industries), 2) those that attract industry due to the presence of the port (port-attractive industries), and 3) those that expand their markets exporting through the port (port induced industries). Port-dependent industries include transport and maritime services (e.g., terminal operators, cargo handling, or towage). Port-attracted industries are export and product or raw material import industries (e.g., oil refineries or steel plants). Port-induced industries represent a much broader category and are generally harder to define because it is difficult to evaluate the degree of their dependence on a port. Typically, the direct impact of ports represents the effects on port-dependent industries, while the indirect impact represents the effects on port-attracted and port-induced industries. Some sources (e.g., the annual National Harbor Watch in the Netherlands) interpret port-related (i.e., port-dependent or port-attracted) industries as requiring direct access to a quay. A related idea is the cluster of seaports, which can be seen as made up of port-dependent and port-attracted industries. For other economic industries, the existing port or its size is not as important as, for example, the city's attractiveness. Some studies investigating container shipping management centers confirm that high-added-value functions are often performed in port cities. However, it is not confirmed that such functions (OECD, 2014) are only attracted to port cities (Verhetsel & Sel, 2009). Finally, ports are the areas for innovation, research, and development. Thus, port cities are a source of the economic benefits described above, but they are certainly not the only areas that benefit from port activities.

Economic security is an integral part of the development of social and economic systems, relevant for all countries in the world as a critical condition from the point of view of national security and a significant prerequisite for their economic growth (Balioti et al., 2018).

Economic security is threatened for a variety of reasons. One of them is the insufficient inclusion of internal economic factors that determine development in economic activities, i.e., unemployment, emigration, shadow economy, and other activities of unfriendly countries. The issue of economic security is related to the ability of the economic system, economic entities, and their parts to resist threats and, on the other hand, to the specific functions of the state as a macroeconomic regulator to ensure economic security and to create special institutes for that purpose (Ginevičius et al.,

2004). One of the main global international organizations ensuring international economic security are the United Nations and the OECD.

Economic security is valued in different ways. Sometimes, one or more indicators are provided. Scientists distinguish the following performance criteria: structure of the GDP, industrial development rates, investment growth rate; natural resources, production and scientific-technical potential of the country; productive use of available resources; economic competitiveness in local and international markets; inflation; unemployment rate; life quality, income inequality, degree of access to material goods and public services; public debt and budget deficit; energy dependence; integration into the global economy (Ginevičius et al., 2004).

The port city is an integral part of maritime economic activity; its development contributes to the economic and environmental connection between the country and the world (Zhu et al., 2022). It has already happened that ports are like economic indicators of the surrounding cities, which facilitate the integration of markets and services that are economically useful and ensure social well-being agglomeration (Notteboom et al., 2009; Notteboom & Rodrigue, 2005; OECD, 2014). Ports, as nodes of the transport system, and cities, as the central places of a broader social and economic system, are two components of port cities that are mainly considered interrelated in terms of their location, development, and activity (Verhetsel & Sel, 2009). According to Ni et al. (2014), there is a relationship between ports and gross domestic product; for example, ports in Rouen accounted for more than 21% of the region's gross domestic product (GDP) in 2007.

 The port directly influences the development of the port city. The port's manufacturing, development and operation generate direct output, employment, and national and tax revenue for the city. However, certain scientific studies make scientists doubt the absolute benefits of ports for the port city. According to Notteboom et al. (2009), based on the case of Plymouth, ports are small employers of labor, and the connections of interconnected industrial complexes are weakening. Notteboom et al. (2009), Činčikaitė and Paliulis

(2013), Rogerson (1999), and Gao et al. (2018) emphasize the emergence of geographical tension, that is, different patterns of land use between port and city economic activities lead to increased geographic segregation. Most potential economic benefits are accrued to other cities; therefore, environmental pollution, traffic congestion, and increased crime negatively affect the city, reducing the competitiveness of cities and decreasing the opportunities to attract investments (Notteboom et al., 2009).

The uniqueness and specificity of port cities mean that many economic benefits are associated with well-functioning ports, which reduce trade costs, attract certain economic sectors, and generate value added and employment. Thus, many of the benefits provided by ports spill over to other regions. Businesses in other regions also benefit from efficient ports for exports and imports, while links with other sectors tend to form outside the port region. However, ports can have negative impacts, mostly related to the use of land, traffic congestion, or environment (OECD, 2014).

Obviously, if cities want to benefit from it, ports have to be competitive and create comprehensive economic benefits. The city's assets are directly linked to the added value and employment created by the port. There are 3 main models for cities to derive additional benefits from their ports (OECD, 2014):

- Clusters of maritime service. Maritime service clusters seek to attract services that create high added value, such as maritime finance, consultancy, legal, and engineering services.

- Development of the industry. In order to ensure the development of port-related industries, the proximity of many industries' imported resources and consumer markets must be ensured.

- Development of port-related quays. The development of quays often helps to take advantage of a port and maritime heritage, turning it into a city's growth source.

There are various policy instruments to support these strategic guidelines. These measures in-

clude knowledge transfer schemes (aimed at attracting high-value-added companies that could transform the city into an international maritime services hub), training and education, and the organization of various platforms and incentive programs. On the other hand, the growth of a port also depends on GDP per capita, external trade, and the resource intensity of production. A port volume growth is more sudden than a GDP per capita growth and an external trade growth – this relationship is expressed in terms of port-to-GDP growth and port-to-external trade growth multipliers. The increase in the cargo transported in containers directly affected the pace of containerization. However, good relations with neighbors and political decisions or other cross-border developments can have a significant impact on these indicators.

On the other hand, three main economic policy strategies, namely maritime service clusters, industrial development, and city quay development, are recognized as appropriate for port cities. These strategies have different directions but are often implemented simultaneously in the world's largest port cities. Some features are more accessible to debug than others. For example, maritime clusters and urban waterfronts can work well together and reinforce each other. However, achieving a successful connection between industrial development and maritime clusters is more difficult due to the different logic of the two directions. However, various port cities such as Hamburg and Singapore have combined three strategic directions, which more or less facilitate policy directions (OECD, 2014).

The composition of the economic functions is crucial for the three strategic policy directions. The most successful maritime clusters, such as Singapore, Hong Kong, and London, have grown into distinct clusters, the diversity of which attracts new businesses that can be sure to find high-quality services in any marine-related industry.

However, when assessing the competitiveness of ports and/or port cities, it is vital to bear in mind that the competitiveness can be affected by several factors, such as the economy of a remote country, geographical location, port infrastructure, transport, and information systems (Gao et al., 2018).

However, the impact of a port activity on the regional economy is quite widely studied in the literature, but port cities themselves are not evaluated in the context of economic resilience.

The analyzed scientific literature revealed that different researchers study competitiveness in different ways. Cities, ports, and the competitiveness of cities are evaluated very differently. Sometimes, the assessment is limited to a single indicator, and sometimes, the comparison is based on indices such as safety index, crime index, or traffic fatality rate. Scientific sources offer a number of assessment methods, complex indices, and comprehensive studies, for example, smart city studies, assessment of the competitiveness of cities in Lithuania (Činčikaitė & Paliulis, 2013; Bruneckiene et al., 2010), and integrated assessment of the competitiveness of capital cities. The Baltic countries' research is based on the principles of sustainable development (Činčikaitė & Meidute-Kavaliauskienė, 2021), the evaluation of the economic, social and environmental aspects of smart city activity (Stanković et al., 2017), determining factors for sustainable smart cities in Europe (Nevado Gil et al., 2020), and analysis of military and demographic interrelationships in the context of Lithuanian sustainability (Meidutė-Kavaliauskienė et al., 2020).

This study aims to comprehensively assess the competitiveness of Baltic ports from the point of view of economic security according to the city competitiveness assessment model (USC), based on the principles of sustainable development. In terms of economic security, it is essential to consider the following: the urban transport infrastructure, the information technology and telecommunications infrastructure, competitiveness of enterprises, the city's investment attractiveness, adapting the labor market to changing conditions, the science and study infrastructure, the economic power of the city, knowledge and innovation, and GDP.

2. METHODS

The city competitiveness assessment model (USC) includes factors that are grouped into three levels:

- Main factors are necessary for every city. Without them, the city could not exist.

- Development factors condition the well-being of the city and, at the same time, shape the competitiveness of the city by means that allow the effective use of the main factors.

- Interaction factors reflect the result created by the main and development factors.

To assess the competitiveness of the target port cities in the Baltic region in terms of economic security, the data for the period 2015–2020 were extracted from the relevant statistical databases (Eurostat and the databases of Lithuanian, Latvian, and Estonian statistical departments) (Table 1). The competitiveness of the target port cities in terms of their economic security is assessed by applying statistical analysis methods. The results depend on the availability of the information.

The empirical research is based on the following multicriteria methods: SAW, COPRAS, and TOPSIS. The main reason for selecting these methods was the consideration of the factors that maximize and minimize. The baseline value is calculated by formula (1):

$$I_{M_{20}} = 0.5 \cdot M_{21} + 0.5 \cdot M_{22}, \tag{1}$$

where M_{21} denotes the factor value of the urban transport infrastructure, M_{22} denotes the value of the factor of the information technology and telecommunications infrastructure.

The development value is calculated using formula (2):

$$I_{M_{30}} = 0.125 \cdot M_{31} + 0.125 \cdot M_{32} + \\ + 0.125 \cdot M_{33} + 0.125 \cdot M_{34} + 0.125 \cdot M_{35} + \\ + 0.125 \cdot M_{36} + 0.125 \cdot M_{37} + 0.125 \cdot M_{38}, \tag{2}$$

where M_{31} denotes the factor value of competitiveness of enterprises, M_{32} is the factor value of the attractiveness of the city's investment attractiveness, M_{33} is the factor value of adapting the labor market to changing conditions, M_{34} is the value of the factor of the tourist attraction of the city, M_{35} is the factor value of openness of the urban economy, M_{36} is the factor value of the science and study infrastructure, M_{37} is the value of the economic power factor of the city, M_{38} is the value of knowledge and innovation factor.

The interoperability value is calculated using formula (3):

Table 1. Factors and indicators representing the competitiveness of port cities

Factors of port city competitiveness	Indicators of port-city competitiveness
Urban transport infrastructure	Number of cars per 1000 population, pcs.
Information technology and telecommunications infrastructure	16-74 years of age who use information technology, pers.
Competitiveness of enterprises	Number of operating economic entities per 1000 population, pcs. Value added created by one employee in the industry, monetary units
The attractiveness of the city for investment	Material investments per capita, monetary units Foreign direct investment per capita, monetary units
Adapting the labor market to changing conditions	Ratio of registered unemployed to working age population (unemployment rate), percent Employment rate, percent Average gross monthly earnings, cash units
The tourist attraction of the city	Number of guests accommodated in accommodation establishments per 1000 inhabitants, pers. Occupancy rate of hotel rooms, percent
Openness of the urban economy	Income from exports per capita, monetary units
Science and study infrastructure	Number of university students per 1000 population, pers.
The economic power of the city	Average gross monthly earnings, cash units Average disposable income per household member per month, monetary units
Knowledge and innovation	Expenditure on R&D in higher education and science and government sectors, as a percentage of GDP Employees involved in R&D in higher education and government sectors per 1000 population Share of small and medium enterprises operating in information and communication (J according to NACE), percent
GDP	GDP per capita, monetary unit

$$I_{M_{40}} = M_{41}, \qquad (3)$$

where M_{41} denotes the factor value of GDP.

This study aims to show that the port cities of small countries such as Lithuania, Latvia, and Estonia play a large economic role, and any changes (e.g., political or economic) can have a significant impact not only on the development of the port city, but also on the economy of the entire country. Three Baltic countries and their port cities were selected following this logic: countries with similar economic development, states of similar size, and port cities located on the eastern coast of the Baltic Sea; they regained their independence simultaneously and are members of the European Union.

3. RESULTS AND DISCUSSION

In the Global Port Ranking, Klaipeda ranks 170th, Riga 207th, and Tallinn 160th (Transport global practice the container port performance index, 2021). The CPPI (Container Port Performance Index) 2021 covers port performance and time. However, this study evaluates the competitiveness of the target port cities in terms of their economic security over time and in relation to each other. Considering that the Baltic countries' selected ports generate an almost similar amount of cargo (Figure 1), it is crucial to evaluate the parameters of each of the three ports and conduct their comparative analysis.

The port of Klaipeda is a significant and biggest transport center of Lithuania, where the sea, railway, and land routes connect east and west. This port is the only ice-free port in the eastern Baltic Sea. Klaipeda is a multimodal, universal, deep-water port, employing 14 large stevedoring,

construction companies, ship repair, and all maritime business services and load handling services. The port can handle more than 70 million tons of various cargo per year. The port can accommodate 400 m long, 59 m wide, and 13.8 m draught ships (Port of Klaipeda, n.d.). The port area covers 1,442 ha and has 157 quays; the total area of covered warehouses covers 99,380 m^2 and opens 1,045,879 m^2. Port has 15 terminals for cargo, 2 terminals for cruise ships, 3 terminals for Ro-Ro, and 2 container terminals. Ships 400 m long and 59 m wide with a draft of 13.8 m can enter the port.

The port of Riga is a multifunctional port with a safe, modern, and sustainable infrastructure. The port is barely freezing; it also has two icebreakers. The infrastructure of the Riga port is characterized by good rail and road connections. About 60 percent of cargo to/from Riga port terminals is transported by rail and 40 percent by road. The infrastructure of the port allows to receive large cargo carriers and cruise ships (Freeport Riga, n.d.). The port area covers 6,348 ha and has 152 quays; the total area of covered warehouses covers 418,603 m^2, and opens 1,894,278 m^2. The port has 46 terminals for cargo, 2 for cruise ships, and 3 for containers. Ships 500 m long with a draft of 15 m can enter the port.

The port of Tallinn acts as an intermodal hub, serving passengers and various cargo daily. The port of Tallinn has two constituent passenger ports and two cargo ports. The port of Tallinn is one of the largest port complexes on the Baltic Sea coast in terms of both passenger and cargo traffic (Port of Tallinn, n.d.).

The analysis of the target port cities in the Baltic region shows that although the national populations are declining, the share of the population living in
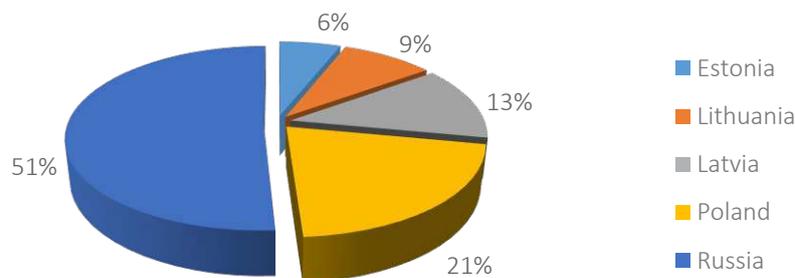
Source: Statista Research Department (2023).

Figure 1. Distribution of cargo flows in Baltic Sea ports (2019)

Table 2. Population dynamics in target port cities over the 2015–2020 period

Source: Eurostat (n.d.).

Port cities	Year					
	2015	2016	2017	2018	2019	2020
Klaipeda	156,141	154,326	151,309	148,908	147,892	149,116
Lithuania	2,921,262	2,888,558	2,847,904	2,808,901	2,792,209	2,796,025
Share of the national population	5%	5%	5%	5%	5%	5%
Riga	641,007	639,342	641,201	632,479	626,147	621,120
Latvia	1,986,096	1,968,957	1,950,116	1,934,379	1,919,968	1,907,675
Share of the national population	32%	32%	33%	33%	33%	33%
Tallinn	413,782	423,420	426,538	430,805	434,562	438,341
Estonia	1,313,271	1,315,944	1,315,635	1,319,133	1,324,820	1,328,889
Share of the national population	32%	32%	32%	33%	33%	33%

Table 3. Unemployment rates in the target port cities during the 2015–2020 period, percent

Source: Eurostat (n.d.).

Port cities	Year					
	2015	2016	2017	2018	2019	2020
Klaipeda	5	5	5	4	6	6
Lithuania	9.0	7.9	8.5	8.4	12.6	13.0
The difference from the national unemployment rate	−4.0	−2.9	−3.5	−4.4	−6.6	−7.0
Riga	7	8	8	7	6	8
Latvia	10	10	9	7	6	8
The difference from the national unemployment rate	−3.0	−2.0	−1.0	0.0	−0.3	0.0
Tallinn	5	6	5	5	4	6
Estonia	6	7	6	5	5.5	6
The Difference from the National Unemployment Rate	−1.0	−1.0	−1.0	0.0	−1.5	0.0

the port cities remains almost unchanged. Tallinn and Riga slightly increased: during the 2017–2020 period, it increased from 32 to 33% (Table 2).

The analysis of the unemployment rates shows that the unemployment rates in the target port cities are lower or coincide (the cases of Riga and Tallinn between 2018 and 2020) with the national unemployment rates (Table 3).

Regarding an integrated assessment of urban competitiveness, scientific studies highlight the aspect of economic security. The study employed the USC model, which includes the determinants of competitiveness and allows one to assess the competitiveness of the port cities at several levels (baseline, development, and interoperability).

Table 4 indicates that in 2020, the largest number of Klaipeda employees worked in agriculture and fisheries, while the smallest share worked in the information and communication sector. In Riga, most people worked in agriculture and fisheries, followed by real estate, public administration, hu-

man health, education, social work, and defense. In Tallinn, most employees work in the following sectors: communication and information, arts, entertainment and recreation, other service activities, and household and non-territorial organizations and bodies.

To assess the competitiveness of the target port cities in the Baltic region in terms of economic security, the data for the period 2015–2020 were extracted from the relevant statistical databases (Eurostat and the databases of Lithuanian, Latvian, and Estonian statistical departments). The competitiveness of the target port cities in terms of their economic security is assessed by applying statistical analysis methods. The results depend on the availability of the information.

Table 5 indicates that the baseline level of the USC model did not reveal any significant port cities, and the results vary from year to year. Stabilization of the positions can only be observed in 2019–2020, and Klaipeda occupies the leading position.

Table 4. Employment by activities (2020)

Port cities	Activities									
	Agriculture, fishery (NACE Rev. 2, A)	Mining, Manufacturing, and Energy (NACE Rev. 2, B-E)	Construction (NACE Rev. 2, F)	Trade, transport, hotels, restaurants (NACE Rev. 2, G to I)	Information and communication (NACE Rev. 2, J)	Financial and insurance activities (NACE Rev. 2, K)	Real estate activities (NACE Rev. 2, L)	Professional, scientific, and technical activities; administrative and support service activities (NACE Rev. 2, M and N)	Public administration, defense, education, human health, and social work activities (NACE Rev. 2, O to Q)	Arts, entertainment, and recreation; other service activities; activities of household and extra-territorial organizations and bodies (NACE Rev. 2, R to T)
Klaipeda	647	18 911	7 313	31 701	1 097	919	3 024	9 269	22 561	5 307
Riga	1 632	39 085	32 218	128 041	31 255	14 311	17 782	57 611	101 280	18 619
Tallinn	0	33 600	17 000	61 100	20 700	7 500	4 600	26 900	45 700	16 900

Table 5. Assessment of the baseline economic environment in the target port cities by employing the COPRAS method

Port cities	Year					
	2015	2016	2017	2018	2019	2020
Klaipeda	0.34	0.32	0.33	0.35	0.34	0.34
Tallinn	0.31	0.35	0.34	0.30	0.33	0.33
Riga	0.34	0.33	0.33	0.34	0.32	0.32

Table 6. Assessment of the economic development environment in the target port cities by employing the SAW method

Port cities	Year					
	2015	2016	2017	2018	2019	2020
Klaipeda	0.17	0.16	0.17	0.16	0.20	0.18
Tallinn	0.49	0.49	0.48	0.49	0.47	0.44
Riga	0.35	0.34	0.35	0.35	0.35	0.30

Table 7. Assessment of the economic interoperability environment in the target port cities by employing the COPRAS method

Port cities	Year					
	2015	2016	2017	2018	2019	2020
Klaipeda	0.28	0.28	0.29	0.29	0.29	0.25
Tallinn	0.41	0.41	0.41	0.40	0.41	0.43
Riga	0.31	0.31	0.30	0.32	0.30	0.32

The data in Table 6 show that Tallinn holds a leading position throughout the period under consideration (2015–2020). It is followed by Riga and Klaipeda.

Data in Table 7 indicate that Tallinn occupies a leading position throughout the period un-

der consideration (2015–2020). It is followed by Riga and Klaipeda.

When comparing the three port cities in the Baltic region in the period 2015–2020, it can be seen that Tallinn holds a leading position throughout the entire period considered, Riga

Table 8. Evaluation of the competitiveness of the economic environment in the target port cities in terms of economic security by employing the TOPSIS method

Port cities	Year					
	2015	2016	2017	2018	2019	2020
Klaipeda	0.32	0.31	0.31	0.32	0.32	0.30
Tallinn	0.45	0.46	0.45	0.45	0.45	0.44
Riga	0.41	0.42	0.43	0.43	0.43	0.42

Table 9. Average annual results representing economic evaluation of the competitiveness of target port cities based on different methods

Port cities	Year					
	2015	2016	2017	2018	2019	2020
Klaipeda	3.0	3.0	3.0	3.0	3.0	3.0
Tallinn	1.3	1.0	1.3	1.3	1.3	1.3
Riga	1.7	2.0	1.7	1.7	1.7	1.7

being second and Klaipeda third. The change in positions can be observed only at the baseline level, while the development and interoperability level results are practically the same as the final result, i.e., Tallinn holds a leading position.

Table 9 presents the assessment of the competitiveness of the three port cities in the Baltic region over the period 2015–2020 based on different multi-criteria evaluation methods.

This study assessed the competitiveness of three selected port cities in the Baltic region from the point of view of economic security. Future research could focus on the impact of an emergency (COVID-19, military unrest, etc.) on economic security.

CONCLUSION

The purpose of this paper was to comprehensively evaluate the competitiveness of Baltic port cities, specifically Klaipėda, Riga, and Tallinn, with a focus on economic security, time factors, and their relative positions in relation to one another. The results of the secondary data analysis yielded some noteworthy findings. First, the study revealed that the unemployment rate in the target port cities is notably lower than the national average. This indicates that these port cities have a relatively stable labor market, which can be attributed to their economic activities and opportunities.

Second, an insightful comparative analysis of the population distribution highlighted a substantial disparity among the cities. Klaipėda was found to have the smallest share of the country's population, accounting for approximately 5%, in contrast to Riga and Tallinn, where more than 30% of the country's population resides. This divergence can be attributed to the dual roles of Tallinn and Riga as not only port cities but also national capitals.

Third, the study employed three different multi-criteria evaluation methods, namely SAW, COPRAS, and TOPSIS, to assess the competitiveness of these port cities in terms of their economic security. Surprisingly, all three methods yielded nearly identical results, consistently positioning Tallinn as the leader, Riga in second place, and Klaipėda in third. These findings underscore the distinct advantages that port cities enjoy as national capitals.

Fourth, the results strongly support the notion that port cities, especially those that double as capitals like Tallinn and Riga, possess a more significant potential for attracting human resources, technology, and financial investments. Consequently, these cities are more economically secure and stable than their counterparts, with robust transport infrastructure but needing more capital status.

In light of these findings, future research endeavors based on the methodologies employed in this study could delve deeper into the competitiveness of port cities situated along the eastern Baltic coast. Such research could yield valuable insights into the dynamics of economic security, population distribution, and competitiveness in a broader regional context, shedding further light on the complex interplay between port cities, capital status, and economic stability in the Baltic region.

AUTHOR CONTRIBUTIONS

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Formal analysis: Ieva Meidutė-Kavaliauskienė.
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Methodology: Renata Činčikaitė.
Resources: Renata Činčikaitė.
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REFERENCES

1. Balioti, V., Tzimopoulos, C., & Evangelides, C. (2018). Multi-criteria decision making using TOPSIS method under fuzzy environment. Application in spillway selection. *Proceedings, 2*(11), 637. https://doi.org/10.3390/proceedings2110637

2. Brooks, K., & Cullinane, M. (2007). *Devolution, port governance and port performance* (1st ed.). JAI Press.

3. Bruneckiene, J., Guzavicius, A., & Cincikaite, R. (2010). Measurement of urban competitiveness in Lithuania. *Inzinerine Ekonomika-Engineering Economics, 21*(5), 493-508. Retrieved from https://inzeko.ktu.lt/index.php/EE/article/view/11709

4. Capobianco-Uriarte, M.d.l.M., Casado-Belmonte, M.d.P., Marín-Carrillo, G. M., & Terán-Yépez, E. (2019). A bibliometric analysis of international competitiveness (1983–2017). *Sustainability, 11*(7), 1877. https://doi.org/10.3390/su11071877

5. Činčikaitė, R., & Meidute-Kavaliauskiene, I. (2021). An integrated competitiveness assessment of the Baltic capitals based on the principles of sustainable development. *Sustainability, 13*(7), 3764. https://doi.org/10.3390/su13073764

6. Činčikaitė, R., & Paliulis, N. (2013). Assessing competitiveness of Lithuanian cities. *Economics and Management, 18*(3), 490-500. https://doi.org/10.5755/j01.em.18.3.4307

7. Eurostat. (n.d.). *Database*. Retrieved from https://ec.europa.eu/eurostat/web/main/data/database

8. Ferrari, C., Merk, O., Bottasso, A., Conti, M., & Tei, A. (2012). *Ports and regional development: A European perspective* (OECD Regional Development Working Papers). Paris: OECD Publishing. http://dx.doi.org/10.1787/5k92z71jsrs6-en

9. Freeport Riga. (n.d.). *Port Location*. Retrieved from https://rop.lv/en/port-location

10. Gao, T., Na, S., Dang, X., & Zhang, Y. (2018). Study of the competitiveness of Quanzhou Port on the Belt and Road in China based on a Fuzzy-AHP and ELECTRE III model. *Sustainability, 10*(4), 1253. https://doi.org/10.3390/su10041253

11. Ginevičius, R., & Podvezko, V. (2008). The problem of compatibility of various multiple criteria evaluation methods. *Business: Theory and Practice, 9*(1), 73-80. https://doi.org/10.3846/1648-0627.2008.9.73-80

12. Ginevičius, R., Podvezko, V., & Mikelis, D. (2004). Quantitative evaluation of economic and social development of Lithuanian regions. *Ekonomika, 65*, 67-81. https://doi.org/10.15388/ekon.2004.17341

13. Govoni, N. (2004). *Dictionary of marketing communications*. SAGE Publications, Inc. https://doi.org/10.4135/9781452229669.n2631

14. Hoyle, D., & Hilling, B. S. (1984). *Seaport system and spatial change: Technology, industry and development strategies*. John Wiley & Sons Inc.

15. Kahler, M. (2004). Economic security in an era of globalization: Definition and provision. *The Pacific Review, 17*(4), 485-502. https://doi.org/10.1080/0951274042000326032

16. Krośnicka, K. A. (2018). Spatial evolution of the European container ports' system in perspective of the location theory. *SHS Web of Conferences, 58*, 01016. https://doi.org/10.1051/shsconf/20185801016

17. Krośnicka, K. A., Lorens, P., & Michałowska E. (2021). Port cities within port regions: Shaping complex urban environments in Gdańsk Bay, Poland. *Urban Planning, 6*(3), 27-42. https://doi.org/10.17645/up.v6i3.4183

18. Lazauskas, M., Zavadskas, E. K., & Šaparauskas, J. (2015). Ranking of priorities among the Baltic capital cities for the development of sustainable construction. *E+M, 18*(2), 15-24. https://doi.org/10.15240/tul/001/2015-2-002

19. Liebuvienė, J., & Čižiūnienė, K. (2021). Comparative analysis of ports on the Eastern Baltic Sea Coast. *Logistics, 6*(1), 1. https://doi.org/10.3390/logistics6010001

20. Lorens, P. (2014). Urban waterfront regeneration: Origins of the issue. In Ş. G. Dündar, N. Karataş, H. E. Erdin, & P. Lorens (Eds.), *W: New Faces of Harbour Cities* (pp. 3-18). Newcastle upon Tyne: Cambridge Scholars Publishing.

21. Meidutė-Kavaliauskienė I., Dudzevičiūtė, G., & Maknickienė, N. (2020). Military and demographic inter-linkages in the context of the Lithuanian sustainability. *Journal of Business Economics and Management, 21*(6), 1508-1524. https://doi.org/10.3846/jbem.2020.13444

22. Munim, Z. H., & Schramm H.-J. (2018). The impacts of port infrastructure and logistics performance on economic growth: The mediating role of seaborne trade. *Journal of Shipping and Trade, 3*, 1. https://doi.org/10.1186/s41072-018-0027-0

23. Musso, E., Benacchio, M., & Ferrari, C. (2000). Ports and employment in port cities. *International Journal of Maritime Economics, 2*(4), 283-311. https://doi.org/10.1057/ijme.2000.23

24. Nevado Gil, M. T., Carvalho, L., & Paiva, I. (2020). Determining factors in becoming a sustainable smart city: An empirical study in Europe. *Economics & Sociology, 13*(1), 24-39. https://doi.org/10.14254/2071-789X.2020/13-1/2

25. Ni, P., Kresl, P., & Li, X. (2014). China urban competitiveness in industrialization: Based on the panel data of 25 cities in China from 1990 to 2009. *Urban Studies, 51*(13), 2787-2805. https://doi.org/10.1177/0042098013514461

26. Notteboom T. E., & Rodrigue, J.-P. (2005). Port regionalization: Towards a new phase in port development. *Maritime Policy & Management, 32*(3), 297-313. https://doi.org/10.1080/03088830500139885

27. Notteboom, P., Ducruet T., & de Langen C. (2009). *Ports in proximity: Competition and coordination among adjacent seaports* (1st ed.). Routledge.

28. Nyga-Łukaszewska, H., & Napiórkowski, T. M. (2022). Does energy demand security affect international competitiveness? Case of selected energy-exporting OECD countries. *Energies, 15*(6), 1991. https://doi.org/10.3390/en15061991

29. OECD. (2014). *The competitiveness of global port-cities*. Paris: OECD Publishing. https://doi.org/10.1787/9789264205277-en

30. Park, J. S., & Seo, Y.-J. (2016). The impact of seaports on the regional economies in South Korea: Panel evidence from the augmented Solow model. *Transportation Research Part E: Logistics and Transportation Review, 85,* 107-119. https://doi.org/10.1016/j.tre.2015.11.009

31. Podvezko, V. (2011). The comparative analysis of MCDA methods SAW and COPRAS. *Inzinerine Ekonomika-Engineering Economics, 22*(2), 134-146. http://dx.doi.org/10.5755/j01.ee.22.2.310

32. Port of Klaipeda. (n.d.). *About the Port of Klaipėda.* Retrieved from https://www.portofklaipeda.lt/about-the-port

33. Port of Tallinn. (n.d.). *Our Ports.* Retrieved from https://www.ts.ee/en/our-ports/

34. Rogerson, R. J. (1999). Quality of life and city competitiveness. *Urban Studies, 36*(5-6), 969-985. https://doi.org/10.1080/0042098993303

35. Stanković, J., Džunić, M., Džunić, Ž., & Marinković, S. (2017). A multi-criteria evaluation of the European cities' smart performance: Economic, social and environmental aspects. *Zbornik radova Ekonomskog fakulteta Rijeka, 35*(2), 519-550. https://doi.org/10.18045/zbefri.2017.2.519

36. Statista Research Department. (2023, October 24). *Distribution of cargo traffic in Baltic Sea ports in Central and Eastern Europe in 2019, by country.* Statista. Retrieved from https://www.statista.com/statistics/1183211/distribution-of-cargo-traffic-in-baltic-sea-ports-by-country/

37. Vasiliauskas, A., & Misiūnas, A. (2000). The estimation of the expansion of Klaipėda Seaport from the economic point of view. *Ekonomika, 50*. https://doi.org/10.15388/Ekon.2000.16693

38. Verhetsel, A., & Sel, S. (2009). World maritime cities: From which cities do container shipping companies make decisions? *Transport Policy, 16*(5), 240-250. https://doi.org/10.1016/j.tranpol.2009.08.002

39. World Bank Group. (2021). *Transport global practice: The container port performance index 2021.* Retrieved from https://thedocs.worldbank.org/en/doc/66e3aa5c3be4647addd01845ce353992-0190062022/original/Container-Port-Performance-Index-2021.pdf

40. Zavadskas, E. K., & Turskis, Z. (2011). Multiple criteria decision making (MCDM) methods in economics: An overview. *Technological and Economic Development of Economy, 17*(2), 397-427. https://doi.org/10.3846/20294913.2011.593291

41. Zhu, H., Su, D., & Yao, F. (2022). Spatio-temporal differences in economic security of the prefecture-level cities in Qinghai-Tibet Plateau Region of China: Based on a triple-dimension analytical framework of economic geography. *International Journal of Environmental Resources and Public Health, 19*(17), 10605. https://doi.org/10.3390/ijerph191710605