

Wiśnicki B.: *Analysis of the market potential for developing a new intermodal connection Scandinavia-Balkans*, Międzynarodowa naukowo-praktyczna konferencja - Analiza i prognozowanie systemów zarządzania, Sankt Petersburg, 2012, s. 105-119. [j. angielski]

PhD Eng Bogusz Wiśnicki
Institute of Transport Engineering
Maritime University of Szczecin, Poland

Analysis of market potential for developing a new intermodal connection Scandinavia-Balkans

1. Introduction

This analysis shows the one of the results of the SoNorA Project which is dedicated to the need of improvement of the multimodal accessibility in Central Europe on the South-North axis. This project is to elaborate schedules, recommendations and directives at a transnational level as well as to show ways of overcoming the deadlock in implementation of schemes of infrastructure development and transport services. In the scope of the project, recommendations for the Trans-European Transport Network – Transport (TEN-T) network will be prepared.

The purpose of the analysis is to determine market potential for a new intermodal connection Scandinavia-Balkans. That means to determine the potential cargoes leaning towards the projected intermodal connection in the 2020 perspective. The assessment of the analysis is to develop intermodal rail connections linking the Świnoujście Ferry Terminal with its hinterland. The launch of the new intermodal railway connection one will achieve a modal shift of goods from road to rail. The designed train route allows for elimination of the gap in transport and communication links between the old and new EU members in the Eastern Europe and the Balkans.

2. Structure of foreign trade of Norway and Sweden

The analysis of differences in economic development between Scandinavian countries and the Central and Eastern Europe displays a big imbalance measured in the level of GDP per one citizen. It may mostly correspond with the differences in cargo structure of commercial exchange between countries. Generally speaking, the higher the level of a country's economic development the bigger number of intermodal cargo units that are involved in transport service to a given country.

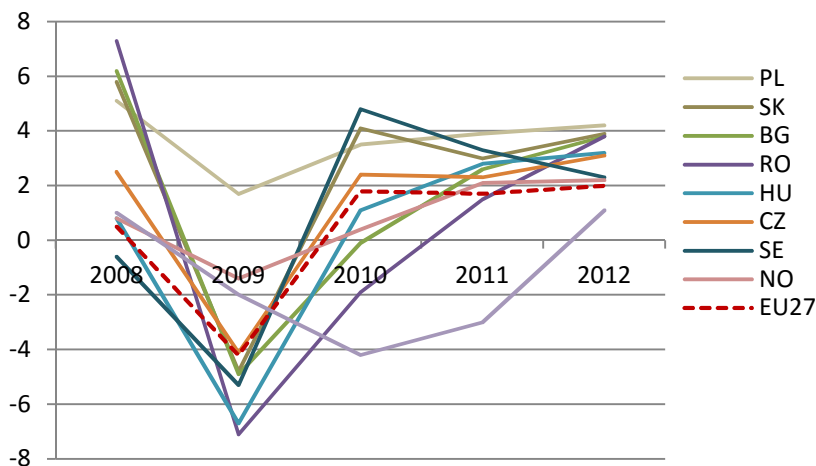


Figure 1. GDP changes in the selected EU countries in 2008-2012 [%]
Source: Eurostat.

The official economy data show that the countries of the Eastern Europe and The Balkans develop faster than other European countries (fig. 1). The economy crisis that had begun in 2008 translated itself into slowing down or even recession of the economy in 2009. The best, positive GDP result that year belonged to Poland and the other countries, led by Romania and Hungary, experienced a few-percentage decrease in their GDP. In 2010 the countries of Eastern Europe and Scandinavia significantly improved their economic results. The crisis was greatly felt by Greece. The prognosis for 2012 shows the 2-4% increase of the analysed countries' GDP. Poland will remain the leader followed by Slovakia, Bulgaria and Romania. All countries, except for Greece, will develop faster than the average growth of the 27 European countries.

The size of the Swedish foreign trade with the Eastern European countries and the Balkans shows a strong position of Poland in the rating of countries, with 2-3% share in value of the foreign trade. The farther positions are held by: Turkey, Czech Republic, Hungary and Slovakia. None of these countries exceeds 1% share in the summarised Swedish foreign trade, both in export and import. Additionally, the Swedish foreign trade is characterised by significant disproportion between import and export. The Norwegian foreign trade with the analysed region of Europe is a few times smaller. Poland holds the first position in the rating with 2,5 % share in the foreign trade. Among the other analysed countries, the subsequent places are held by Turkey and Czech Republic, which however do not exceed 1% share in the Norwegian trade, considering both import and export.

3. Cargo streams analysis

The above described structure of the foreign trade of Sweden and Norway, has its reflection in amounts of cargo transported in various means of transport between Norway and Sweden on one side and Central and East European and Balkan countries on the other. The further analysis concerns the transported cargo mass directed to/from the selected countries: Poland, Czech Republic, Hungary, Slovakia, Romania and Bulgaria. The analysis of transport relations allows defining specific dependences of a macroeconomic character (fig. 2&3):

- 1) Despite the relative financial balance of the international trade, the Scandinavian countries have a big surplus of export over import. In case of Sweden that surplus amounts 30% and in case of Norway it constitutes almost 70% of the total foreign trade.

- 2) Cargos to/from Poland have 70-80% share in the Scandinavian import and 40-50% in its export. These figures are slightly higher from those reflecting the position of Poland in the foreign trade expressed in monetary values.
- 3) Czechs, Hungarians and Slovaks are important trade partners of Sweden. But also in this case one can observe a big asymmetry of import and export. For Norway, aside from Poland, the Czechs are extremely important partners. Transport of cargoes to that country constituted 56% of the Norwegian export directed to the analysed region of Europe.
- 4) Romania and Bulgaria have a marginal share in the foreign trade of the Scandinavian countries, considering both the value and cargo mass.

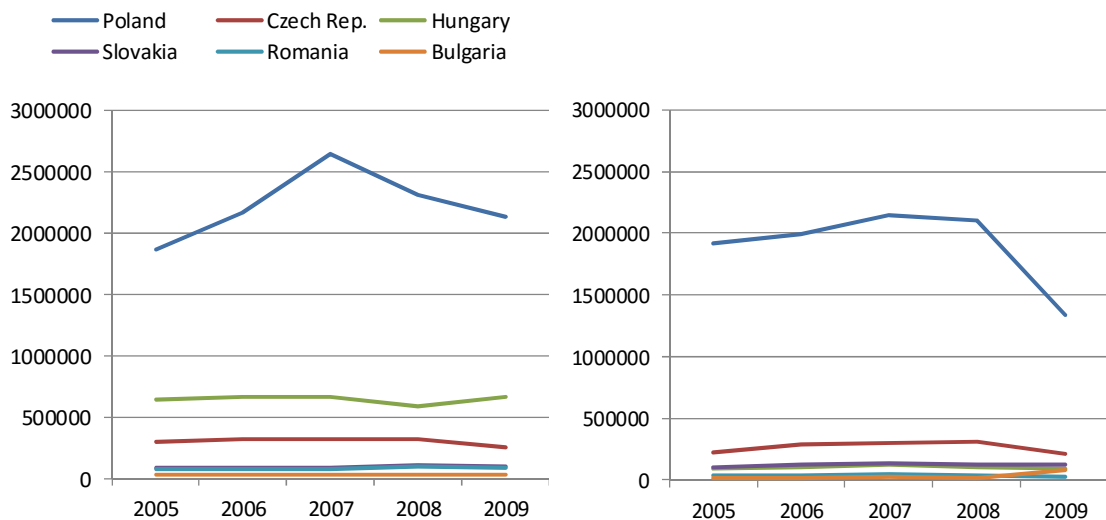


Figure 2. Swedish import (left) and export from the selected countries in 2005-2009, in tonnes
 Source: own elaboration on the basis of the data from Statistiska centralbyrån (SCB), www.scb.se

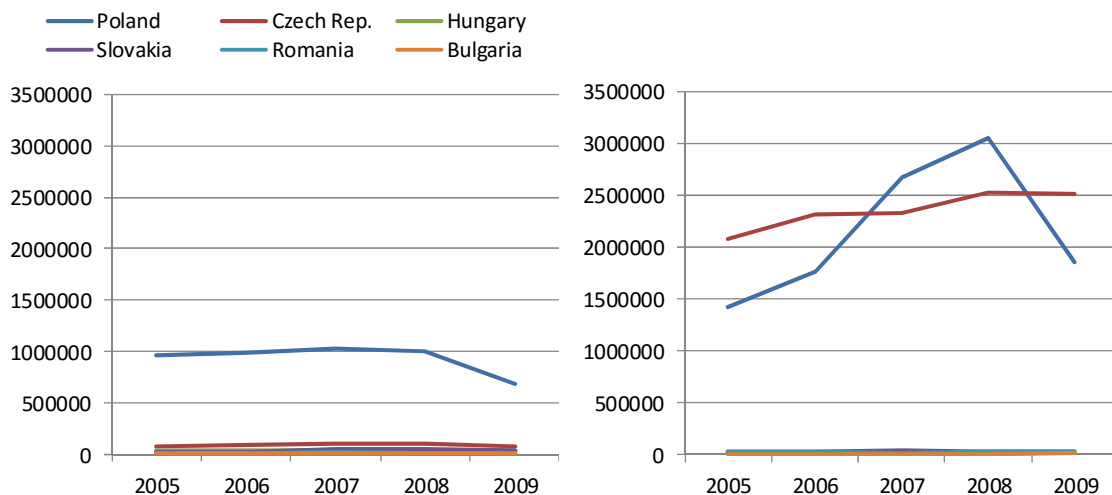


Figure 3. Norwegian import (left) and export from the selected countries in 2005-2009, in tonnes
 Source: own elaboration on the basis of the data from Statistiska centralbyrån (SCB), www.scb.se

From the perspective of this analysis, it is essential to establish the transportation structure of the realised foreign trade of the Scandinavian countries. The project of a new intermodal connection needs to take into consideration feasible possibilities of shifting cargo streams to new means of transport and/or new transport corridors. Unfortunately, available statistical data do not make it possible to fully analyse the Scandinavian foreign

trade with Central and Eastern Europe and the Balkans in terms of means of transport and routes used. The Eurostat and the particular countries' statistical data give limited information on the share of particular means of transport in the international trade. In general, the information refers to sea and rail transport but there is no, even estimated, information on cargo and direction structure of international road transports. That greatly results from the specifics of the road transport. That means of transport is the most liberal, flexible and of scattered ownership. The number of carriers and freedom of their activity on the European market make it impossible for competent institutions to precisely monitor their actions.

While comparing the available data, the most information can be obtained from Norwegian statistic annuals. On those data one can, to a large measure, base evaluations of the transport structure of Scandinavian foreign trade with the European region being within the interest of this analysis. The 2009 figures show obvious dependencies: cargoes are transported from Scandinavia mainly by sea and then by road transport. The percentage share of rail is minimal and it gets bigger with the distance from Scandinavian countries. For an example, within the Norwegian foreign trade with Poland and Czech Republic it amounts to 2-3% and with Slovakia, Hungary and Romania it is from a dozen up to 20%, while quantities of cargos carried by rail are minimal and in the case of some Balkan countries they are marginal.

Poland is a transit country and the Polish ports are the nodes where the means of transport change from sea to mainly road. Ferry terminals situated in the South Baltic Sea region, to which Świnoujście Ferry Terminal belongs, service cargo streams in the North-South direction. One may assume that majority of Norwegian road carriers use German ferries and bridge connections between Sweden, Denmark and Germany. Swedish road carriers generally use the Polish ferries.

It is necessary to explain that big disproportions between export and import realised by sea may result from economic phenomena of a short-lived character. Those may be bulk or liquid cargos carried by ships within bilateral trade contracts. They do not influence ferry traffic but significantly influence sea transport statistical data. Additionally, the source data enable explanation of the case of the large cargo mass being noted in Norwegian export to Czech Republic. One can assume that 2,5 mln tons not assigned to any standard means of transport relates to the amount of gas transported via gas pipes from Norway to Czech Republic via Germany. That quantity may not be the subject of the further analysis in the intermodal transport context.

The further analysis will concern cargo streams that may be taken over by the new intermodal connection Malmoe-Budapest via the Świnoujście-Ystad/Trelleborg ferry crossing. Those cargo streams include both cargo carried by road and by rail.

4. The analysis of cargo flows serviced by the Świnoujście Ferry Terminal

The present rail transport from Sweden, which is the only Scandinavian country maintaining rail connections with Eastern European countries and the Balkans, uses the rail-ferry connection Świnoujście-Ystad. The data from the years 2005-2008 show that most cargo is carried to/from Poland and the rest is carried to the Czech Republic, Slovakia and Hungary (fig. 4). The cargo mass which is carried by rail from Sweden to those three countries is comparatively small and does not exceed 200 thousand tons of cargo a year in one direction. Similarly as in the case of the earlier analysed structure of the total trade, there occurs imbalance between export and import. The rail transport between the Balkan countries (Romania, Bulgaria and Greece) practically is not taking place.

Much more intensive commercial exchange is realized by road transport via the Świnoujście Ferry Terminal. The cargo mass carried on semitrailers and roll-trailers grows systematically and in the year 2009 it was 2,8 mln tons. The detailed market research conducted in 2005 in the Świnoujście Ferry Terminal in the scope of the EU LogVAS project allows for the following conclusions [1]. The structure of transport directions in the southern direction includes: Poland (70%), the Czech Republic (8%), Hungary (7%) and Slovakia (5%). Whereas in the northern direction: Poland (73%), Slovakia (9%) the Czech Republic (7%). The countries of the Central and Eastern Europe and the Balkans (Romania, Bulgaria, Greece and Turkey) have in total 8-9% share in commercial exchange with Scandinavia. It means the shipment of the cargo mass of up to the limit of 250 000 tons every year.

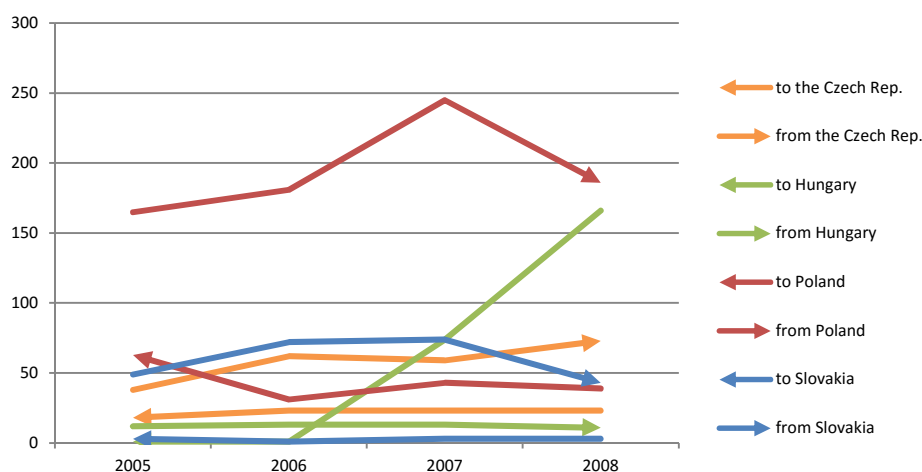


Figure 4. International railway transport to/from Sweden from/to selected countries in 2005-2008 [1000 t]
Source: The author's elaboration on the basis of Eurostat.

The market research in the scope of the LogVAS project also included the cargo structure of commercial exchange realized by means of rail and road transport via ferry crossings which connect Scandinavia and the Świnoujście Port. The results show that among the shipped cargo the cargo over 50% accounts for machinery and other manufactured products. In the scope of this cargo group, wooden cargo and products of forest origin like furniture, paper or wood which jointly constitute a considerable part of the commercial exchange are carried.

5. Susceptibility of cargo to intermodal technologies

On the basis of the definition by the United Nations Economic Commission for Europe (UNECE), the intermodal transport means „carriage of cargo in one and constantly the same cargo unit or vehicle with use of two or more means of transport without reforming the cargo unit during any change of means of transport” [2]. The principal characteristic of intermodal transport is the use of standard cargo units carried by various and following each other means of transport: road, rail, inland navigation and sea. The so called intermodal cargo units (ITU or UTI¹) encompass: containers (10', 20',

¹ Unité de transport intermodale (UTI).

30', 40' and 45'²), swap bodies (C lass with the length up to 7,82 m and a class with the length up to 13,60m³), semi-trailers and complete road trains (trailer with a truck tractor).

Determination of cargo economic susceptibility to containerisation, i.e. the transport using intermodal cargo units, requires costs comparison of alternative transportation systems. One adopts the criterion of the ratio of cargo value towards total cost of transport. The higher the ratio the higher is cargo susceptibility to carriage in containers. The problem lies in calculation of the true costs that are related to movement of cargo with the use of various means of transport. Considering only selected elements from the whole cost structure often leads to incorrect conclusions. The additional difficulty lies in variability of cargo values and costs in time. Development of container transportation system constitutes a process taking various courses in various parts of the World. Any analysis gains in value when it refers to a single country or a single transport route within a possibly short time horizon.

Taking into consideration the natural and Technical susceptibility, which are the easiest to describe, one may assume that from 10% up to 25% of general cargo is completely not susceptible to containerization. Therefore, there remain about 75% of cargos that are of full or partial susceptibility. One should also add to that figure a small number of bulk or semi-bulk cargos. Those are the cargos which due to their value or required protection against natural elements are fit for containerization. In practice, in the World there exist big disproportions in sizes of potential intermodal transport markets and extent of their utilization. In highly economically-developed Japan or South Korea, almost all cargos produced for export are fit to containerization share of which in the export transport amounts up to 80%. In the not less economically-developed European Union the average degree of unitization of the international trade, as expressed by numbers of carried containers, swap-bodies and trailers, amounts to a few percent (tab. 1).

Table 1. The share of intermodal carriage in the selected EU countries' transportation volumes [in tonnes]

Country	Rail transport	Road transport >150 km	Total	Intermodal rail/road	Share
	[bln tkm]				[%]
EU	443	1445	1888	69	3,6
Sweden	23	27	50	3,3	6,6
Slovakia	9	25	34	1,7	5,0
Czech Republic	15	42	57	1,7	3,0
Bulgaria	5	12	17	0,5	2,9
Poland	52	139	191	2,2	1,1
Romania	15	48	63	0,5	0,8

Source: own elaboration on the basis of the Eurostat data.

The analysis of the size and share of the intermodal transport in the rail-road technology in individual EU countries shows that within the analysed transport route Sweden is the leader in that respect. The degree of unitization of the Swedish foreign trade is by 80% higher than the EU average. Similarly, Slovakia shows the degree of containerization above the European average. Slightly lower, than the average, degrees are in Czech Republic and Bulgaria. Poland is technologically underdeveloped in this respect and the degree of unitization of cargo can be assessed at 30% of the standard

² Container classification is given in the ISO standard: ISO 668:1995 *Series 1 freight containers -- Classification, dimensions and ratings* with later amendments.

³ Swap body classification is given in the standard: EN 283, EN 284 and EN 452 for construction and design, as well as EN 13044 for marking and identification.

European level. Even worse, in this respect, is the situation of the Romanian foreign trade. This picture is partially confirmed by yet another specification which shows place of countries in the ranking of intermodal units carried with the use of rail-road technology. Czech Republic and Sweden are the leaders in this ranking and the list is closed by Bulgaria. Czech Republic is characterized with high number of short distance transports and Bulgaria owes its good degree to long distance transports of comparatively small mass of carried containers and other intermodal units. One can thus assume, that leading in the both rankings Sweden will be the technological leader of the projected consortium which will start the Scandinavia-Balkans intermodal train. The rest of the transit and destination countries will treat this initiative as their chance to develop modern transport Technologies and to equalize disproportions present in this respect within the EU.

Assessment of cargo mass which may potentially be serviced by the planned intermodal connection requires estimated calculations with consideration of the so called containerization coefficients which describe cargo susceptibility to intermodal technologies. They describe what part of cargo belonging to specific cargo groups may be carried in intermodal transport units. Taking the SITC⁴ cargo division by groups and the commonly used cargo unitisation standards in the technologically leading countries, one has assumed the updated values of containerization coefficients (tab. 2).

Table 2. Containerisation factor according to SITC commodity classes

SITC Class	Category	Examples	Containerization possibilities	Containerisation factor
0	Food & Live Animals	Meat, Fish, Wheat, Rice, Corn, Orange juice, Sugar, Coffee, Cocoa, Tea	Low (grains) to high (cold chain products)	0,80
1	Beverages & Tobacco	Wine, Beer, Tobacco	High	0,90
2	Raw Materials	Rubber, Cotton, Iron ore	Commodity specific	0,50
3	Fuels & Lubricants	Coal, Crude oil, Kerosene, Natural gas	Very limited	0.10
4	Animal & Vegetable Oils	Olive oil, Corn oil	High	0.80
5	Chemicals	Salt, Fertilizers, Plastics	Low to average	0,30
6	Manufactured Goods	Paper, Textiles, Cement, Iron & Steel, Copper	Commodity specific	0,60
7	Machinery & Transport Equipment	Computer equipment, Televisions, Cars	Very high (already containerized)	0.80
8	Miscellaneous Manufactures	Furniture, Clothes, Footwear, Cameras, Books, Toys	Very high (already containerized)	0,90
9	Others	Postal packets	Commodity specific	0,60

Source: own elaboration on the basis of: [3], [6].

Table 3. Cargoes susceptible to containerisation in the Swedish and Norwegian trade with chosen countries in 2004-2009 [in tonnes]

	2004	2005	2006	2007	2008	2009	average 2007-2009	cargos susceptible to containerisation
IMPORT								
Bulgaria	18 577	19 281	24 063	26 412	23 067	86 981	45 4867	19 923
Hungary	123 982	123 937	137 734	158 505	139 771	130 968	143 081.	94 935
Romania	39 368	42 180	56 333	64 065	52 944	34 432	50 480.	36 188
Slovakia	117 516	127 710	151 500	184 389	176 034	158 732	173 052	118 742
Total	299 443	313 108	369 630	433 371	391 816	411 113	412 100	269 788
EXPORT								

⁴ SITC -Standard International Trade Classification.

Bulgaria	51 481	29 059	32 852	38 814	34 024	37 625	36 821	21 674
Hungary	578 272	644 885	664 076	664 541	590 501	661 144	663 406	345 452
Romania	81 081	70 018	78 255	75 968	94 549	79 445	107 720	64 550
Slovakia	97 989	108 676	118 769	134 049	135 078	123 953	131 027	73 940
Total	808 823	852 638	893 952	913 372	854 152	902 167	938 974	505 616

Source: own elaboration on the basis of the data from Statistiska centralbyrån (SCB) (www.scb.se) and Statistisk sentralbyrå (SSB) (www.sbb.no).

In order to determine the realistic cargo mass that might be serviced by intermodal train, there were chosen only four countries, which represent the most important target group of countries serviced by the train. Those are the countries of the Central-Eastern Europe and the Balkans: Slovakia, Hungary, Romania and Bulgaria. It has been assumed that those countries should generate enough cargos in their trade with Sweden and Norway to guarantee economic effectiveness of the new connection. Thus, the basic issues for the market prognosis are the determination whether the countries already do generate sufficient amounts of intermodal cargos and how the analysed international trade will change within the 10-year perspective.

The conducted calculations have shown that within their trade with Scandinavian countries the four analysed countries transport in import and in export, respectively, 269 and 505 thou. tonnes of cargos susceptible to unitisation (tab. 3). Those amounts do not allow reaching the full profitability of the planned Budapest-Malmö connection. Usually, such profitability is connected to operation of daily block trains connecting the two terminals. Daily intermodal connection means the carriage of 20000 TEU⁵ per year, i.e. about 220 thou. tonnes each way. With 2-3 trains a week each way the critical mass comes close to 6000-9000 TEU, i.e. about 60-100 thou. tonnes per year each way. One has to remember that those amounts refer to the actually transported cargo and always constitute a fraction of the potential market gravitating towards intermodal transport.

6. Market development prognosis

The long term Scandinavia-Balkans foreign trade prognosis has to be burdened with a great margin of uncertainty. While making the prognosis one has taken into account the starting point, which is present level of import and export of cargos susceptible to containerization. The geographical structure of that trade has also been considered.

⁵ TEU is the unit corresponding to one ISO container of 20 feet in length and convertible to other intermodal units: swap-bodies and semitrailers.



Figure 5. Network metropolis 2030 in Europe
Source: [4].

As factors having the most important influence on the future trend in foreign trade, one has adopted the following:

- 1) integration processes within the EU areas: the Baltic and the Danube [5],
- 2) accelerated economic development of the poorest EU countries: Bulgaria and Romania, thanks to utilisation of the Union’s financial recourses,
- 3) the processes of globalisation and creation of economic bonds between European metropolis and the so called development impulse (fig. 5),
- 4) economic and technological co-operation between highly developed Scandinavian countries and Fast developing Balkan countries,
- 5) the very strong South-Eastern direction of the European integration with the particular role of Istanbul and Turkey, described as “the growth locomotives”, for Europe.

Table 4. The prognosis of the increase in cargos subject to containerisation in the trade between Sweden and Norway with the selected countries till 2020 [in thou. Tons].

	2009	2019 (pessimistic)	2019 (realistic)	2019 (optimistic)
Bulgaria	20	40	46	52
Hungary	95	190	218	247
Romania	36	72	83	94
Slovakia	119	237	273	309
Total	270	540	621	701
Bulgaria	22	43	50	56
Hungary	345	691	795	898
Romania	65	129	148	168
Slovakia	74	148	170	192
Total	506	1 011	1 163	1 315

Source: own elaboration.

The prognosis has been made by analysing the trend line of the examined trade till 2020. The optimistic and the pessimistic variants have been assumed in order to provide

for possible deflection from that line within +/-20%. The obtained figures show that the cargo mass gravitating towards intermodal transport will increase by about 200% in the pessimistic variant, by 230% in the realistic variant and by 260% in the optimistic variant. This means that the potential market to be serviced by the planned intermodal connection, in 2019, amounts up to from 1,5 to 2,0 mln tonnes of cargo, combined in the both directions (tab. 4). To achieve the economic effectiveness of the intermodal connection it is necessary to actually take over at least 10% of that market, which seems to be a rational figure.

7. Conclusions

The above calculations show how difficult is the business enterprise consisting in the activation of a permanent intermodal connection. For connections which offer competitive to the road transport time of shipment a train moves along the shortest possible terminal-terminal route without stopping at any in-between terminals. This brings about a necessity of regular accumulation of a big number of intermodal cargo units at one land terminal of a train's departure. The units can be delivered to that terminal by other trains or heavy vehicles from the direct hinterland of the terminal. In the guidelines of the intermodal rail-road transport in Europe deliveries and return carriage by road transport means to the terminal should not be longer than 100 km. Performing the role of distribution notes by the terminals in Malmoe and Budapest, undoubtedly is the success factor of the planned enterprise.

The analysis allowed determining the potential cargoes leaning towards the projected intermodal connection Malmoe-Budapest in the 2020 perspective. Therefore the investment in the new rail-road connection has basic economic justification. Then step is to set the basic technical parameters for the intermodal connection: route, railway infrastructure and rolling stock parameters, location of and potential of end and transit terminals. Additionally, the full feasibility study of the investment will allow adopting the most important exploitation assumptions in relation to frequency of operation, load capacity and integration with the ferry connection Trelleborg/Ystad-Świnoujście. What is the most important the study should contain the full financial analysis for economic effectiveness of the new intermodal connection.

Bibliography:

1. *Analysis of traffic flows (North-South Corridor)*, presentation of LogVAS Project, www.logvas.com.
2. *Best practices for the management of combined transport terminals, DIOMIS Project (Workpackage A4), the International Union of Railways (UIC), Paris 2007.*
3. *Hackett B., National Dredging Needs Study of U.S. Ports and Harbours, DRI-WEFA, Update 2000.*
4. *Koncepcja przestrzennego zagospodarowania kraju 2030, projekt dokumentu rządowego przeznaczony do konsultacji, Ministerstwo Rozwoju Regionalnego, Warszawa, 25 stycznia 2011 roku.*
5. *Nash Ch., Matthews B., European transport policy - progress and prospects, Institute for Transport Studies, September 2009.*
6. *Rodrigue J.-P., Notteboom T., Moving inside the Box: The Containerization of Commodities, presentation at the International Association of Maritime Economists (IAME), Copenhagen 24-26 June 2009.*

Summary

The article results from outcomes of the SoNorA Project, dedicated to the need of improvement of the multimodal accessibility in Central Europe on the South-North axis. The analysis determines market potential for a new intermodal connection Scandinavia-Balkans. The potential cargoes leaning towards the projected intermodal connection Malmoe-Budapest in the 2020 perspective were researched. The study allows developing intermodal rail connections linking the Świnoujście Ferry Terminal with its hinterland.

Key words: market analysis, ferry terminal, intermodal transport, road-rail connection.