

PORT COMPETITIVENESS AND ECOLOGICAL IMPACT OF LOGISTICS ACTIVITIES: A CASE STUDY OF THE PORT OF PLOČE

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Abstract

From the historical perspective the port competitiveness was often strongly determined by the geographical position of the port itself as well as the natural conditions of its surrounding. It is logical if we take into consideration that the port location is static while the port needs to be a connector of the inland and maritime transport routes, and it needs to have favourable maritime conditions in order to effectively serve ships and cargo. From such a perspective, the ecological specificities and biodiversity of the surrounding area can be perceived as a negative development factor that can significantly limit and/or reduce potential for competitiveness development. From the methodology point of view this paper develops a framework that examines ecological impact of logistics activities and port development activities in general in order to evaluate possible competitiveness boost strategies in practical situations when there is ecologically sensitive and environmentally fragile area around the port. Authors are trying to shed some light onto modern approach toward port competitiveness and logistics operations that aims to harmonise and reconcile the requirements of ecological protection with modern port development directions towards competitiveness boost. Such development direction can be founded on the idea that modern technological and social and economic development enables port authorities as well as ports' top management to take into account much wider ecological perspective in order to improve logistics services, attract more cargo as well as future investors in the port infra and superstructure.

Key words: port competitiveness, ecological impact, logistic activities, development directions

This paper has been produced on the basis of the research conducted for the realisation of the project "Technical Assistance to Port of Ploče Authority to Improve Efficiency and Competitiveness on Rail Corridor Vc and the competitiveness of the port of Ploče" in 2015.

1. INTRODUCTION

This paper develops a framework that examines ecological impact of logistics activities and port development activities in general in order to evaluate possible competitiveness boost strategies in practical situations when there is ecologically sensitive and environmentally fragile area around the port. Special attention needs to be paid to harmonize port competitiveness development directions with environmental restrictions while the latter can also be used as a factor that can possibly additionally stimulate port growth. This research was modeled on the case study basis, investigation the complex situation around on of the main Croatian cargo ports – the port of Ploče. The case study analyzes the port system of the port of Ploče in its direct connections with surrounding micro area and indirect connections with national, European as well as global environmental regulation and institutional framework.

The port of Ploče is situated at the Central Adriatic coast line (precisely situated on the eastern coast of the Adriatic Sea on the location of 43°03 'N and 17°26' E), approximately 120 km south from the city of Split and 100 km North from Dubrovnik. The ports central-Adriatic location, as well as its position in the south of Croatia leads to an international hinterland, covering the Dalmatic Coast line as well as Bosnia and Herzegovina, Serbia, Montenegro and Hungary. The port of Ploče is of great importance for the national economy as well as for the neighbouring Bosnia and Herzegovina as a result of its specific positioning. The Bosnian border is only 25 km from the port of Ploče and the port can also play a significant role for partners from Serbia and Montenegro, Hungary and other Central European countries.

The port of Ploče is directly connected with its hinterland in Bosnia and Herzegovina through a 24 km railway line and road, further to the north-eastern part of Croatia, and to Central Europe by rail and road. That extends along the route of the C branch (Budapest - Osijek - Sarajevo-Ploče) of the Pan-European Corridor V (Venice - Trieste - Budapest - Uzhgorod - Lviv). Through a 24 km railway line and road, the port is linked with its immediate hinterland of and further to the North-East of Croatia and Central Europe. It is the start/end point of the Corridor Vc (Budapest-Osijek-Sarajevo-Ploče) (Rak et al., 2016).

2. SITUATIONAL ANALYSIS AND BUSINESS POLICY CONTEXT

The EU is highly dependent on seaports for trade with the rest of the world and within its Internal Market: 74% of goods exchanged (imported and exported) with the rest of the world and about 37% of exchanges among EU Member States transit through seaports (Pastori, 2015). According to Pastori (2015) European ports guarantee territorial continuity of the EU by servicing regional and local maritime

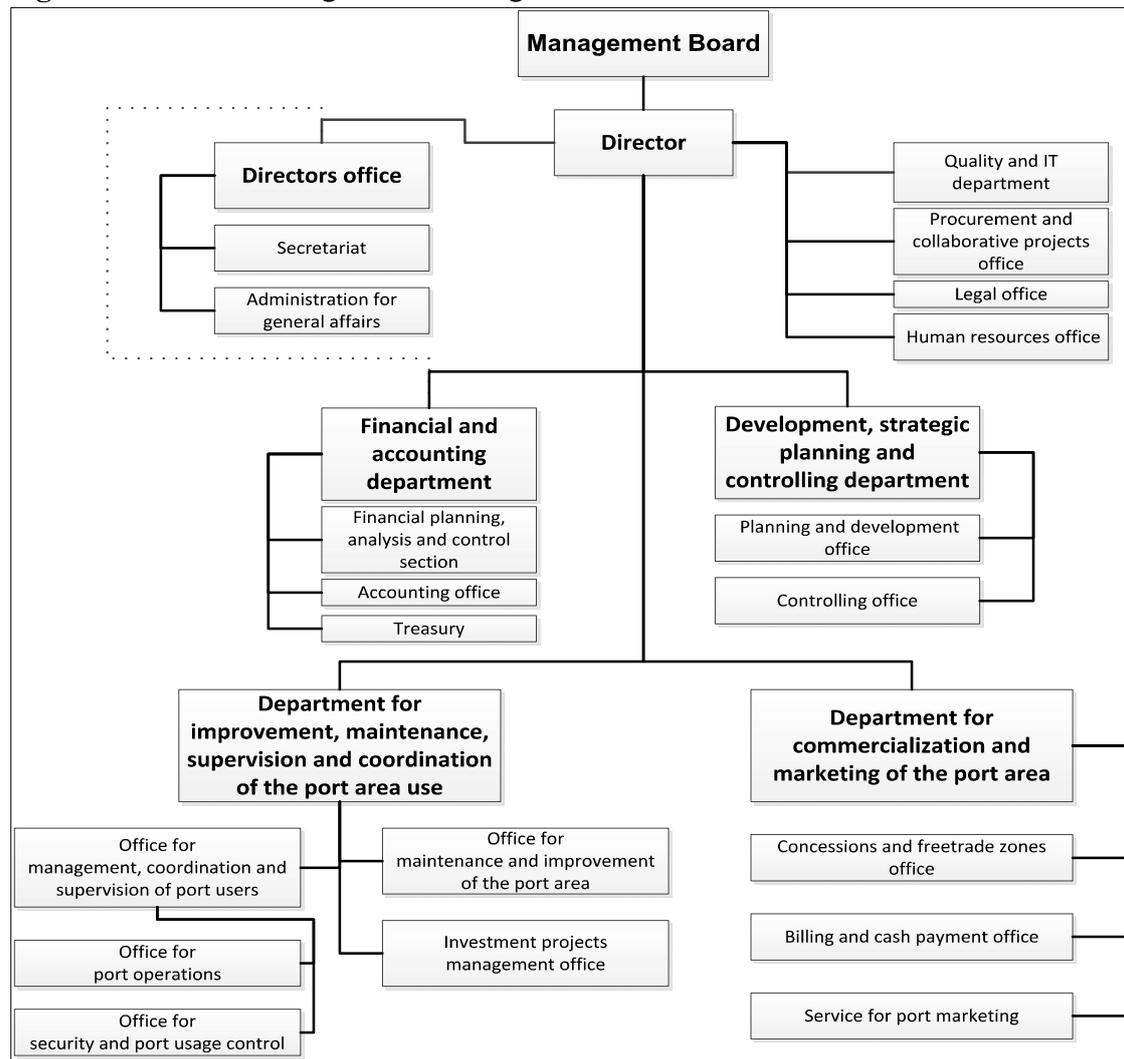
traffic to link peripheral and island areas and they are the nodes from where the multimodal logistic flows of the trans-European network can be organised, using Short Sea Shipping, rail and inland waterways links to minimise road congestion and energy consumption.

From the perspective of local economy the port of Ploče is essential for job creation given its tradition and limited development of neighbouring SMEs not related to port. There is still present a valuable and strong aspiration towards strengthening of local and regional competitiveness improvements and economic growth, but also a high level of concern about environmental issues in development process and especially potential impacts of industrial development. Ploče Port Authority as well as other port community members share a focus of development continuity with the local population and public authorities in order to improve quality of life and boost employment on local job market.

Through years the port of Ploče has become valuable fundament of employment in the local community and probably it will be even increasingly attractive as active investments are finalised and put in operation.

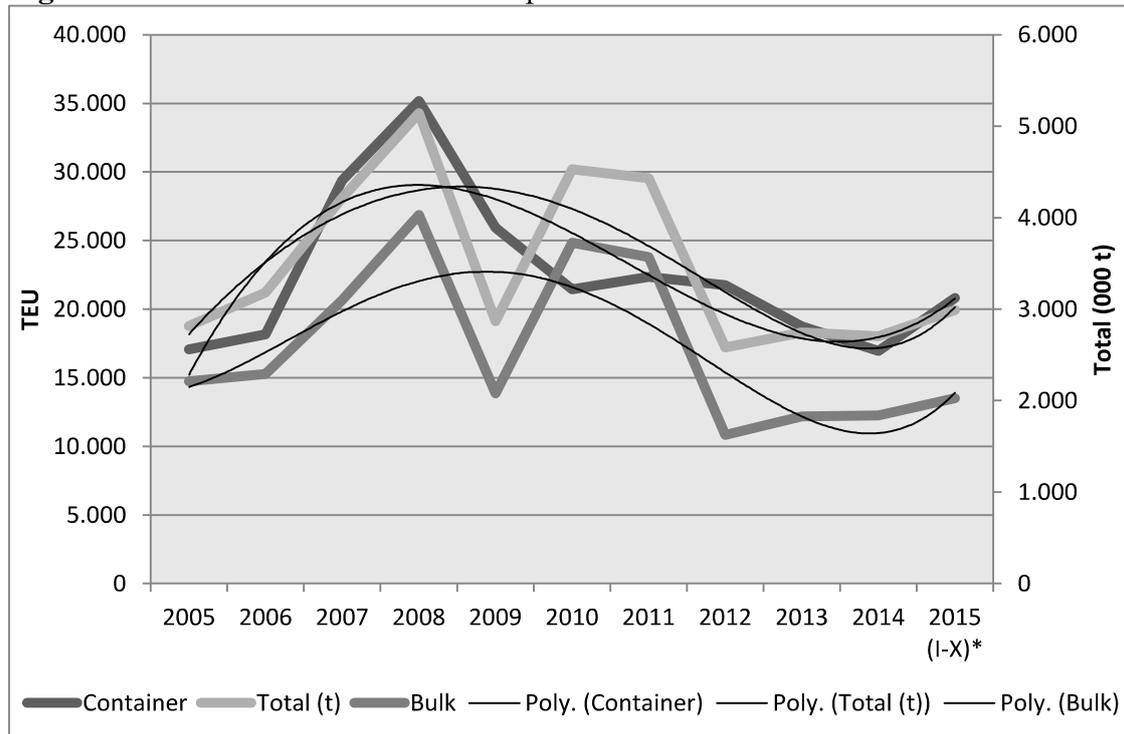
The Ploče Port Authority as a public entity devoted to operation under national public policies, currently employes 35 people (Rak et al., 2016) with the organisational structure illustrated on the following Figure.

Figure 1. Port of Ploče governance organisational model and structure



Source: Authors based on data from Ploče Port Authority

From the policy perspective and situational analysis it is important to analyse the traffic achievements in port of Ploče based on most significant types of cargo – total traffic, bulk cargo and containers. The graphic representation and polynomial trend lines are shown on the following figure.

Figure 2. Container and total traffic in port of Ploče

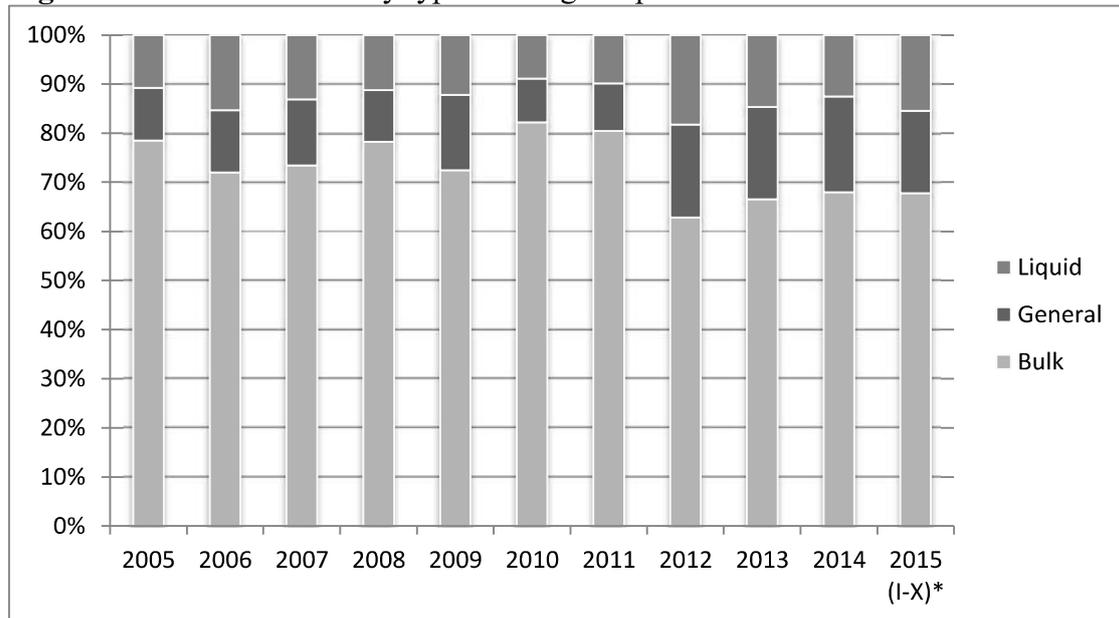
Legend: * Data for 2015 is estimated based on actual traffic achievements for the period I-X/2015

Source: Authors based on data from Ploče Port Authority

It can be seen that the actual movement of the total traffic follows the trend of bulk cargo traffic, obviously as a result of the domination of bulk cargo in the structure of the total cargo. In 2014, realisation of total traffic and traffic of bulk cargo are somewhat below the achievements from a decade earlier – from 2005, with indications of a slow recovery process after the crisis years following 2008 and that have strongly shaken the global traffic flows as well as the realization in the port of Ploče. Level of container traffic in 2014 is almost the same as it was in 2005 but results for Q1-Q3/2015 (17.354 TEU) are showing a sign of recovery in a sense that the final result in 2015 outreached the achievements from 2006 and was close to 2007 container traffic realisation. Polynomic trend lines represented on the figure above are also showing a notice of recovery that is very valuable to further port growth and development in the shade of active investments.

The structure of the traffic by main type groups of the cargo is shown on the following Figure.

Figure 3. Traffic structure by types of cargo in port of Ploče



Legend: * Data for 2015 is estimated based on actual traffic achievements for the period I-X/2015

Source: Authors based on data from Ploče Port Authority

In comparison between 2005 and 2014 it is evident that nowadays there is a bigger share of liquid and general cargo in total cargo volumes with lower share of dry bulk cargo. It is not so much a result of increase of liquid and general cargo (although it is important to emphasise that the general cargo has increased for 75% in the period), as is the reason of decline of bulk cargo (- 4%) as a dominant type of cargo in total cargo volumes. All those transport and economic production aspects are significantly influencing further strategic development directions of the port of Ploče, especially taking into account intensive investment cycle in the port infrastructure in recent years. Based on performed analysis it can be concluded that there is still a plenty of room for further improvements and business growth, but in order to adequately plan the development process multiple environmental aspects that play a significant role in that process need to be considered.

3. ENVIRONMENTAL ANALYSIS AND ECOLOGICAL IMPACT ON PORT DEVELOPMENT

The port of Ploče faces up to its ecological obligations and responsibility in the community. By following feasible environmental standards the port can be devoted to actively promote technological solutions and organisational concepts oriented on the long run sustainable development with the environmental issues included in the top priorities.

It is strategically smart that new technological and organisational approaches are applied targeting "green" orientation in order to help the port live its business life and

develops its competitive strengths in a fruitful symbiosis with the surrounding population, the city and the region.

3.1. The Ramsar Convention and influence on port development directions

It is particularly important to stress out the relationship of the port of Ploče with its local surroundings. The port should recognize the close collaboration with the local environment as a major priority in all of its development directions. All planned investments need to pass thorough environmental impact studies in order to be eligible for continuation and implementation. This is particularly important because the port of Ploče is situated beside the Neretva River Delta which is one of the five Ramsar sites in Croatia, occupying 14% (12.742 Ha of 94.358 Ha) of total Croatian wetlands area included into the List of Wetlands of International Importance (Ramsar List) by the Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention). It is an international treaty for the conservation and sustainable utilization of wetlands, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value that was signed in 1971 and amended in 1982 and 1987 (Ramsar Convention Secretariat, 2013). Ramsar Convention came into force in 1975 (Kellogg Brown & Root, 2010) and since then almost 90% of UN member states from all over the world (including Croatia) have acceded to become Contracting Parties.

The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world" (Ramsar Convention Secretariat, 2013). The reason for this mission is that wetlands are among the most diverse and productive ecosystems and they provide essential services and supply all fresh water but they continue to be degraded and converted to other uses. One of the main reasons for that from the port infrastructure point of view is that wetlands is relatively shallow and very often situated in lowland areas near the sea that is relatively often suitable for building port infrastructure. So, special attention needs to be paid to preservation in harmonic relationship with port development and especially port growth, especially taking into account port infrastructure.

The Ramsar Convention Secretariat (2013) helped in the modelling the crucial development relationships between wetlands and their business surrounding in a sense of:

- Strengthening economic knowledge and understanding through contribution to better understanding of the economic value and importance of all types of wetlands.
- Advising investors and private companies through sharing knowledge and making recommendations via different sustainable development platforms, as well as work with individual companies on their water and wetland policies.
- Advising governments through providing tailored advice and offering broad support to inter-governmental meetings, to explain the value and importance of wetlands in the context of economic planning and development and to identify opportunities for possible win-win arrangements and partnerships.

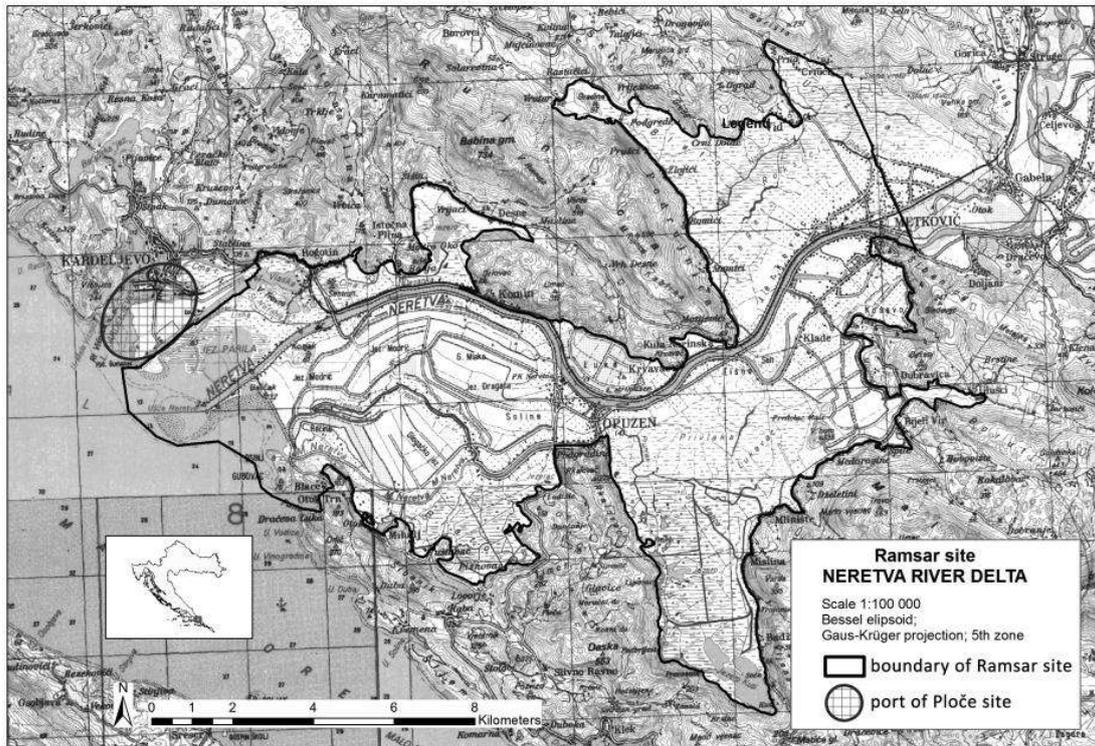
- Stimulating and supporting public-private partnerships through several deep collaborations between the private and public stakeholders and governing bodies that can significantly contribute to the economic vibrancy of respective region.
- Improving regional cooperation between a wide range of public, private as well as NGOs stakeholders through realisation of different activities and projects geared towards the fulfilment of the main goals of the Ramsar Convention.
- Developing and maintaining diverse global network of partners, ranging from formal collaborators on Convention implementation and organizations engaged in sustainable development and biodiversity to prominent private companies and NGOs.

For Neretva River Delta to become one of the Ramsar sites (Ramsar Convention Secretariat, 2013) the following nine main criteria for identifying Wetlands of International Importance are important and the respective site needs to:

1. Contain a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region;
2. Support vulnerable, endangered, or critically endangered species or threatened ecological communities;
3. Support populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region;
4. Support plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions;
5. Regularly support 20,000 or more water birds;
6. Regularly support 1% of the individuals in a population of one species or subspecies of water bird;
7. Support a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity;
8. Be important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend;
9. Regularly support 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.

The strong interrelation between port of Ploče and Neretva River Delta as one of the Ramsar sites is very tight and inseparable as it can be seen on the following figure.

Figure 4. Positioning and interrelation between port of Ploče and Neretva River Delta as the Ramsar site



Source: Authors based on the original map from Ramsar Sites Information Service (2016) [available at: <https://rsis.ramsar.org> access June 1, 2016]

Such a geographical position of the port of Ploče determines that it must incorporate all the ecological aspects of the Neretva River Delta and respective Ramsar convention into development of its strategic planning and it should take into consideration all the environmental as well as social impacts of its business and logistics operations (Naim, 2006; Vilke et al., 2015; The World Bank, 2007).

The convention has three main pillars that contracting parties should commit to, especially to work towards the wise use of all their wetlands, designate suitable wetlands for the Ramsar List and ensure their effective management and cooperate internationally on transboundary wetlands, shared wetland systems and shared species (Kellogg Brown & Root, 2010). In the light of Ramsar Convention it is very important for the port of Ploče to be focused on green and sustainable development in harmonised cooperation with local community. This ecological aspects represents a significant restricting factor, but it is important to understand it as "restricting", but not "limiting" factor. Restrictions are present and their economic impact have to be calculated and taken into account in business development modelling and planning, but positive aspects of environmentally respectful business conduct of the port itself, especially its management and governance system, can significantly overpower negative restrictions. Environmentally friendly business conduct can be perceived as a strong "magnet" for future investors as well as a significant social responsibility multiplicative factor in a sense that it can provide higher level of certainty to all

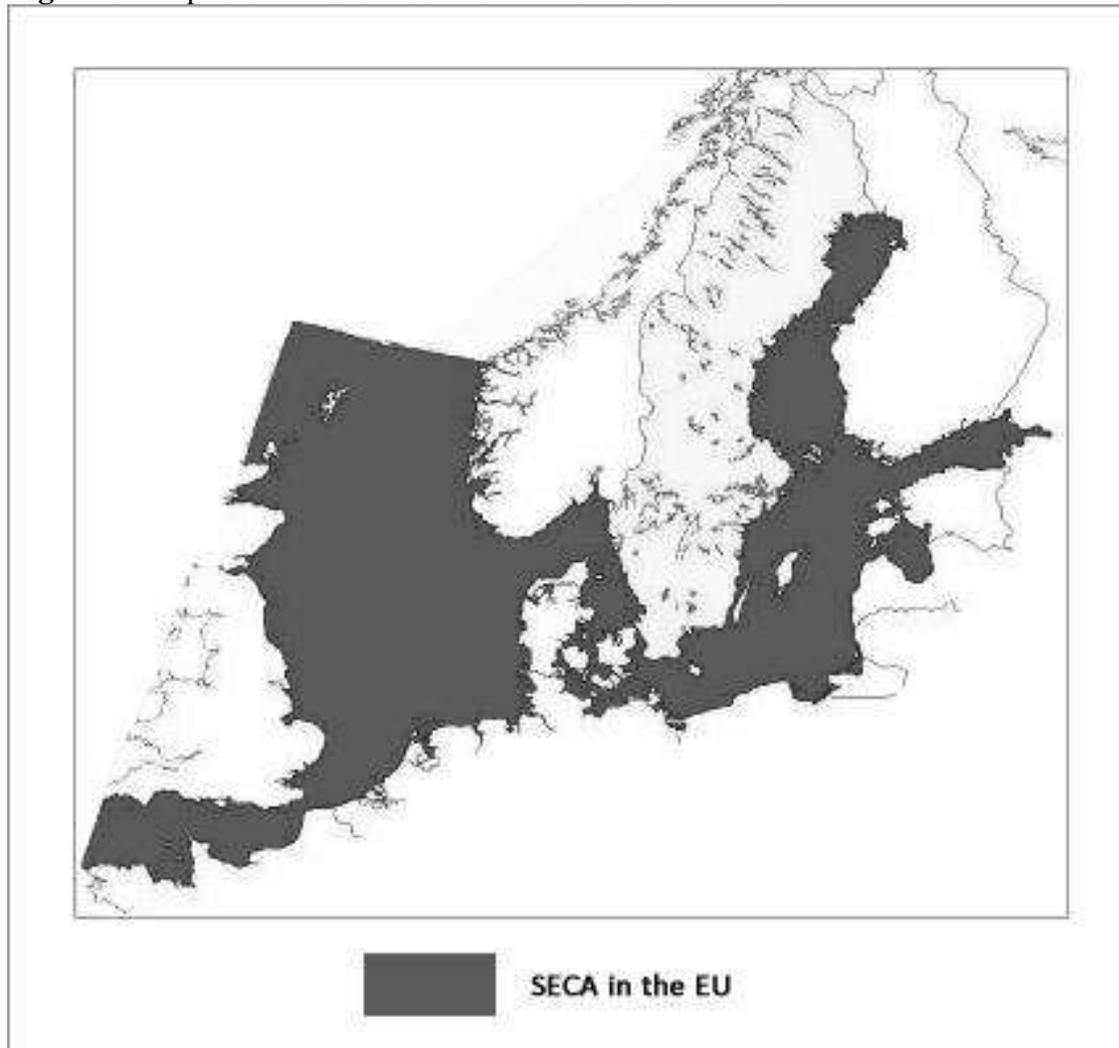
stakeholders, especially local citizens as well as general public, that port management always take into consideration environmental impact of its business operations.

3.2. Port Development in the Framework of Emission Control Areas

Environmental and ecological preservation activities are very prominent also on the international public policy agenda, so it is important for the port to proactively fit in it. This is also one of the dominant themes on the EU policy level as emissions from maritime transport have increasingly affected air quality in the EU, mainly as a result of emissions of air pollutants like sulphur dioxide that can travel long distances. Following the official EU policy point of view, sulphur dioxide emissions cause acid rain and generate fine dust that is dangerous for human health, causing respiratory and cardiovascular diseases reducing life expectancy in the EU by up to two years.

The global idea and concern that emissions from maritime transport increasingly affects air quality is institutionalised through the establishment of the so called Emission Control Areas (ECAs), established under MARPOL Annex VI (Regulations for the Prevention of Air Pollution from Ships) for Sulphur Oxides for the following areas: the Baltic Sea area, the North Sea area, the North American area (covering designated coastal areas off the United States and Canada) and the United States Caribbean Sea area (around Puerto Rico and the United States Virgin Islands) (International Maritime Organization, 1973, 2014).

Such an issue influenced that as of beginning of 2015 EU Member States have to ensure that ships in the Baltic, the North Sea and the English Channel are using fuels with a sulphur content of no more than 0.10% (EU Directive 2012/33/EU). There is established the so called Sulphur Emission Control Area (SECA) and on the following figure it is represented on the EU level. The SECA regulation allows the higher sulphur contents and they are still possible, but only if the appropriate exhaust cleaning systems are in place, so it produce additional costs.

Figure 5. Sulphure Emission Control Areas – SECA in EU

Source: Authors based on Swedish Maritime Administration (2009)

Presently the port of Ploče is not geographically inclusive in the SECA (Swedish Maritime Administration, 2009) but this can be perceived as a significant price competitiveness factor for modern port development. Nevertheless, it is important to stress out that outside the emission control areas, the current limit for sulphur content of fuel oil is 3.50%, falling to 0.50% m/m on and after 1/1/2020, but this date is subject to a review to be completed by 2018, as to the availability of the required fuel oil, and depending on the outcome of the review this date could be deferred to the beginning of 2025 (International Maritime Organization, 2014).

The SECA regulation can be seen as a kind of twist competition factor. The regulation requires the use of low-sulphur ship fuels only for the SECA so it does not apply to the Mediterranean nor Adriatic Sea in the context of port of Ploče. So in non-SECA fuels with a higher share of sulphur content may be used and such fuel is less costly so this present a risk of weakening marine traffic in the SECA and boost the same in non-SECA. Off course, this is not desirable, especially from the macroeconomic perspective, but it can be competitive advantage for the ports

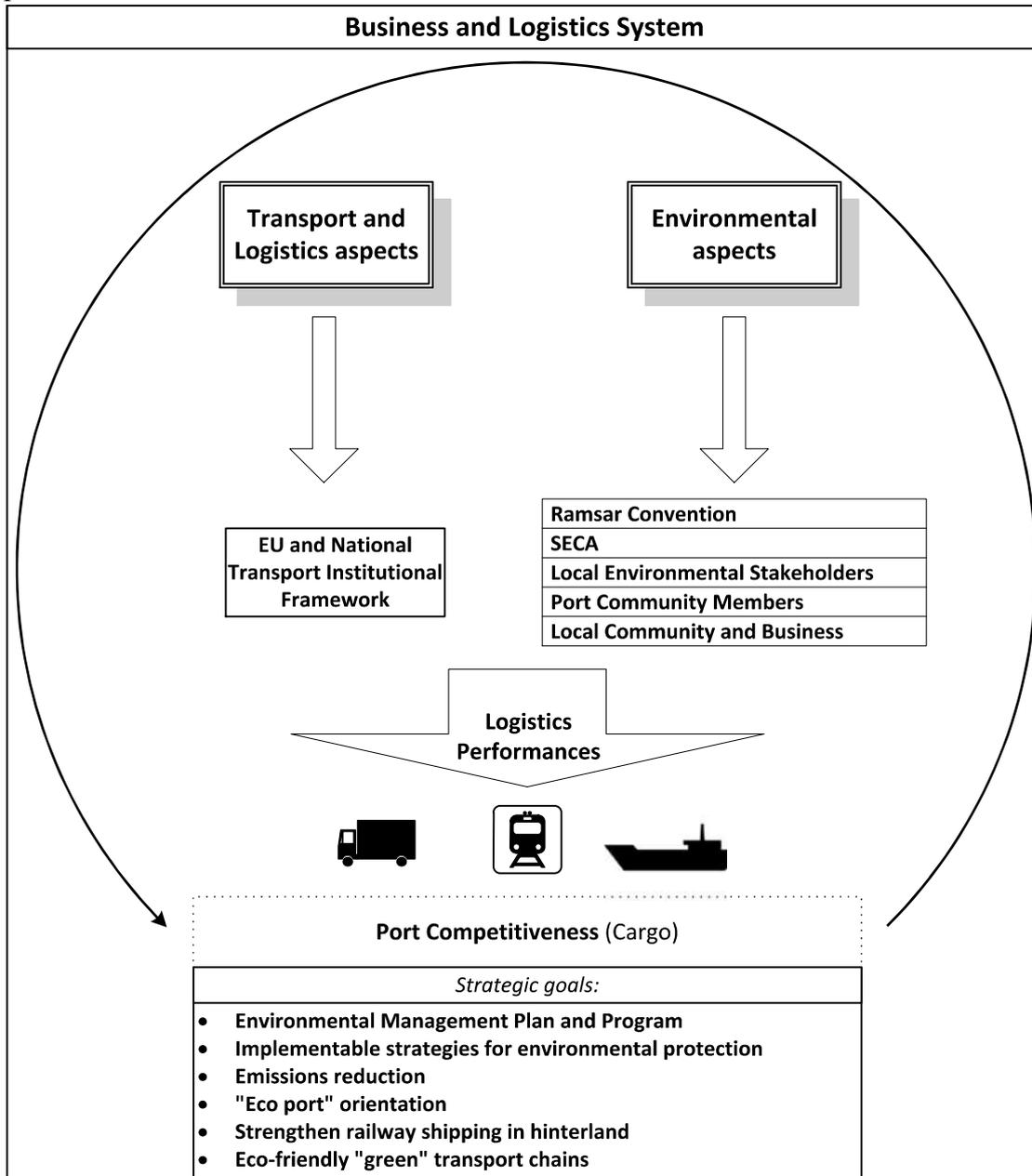
positioned in the non-SECA. Such a competitive advantage (Kesić & Debelić, 2014) can be considered only on the short run because each modern port that wants to be feasible and successful, and especially the port of Ploče, needs to be environmentally friendly on the long run. Beside the mention need for long run "green" orientation, the port of Ploče is devoted to and wants to be environmentally sensitive because it is a part of approach in its surrounding community. General development tendencies should include more orientation to environmental protection issues and energy efficiency as well as sustainable energy orientation.

4. ECOLOGICAL IMPACT OF OPERATIONS AND LOGISTICS ACTIVITIES ON PORT COMPETITIVENESS

In order to establish and strengthen the dialog with its surrounding subjects regarding port logistics activities in conjunction with previously elaborated environmental aspects the port should:

- prepare Environmental Management Plan and Program,
- develop and follow environmental protection goals and seek implementable strategies for achievement of those,
- reduce emissions from terminals and industrial plants if feasible,
- be focused on the activities that will make the port being eligible to be so called "eco port" in partnership with its surrounding,
- be focused on and strengthen the railway shipping in the hinterland,
- be prepared to stimulate eco-friendly "green" transport chains.

This approach can be modelled as it is illustrated on the following figure.

Figure 6. Port Competitiveness and environmental aspects of business logistics performances

Source: Authors

Main aims that can be expected to be achieved with such an orientation, that could help the port become trustworthy in a wider ecological sense, are those that will stimulate public acceptance of the port and improve quality of service (Bendeković et al., 2010) as well as attract competitive entrepreneurs and firms as well as better human resources.

Port of Ploče Authority needs to be fully devoted to the principles of sustainable development and long term strategical planning in accordance with the "green development" principle. They should plan to operate and further develop the port system including all terminals and pools in the following years in accordance with

environmentally friendly and ecologically responsible way which thus ensures sustainable growth and long term viability.

The relationship of the port of Ploče with its local surroundings is of special importance for achieve integrated development harmonised with the local community expectations as well as requirements for smart and green competitiveness boost.

Such port positioning requires that the port of Ploče development should be based upon the wise use and effective management of wetlands, recognising international cooperation as a significant instrument to achieve macro goals while in the same time paying attention to the satisfaction of micro ecological and social requirements and proactive dialogue with the local community.

One of the major challenges of the port will be development and maintenance of port services (Boughton, 2003; Barad & Sapir, 2003; Ishfaq, 2012) and operations in/near an urbanised environment, city of Ploče. A special attention and concern for port of Ploče is urban environment due to the potential impact on local way of life that can potentially occur with cargo-related development activities.

The requirement emphasised in this paper is the strategic planning and development approach that is required to minimise potential conflict, and which is multidimensional by nature, so it should consider especially:

- suitability of land use;
- smart and proactive planning of investment activities alongside identification of future freight requirements;
- continuous deliberation and public orientation in dissemination process as It is much more effective to avoid possible conflicts in the first place than to attempt to resolve issues and minimise impacts once they occur.

It is important that the Environmental Management Plan and Program are prepared in a way that can identify the potential environmental impacts during operations, and feasible measures to address these potential impacts. It should be developed as a solid management framework and special "tool" oriented towards prevention.

Community awareness is crucial for engagement opportunities, and community support is needed in order to harmonize development of the port system in conjunction with its surrounding. On the long run it is the only feasible way so port of Ploče should pay special attention to that and should put the common development success goals high on the priority list. This should be performed in order to continue and even intensify the communication and dissemination channels with the community in order to share information regarding port activities and integral business development.

5. DISCUSSION ON LUKA PLOČE WITHIN SMART AND GREEN PORT DEVELOPMENT PHILOSOPHY

Looking from the global perspective in today modern business environment the fundamental and traditional transport function of the port is modified and upgraded so the ports are becoming more and more the centres of trade and logistics (Chow, 1994; Caplice & Sheffi, 1995; Rutner & Langley, 2000) on national and even on international level. In addition to being strategic points in the transportation activities,

they became a modern complex distribution centres (Bendeković & Aržek, 2008). So, the fundamental competitiveness factors in today's modern transport market are added value creation oriented facilities, equipment, and services based on integrated price and quality policies focused on competitiveness boost along the transport route and not only within the port boundaries. The total transport price and quality of service is the one that count for total business success. Port development in a perspective of modern distribution and logistics centres immanently implies parallel and simultaneous development of multimodal transport routes along the transport chains taking into account environmental standards and using ecological diversity and complexity as a development factor to improve its own competitiveness. On the first sight it is contradictory that something that presents a limitation in building and operating new infrastructure as well as superstructure can be seen as development factor. But in modern business logistics such limitation can be transformed into advantage, especially considering the point of view of modern "green" public policies that are often favourable towards infrastructure and transport development that specially cares about ecological aspects. In addition, such "smart and green port development orientation" represents a possible development factor that will attract socially responsible entrepreneurship initiatives and investors in order to fully utilize such a direction towards competitiveness development of the port itself as well as logistics network in its surroundings, especially in the hinterland.

Researches also confirm such a premise that controlled and properly directed sustainable development of the port systems must be based on an integrated strategic orientation and a common policy of all port community members and stakeholders (Debelić et al., 2015). They need to be proactive (Debelić, 2013) in the modern turbulent business environment in terms of modernization and construction of port facilities as well as provision of quality based port and logistics services.

Port of Ploče has a significant and still not fully used potential for developing (widening) its gravitational zone and the markets itself, in accordance with the analysis and by following business development targets and actions analysed in this paper. Fundaments for enhancing the traffic, in a narrow sense, and improving general business achievements, in a broader sense, of port of Ploče are founded on three main development pillars: human resources, infrastructure and organisation. It is evident that physical barriers for further development are present, but they are not crucial. The crucial ones are non-physical barriers that need to be overcome and "soft" managerial and organisational measures that need to be implemented in order to boost business performances of the port of Ploče. In that sense port of Ploče (its position and development opportunities) has great potential for full inclusion into European traffic flows while fulfilling main goals determined by EU transport policies, national policies as well as international environmental standards. An essential prerequisite is, however, improvement of logistic transport chains through parallel green and sustainable orientation of the port to allow the development of the port of Ploče as a hub not only for BiH market, but also for Central and Eastern Europe. There is a significant potential for both – traffic as well as quality of service growth, providing the basis for competitiveness strengthening of all development factors within the port system and port community itself, but also on the entire transport route as an integral part of modern TEN-T network (European Commission, 2015; Raballand et al., 2008).

One of the main sustainable development objectives of the port of Ploče, regarding environmental awareness, should be to harmonise the port development with the surrounding economy bearing in mind ecology and society. The key factor of success is co-operation, not only on commercial basis, but also on general social basis aiming achievement of medium as well as long term social goals. The development policies should therefore be focused on strengthening the port growth through quantitative as well as qualitative measures seeking job generation and taking into account sustainability requirements and customer orientation on the long run.

6. CONCLUSION

In the modern transport market the essential competitiveness factors are added value creation oriented facilities, equipment, and services based on integrated price and quality policies. Stated factors are focused on competitiveness boost along the transport route and not only within the port boundaries. In order to improve its own competitiveness, port development immanently implies parallel and simultaneous development of multimodal transport routes along the transport chains taking into account environmental standards, ecological diversity as well as complexity.

Port of Ploče has a significant and still not fully used potential for developing (widening) its gravitational zone and the market itself. Three main elements for development and improvement of the traffic, in a narrow sense, and general business achievements, in a broader sense are human resources, infrastructure and organisation. While fulfilling the main goals determined by EU transport policies, national policies as well as international environmental standards, Port of Ploče has great potential for full inclusion into European traffic flows considering its position and competitiveness boost opportunities. Improvements of logistic transport chains, through parallel green and sustainable orientation of the port, are essential prerequisite for development of the port of Ploče as a hub port not only for BiH market, but also for Central and Eastern Europe. There is a significant potential for traffic growth as well as development and improvement of quality of service, providing the basis for competitiveness strengthening of all development factors within the port system and port community itself, but also on the entire transport route as an integral part of modern TEN-T network.

Relationship of the port of Ploče with its local surroundings is of particular importance and needs special attention in order to achieve integrated port development harmonised with the local community expectations as well as requirements for smart and green competitiveness boost. The key factor of success is stakeholders' co-operation, not only on commercial basis, but also on general social basis aiming achievement of medium as well as long term social goals. Port of Ploče should promote technological solutions and organisational concepts focused, in the long run, on sustainable development with the environmental issues included in its top strategical priorities.

Considering previously elaborated port stakeholders cooperation, the scope for the future research can adopt stakeholder analysis on three levels: port itself, transport

route and customers. Also, the social and business effects of the so-called green and smart port development orientation can be further analysed.

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