Closer transport/logistics market integration through interoperability between the TEN-T Core Network Corridors and the transport networks of the EU Eastern Partnership Countries

Thematic study

TENTacle WP 5, Activity 4: "Interactions between the Core Network Corridors and transport networks of the EU Eastern Partnership countries"

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Abbreviations

BSR	Baltic Sea Region
BSRP	Baltic Sea Region Programme 2014-2020
CAREC	Central Asia Regional Economic Cooperation
CG	Coordination Group
CIS	Commonwealth of Independent States
CNC	Core Network Corridor
DG MOVE	Directorate-General Mobility and Transport
EaP	Eastern Partnership countries
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EIB	European Investment Bank
EU	European Union
EWTC	East West Transport Corridor
EWTCA	East West Transport Corridor Association
ICT	Information and communication technologies
ILC	International logistics centres
ITU	Intermodal Transport Unit
IWW	Inland waterways infrastructure
LPI	Logistics performance index
MoS	Motorways of the Sea
OSJD	Organization for Cooperation of Railways
PA	Priority area
PPP	Private Public Partnership
SSC	Stevedoring companies
TEN-T	Trans-European Transport Network
TRACECA	Transport Corridor Europe Caucasus Asia

UNCTAD	United Nations Conference on rade And Development
UNECE	United Nations Economic Commission for Europe
USAID	United States Agency for International Development
VGTU	Vilnius Gediminas Technical University
WB	Workd Bank

1. Executive summary

Thematic study presents the activities and main results of TENTacle project task 5.4 “Interactions between the CNCs and transport networks of the EU Eastern Partnership countries”. Which aims at finding solutions to ensure seamless traffic flow, enhance economic growth and competitiveness through interconnected subsets of transport networks (CNCs vs. EaP) and identify priority action areas to achieve a time and resource reduction for transport operations.

The stakeholders along the EU BSR and EaP countires are interested in connecting transport markets using good practises (used in intermodal transportation could shorten the route from origin to destination) and transport corridors facilitate for trade (transport volume and routes) and economic growth between the regions.

As solutions for closer transport/logistics market integration between the BSR and EaP countries respondents, first of all, indicated the removal of political frictions. Economic growth of the Baltic states should level up with the average EU economical level that will convince decision-makers of EaP countries of the border that open markets bring more benefits to the society than costs. Stakeholders indicated the need to organise the joint inspection at the border crossings for implementation of the accelerated container trains. Secondly, the respondents indicated the organisation of conferences for market incumbents e.g. a special event on transport & logistics as solutions for closer transport/logistics market integration between the BSR and EaP countries.

Tthe main obstacles or problems for connection transport markets in the EaP countries with the BSR that are related to the administrative and regulatory barriers, especially in different custom regulations and procedures system at broader crossing points that causes delays at borders that is the main bottleneck for improvement of logistics system. This harmonisation could be done by adoption on EU legislation practice and persuading EaP countries to adopt the technical specifications set for the CNCs. It is clear that the main obstacle for connection transport markets between Black Sea and Baltic Sea regions depends on the development of multi-modal transport systems, supported by modern logistics facilities and services, and strongly focused on containerized cargo.

For improving the competitiveness along BSR and EaP direction indicates raising awareness for the private sector about new services and current and planned infrastructure development projects in the region, notably in the area of new logistics hubs, railway lines, road and port infrastructure.

As the current situation on stakeholders interest in the development of the extended CNC between the BSR and EaP countries the stakeholders indicated that possible extension of CNC to the EaP transport network is needed. This extension is a strategic target of the EU policy shows that the EU stakeholders support it.

Priority action areas suggested for public and private stakeholders in the EU-BSR and the EU Eastern Partnership countries to achieve time reduction and less resources in transport operations, thus to open up new business opportunities further stimulating the trade exchange along the CNCs. The study presents results of the mapping, inventory-making and assessment on the quality and interoperability between the CNCs and the transport networks of the six EU Eastern Partnership countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova, and Ukraine).

2. Introduction

The TEN-T core network corridors (CNC) is a new instrument of the EU transport policy, aimed to improve mobility, intermodality and interoperability on the major transport axes across Europe. The Baltic Sea Region (BSR) is intersected by three TENT-T core network corridors (CNCs) being Scan-Med, North Sea-Baltic and Baltic-Adriatic.

A broad range of stakeholders are expected to be involved in a joint action to remove physical, technical, operational and administrative bottlenecks along these corridors by the year 2030.

Implementation of the three core network corridors has a large but untapped potential to stimulate positive effects in the BSR beyond the pure transport sector and beyond the immediate geographical areas they cross.

2.1 General TENTacle project description

Opening it up for a broader group of stakeholders and a wider geographical area requires tackling major capacity challenges. These are, for example, related to a low awareness and deficient understanding of how the TENT-T core CNC implementation can help improve accessibility and connectivity challenges in specific territories.

Given that specific mobility and connectivity challenges vary with location and require a place-based response, the stakeholder capacity-raising actions of "Capitalising on TEN-T core network corridors for prosperity, growth and cohesion" (TENTacle) project are oriented to both the regional and the macro-regional level.

At the regional level, 7 pilot projects in different areas demonstrate how to strengthen potential CNC gains in different geographies and development contexts. The cases are launched in sites representing:

1. located along a CNC corridor node and transit areas (Work package 2);
2. corridor catchment areas located in a close distance to one or more CNCs (Work package 3);
3. Corridor void areas located farther away from the three CNCs (Work package 4).

In the macroregional dimension (Work package 5), the project generalise results of the seven regional showcases and analyse win-win opportunities if the core network corridors:

- better serve the northernmost Baltic Sea region areas,
- are interconnected with the transport networks of the Eastern Partnership countries.

TENTacle project's tasks of Activity 5.4 "Interactions between the CNCs and transport networks of the EU Eastern Partnership countries" objectives are:

- find solutions to ensure seamless traffic flow, enhance economic growth and competitiveness through interconnected subsets of transport networks (CNCs vs. EaP)
- identify priority action areas to achieve a time and resource reduction for transport operations

Activity 5.4 tackles two specific CNC implementation challenges in the BSR:

- a geographical limitation of the CNCs to the EU borders and - consequently - lack of instruments and schemes how to connect them to the transport networks of the EU neighbouring countries; and
- low uptake of the CNC policy instrument among the business players due to problems with streamlining the CNC implementation approaches with supply chain management models.

Outcomes of Task 5.4 will allow to take new knowledge how to improve the interoperability between the CNCs and the transport networks of the EaP countries (it's in line with the scope of the recent 'Issues Papers' for the CNCs prepared by DG MOVE (8 January 2016)). On the EaP section of the 'Issues Papers' it is stated that "The definition of a core network as indicative in the EaP region shall help focusing the financing priorities on a more restricted number of key axes and implementing in parallel a series of "soft actions" to make transport operations on these corridors more efficient. To this effect, a single coordinated national pipeline of priority projects promoting a well-functioning, safe, secure and environmentally friendly transport system must be defined." (TEN-T Corridors: Forerunners of a forward-looking European Transport System (2016)).

Bearing in mind the growing dependency of the Baltic Sea Region's prosperity on its infrastructural connections with the neighbouring and more remote economic markets (renewed European Union Strategy for the Baltic Sea Region ACTION PLAN {COM(2009) 248} Brussels, 20.3.2017 SWD(2017) 118 final in PA Transport) it is stated "In connection to the work on the core network corridors, the European Commission identified the cooperation with the third countries as one of five subjects calling for joint action beyond regular infrastructure projects".

This 5.4 thematic study delivers results of the mapping, inventory-making and assessment on the quality and interoperability between the CNCs and the transport networks of the six EU EaP countries. It suggests priority action areas for the public and private stakeholders representing the EU BSR and the EU EaP countries, to achieve time reduction and less resources in transport operations, thus opening up new business opportunities further stimulating the trade exchange along the CNCs. It also includes recommendations how to extend an operational/geographical range of core network corridors by a strengthened interoperability of its nodes with the transport networks of the EU neighbouring countries.

2.2 The geographical scope of thematic study

The BSR INTERREG TENTacle project's 5.4 tasks that analyses closer transport/logistics market integration through interoperability between the CNCs and the transport networks of the EaP Countries is described in geographical scope with the aim to simplify the desk research identifying the main international transport corridor that connects BSR and EaP regions.

Globalization of the world economy has caused tremendous challenges for trade development and transnational transport services. A fresh look at construction of new transport routes in the Baltic Sea Region (BSR) could be one of the important factors of the establishment of more efficient transport link better served to support rapid growth of international trade. Expansions of the European Union and its related effect on the rapid growth of economies in the Baltic States make balanced and modern transport network development necessary, not as traditionally with focus on the Northern part of the BSR, but in whole BSR. This is especially important for the East-West Transport Corridor (EWTC) in the BSR and beyond it, due to its physical nature interchange points, multi - language and cross-border interaction. The EWTC has evolved as the backbone of the Pan-European

transport corridor IXB (Klaipeda- Minsk - Kiev - Odessa/Ilyichevsk) with the recently added links with Danish, German, and Swedish seaports via Klaipeda seaport in Lithuania. The transport links and logistics networks connecting the Southern Baltic Sea Region with China and the Black Sea are very important for functioning of the EWTC (EWTC II Project (2012)). (Šakalys, 2017)

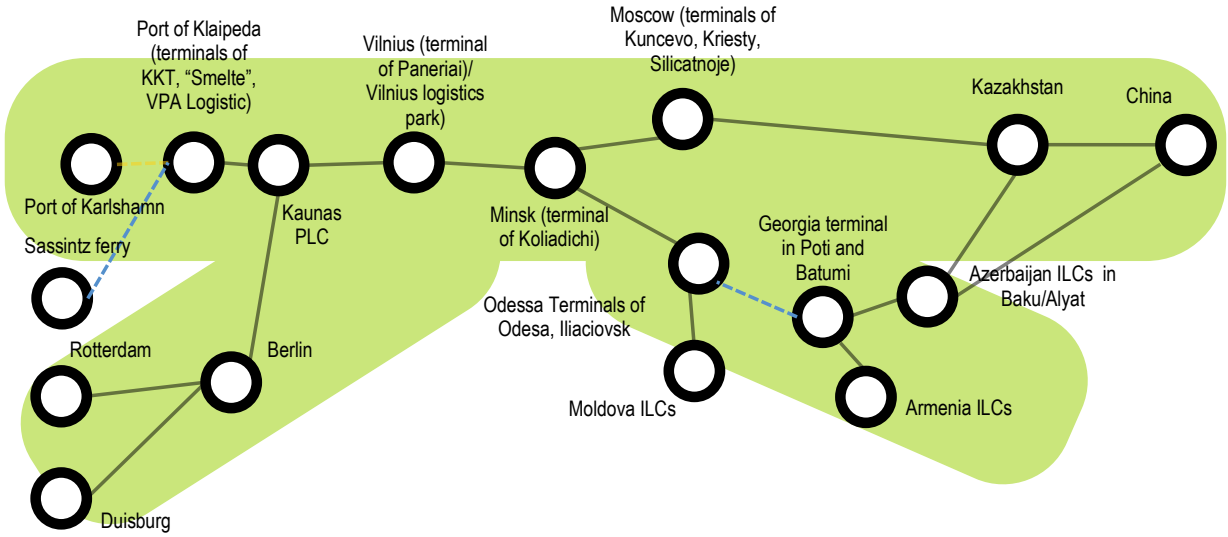

Figure 1 – EWTC transport network

Source: VGTU, 2017

The eastern part of the corridor is a gateway to and from the Baltic Sea Region connecting it with Russia, Kazakhstan and China to the east and Belarus, Ukraine and Turkey to the south-east. *East west transport corridor with Back sea link going to Georgia, Armenia and Azerbaijan. Connecting this route with Kazakhstan and Far East.* The EWTC future perspectives of the Corridor are related to the increasing transportation flows along Asia-Europe transport links. Industrialization and economic developments in the Black Sea, can be expected to result in the growing railway transport flows and connection of these areas with Europe.

2.3 Structure and methodology of the thematic study

In the section 3 is presented the general logic of extension of CNCs to Eastern Partnership direction. Eastern Partnership that is a unique EU foreign policy tool for long-term strategy for partners (namely Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine) to carry out sustainable reforms and it foresees the ways in which the EU can help to accelerate them. In this section presented the main four priority areas of cooperation between EU and Eastern Partnership. The Eastern Partnership Transport Infrastructure network will provide the EU with a coherent and long-term transport policy towards its Eastern partners. In 2017 the area of transport interconnections, the EU and EAP countries agreed on the indicative maps extending the EU's Trans-European Transport (TEN-T) core network to the Eastern Partner countries, as a basis to enhance transport connectivity and the identification of common infrastructure priorities. Also presented information relating to developments for international trade in goods between the EU and the EaP regions. Where geographical proximity appeared to play an important role in determining which EU Member States had relatively high trade flows with the six EaP countries. Reviewed the

2016 Logistics Performance index (LPI) results almost all EaP countries were below the overall ranking comparing to 2014.

Section 4 provides the Mapping and inventory-making of EaP countries transport systems by reviewing possible extension of the TEN-T Core Network Corridors to EaPs, transport infrastructure and transportation system in each country and highlighting weak or missing links, interoperability problems and interconnectivity gaps. The findings are synthesised in thematic reports covering each mode of transport, multimodal capabilities, the logistics sector and the legal framework in a corridor perspective. Is was done using desktop research on quality and interoperability in each EaP country (was conducted based on the EaP countries transport and logistics sector information is a combination of the official investment report, country report and the existing knowledge of the VGTU researchers).

In Section 5 presented International collaboration platforms (TRACECA, CAREC and Viking) that enhances the efficiency and sustainability for removal of bottlenecks, facilitates border and sea crossings, and improves public and private asset management. As efficient intermodal and logistics facilities and services located and designed for development of international supply chains and seamless flow of goods across borders. The most countries are aware of the benefits from attracting transit cargo flows through their countries that needs to be supported by trade facilitation through international cooperation.

The results on analysis of quality and interoperability between the CNCs and EaPs the transport networks are provided in Section 6. The analysis were conducted on the basis of transport sector stakeholders' interviews (in English, Russian and Lithuanian languages, using emails, online tools, face-to-face interviews and via phone calls). Two sets of interviews were performed:

- The aim of the first interview was to identify major stakeholders involved in transportation and management of supply chains between the European Union Baltic Sea Region and six European Union Eastern Partnership countries;
- The second interview investigated the nominated logistics areas in order to select corridor nodes and transit areas, corridor catchment areas, corridor void areas for the preparation of a possible synchronisation model. The research results were processed by applying the method of Kendal`s concordance coefficient, i.e. compatibility of experts' options was analysed (detailed information could be found in section 6).

In Section 7 main results based on stakeholders (transport and logistic sector from EU and EaP regions) proposals and opinions were presented as solutions to ensure seamless traffic flow, enhance economic growth and competitiveness through interconnected subsets of transport networks (CNCs vs. EaP). Based on carried out interview identified priority action suggested for public and private stakeholders in the EU-BSR and the EU Eastern Partnership countries to achieve time reduction and less resources in transport operations, thus to open up new business opportunities further stimulating the trade exchange along the EU CNCs. In order to ensure efficient transportation process of intermodal freight along the EWTC, it is necessary to obtain compatibility of the existing infrastructure capacity, as well as coordinate operations of infrastructure managers and operators. Synchromodal transport emerged as a new concept in freight transport. It integrates different transport modes and gives the logistics service providers the freedom to deploy different modes of transportation in a flexible way, which enables better utilization of existing infrastructure capacities in main hubs in transport corridors.

3. CNCs and Eastern Partnership (EaP) countries

3.1 Background

The extension of the TEN-T maps towards the neighbouring countries is a first step in order to ensure coherence in infrastructure planning. Such an approach brings benefits to the overall EU transport system ensuring the continuation of the infrastructure beyond our borders. It is also a first step to promote the use of EU standards This will contribute to the reduction of transport costs and to an increase of the overall efficiency of the transport operations. It will benefit to our neighbours, facilitating the intra-regional connectivity and the access to the EU market. (TEN-T Corridors: Forerunners of a forward-looking European Transport System (2016)).

The TEN-T core network corridors is a new instrument of the EU transport policy, aimed to improve mobility, intermodality and interoperability on the major transport axes across Europe. By working across the borders and sectors, TENTacle project will improve stakeholder capacity to reap benefits of the core network corridors implementation for the prosperity, sustainable growth and territorial cohesion in the Baltic Sea Region.

Figure 2 - Trans-European Transport Network (TEN-T Corridors)

Source: Trans-European Transport Network (TEN-T). Mobility and Transport.

TEN-T networks focus, obviously, on long distance transport. This is either interregional or international in nature, thus requiring co-operation between network and service operators in different regions (if they are not the same) and countries, providing interoperability for both

passengers and goods transport. Long distance travel is made more difficult, time consuming or expensive due to issues like different information systems, pricing systems, national regulations, jurisdictions, technical standards and languages. Thus there is a close relationship between long-distance transport and interoperability.[1]

Harmonisation is an issue that affects the user in the same ways as interoperability. E.g. having similar speed limits in each country provides more comfortable and logic transport. According to the Trans-European transport network planning methodology (2010) two different types of bottlenecks can be distinguished: the capacity of the inter-modal connection itself and the access to the networks of the different modes.

3.2 Eastern Partnership (EaP) countries

EU and six partner countries (Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine) established in 2009 the Eastern Partnership (EaP), a joint initiative building also on bilateral relations.Eastern Partnership is a unique EU foreign policy tool providing long-term strategy for partners to carry out sustainable reforms and it foresees the ways in which the EU can help to accelerate them.

Figure 3 - EaP countries (in yellow)

Source: European Council

The Eastern Partnership Transport Infrastructure network, approved by the ministers maps (approved 2013 and included in the indicative TEN-T maps) (Appendix 1) out the most significant transport connections between the EU and its Eastern partner countries. This network was developed

[1] https://ec.europa.eu/transport/sites/transport/files/themes/infrastructure/studies/doc/2010_10_ten-t_planning_methodology.pdf

in accordance with the TEN-T links in Lithuania, Latvia, Poland and other member states. Therefore, it will provide the EU with a coherent and long-term transport policy towards its Eastern partners.

Eastern Partnership engagement is focused on the four priority areas of cooperation (agreed at the 2015 Riga Summit) [2]:

- stronger governance: strengthening of institutions and good governance;
- stronger economy: economic development and market opportunities;
- better connectivity: interconnectivity;
- mobility and stronger society: people-to-people contacts.

In 2017, at Eastern Partnership Summit (Brussels, 24 November 2017) participants agreed a Joint Summit Declaration[3]. In the margins of the Summit, a number of agreements were taken forward, including a new bilateral agreement between the European Union and Armenia; A Common Aviation Area Agreement with Armenia; and the extension of the EU's Trans- European Transport (TEN-T) network to Eastern partners (updated information on agreements can be found in Appendix 2).

Since the last Eastern Partnership (EaP) Summit (2015) significant progress has been achieved in relations between the EU and its six partner countries. Association Agreements including Deep and Comprehensive Free Trade Areas with Georgia, the Republic of Moldova and Ukraine have now fully entered into force, opening new opportunities for closer cooperation on tackling key challenges, as well as economic integration and trade. Trade between the three associated partner countries and the EU has significantly increased. Following a set of demanding reforms, visa free travel to the Schengen area was put in place for the biometric passport holders of Georgia and Ukraine, in addition to that with the Republic of Moldova, in place since 2014.

Relations with Armenia, Azerbaijan and Belarus have also advanced. The European Union and Armenia signed a Comprehensive and Enhanced Partnership Agreement. Good progress has also been made in negotiations of a new framework agreement with Azerbaijan, while relations with Belarus have been advanced through the newly established Coordination Group. The Partnership Priorities with Armenia have been agreed and Partnership Priorities are also being discussed with Azerbaijan and Belarus.

In 2017 at Eastern Partnership Summit (Brussels, 24 November 2017) in the area of transport interconnections, the EU and partner countries agreed on the indicative maps extending the EU's Trans-European Transport (TEN-T) core network to the Eastern Partner countries, as a basis to enhance transport connectivity and the identification of common infrastructure priorities. For this purpose, High-Level Understandings have been signed in the margins of the Summit.

[2] https://eeas.europa.eu/headquarters/headquarters-homepage/419/eastern-partnership_en
[3] http://www.consilium.europa.eu/media/31758/final-statement-st14821en17.pdf

3.3 Statistics on trade flows between the EU-28 an EaP

Eurostat[4] presents information relating to recent developments for international trade in goods between the European Union (EU) and the six countries that together form the EaP region.

Exports of goods from the six EaP countries to the EU-28 were valued at EUR 32.4 billion in 2016, while imports into the six EaP countries from the EU-28 were valued at EUR 31.6 billion (Appendix 3).

These overall developments mask the fact that three of the EaP countries - Georgia, Moldova and Ukraine - reported strong growth in trade with the EU-28, while trade developments for the other three countries - Azerbaijan, Armenia and Belarus - were more subdued.

Key points from the EU and ENP-East countries trade statistics[5]:

- Azerbaijan, Ukraine and Belarus recorded trade surpluses for goods with the EU-28 in 2016;
- In 2016, more than half of all the goods exported from Ukraine and Moldova were destined for the EU-28;
- Some 1.6 % of the goods exported from the EU-28 were destined for the six EaP countries;
- Ukraine accounted for three fifths of the EU-28's goods exported to EaP countries in 2016;
- Azerbaijan and Ukraine together provided four fifths of all goods imported into the EU-28 from the six EaP countries in 2016;
- In 2016, Germany had the highest exports to the six EaP countries from among the EU Member States, with a 21 % share; this relatively high share may, at least in part, be linked to Germany's specialisation in the manufacture of machinery and equipment;

Geographical proximity appeared to play an important role in determining which EU Member States had relatively high trade flows with the six EaP countries. Perhaps unsurprisingly, given their geographical location, the EU Member States which had a relatively high share of their total trade with EaP countries included Lithuania, Latvia, Romania, Poland, Bulgaria and Hungary. Some 7.1 % of all goods exported by Lithuania in 2016 were destined for EaP markets. Among the EU Member States, Lithuania also recorded the highest share of its imports of goods originating from the EaP countries, at 3.8 % in 2016.

Thus, the EaP countries slowly moved closer to adoption of EU standards and practices in transportation. The countries followed the earlier established pathway of reforms to align their transport systems with EU standards, helping them to better integrate into European transport networks and internal markets. A Regional Eastern Partnership Transport Network was developing very slowly, mainly through infrastructure projects funded by different European financial institutions, such as the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB), supplemented with EU technical co-operation.

In the majority of the EaP countries (an exception is Georgia), the state has controlling ownership of, or (in the case of Moldova, Armenia and Ukraine) awards concessions to operate, key transport networks (railway, seaports, in some cases also airports). This restricts the access to transport

[4] Eurostat statistics *[data of 8 February 2018]*
[5] Eurostat statistics *[data of 8 February 2018]*

infrastructure for third parties, although these can provide some related services – renovations (roads), partial administration (railways), or handling services (airports and ports).

Some of the six countries have indeed shown impressive progress in terms of adopting new, or updating existing, sustainable development strategies.

3.4 Logistics performance index (LPI) analysis

The LPI is a recent indicator created by the World Bank in 2007. Aimed specifically to assess the logistics sector, it helps countries to identify their challenges and improve their performance in trade logistics. Logistics performance both in international trade and domestically is central to the economic growth and competitiveness of countries, and the logistics sector is now recognized as one of the core pillars of economic development.

The World Bank's LPI analyses countries in six components:

- The efficiency of customs and border management clearance
- The quality of trade and transport infrastructure
- The ease of arranging competitively priced shipments
- The competence and quality of logistics services
- The ability to track and trace consignments
- The frequency with which shipments reach consignees within scheduled or expected delivery times

The LPI measures on-the-ground trade logistics performance, helping national leaders, key policymakers, and private sector traders understand the challenges they and their trading partners face in reducing logistical barriers to international commerce. As the backbone of international trade, logistics encompasses freight transportation, warehousing, border clearance, payment systems, and many other functions. While policies and investments that enable good logistics practices help modernize the best-performing countries, logistics still lags in many developing countries. The tremendous importance of logistics performance for economic growth, diversification, and poverty reduction has long been widely recognized. National governments can facilitate trade through investments in both "hard" and "soft" infrastructure. Logistics is also increasingly important for sustainability.

The LPI is 'based on a worldwide survey of operators on the ground (global freight forwarders and express carriers), providing feedback on the logistics 'friendliness' of the countries in which they operate and those with which they trade. They combine in-depth knowledge of the countries in which they operate with informed qualitative assessments of other countries with which they trade, and experience of global logistics environment'. The LPI overall score is the result of the evaluation of logistics performances by categories, which are rated on a scale from 1 (worst score) to 5 (best score). The components have been chosen based on theoretical and empirical research and on the practical experience of logistics professionals involved in international freight forwarding.

One hundred and sixty countries are evaluated based on the performance of their customs' systems, infrastructure development and the amount of international shipping. In terms of the EWTC in the southern part of the Baltic Sea Region, it is necessary to note that countries the territories and territorial waters of which are crossed by this international corridor connecting BSR and EaP

countries, in 2016 have reached very high LPI global rates[6]: Germany (rank 1, LPI score - 4.23), Sweden (rank 3, LPI score – 4.20), Denmark (rank 17, LPI score – 3.82) and Lithuania (rank 29, LPI score – 3.63). With extension to TEN-T CNCs countries: Poland (rank 33, LPI score – 3.43), Slovakia (rank 41, LPI score – 3.34), Hungary (rank 31, LPI score – 3.43) and Romania (rank 60, LPI score – 2.99). Whereas the EaP countries developing lower global LPI ratings: Ukraine (rank 80 LPI score – 2.74) and Moldova (rank 93, LPI score – 2.61), Belarus (rank 120, LPI score – 2.40), Georgia (rank 130, LPI score – 2.35), Armenia (rank 141, LPI score – 2.21), note that for 2016 Azerbaijan (n.a.) data was not provided from the World bank. The EaP countries LPI's is quite low (Appendix 4)

Reviewing the 2016 LPI results almost all EaP countries were below the overall ranking comparing to 2014, Moldova was the only country that managed to improve Logistics competence, Tracking & tracing and Timeliness to stay in the same overall ranking.

Compared 2016 data to 2014 results, Armenia haven't improved scores in all six points it dropped from 92 to 141 position, Azerbaijan improved Customs, Infrastructure and International shipments rank and dropped only 9 positions (from 116 to 125).

Belarus major drop from 99 to 120 rank (compared 2016 data to 2014) can be be explained by the location of Belarus. There are many channels through Belarus and due to that, there is a great experience in international transits. Nevertheless, only one value (International shippment) is higher than the other valus. In order to increase the LPI index of Belarus, it is necessary to increase the investment attractiveness of the logistics industry, accelerate the formation of the 3PL service market and transition to the 4PL concept, improve the regulation of the logistics industry, raise the level of personnel's qualification for the logistics industry and restructure logistics systems.

In 2016 Georgia dropped 14 places to 130 out of 160. In 2012 Georgia was ranked as 77th. The index highlighted the lack of reforms to the existing customs and transportation system. Reduced international shipping over the past two years contributed to Georgia's fall in the rankings. Georgia's has made no significant improvements to its transportation system in recent years whilst others have. This is why countries which were ranked below Georgia in 2012 and 2014 have now surpassed it in 2016.

Main reasons (factors) of improvements of the LPI rankings:

- Armenia has benefited from a complete overhaul and simplification of border crossing procedures.
- Training of Customs officers has also had an effect in Georgia, there was a radical overhaul of the Customs service, which reportedly eliminated corruption.
- Georgia has also benefited from cooperation between forwarders and Customs authorities, involving the training of forwarders" staff to reduce paperwork errors.
- Ukraine has introduced a new Customs Code and simplified customs procedures; and in Odessa port there is now a „single window" with electronic pre-declarations and digital signatures.

[6] https://lpi.worldbank.org/international/global

- Azerbaijan is known to have instituted substantial reform of the Customs system, and to have fully implemented single-window border control.

The conclusion must be that there should be no relaxation in past and ongoing efforts to remove obstacles to trade and transport, with emphasis on making procedures and regulations more business-friendly; tackling corruption; and eliminating the causes of excessive cost and delay associated with international transport.

4. Mapping and inventory-making of EaP countries transport system

The information is provided by each EaP country (each EaP countries' transport sector information is a combination of the official investment report, country report and the existing knowledge of the VGTU researchers and Transport/logistics sector). Each transport mode under review has been assessed with a view to highlighting weak or missing links, interoperability problems and interconnectivity gaps. The findings are synthesised in thematic reports covering each mode of transport, multimodal capabilities, the logistics sector and the legal framework in a corridor perspective. The emphasis is on the identification of bottlenecks (operational / technical), inconsistencies and vacuums; and benchmarking for ease of international transit. Based on UNCTAD[7] disruption of transport infrastructure and services, including shipping, ports, roads and railways are essential for global merchandise trade and related supply chains.

4.1 Belarus

Belarus is a landlocked country in the north-east of Europe bordered by Russia to the northeast, Ukraine to the south, Poland to the west, and Lithuania and Latvia to the northwest. Export and import are carried out through the sea port facilities of Lithuania, Latvia, Estonia, Ukraine and the Russian Federation. Located at the intersection of highways, Belarus endeavours to obtain the status of an international centre for goods transfer. Its strategic geographical position is highly favourable to the development of logistics centres on route for Europe and Asia.

On 28 December 2017 approval of the Concept of development of logistic system of the Republic of Belarus for the period till 2030, that states the key points:

- Efforts to develop the national logistics system will focus on improving Belarus' standing in the World Bank's Logistics Performance Index to at least 50.
- The volume of logistics and transportation services will have to be doubled in comparison with 2016;
- The development of the logistics system will also optimize the involvement of the government and commercial entities in the formation of legal, economic, and other relations on the merchandise distribution market;
- The main goals also include the development of the logistics services market in a way to implement the multimodality principle as much as possible;
- The transit potential will be increased by involving logistics operators and the country's logistics infrastructure in international transportation projects;
- the goal of Belarusian logistics infrastructure and technologies to become part of the Belt and Road initiative, part of schemes used by international container transporters;

[7] http://unctad.org/en/Pages/DTL/TTL/Infrastructure-and-Services.aspx

- Innovative technologies in container transportation will be implemented, including the transportation of containers between China and the European Union via Belarus;
- The transboundary potential of the Belarusian logistics system will be developed through integration with European Union markets.
- The Belarusian logistics infrastructure will be integrated into international transport and logistics companies.
- to be involved in the logistics side of export-oriented distribution chains. The China-Belarus industrial park Great Stone, which is positioned as a pillar of the Silk Road Economic Belt, will be one of the key projects.

4.1.1 Transport infrastructure[8] of Belarus

Belarus' high transitivity owes to five E-category roads of the 2nd and 9th international transport corridors that cross the country: Number 2 Berlin–Warsaw–Minsk–Moscow–Nizhny Novgorod; Number 9 Helsinki–St.-Petersburg–Moscow/Pskov–Kiev–Chisinau–Bucharest–Dimitrovgrad–Alexandropolis, Number 9B Kaliningrad/Klaipeda–Kaunas–Vilnius–Minsk–Kiev–Odessa. The key road corridors are now being upgraded to the 1st category standard with dual separated carriageway, paved shoulders and controlled access.

Transport infrastructure bottlenecks of intermodal system are:

- Extension of complexness of services in the logistics centres in the territory of Belarus;
- Poor transit efficiency of Belarus regarding the control of movement of the goods across the customs border, complicated procedures for customs clearance of goods (UNECE 2013).

Three main transport infrastructure projects cover the highest priority in the country:

- Upgrade of the road between Minsk and Vilnius;
- Construction of the bridge across the river Zapadny Bug (Western Bug) at the road checkpoint Domachevo (Slovatichi);
- Electrification of Molodechno-GudaGai-State border.

In transit traffic, the effectiveness of transport passing through state borders is to a large extent determined by the capacity of border crossing points. Until now, long waiting times for vehicles in customs clearance points have been reducing traffic flows and related controls is one of the major reserves for improvement of transport efficiency. To solve this problem, it is necessary to continue the work on improving customs legislation, the implementation of modern information technologies for customs control, and development of transport infrastructure.

[8] *Transport infrastructure consists of the fixed installations including roads, railways, airways, waterways, canals and pipelines and terminals such as airports, railway stations, bus stations, warehouses, trucking terminals, refueling depots (including fueling docks and fuel stations) and seaports. Terminals may be used both for interchange of passengers and cargo and for maintenance.* https://en.wikipedia.org/wiki/Transport

4.1.2 Transportation system[9] of Belarus

The attractiveness of the transit routes through the territory of the Republic of Belarus is largely determined by the level of development of transport infrastructure for the provision of comprehensive services in transit, including transport and logistics services.

Based on Ministry of Foreign Affairs of the Republic of Belarus information (Source: http://mfa.gov.by website) in 2015 European cargo turnover through Belarus exceeded 100 mln t, of which nearly 90% fall to Russia-EU share, whereupon Belarus fully ensures transit efficiency and safety.

The Belarus transport infrastructure (rail, road, water, and air) is good but the logistics industry is still under-developed. There are 13 logistic centers in Belarus. It is estimated that the total volume of work of the logistic centers of general use could reach 25-30 million tons of cargo per year.

The convenience of placing logistic centers of general use in provincial cities of the Belarus is justified by the most developed transport nodes, industrial and trading centres, places of origin of mass demand for integrated freight forwarding services. An important feature of creation of the regional logistic centers in regional cities is the fact that almost all of them are located in close vicinity of the international transport corridors.

BTLC State Enterprise, the official freight forwarder and logistic operator of the Belarus Railways, organizes cargo transport by the fast container trains “Viking”, “Zubr”, “Mongolian vector”, “Marco Polo Express” and others.

The following measures for the development of the entire transport and logistics system must be implemented in the Republic of Belarus (UNECE, 2013):

- to legislate a special simplified customs clearance procedure in LCs;
- to reduce the cost and time for railway cargo transport, separate procedure for customs clearance and cargo release;
- to simplify document management in the provision of logistics services, use automation and standardization of transport and relevant documents;
- to develop effective use of transit capacity through technologies for transport of transit cargo by container trains;
- to abolish the practice of compulsory convoying of certain transports;
- to eliminate corruption at checkpoints across the state border.

These complicated tasks can be accomplished only in close collaboration of the Governmental level of the Republic of Belarus with Latvia, Lithuania and Poland. Technical and other standards should be implemented simultaneously in all countries of the EU, to avoid the possibility of freight operators to pass through one of these countries.

It is blindingly obvious that the development of the market of transit services in Belarus is inextricably linked to the general geopolitical and economic transformations in Eurasia. For the last 10-15 years, there has been a downward trend observed in the capital and service flows between

[9] *Transportation systems are a fundamental part of logistics and planning whenever vehicles are used to move people or items from one location to another. https://getawaytips.azcentral.com/what-is-the-meaning-of-transportation-system-12347036.html*

Western Europe and the Asia-Pacific region as a share of the global volume. Nevertheless, Belarus is ready to ensure stock movement between West and East in present and even larger volumes. (Source: http://mfa.gov.by website)

4.2 Ukraine

Ukraine is one of the biggest markets in the Eastern Europe and one of the advanced economies in the Black sea region.

Owing to its geographical location, Ukraine benefits from the passage of a number of international transport corridors through its territory:

- pan-European transport corridors No. 3, 5, 7, 9 (Appendix 5);
- rail OSJD corridors (No. 3, 4, 5, 7, 8 and 10) (Appendix 5);
- the multimodal Europe-Caucasus-Asia Transport Corridor (TRACECA) (Fig. 7);
- three extensions of TEN-T core network corridors.

EU - Ukraine Deep and Comprehensive Free Trade Area DCFTA began on 1/1/2016. The AA/DCFTA aims to boost trade in goods and services between the EU and Ukraine.

4.2.1 TEN-T core network extension to Ukraine

The Ukraine's Government has continued to prepare a new National Transport Strategy, to pave the way for harmonisation with EU legislation and help enhance connectivity through the transEuropean transport network (TEN-T) (Association Implementation Report on Ukraine, 2017). Ukraine officially became part of the all-European transport network TEN-T starting from November 2018. Ukraine signed High Level Understanding between Ukraine and the EU on the extension of indicative maps of the Core Trans-European Transport Network (TEN-T) to Ukraine. (Source: EC DG MOVE website)This will help increase the competitiveness of Ukraine's transport corridors, improve logistics, as well as simplify the formalities in the field of transport between Ukraine and the EU.

4.2.2 Transport infrastructure of Ukraine

Ukraine's advantageous geographical position makes it an inevitable destination for transit of goods and passengers between Europe, Asia and Middle East. Through the territory of Ukraine goes a number of international transport corridors, reaching a total length of over 5 thousand km. (Transport Market in Ukraine, 2016)

Ukraine's transportation infrastructure is made of 1631 thousand km of highways, 21.7 thousand km of railways (rail transport is a leading mode of the country's transport sector, accounting for 82% of the overall freight (ton.km) and almost 50% of passenger traffic (World Bank Group, 2015)), 62 airports (including international, military, public airports), 13 (5 port are on the occupied territory of the AR Crimea) seaports and other transport facilities. There are 20 state-owned seaports along the Black Sea (passenger and roro vessels operated mainly in Odessa and Yalta regions) and Azov Sea coast as well as a number of river ports on Dnieper and Danube. (Transport Market in Ukraine, 2016)

Ukraine's highways network is also quite extensive, it covers all the territory of the country; however, the quality of the road surface and automotive infrastructure needs some improvement. (Transport Market in Ukraine, 2016)

The level of development of sea and air transportation routes is lower. There are a number of port terminal and airport development projects financed by commercial and government entities; however, current investment volumes are insufficient and do not allow the significant increase of freight and passenger traffic.

Currently ongoing Ukraine's transport infastructure projects on extended TEN-T Network :

- GO Highway Project (GO highway project, 2017)(Road route Krakovets – Lviv – Uman – Odesa), as:
    - New intermodal Southern Silk Road route across the Black and Caspian Seas bypassing Russia enhance, cuts delivery costs from Europe to China and vise versa;
    - Improves EU – Ukraine connectivity through Poland to Gdansk/Gdynia seaports. Roughly 150 mln tons of cargo is currently handled by the ports in Poland and Ukraine.
    - Catalyzes to develop markets along the routes providing them with access to overseas markets;
- Railway electrification of the Kovel - Izov border railroad section on the Polish border[10];
- Construction and reconstruction of an overpasses on international roads, highways and railway tracks, establishment of passenger terminal;[11]
- Electric vehicles and its charging stations EU-Ukraine connectivity;
- Intelligence transportation system of Ukraine;
- Odesa logistic hub:
    - Connects Odesa seaports' cargo flow with EU;
    - Improves EU-Ukraine connectivity;
    - Improves intermodal connectivity;
    - Provides cost cut of EU-China cargo flow transit;
    - Eliminates infrastructure bottlenecks;
    - Improves safety, regional development, TEN-T corridors.

4.2.3 Transportation system of Ukraine

High contribution of transport sector to economy. Transport contributed to 7% of Ukrainian GDP and 6% of employment. 4% of Ukrainian enterprises operate in transport. More than 95% Ukrainian transport enterprises are SMEs. (Updated National Transport Strategy of Ukraine, Part 2, 2016)

Slow rates for transport infrastructure maintenance and overhaul/rehabilitation. 30% of road transport infrastructure maintained in due time, which puts at risk road transport safety.

[10] *Elimination of infrastructure bottlenecks in Ukraine project pipeline, 2017*

[11] *Reconstruction of European 1435 mm rail track on Záhony, Hungary - Chop - Batiovo – Mukachevo section; Construction of an overpass at km 522 + 250 international road M-06 / E40; railway tracks at km 618 + 500 and 618 + 900 M-06 / E50, M06/M12 multi-level road interchange;overpass at the intersection of international highways M-06 and M-12 / E50, overpass across railway at km 213 + 950 international road M-19 / E85;and 64+339 road of national importance N-02*

Lack of public investments in transport sector. The majority of state transport development (road infrastructure, railway transport, air and sea ports development) programs are underfinanced.

Trade intensification with EU and Asia. Although during the last 4 years the overall foreign trade turnover of Ukraine considerably reduced, the share of foreign trade with EU and Asian countries increased considerably. This gives an opportunity for Ukraine to adapt to transport needs of these two growing markets.

Perspective for the development of green transport modes. EU targets at shifting to "green" transport modes, which will inevitably involve multimodal solutions within the scope of international long-distance haulage chains.

Reduction of foreign trade volumes. Owing to the overall reduction of Ukrainian foreign trade (exports and imports) the occupancy rate Ukrainian transport infrastructure might reduce. In this connection, it becomes reasonable to reorient Ukrainian transport network towards the needs of domestic and transit traffic. This can help sustaining transport operations in a mid-term perspective.

High competition on alternative routes connecting EU and Asia. Ukrainian transport network is integrated into international transport corridors competing with each other in terms (travel time and cost) and conditions (transport and clearance technologies, safety) of transport. Presently Ukraine has quite a strong port complex consisting of 13 seaports that are able to handle up to 230 mln tons of cargoes per year. The third part of all the existing port capacities fall under the state-owned stevedoring companies Every year stevedoring companies keep losing cargo traffic to private stevedoring companies and terminals.

There is a definite need for additional handling capacities in bulk cargoes in Ukrainian ports. With that said, the deep water terminals are in the highest demand handling practically at 100% of workload.

Regional/political challenges that faces transport sector in Ukraine (Updated National Transport Strategy of Ukraine, Part 1, 2016):

- Political instability, corruption and the anti-terror operation in the east have impacted the main transport flows in the corridors towards EU borders.
- Operational and/or organizational bottlenecks at borders often result in high travel times and low average speeds reducing the attractiveness of international journeys. The elimination of bottlenecks at borders is a special challenge for Ukraine.
- Transport policy needs to address territorial cohesion through accessibility and connectivity for all regions in order to reduce regional disparities and ensure Ukraine's sustainable growth.
- Careful consideration of the interaction of urban and national transport is necessary to achieve sustainable development of the sector.

Transport sector is a pillar for enhancement of the national economic development with Ukraine as an International Transport Hub between Europe and Asia and through the establishment of safe, secure, effective, efficient, multi-modal (Multimodal transport's strengths, weaknesses and opportunities in Ukraine is in Appendix 6) and suitable transport systems, which embody market principles and respond to the needs of industry and the citizens of Ukraine.

4.3 Moldova

Moldova is a small south-eastern European country without any maritime borders. It borders Romania to the West and Ukraine to the North, East and South.

4.3.1 TEN-T core network extension to Moldova

Currently in the Republic of Moldova the infrastructure projects with highest priority as extension of Trans-European Network TEN-T (Ring of Chisinau as part of TENT – network, 2017):

- M1 – Romanian border road, km 6- km 14 section (8 km modernization);
- M21Chisinau – Dubasari – Poltava road, section km 5 - km 15 (10 km modernization);
- M14 Brest – Chisinau – Odessa road, sector km 265 - km 275 (10 km modernization);
- Link construction between national road M14 Brest – Briceni –Chisinau – Tiraspol – Odessa (km 275) and R2 Chisinau-Bender (km 18,5), approximate length 17 km (new construction);
- Link construction between national road R2 Chisinau-Bender (km 18,5) and R3 Chisinau – Hincesti – Basarabeasca (km 10), approximate length 32 km (new construction);
- R6 M1- Ialoveni road, 6,6 km length, now in rehabilitation;

The opening of the bridge (part of pan-European transportation corridor IX) in November 2017 significantly increased opportunities for the movement of people and goods, transport and business activities on both banks of the Nistru River and in the wider region. (Association Implementation Report on Moldova, 2018)

Apart from closing the inland waterway gaps of the existing "Rhine-Danube Corridor" through Serbia, Moldova and Ukraine, it seems quite evident that, following the accession process, the former Pan- European Corridors (PETC), which also would actually fulfil the criteria specified in the TEN-T Regulation, should become new Core Network Corridors or extensions beyond external borders of already existing Core Network Corridors or their branches.

In Moldova, the following PETC could be considered as new or extended TEN-T Core Network Corridor crossing IX Kyjiv – Odessa/Chisinau – Bucharest – Dimitrovgrad – Alexandroupolis (possibly with an improved, i.e. more direct alignment between Chisinau and Bucharest). As an option corridor could be understood as an extension of PETC VIII from Bucharest towards Iasi – Chisinau – Odessa/Kyjiv.

At the long run, an additional multimodal corridor connecting the Baltic Sea and the Black Sea beyond the Carpathians, passing through Warsaw, Lviv and Bucharest might make sense from an all-European view. (Working paper for the Optimization of the proposed Comprehensive and Core TEN-T. 2015)

4.3.2 Transport infrastructure of Moldova

There are four TRACECA links that are important for Moldova: Giurgiulesti-Chisinau (capital of the Republic of Moldova); Iliychevsk-Odessa-Tiraspol-Chisinau-Balti-Criva-Ukrainian border-Cernovti-Livov; Bucuresti-Leuseni-Chisinau-Dubasari-Liubasevka-Kiev and Chisinau-Soroca-Ukrainian border.

In addition, the following corridors pass through Moldova:

- 2 extensions of TEN-T corridors (corridor VII–Danube and corridor IX–road/railway);
- 2 rail OSJD corridors (corridors 5d and 12).

The EaP rail network in Moldova is of 770 km length, single-track and fully non-electrified. Most railway tracks have CIS gauge (1,520 mm), 14 km stretch of standard (1,435 mm) gauge track and there is a dual railway track (of 1,520 mm and 1,435 mm in width) allowing goods going through the port to arrive or depart at either of Moldova's neighbouring countries without subsequent bogey exchange or unloading/reloading. Recent developments include new railway lines between Chisinau and Southern Moldova, to the Giurgiulesti terminal.

Two Moldovan inland waterways (Dniester and Prut Rivers) are of international importance. Moldova has a stretch of the Danube River bank, with a length of 430 m.

Moldova's public roads include: 67% surfaced and 33% unsurfaced roads. From these 3.339 km are national roads (37% in good, 38% in mediocre and 25% in poor condition[12]) and 5.540 km are local roads (20% in good, 20% in mediocre and 60% in poor condition).

Transport infrastructure bottlenecks are (Source:LOGMOS):

- poor condition and maintenance of existing roads and technical characteristics of national roads with respect to international requirements,
- poor conditions for transport operation along existing roads; new road facilities, enhancement of safety and reduction of transport costs are needed;
- a major bottleneck remains the separation of Transdniestria, cutting off some of the most developed regions of the country and severing traditional connections to Ukraine;
- road safety remains a stringent issue;
- poor condition of railways infrastructure; modernisation needed; low commercial speeds of trains; poor condition of existing border crossing stations;
- railway tariffs in Moldova are generally high when compared to neighbouring countries;
- Moldova needs an electrified railways;
- old rolling stock;
- port interfaces for operations, services, procedures etc. between land and sea are among the most critical points;
- inland waterways infrastructure along the Dniester and Prut Rivers is in poor condition with respect to international requirements and lack of port facilities for passenger and cargo traffic in the estuary of the Prut River.
- the construction of a mixed gauge rail terminal for oil products of the oil terminal in Giurgiulesti port is needed;
- lack of cargo processing and storage capacities, like multimodal transport terminals, which would provide a complete package of custom clearance and cargo handling services;
- lack of national intermodal transport operators capable of providing a full set of services based on through rates and control of cargo shipments along the whole route.

[12] *The indicator "Condition of the road" takes into account on surface design and maintenance status, whereas: High - Adequate surface condition with no hazard to traffic flow; Medium - Acceptable condition, no immediate action is required as shown in the picture; Poor - The road surface condition may pose risk to traffic flow and increased safety hazard (Eastern Partnership regional transport study, 2015)*

4.3.3 Transportation system of Moldova

The freight transport and logistics sector is small and has recently experienced a rapid decline as a result of the financial crisis. The sector is now showing some recovery signs

Moldova is a strategic border between the EU and Eastern Europe and can become a transport hub for the region. Its existing road and rail network structure is generally well-suited to cope with traffic demand and the objectives of domestic and international connectivity. Lack of maintenance of the transport infrastructure and high logistics costs however hinder the development of the transport industry in Moldova.

Giurgiulesti International Free Port (GIFP), a regional logistics hub situated in the South of Moldova, on the Danube River. Access to road and railroad networks to Europe and Russia, to the Danube River and to the Black Sea. Port accessible by road, sea/river transport and Broad gauge (Russian standard), Narrow gauge (EU standard), as well as planned line Chisinau Shuttle Train. (Source: Giurgiulesti International Free Port website, 2017). Annually GIFP loads/unloads 876.3 thous.t. of cargos.

A business park called "Giurgiulesti Free Economic Zone (GFEZ)" developed and operated by Danube Logistics forms an integral part of Giurgiulesti International Free Port. Due to the location and access to tri-modal transport infrastructure residents of GFEZ have easy access to the markets of Moldova, Romania and Ukraine.

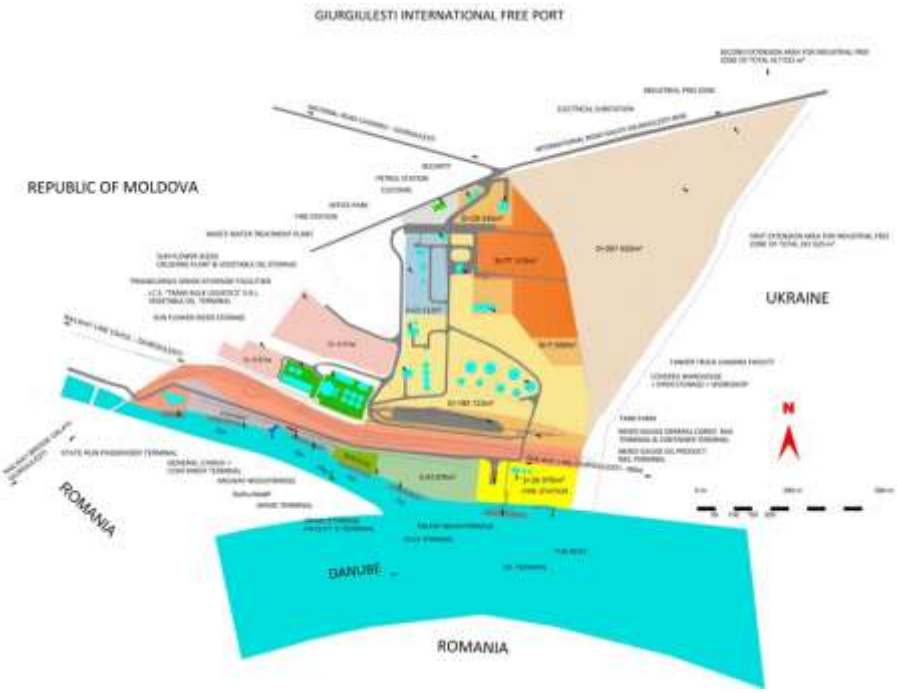

Figure 4 - Giurgiulesti International Free Port (GIFP)

Source: http://www.gifp.md/en/page/59/Plan-General

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transport infrastructure and high logistics costs however hinder the development of the transport industry in Moldova.

4.4 Georgia

Georgia occupies a very central and strategic geographical position in the Southern Caucasus region. The importance of Georgia is also reinforced by its role as the main gateway to the neighbouring and landlocked Republic of Armenia. Georgia borders Russia in the North, Azerbaijan in the East, Armenia in the South as well as Turkey. A common maritime border is also shared with Ukraine.

4.4.1 TEN-T core network extension to Georgia

Integration with Trans-European Transport network (TEN-T) by development of infrastructure and legal approximation with EU standards. EU-Georgia cooperation in transport is based on Association Agreement (AA), including Deep and Comprehensive Free Trade Agreement (DCFTA) and European Common Aviation Area Agreement signed between Georgia and EU and its Member States (CAA-A). Under AA deadlines for implementation of 23 maritime, 10 road and 8 railway transport directives and regulations are defined, while CAA-A envisages obligation of Georgia to implement 69 EU Directives and Regulations in Georgian legislation. As of May 2016, Georgia has implemented 5 maritime (out of 23), and 9 aviation (out of 69) directives and regulations. Moreover, 3 maritime and 3 road transport (out of 10) directives have been partially implemented.

4.4.2 Transport infrastructure of Georgia

Georgia's transport network composed of nearly 1,600 km of rail line and 19,100 km of road. It also possesses a number of international ports including Poti and Batumi, which serve as the European gateways for international dry-cargo trade in the whole Caucasus region and beyond. (Source: LOGMOS). Development of connections and infrastructure network to ensure good functioning of its economy through a smooth and seamless of transport of goods. Infrastructural projects:

- Construction of Baku-Tbilisi-Kars New Railway Line to support attraction of additional cargo flows to Georgia from eastern regions of China, improving of competitiveness of the transport corridor and fully using transit potential of Georgia. This is a regional rail link project directly connect Azerbaijan, Georgia and Turkey. Capacity: 5 mln. tones cargo per year and 1 mln passenger per year. Became operational on October 30, 2017.
- Anaklia New Deep Water Black Sea Port development will be separated into nine phases. At the end of the final phase (2030) it must be able to handle 100 million tonnes of cargo per year. Pre-construction works of Anaklia Deep Sea Port started in 2016, while the opening of the first phase of the port and receiving the ships in Anaklia is planned for 2021.
- Railway Modernization project to complete in November 2019 . This includes complete rehabilitation of Khashuri-Zestaponi Railway and construction of 14 km-long tunnel for new railway and 8km-long connecting tunnel to Zvare-Kvishkheti. It will enable us to increase capacity and decrease operation expenses. This project is directly related to Anaklia Deep Sea Port development concept.
- East-West Highway. With a total length of about 185 km, the East-West highway is the main artery for long distance road traffic in Georgia and is being used by most traffic from Azerbaijan and Armenia to the Black Sea ports and Turkey, as well as long distance traffic to and from Tbilisi. This highway is also part of the Pan-European corridor linking the EU

with Central Asia through the Caucasus and part of the Transport Corridor Europe-Caucasus-Asia (TRACECA) programme.

Key problems identified in the field of transport infrastructure are:

- Beyond large infrastructure construction on motorways, the sustainability of the national road network remains a challenge. Road safety is a serious issue in the country. Poor road conditions, unsafe driving behaviour, and ineffective enforcement of traffic laws and regulations contribute to this problem.
- The transit time between Poti/Batumi and Baku on railways are high, the transit procedures are challenging, the existing service is irregular and unreliable and the capacity is not enough. The Tbilisi-Yerevan line suffers from a severe backlog of maintenance and modernisation resulting in speed restrictions due to insufficient track quality. Due to the different rail gauge standards between Turkey, Georgia and Azerbaijan, on a bogie exchange and cargo transhipment point is under construction at Akhalkalaki (Georgia) railway station.
- Georgian Ports cannot accept Panamax type Vessels. There is a need for construction of new Deep Sea Port.
- Distribution of traffic among the modes is inefficient, because multimodal and intermodal connections are poor and service information is unavailable
- The logistics situation in Georgia is critical given to underdeveloped logistics infrastructure.
- Also the logistic chain is underdeveloped which causes increased cost and mistakes in operation representing a barrier for traders and manufacturers to set their operation in the country.

Infrastructure development geared towards bringing more economic opportunities to underdeveloped regions, increasing regional connectivity and utilizing Georgia's potential as a transit country. In addition to largescale transport infrastructure projects, the plan intends to roll out high-speed internet throughout the country, an initiative that is directly supported by this operation. (Document of The World Bank Report No. 114787 –GE, June 27, 2017)

4.4.3 Transportation system of Georgia

Georgian ports are fully privatized at Poti and Batumi ports. Private investor at Poti promised to develop container yards next to berths, enhance the existing port railway network and improve the draft at berth to receive bigger feeders. To-date there is no sign of implementation of these plans.

Accordingly, improvement of the East–West Highway (EWH), which requires removing some of the bottlenecks and introducing advanced traffic management systems, remains the priority for public investment. As it is the fastest and shortest surface transport link between the east and west of the country, and is important for the cohesiveness and security of the country. It is also the only alternative to the railway, which runs parallel in close proximity, in the case of an emergency.

East–West Highway plays a strategic role, and is part of three international road networks-the Central Asia Regional Economic Cooperation, European, and Asian networks-extending from Red Bridge at the Azerbaijan border to Sarpi at the Turkish border. Nearly 60% of international trade crossing Georgia moves on the East-West highway. (Source: ADB)

Strategic link on the original "Silk Road", Georgia serves as a trade and transit hub for the Southern Caucasus and Black Sea Region. Only access to the Black Sea for the Caucasus.

Driven by Turkish companies, road transport includes both freight (road transport accounts for approximately 60% of total cargo transportation) and passenger transport (road transport accounts for 99% of total passenger transportation and is crucial for tourism).

The government aims to leverage Georgia's transit and trade potential to boost private sector competitiveness and inclusive economic growth. The Socio-economic Development Strategy of Georgia (2014) emphasizes environmental sustainability and integrating Georgia within regional and international transport systems. The broad strategic directions are to improve the transport system to link all parts of the country, and to connect its ports and airports to neighbouring countries and beyond. Key to this strategy is streamlining transport infrastructure and developing logistical centres, mobilizing public-private partnerships (PPPs) where feasible .In order to fulfil these tasks, the transportation corridors via Georgia should maintain and increase their attractiveness, for which cooperation with other countries in the region is decisive.

4.5 Armenia

The Republic of Armenia is situated in the south-western part of Asia at the junction with south-eastern part of Europe. This landlocked country occupies the North-Eastern part of the Armenian plateau, between Caucasus and Western Asia. It borders in the North and East with Georgia and Azerbaijan, and in the West and South with Turkey and Iran.

1.1.1 Transport infrastructure of Armenia

Road, rail and air routes are main transport modes in the Republic of Armenia. The most accessible ports are those of Georgia, Poti and Batumi, situated on the Black Sea some 650 km from Yerevan. The route to the Iranian ports is much longer (2000 km from Yerevan) and is more expensive. As Armenia's main trade partners are Europe, Russia and China, cargo is usually transited on rail ferry services from Georgian Ports. A land connection with Russia exists through the Verkhny Lars crossing points. (Source: LOGMOS)

Total road network length is 707 km. The survey on road quality performed on the context of the EaP regional transport study shows that 93% of the EaP strategic network in Armenia is characterized by poor (54 km) and poor to medium (600 km) road conditions.

The total length of the railway tracks in Armenia is 1,328.6 km (these are 1520 mm gauge, including 780 km of express tracks) but only 845 km is operated. Almost all the rail tracks are single, electrified and equipped with semi-automated blocking and modern communication systems.

4.5.1 Transportation system of Armenia

Being a landlocked country, Armenia depends on transport and cross-border access. So far, the borders with Iran and Georgia are the only to be opened. Armenia could organise its trade via:

- Two highway routes and one rail-link providing access to the Black Sea ports of Batumi and Poti (Georgia) and further to the EU by sea (TRACECA line);
- One road South through Iran to the Persian Gulf.
- Significant improvements to the road and railway networks are planned or already undergoing under the North-South Road Corridor investment programme, expected to halve travel time and double Armenian export.

The North-South Road Corridor is the key transport corridor in Armenia. The North-South Road Corridor (550 km) connects Central Asia to Europe, Iran, Turkey and Georgia (North) and Iran (South) along Meghri - Yerevan - Bavra. The design of the Northern part of the corridor is progressing and Tranche 1 (31 km Yerevan-Artashat and Yerevan-Ashtarak) has been opened for traffic in December 2015. There also are no major railways that connect Russia and Iran via the Caucasus (since Russia and the former Soviet Caucasus countries use a different rail gauge than Iran).

Figure 5 – North South Transport Corridor

Source: https://worldview.stratfor.com/article/caucasus-competition-will-limit-cooperation

There are two major roads that run in a north-south direction. The first runs along the Caspian Sea, through Dagestan and Azerbaijan, while the second follows the Georgian Military Road through the Jvari Pass in the Caucasus Mountains. The traditionally contentious relationship between Azerbaijan and Iran limits the first road's use. The second is often closed during the winter and cannot be used easily by the larger trucks that would be necessary in any expansion of overland trade between Russia and Iran or Armenia. The result of this lack of north-south infrastructure integration is very small trade flows between these countries, trade stood at just over $4.1 billion in total in 2016.

Key problems identified in the field of transport system of Armenia are:

- in road transport there are lack of roads in good technical conditions this makes the roads unsuitable for cargo transportation and a great deal of modernisation will be required to make them reliable for heavy commercial truck fleets. Road design and maintenance standards as well as technical specifications need to be modernized, collection of road and traffic data should be improved, and cost-effective technical solutions need to be developed for low-volume roads.
- the need of updating the vehicle fleet, free market formation and creation of logistics centres.
- road safety is a critical issue for the Armenia;
- in railway transport there is only one key railway line connection, which is now under development;

- key challenges and opportunities for the railway include network development for faster transit across Armenia and to Georgia, establishment of intermodal terminals, and development of container transport;
- a major problem in Armenia's transport sector is that multimodal transport and logistics services are underdeveloped.

Planned developments in Armenia's transport sector:

- Construction of 2 international logistic centres in Yerevan (close to International Airport Zvartnots) and Gyumri Terminal, including logistics infrastructure for accessing the Free Economic zone.
- Construction of an international logistic centre at the Akhuryan railway station;
- Development of logistics services for Armenian businesses.
- Another priority is the rehabilitation and improvement of M6 Vanadzor-Alaverdi-Georgian border (90 km), M3, M4 and M8 interstate roads. Future plans in the sector regard the rehabilitation of additional 300 km of interstate roads in order to improve road safety which is a serious issue for the country.

4.6 Azerbaijan

Azerbaijan constitutes a bridge between Europe and Asia. It borders Russia in the North, Georgia and Armenia in the West, Turkey in the South West and the Islamic Republic of Iran in the South and shares a common maritime border with Turkmenistan, Kazakhstan, Russia and Iran in the East. Azerbaijan therefore plays a key role in the development of international trade in the region. It is crossed by the East West transport corridor and North South transport corridor[13], which goes from North Europe to Persian Gulf, and further to India. Baku, the capital city of Azerbaijan, is also the main airport and maritime hub of the country and of the Caspian Sea. (Source: LOGMOS)

1.1.2 Transport infrastructure of Azerbaijan

Recently, the highways from Baku-Russian border, Baku-Iranian border and Baku-Georgian border have been fully reconstructed. In the last 5 years 2.690 kilometres of major roads of international, national and local significance have been reconstructed and upgraded to the I category. The survey on road quality performed on the context of the EaP regional transport study shows that 27% of the EaP strategic network in Azerbaijan is characterized by medium (187 km) road conditions. The remaining network is characterized by high road conditions.

The EaP rail network in Azerbaijan is of 503 km length, double-track and fully electrified.

[13] *The International North–South Transport Corridor (INSTC) is a 7,200-km-long multi-mode network of ship, rail, and road route for moving freight between India, Iran, Afghanistan, Armenia, Azerbaijan, Russia, Central Asia and Europe. The route primarily involves moving freight from India, Iran, Azerbaijan and Russia via ship, rail and road. The objective of the corridor is to increase trade connectivity between major cities such as Mumbai, Moscow, Tehran, Baku, Bandar Abbas, Astrakhan, Bandar Anzali, etc. Dry runs of two routes were conducted in 2014, the first was Mumbai to Baku via Bandar Abbas and the second was Mumbai to Astrakhan via Bandar Abbas, Tehran and Bandar Anzali. Other routes under consideration include via Kazakhstan and Turkmenistan.* https://en.wikipedia.org/wiki/North%E2%80%93South_Transport_Corridor

4.6.1 Transportation system of Azerbaijan

Freight traffic flows by modes of transport are distributed as follows: road 48.8%, railway 16.7%, pipelines 28.3%, sea 6.1%. The breakdown for passengers is the following: road 84.0%, metro 15.3%, railway 0.6%, airport 0.1%

Shipping also showed strong growth since the mid-1990s, at an average annual rate of about 20%. Due to the increasing volume of goods in transit through the country, rail transportation is growing at the same pace.

Key problems identified in the field of transport of Azerbaijan are:

- Road safety is a very serious problem. Unsafe driving behaviour and ineffective enforcement of traffic laws and regulations contribute to this problem.
- The railway network is over 30 years old and around 40% of the track length needs to be rehabilitated. Current rail tracks are in critical condition, with detrimental effects to the overall efficiency of the rail network; 183 km of the 502 km on the East-West line and 126 km of the 211 km on the North-South line are under speed restriction. The locomotive fleet has been heavily used and is technically obsolete: about two thirds of the fleet requires replacement and modernisation.
- The maritime services from Baku to both Aktau and Turkmenbashi are of poor quality.

The Azerbaijan's government took significant steps to encourage private participation in the sector's various segments, to develop multimodal transport and to reduce the time spent on export-import and transit operations:

- Massive investment in infrastructure for the modernisation (the rehabilitation of the Baku-Georgian and Baku-Russian border Baku-Iranian border) motorways are ongoing and construction of roads, railways and other physical infrastructure (construction of the new motorway bridge on the state border between the Republic of Azerbaijan and Russian Federation across the Samur River is under consideration);
- Relocation of the Baku International Sea Port in Alyat (65 km South of Baku) to increase cargo transportation capacity from 8 million tons to 10 million. Currently only the ferry terminal is operational, but the capacity can be expanded according to the demand needs. Alyat port is also developing a project dedicated to the improvement of clearance system to facilitate the customs procedure and to save time. The ambition is to have the procedures solved one week in advance of the shipping arriving in the port.

Figure 6 – Alyat trade and logistics zone

Source: Republic of Azerbaijan presentation, 2017-03-17

- Railway modernisation programme for rehabilitation of East-West main line, new mainline locomotives, adoption of international monitoring methods, modernisation of oil spill prevention and response capacity equipment, capacity building:
    - the construction of Baku-Tbilisi-Kars new railway line, which will connect railways of Azerbaijan, Turkey and Georgia. In the meantime, the construction of missing segment within the aforementioned project will create an opportunity of transportation of goods by railways through Central Asia and the Caucasus from China and Far East to Europe and vice versa, connecting Trans-Europe and Trans-Asian railway networks (it is forecasted the volume of goods will reach 3-5 mln tons in its fifth operational year, tenth year it is estimated to reach 8-10 mln tons and for the next period 15 mln tons and more);
    - railway link on the border between Azerbaijan and Iran within the Gazvin - Rasht - Astara (Iran) - Astara (Azerbaijan) railway project. This project is the main segment of the North-South railway corridor which represents an important connection linking Azerbaijani, Iranian and Russian railways.
- Development of transport and logistics projects under the PPP model via the Azerbaijan Investment Company: 25% stake in Baku Shipyard Company (construction of a modern shipyard and ship repair facility on Caspian Sea), 25% stake in the Sangachal Terminal (construction of a new logistics terminal).
- Establishment of the Free Trade Zone on the establishment of the special economic zone of free trade zone type in the Alyat settlement of Garadagh district of Baku city, in new Baku International Trade Port territory. Its establishment requires the development of a special legal regime meeting international. To this purpose, and with the support of the EU, a consultancy has been appointed to prepare the legislative framework.
- The improvement of border crossing operations is also a priority. A key need is the establishment of an electronic database for the exchange of transport documents with other countries. Now data exchange is centralized through Russia.

5. International collaboration platforms

5.1 TRACECA corridor

TRACECA[14] corridor is involved in gradually developing trends of trade and economic development (Fig. 7). Major traffic flows passing through a corridor formed on the one hand, in Western and Central Europe, and on the other - in Central and South-East Asia. There is a strong commitment to creating a core transport network within the EU – a single network serving a single market. It includes the construction and upgrading of infrastructure, and legal, institutional and technological aspects are crucial, and likely to be more challenging. It is well recognised that logistics facilities and services and the corresponding regulatory framework play an increasingly important role in transport and trade; in facilitating the development of value chains. The modern supply chain concept voids the antiquated distinction drawn between industry, trade and transport services by combining them all.

Figure 7 – TRACECA Corridor map

Source: The World bank group

[14] *The Europe-Caucasus-Asia Transport Corridor (TRACECA) is an EU programme, launched in 1993, to develop a transport corridor from Europe to China, via the Black Sea, the Caucasus and the Caspian Sea.*

The purpose of the core network in the TRACECA region is similar to that of the EU's internal core network: to prioritize the most important links and nodes, to ensure interconnectivity within the region and integration into the TEN-T. Considerable attention in paid to the EaP process on transport for Ukraine, Moldova, Armenia, Azerbaijan and Georgia and defined routes, links and hubs under these initiatives for countries with a direct land or maritime border to the EU.

Major international logistics centres in the Western and Central Asian parts of TRACECA are already located on the existing TRACECA network, being main distribution or transshipment hubs as well as having high potential for contribution to international trade. Such centres in Odessa, Tbilisi, Baku are included in the core network. Logistics centres, identified mainly in landlocked countries (e.g Belarus, Armenia, Moldova) by the size of their possible operation cannot be treated as international multimodal logistics centres. However, these centres in the future can play a role in unlocking market potentials for these countries and improving attractiveness of the logistics infrastructure.

5.2 CAREC Corridor Linking Europe and East Asia

The CAREC Program has identified six priority corridors and supports their development into economic corridors through greater economic cooperation and stronger trade integration. The corridors are intended to reinforce links among countries in the region, with neighboring regions whose booming economies offer unique opportunities for further growth, and with global markets.

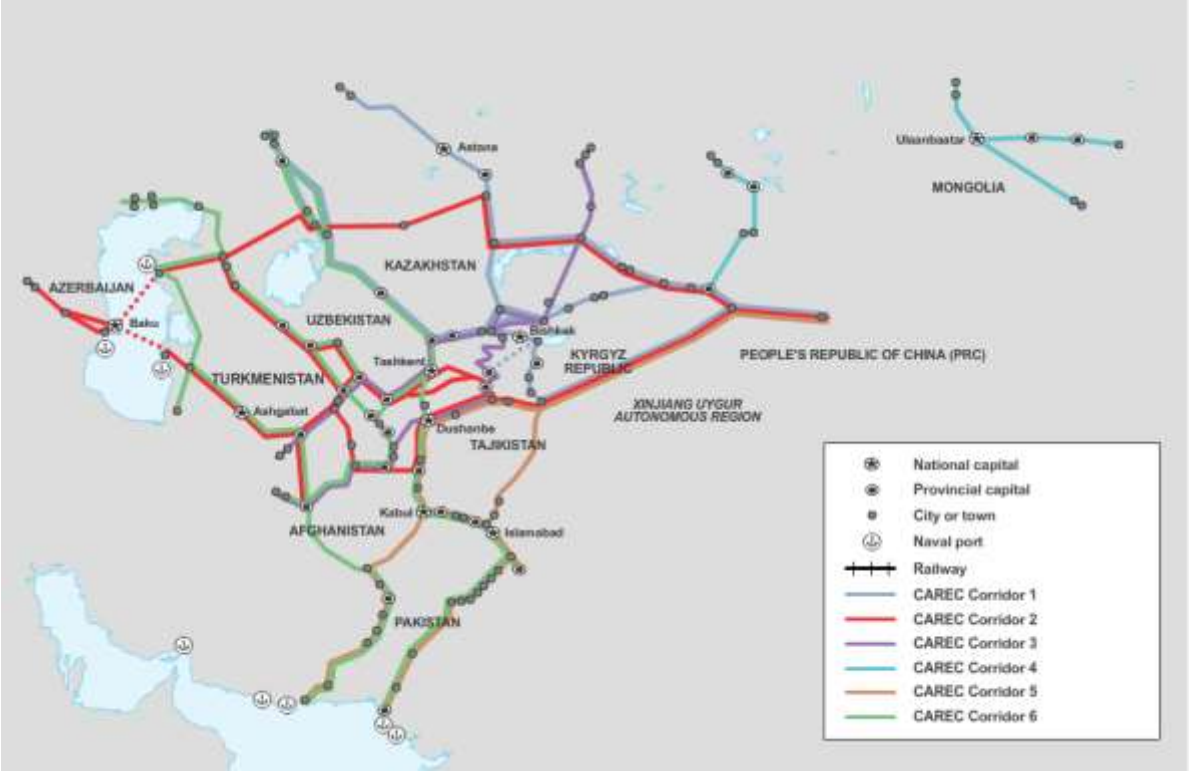

Figure 8 – CAREC Corridor

Source: https://www.carecprogram.org

These CAREC corridors were carefully chosen on the basis of the following criteria[15]:

- current traffic volume,
- prospect of economic and traffic growth,
- capacity to increase connectivity between economic and population centers,
- potential to mitigate delays and other hindrances, and
- economic and financial sustainability.

Corridors are not final products, once a corridor is established, it must meet the needs of its users. This means improving physical infrastructure is only part of the equation. It is also necessary to ensure border-crossing times and costs as well as other transshipment operations are completed as seamlessly as possible. Harmonization of transport and trade procedures and processes will greatly facilitate the movement of goods and people.

On of the route crossing the east west direction is corridor 2 (linking Mediterranean–East Asia (Afghanistan, Azerbaijan (as EaP country), Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, Uzbekistan, and Xinjiang Uygur Autonomous Region) is a multimodal corridor featuring roads (9,900 km) and railways (9,700 km), and one of the two corridors that feature maritime transport across the Caspian Sea. Corridor 2 serves the traffic to Georgia by way of the Caspian Sea and the South Caucasus. Corridor 2 remains the fastest road corridor with an average of 49 kph. However, trucks travelling predominantly in Uzbekistan, crossing Kazakhstan and Turkmenistan for transit, suffer from long border crossing: hence a significantly lower of 23 kph (53% reduction).

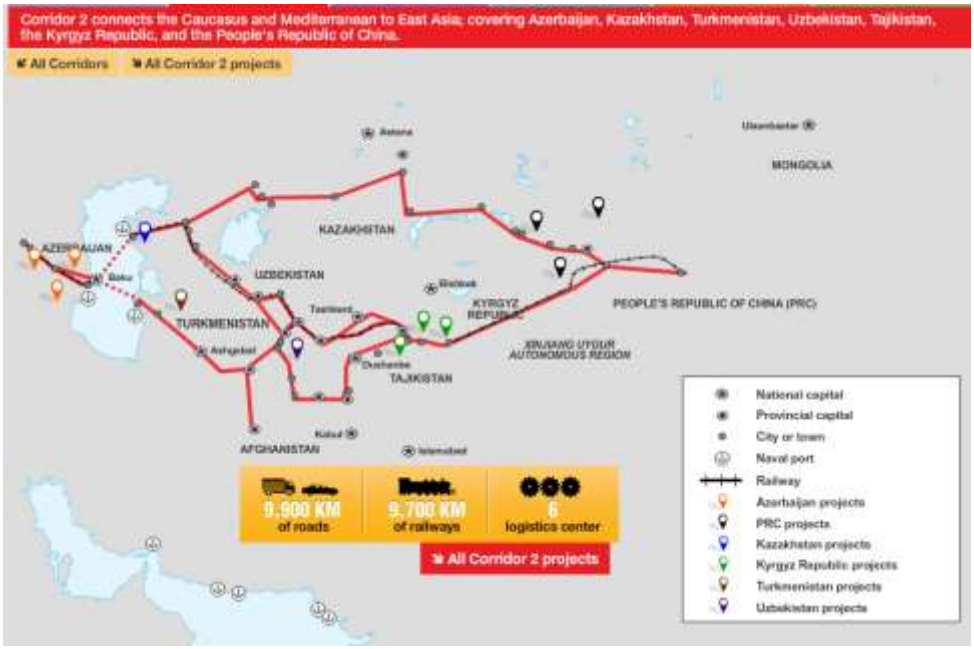

Figure 9 – CAREC Corridor 2

Source: CAREC website

[15] https://think-asia.org/bitstream/handle/11540/4085/carec-cpmm-forward-looking-retrospective.pdf?sequence=1

There is heavy traffic from Azerbaijan to Europe, implying that corridor 2 could become a gateway for goods shipments from Central Asia to Europe. Although (Caspian Sea) ferry density seems relatively low compared with road, findings suggest there is significant vehicle movement from Baku to Georgia and to points west.

5.3 Best practise: Container train ”Viking”

The Viking train example is taken as a currently working tested train route from Sweden/Germany (via ferry line) to Lithuania via Belarus to Odessa (railway line) and further to Georgia and Azerbaijan (using ferry line and then railway line)[16]. It is a good example for solving geographical limitation problem of the CNCs to the EU borders and as a scheme how to connect transport markets in the EU Eastern Partnership countries to CNCs. The example is the basis to improve accessibility in order to strengthen the joint Baltic market potential and increase odds to turn the BSR to the EU’s EaP as gateway to Asia. Container Train "Viking” (launch in 2003) is a joint project of Lithuania, Belarus and Ukraine railways, stevedoring companies in Klaipeda, Odessa and Ilyichevsk seaports, connecting Baltic and Black seas with railways. The solution mainly focuses on shortening the time that trains spend on international borders while cargo-checked. The solution requires maximum 30 minutes (at Kena station) of time to check the consistency and safety of the cargo therefore it greatly speeds up the delivery time. Main route (Klaipėda (Draugystė)-Vilnius-Minsk-Kiev-Ilyichevsk - 1734 km) is covered in 54 hours. It is also important to note that trains are more ecofriendly than trucks when we count a similar amount of transported goods.

Figure 10 – Viking train route

Source: www.litrail.lt

[16] *Already exsisting Viking route (backbone is Pan-European transport corridor IXB (Klaipeda- Minsk - Kiev - Odessa/Ilyichevsk) with the recently added links with Danish, German, and Swedish seaports via Klaipeda seaport in Lithuania).*

By using the route of the Viking train, its clients have an opportunity to save up to 30% of their funds comparing to other types of transportation, and at the same time have a guaranteed time of cargo delivery.

All sizes of universal and special-purpose containers and trucks with semitrailers (contrailers) are carried by the train, which from Scandinavian and Western European countries are delivered by sea transport to the seaport of Klaipeda, and through Mukran-Klaipeda ferry are transported further to Ukraine, Belarus, the Near East, the Caucasus, and Turkey - through seaports of Ilyichevsk and Odessa and back.

It works well because it greatly improves the cargo delivery time. In the end the customers care about quick and safe delivery of the goods – this is exactly what this solution brings:

- Improves the good delivery speed as well as improves trade potential between countries and increases the potential trade between EU member states and third countries
- Relatively reduces the emission per transported ton of goods
- In Viking train barriers of interoperability were overcame.

"Viking train" have two development alternative possibilities:

- The first is development of the maritime transit routes between Turkey and Ukraine through the Black sea further extending the route to Lithuanian Klaipeda sea port.
- The second possibility includes the development of the land route from Turkey through Bulgaria and Romania further extending the route to Lithuanian Klaipeda sea port.

VIKING TRAIN connects Turkey with Sweden sea ports (Karlshamn, Gothenburg)

TYPES OF TRANSPORTATION / INDICATORS	Railway transport	Railway + Black sea	Sea transport	Road transport
	Istanbul–Klaipeda– by rail Klaipeda–Karlshamn– by Baltic Sea	Istanbul–Odessa– by Black sea Odessa–Klaipeda– by rail Klaipeda–Karlshamn– by Baltic Sea	Istanbul–Gothenburg– by Mediterranean and North sea	Istanbul–Gdansk– by road Gdansk–Karlshamn– by Baltic sea
TRANSIT TIME (days)	9-10	8-10	20-25	5-7
SAFETY	++++	++++	++++	++

Figure 11 – Viking train route by types of transportation

Source: www.litrail.lt

Further Viking Train perspective is related to the growing container traffic flows all around the world. Additional cargo flows can be attracted by adding Georgia or Azerbaijan to the train route. Viking Train project is constantly developing transportation possibilities are introduced in international forums and other targeted events.

6. Analysis of quality and interoperability between the CNCs and EaPs the transport networks

The thematic study is aimed to provide recommendations how to extend an operational/geographical range of TEN-T core network corridors by a strengthened interoperability and synchronisation activity of its nodes with the transport networks of the European Union neighbouring countries.

The research investigates nominated logistics areas in order to select corridor nodes and transit areas, corridor catchment areas, corridor void areas for the preparation of possible supply chain management models / synchronisation/cooperation model.

Interactions between the TEN-T Core Network Corridors and transport networks of the European Union Eastern Partnership countries interview was carried out by Vilnius Gediminas Technical university (19 October 2016 – 19 February 2017) in the framework of TENTacle project.

The survey answers were received from 13 experts from 6 countries (Germany, Denmark, Sweden, Belarus, Ukraine and Lithuania), from transport and logistics decision makers, researchers and business sector representatives.

Majority of respondents are well aware on the present and future development of the CNCs with interconnection in nodes providing for the connection between the EU and with the EaP countries' transport infrastructure networks.

EaP countries recognize the need for regional cooperation

Globalization is likely to provoke change, as countries recognize the need for regional cooperation to achieve national goals. The fast-growing internationalization of the global economy may be the catalyst for change in the EU EaP Region countries will recognize that individually decided policies could prove inefficient and counter-productive and there is a need for bilateral, multilateral and regional cooperation to access world markets.

Connecting transport markets

The respondents of the organised survey by VGTU are interested in connecting transport markets in the EaP countries with EU BSR via using good practises (intermodal transportation could shorten time of route from origin to destination) and transport corridors facilitate the trade (transport volume and routes) and economic growth between the regions. It is clear that the main obstacle for connection transport markets between Black Sea and Baltic Sea regions depends on the development of multi-modal transport systems, supported by modern logistics facilities and services, and strongly focused on containerized cargo.

Also connecting transport markets by developing most important links between Western Baltic and North Eastern Baltic Countries to Russia via Lithuania, Latvia, Estonia or directly to Russia, and by using "sea-bridge" as the possible alternative for efficient transport route (less borders, rest time for drivers etc.), but the geopolitical situation should be kept in mind.

To enhance the efficiency and sustainability of soft measures to remove bottlenecks, facilitate border and sea crossings, and improve public and private asset management. Respondents identified the main obstacles or problems for connection transport markets in the EaP countries with the BSR that are related to the administrative and regulatory barriers, especially in different custom regulations and procedures system at broader crossing points (EU and non-EU countries), where less interest of the border countries to invest or because of lack of funds financing on cross-border connections that causes delays at borders. During the survey has been indicated the need organise the joint inspection at the border crossings for implementation of the accelerated container trains.

Benefits from transit cargo flows

As efficient intermodal and logistics facilities and services located and designed for development of international supply chains and seamless flow of goods across borders. The most countries are aware of the benefits they can reap from attracting transit cargo flows through their territories, in terms of investments, employment and revenues. Such flows need to be supported by trade facilitation that can be achieved only through international cooperation.

Respondents indicated that rises the contradiction between attractive frequency of service and limited cargo volume. Nevertheless, there is the interoperability problems (especially on rail transport) in EU an EaP countries links on TEN-T CNCs extended transport links and transloading operation in ports. Landlocked countries need efficient land-and-sea corridors that allow optimum use of all transport modes.

Interoperability could be done by harmonisation of legislation

Respondents of the survey (that VGTU carried out) indicated that improvement of the interoperability between the TEN-T CNCs and transport networks of the EaP could be organised by harmonisation of legal and operational rules. Especially concentrating on simplification customs procedures (as an example, in the port of Odessa 1 TEU processing time takes up to 15 minutes) that is the main bottleneck for improvement of logistics system for interchange of containers and railcars to avoid empty returns. This harmonisation could be done by adoption on EU legislation practice and persuading EaP countries to adopt the technical specifications set for the TEN-T transport network (based Trans-European transport network planning methodology, 2010). The respondents of the survey indicated the need to provide interoperability model suitable for all stakeholders and including the interoperability of transport networks with improved cooperation platform.

Competitiveness and infrastructure development projects

Improving the competitiveness includes raising awareness of the private sector about new services and current and planned infrastructure development projects in the region, notably in the area of new logistics hubs, railway lines, road and port infrastructure. Respondents of the survey indicated that railway infrastructure should be developed on a constant basis, the need of transport projects to attract investments with direct the financial aid that is provided to these countries towards this aim.

According to the respondents development plans should be presented and coordinated with neighbouring countries to avoid creating overcapacity and hence underutilization of infrastructure.

Cooperation and collaboration scheme for connecting transport markets

According to the respondents of the survey the business, cooperation or collaboration scheme for connection transport markets of EaP with CNCs could be done by applying the EU Convention on the joint transit procedure, the Rail Baltica approach could be used as an example for close crucial cooperation between the countries. The respondents recommended privatisation of rail operators in the EaP (if they are still state owned), as well as, geopolitical situation should be resolved in order to reach the collaboration scheme for connection transport markets of EaP with CNCs.

Involvement of the private sector is crucial for development of the corridor infrastructure. This can be achieved by a combination of direct measures (promoting PPP, creating favourable investment conditions, involving stakeholders in consultation processes, etc.) and indirect measures (raising awareness of infrastructural plans, learning from best practice of private sector participation, etc.). International best practices in infrastructure development should be identified, considered and applied in all aspects of infrastructure development (applies to the process of planning, financing and operating the infrastructure projects).

Closer transport/logistics market integration

As solutions for closer transport/logistics market integration between the BSR and EaP countries respondents, first of all, indicated the removal of political frictions. Economic growth of the Baltic states should level up with the average EU economical level that will convince decision-makers of EaP countries of the border that open markets bring more benefits to the society than costs. Secondly, the respondents indicated the conferences for market incumbents e.g. a special event on transport & logistics as solutions for closer transport/logistics market integration between the BSR and EaP countries.

As the current situation on stakeholders interest in the development of the extended CNC between the BSR and EaP countries the respondents indicated that possible extension of CNC to the EaP transport network is needed. This extension is a strategic target of the EU policy shows that the EU stakeholders support it. The extension CNCs to the EaP countries could be done via existing good practises of container trains "Viking" (Odessa – Klaipeda), "Zubr" (Odessa / Illichevsk - Riga / Liepaja / Ventspils - Maardu / Muuga / Paldiski / Ülemiste). Taking in to the account that current situation is problematic since countries in the EaP (Georgia, Armenia and Azerbaijan) are dependent on Russian Federation (because of the Russian gas pipelines links going via Georgia, Armenia and Azerbaijan).

Recommendation on how extend the operational/geographical range of transport networks

On recommendation on how extend the operational/geographical range by a strengthened interoperability of its nodes of CNC with the transport networks of the EaP, the respondents indicated high-level group of the EC developed the concept of TEN-T axes, including a significant expansion of the TEN-t geography (on 24 November 2017 at Eastern Partnership Summit participants agreed a Joint Summit Declaration for the extension of the EU's Trans- European Transport (TEN-T) network to Eastern partners). As EaP countries seeks integration into global supply chain to the EU countries in the West through the TEN-T and to the emerging markets in the

Far East. Therefore, transport policies and projects should address national, regional and international requirements and trends.

Also respondents indicated to strengthen interoperability of the CNC nodes close to the border when the consumption and purchase capacity increases in the Baltic States. Strong commitment by public and private stakeholders is a prerequisite together with market-responsiveness, pragmatism and willingness to learn from others' experience.

It is highly recommended to prioritize investments and support environmentally friendly modes of transport and facilities (e.g. ILCs and ports that contribute to reduction of congestion and emissions). In addition, all infrastructure projects should include a sound environmental assessment.

The technological interface of European Union's transport with transport connections of the EaP countries

Preparation of second technical and technological questionnaire aimed to investigate technological interface of European Union's transport with transport connections of the third countries was determined by the fact that evaluation of political intentions of only third countries with respect to Eastern Partnership incentive was obviously insufficient. The best example of this is the case of Belarus, where politicians are not very much interested in the development of the Eastern Partnership policy with the EU (Belarus is land-locked country). In view of this, Belarussian business companies are interested in cooperation with Lithuania and Latvia in the sphere of transport, and coordinate/harmonise their plans and practical actions with the neighbouring countries. The fact that a full freight train set can cross Lithuanian/Belarussian border in Kenna in 30 minutes could serve as an example of effective cooperation. This would not be possible without a necessary synchronization of technological actions. The most important thing is that here the initiative was implemented on the „bottom up" principle, despite different political and economic environment.

Thus, in order to identify the main transport performance synchronization indicators, the analysis of scientific literature sources was carried out. It provided for the identification of main factors and criteria which may affect synchronization of transport flows in the international transport corridor.

This synchronisation model will allow:

- Accumulate small and medium-sized flows of containers to transport them in long distances.
- Organize new container trains between intermodal terminals along the corridor (as a new service).
- Develop intermodality and interaction between transport modes (integrate into a single container transportation process in long distances and „last mile"solutions).
- Prepare and apply general service quality standards in transport corridors developed by all stakeholders.
- Use common brokerage information system in international transport corridors.

VGTU researchers believe that synchromodality between the main multimodal transport nodes in transport corridors can be defined by these main manager and executor levels:

- Goods supply chain level;
- Service supply level;

- Infrastructure level;
- Technical and technological level of intermodal freight terminals.

In order to ensure efficient transportation process of intermodal freight along the EWTC, it is necessary to obtain compatibility of the existing infrastructure capacity, as well as coordinate operations of infrastructure managers and operators. Synchromodal transport emerged as a new concept in freight transport (Behdani et al. 2016; Lucassen, Dogger 2012; SteadieSeifi et al. 2014). It integrates different transport modes and gives the logistics service providers the freedom to deploy different modes of transportation in a flexible way, which enables better utilization of existing infrastructure capacities in main hubs in transport corridors (Kapetanis et al. 2016).

Synchromodal transport is defined as constantly tuning inside and between good chains, transport chains and infrastructure so that given the aggregated transport demand, and at moment in time, the best modality can be chosen. The definition for synchromodal transport planning is intermodal transport planning with the possibility of real-time switching between the modes. According to Defares (2011) the core of the concept of synchromodality is that the gearing within and between the goods flows, the transport chains and the infrastructure chains is made such that goods volumes can largely be consolidated and the unused capacities of transport modes and the infrastructures can be better be utilized.

The report of the research includes calculations (and visual forms) of all factors affecting synchromodality of transport flows in the international transport corridor. The average ranks (by criteria) attributed by experts indicate the most important factors (criteria).

Table 1 - Main indicators influencing synchromodality of transport activity

Source: VGTU

Main indicators influencing synchromodality of transport activity	Reference
A. Efficiency. Absolute limit cost and alternative cost (€)	Cruijssen et al. 2007; Kos et al. 2017; Rossi 2012
B. Service quality. Transport time, service and waiting time, handling time, working hours, reliability, frequency of service, cargo safety and security.	Behdani et al. 2016; Bontekoning et al. 2004; Brümmerstedt et al. 2017; Geerlings et al. 2017; Mason et al. 2007; Pedersen et al. 2009; Pomponi et al. 2015; Tavasszy et al. 2015; Van der Burg 2012; Veenstra et al. 2012
C . Infrastructural sufficiency. Congestion, bottlenecks, obstructions	Dolinsek et al. 2013; Veenstra et al. 2012
D. Technical properties of terminals. Availability of technical means to service intermodal transport at main intermodal transport nodes.	Alessandri et. al. 2007; Nabais et al. 2013
E. Interaction of technologies. Accessibility of seaports, airports, railway stations, inland waterways, logistics centres; loading according to requests received in advance.	Bontekoning et al. 2004; Brümmerstedt et al. 2017

In the questionnaire the experts were asked to rank (according to their personal experience, knowledge and competence) transport synchronisation concept by the importance of factors. Ranking is the procedure when the most important factor is ranked one, the second (by importance) – two etc.; the last by importance rank = m, here m is the number of compared factors.

Synchronization activity of transport flows in the international corridors was evaluated according to 5 independent factors (criteria) A, B, C, D, E of the main group (Table 1), indicating which of the

factors under examination have major influence on synchronization activity in the international transport corridor.

A specific questionnaire was developed on the above analysis and sent to business and science representatives (prepared in English, Lithuanian and Russian). The importance (ranking) of these main factors (criteria) and sub-factors (sub-criteria) was evaluated by 13 experts, representatives of transport business sector, and transport researchers from Denmark (DTU), Sweden, Germany, Ukraine (Ukrainian Logistics Alliance and Ukrainian Logistics Association) and Lithuania (VGTU scientists, LINEKA, Lithuanian National Association of Forwarders and Logistics, LLA Lithuanian Logistics Association, EWTC Association, heads of Logistics Forwarding Division of the SC „Lithuanian Railways“, and heads of DB Schenker business sector). The selected experts have accumulated extensive experience and knowledge about the EWTC.

The data indicated in the conclusion of the research demonstrates that evaluations of all 13 experts of the importance of A, B, C, D, E (Table 1) factor group criteria and their sub-criteria coincide and can be logically applied (according to their common views).

It is expected that synchronisation could facilitate in minimising of:

- waiting time of container consignment at location place;
- total transportation time by train between hubs;
- waiting time of container consignment at destination place;

The next necessary step was to assess the significance (rate) of each main indictor for the development of synchromodal transport.

The method of Kendall‘s Concordance Coefficient was chosen for the analysis of compatibility of experts‘ views, because the number of experts exceeds two (compatibility of two experts‘ opinions in quantity terms can be indicated by the correlation coefficient). The logic of calculation of Kendall‘s coefficient is that S, the estimated sum of squares of deviations of all criteria ranks indicates on whether experts‘ evaluations differ a lot from the general average evaluation. Therefore reliability of expertise can be expressed in the concordance coefficient of experts‘ opinions W, indicating the degree of similarity of individual opinions. A set of concordance coefficient W values is [0,1], i.e. $0\ 1 \leq\ \leq\ W$. The higher is W, the higher is correlation of variables. When all the ranks coincide, W =1.

Kendall’s coefficient is related to each index taking into account the sum of ranks R_{ij} of all respondents.

$$R_j = \sum_{i=1}^{n} R_{ij} \left(j = 1,2,...m\right), \tag{1}$$

R_j deviation from the square sum S of the total mean:

$$S = \sum_{n}^{m} \left(R_j - \bar{R} \right)^2 \tag{2}$$

Then total mean could be calculated according to the formula:

$$\bar{R} = \frac{\sum_{j=1}^{m} R_{ij}}{m} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{m} R_{ij}}{m}, \quad (3)$$

The average rank $\bar{R}_j$ of each indicator (criteria) is calculated by dividing the sum of ranks by the number of respondents:

$$\bar{R} = \frac{\sum_{i=1}^{n} R_{ij}}{n} (j = 1,2,...m), \quad (4)$$

here R_{ij} – the rank of indicator (criteria) given by the respondent,

n – number of respondents.

If S is a real sum of squares (Formula 2), the coefficient of concordance when there are no related ranks, is defined by the ratio of the calculated S and S_{max} :

$$W = \frac{12S}{n^2(m^3 - m)} \quad (5)$$

Research and application of Kendall's Concordance Coefficient showed that views of all experts coincide in investigating the factors influencing synchronization of flow activity.

Table 2 - Indicator (criteria) evaluated according to the importance of groups

Source: VGTU

Experts' (respondents') codes		Indicator (criteria) evaluated according to the importance of groups (j = 1,2,...,m)					
		A - Efficiency	*B - Service quality*	*C - Infrastructural sufficiency*	*D - Technical properties of terminals*	*E - Interaction of technologies*	Total sum
i = 1,2,..,n	E_1	5	2	4	3	1	15
	E_2	3	5	4	2	1	15
	E_3	1	3	2	4	5	15
	E_4	2	3	5	1	4	15
	E_5	3	1	2	5	4	15
	E_6	5	3	2	4	1	15
	E_7	1	5	2	3	4	15
	E_8	3	1	4	5	2	15
	E_9	1	2	5	4	3	15
	E_{10}	1	2	3	5	4	15
	E_{11}	2	1	4	3	5	15
	E_{12}	3	1	2	5	4	15
	E_{13}	2	1	3	5	4	15

Rank sum $\sum_{i=1}^{n} R_{ij}$	32	30	42	49	42	195
Average rank $R_{ij} = \frac{\sum_{i=1}^{n} R_{ij}}{n}$	2,46	2,31	3,23	3,77	3,23	15
Priority	2	1	3-4	5	3-4	

Average $\overline{R}_i$ ranks set for the investigated factors (criteria) allowed to establish the hierarchy of factors and their sub-factors indicating that the most important criteria of the main factor group A,B,C,D,E influencing synchromodality of transport flows in the EWTC corridor is B service quality (B=2,5), which is characterized as freight transportation, handling, waiting and re-loading time, frequency of services and freight safety in the main transport hubs (in the sea and land terminals). A less important factor is A=2,46, which is described as an absolute and alternative service price. The third according hierarchy are C=3,23 and D=3,23 factors that are described as infrastructure provision (expressed in transport congestion, bottlenecks and other obstacles) and technical characteristics of terminals described as the ability of main hubs (terminals) of multimodal transport to serve different transport modes in the transport corridor.

The least important (as having minor impact on synchromodality of transport flows) is E=3,77 factor (criterion) which is described as an interface of technologies, i.e. connection with seaports, railway marshalling yards, airports, inland water transport, and logistics centres, and expressed in the distance between the main transport hubs.

The data demonstrates that, according to main **factor groups influencing synchromodality of transport activity, the experts' opinion is**:

1. *Service quality (*Transport time, service and waiting time, handling time, working hours, reliability, frequency of service, cargo safety and security)
2. *Efficiency (*Absolute limit cost and alternative cost (€)).

*3-4. Infrastructural sufficiency (*Congestion, bottlenecks, obstructions) and *Interaction of technologies (*Accessibility of seaports, airports, railway stations, inland waterways, logistics centers; loading according to requests received in advance)

*5. Technical properties of terminals (*Availability of technical means to service intermodal transport at main intermodal transport nodes)

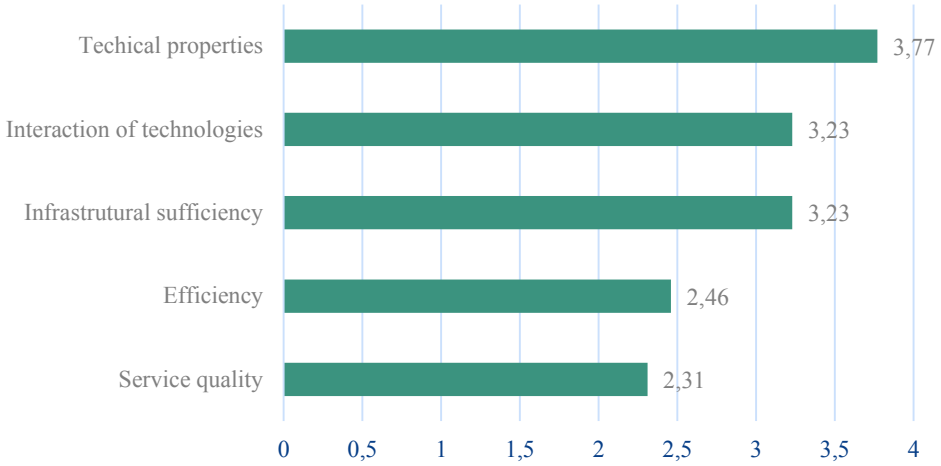

Figure 12 – Average Ranks each Criterion of Groups of Key Performance Indicators

Source: VGTU, 2017

At the same time the analysis of sub-criteria of the main factor group A, B, C, D, E was made (according to separate sub-criteria groups - Apendix 9). For processing of research results, the same Kendall's Concordance Coefficient method was applied (the same as for the establishment of the main factor group affecting synchronization of transport flow performance.

The research established that in the main factor group A, B, C sub-factors A1, A2, B1, B2, B3, B4, B6, B7, C1 group affecting synchronization of transport activity the main factors according to average ranks are:

1. *B5 Reliability* (B5=3,42), which expressed as the percentage of on-time deliveries to terminals.
2. *A1 Absolute limit cost (€)* (A1=3,75), used for comparisons of transport solution on the same route.
3. *B1 Transport time* (B1=4,0), expressed either in absolute terms (s, days) or in relative terms (average speed), of transport time of intermodal cargo.
4. *A2 Alternative cost* (€) (A2=4,92) which used for comparison of transport solution on different route in the same transport corridor or in different transport corridors.
5. *B7 . Cargo safety and security* (B7=5,33) expressed as percentage of safety incidents over total number of shipments and as percentage of security incidents over total number of shipments.
6. *B6 Frequency of service* (B6=6,17), which expressed as number of shipments (ITU) available per week between intermodal terminals
7. *B2 Service and waiting time at terminal* (B2=6,33) expressed in absolute terms (minutes, hours, days) of service and waiting time at intermodal terminals.
8. *C1 Congestions, bottlenecks, obstructions* (C1=6,66) expressed in either absolute terms (average delay in hours) or in relative terms (ratio of average delay over total transport time). Alternatively, congestion can be expressed in money terms, if the average delay is multiplied by a proper 'value of time'
9. *B3 Handling time* (B3=6,83) which expressed in TEU or tons per hour, in main intermodal terminals.
10. *B4 Working hours* (B4=7,5) expressed in days and hours (sea and land intermodal terminals).

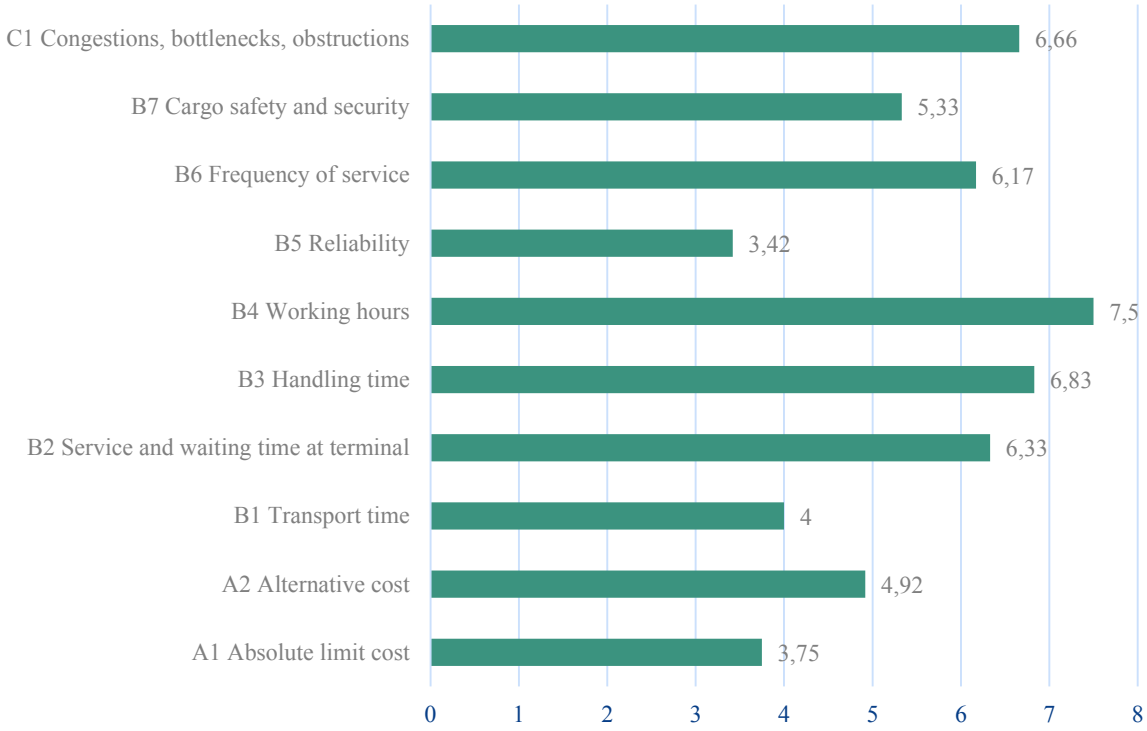

Figure 13 – Average Ranks each Criterion of Importance of Factors of KPI groups

Source: VGTU, 2017

D, E, group sub-factors characterize technical and technological terminal capacities of terminals, as well as possibilities for the use of interoperability of transport modes. The larger are terminals, the more developed is their infrastructure, technical equipment and specialization, the more they are attractive for the use of multimodal transport in the international transport corridors.

In the group of D sub-factors the experts defined the following sequence of main factors characterising technical qualities of terminals:

1-2 *D1 Railway infrastructure* (D1=2,46) expressed in number of railway networks and length (m) in intermodal terminal and *D2 Road transport infrastructure* (D2=2,46) expressed as area (m^2) of road infrastructure in terminal (parking area and road transport service area).

2. *D5 Loading equipment* (D5=2,77) expressed in number of frontal loaders and other equipment needed to service intermodal cargo.
3. *D3 Area of cargo storage* (D3=2,85) expressed as number of different transport units (TEU and ro-ro) available to store or area of cargo storage (m^2).
4. *D4 Technical equipment* (D4=3,46) expressed by number of equipment to service intermodal cargo as refrigerated cargo containers, equipment to eliminate accidents of hazardous cargo, and area (m^2) for containers servicing (repairing).

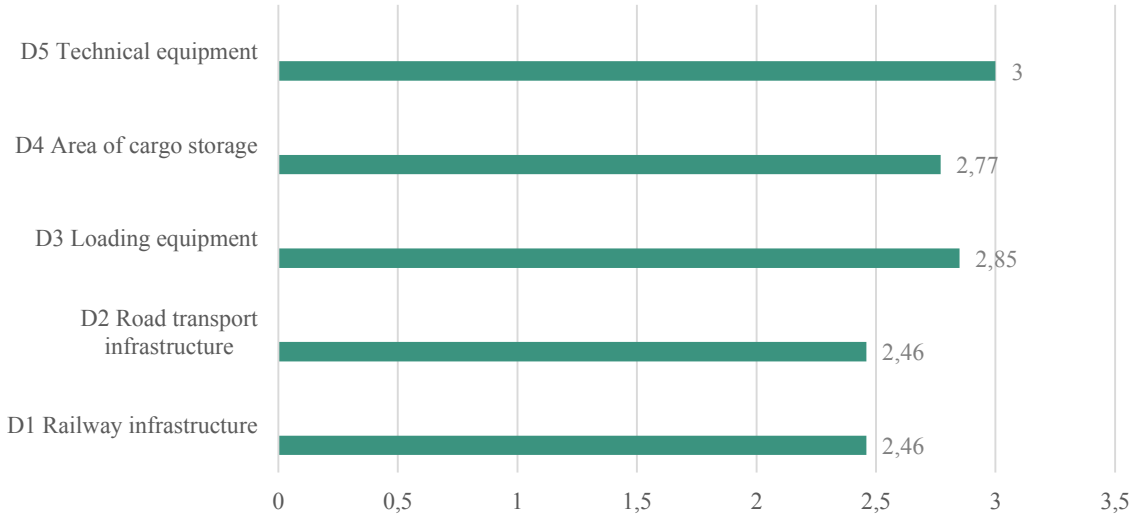

Figure 14 – Average Ranks of Technical Terminal factors

Source: VGTU, 2017

In the group of E sub-factors the experts defined that sequence of factors (by importance) characterising interoperability of transport modes is as follows:

1. *E1 Seaports accessibility* (E1=3,23) expressed in km.
2. *E6. Roads accessibility* (E6=3,23) expressed in km.
3. *E7. Railway Accessibility* (E7=3,38) expressed in km.
4. *E2. Railway stations accessibility* (E2=4,84) expressed in km.
5. *E4. Logistics centres accessibility* (E4=4,84) expressed in km.
6. *E5 Operational interaction of intermodal transport* (E5=5,85) loading carried out in order according prior enquires expressed as percentage per month.
7. *E3 Airports accessibility* (E4=5,85) expressed in km. and
8. *E8. Inland waterways accessibility* (E8=5,38) expressed in km.

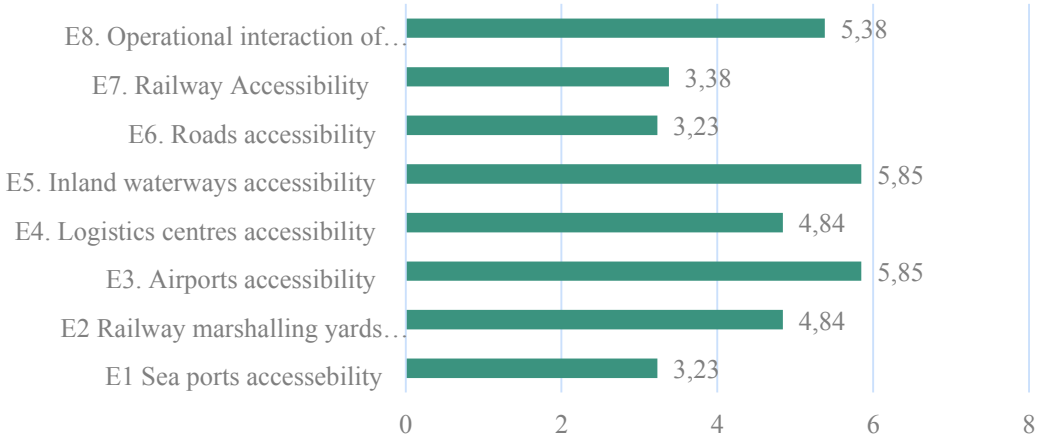

Figure 15 – Average Ranks of Technological Factors of interaction between different transport modes. Source: VGTU, 2017

Main outcomes of the research have shown that service quality (transport time, service and waiting time, handling time, working hours, reliability, frequency of service, cargo safety and security) is the most important indicator (criterion) impacting synchromodality.

In the following stages of the research, service quality and efficiency indicators will be used to create models describing synchronisation of the activities of the transport hubs along specific transport corridors. On the basis of synchromodality it is possible to establish innovative transportation and logistics services through developing cooperation between intermodal terminals along a specific transport corridor, including the EWTC branch to Eastern Partnership Countries.

7. Main results of the thematic study

Thematic study presents the activities and main results of TENTacle project task 5.4 “Interactions between the CNCs and transport networks of the EU Eastern Partnership countries”. Which aims at finding solutions to **ensure seamless traffic flow**, e**nhance economic growth and competitiveness through interconnected subsets of transport networks** (CNCs vs. EaP) and **identify priority action areas to achieve a time and resource reduction for transport operations**.

The stakeholders along the EU BSR and EaP countires are interested in connecting transport markets using good practises (used in intermodal transportation could shorten the route from origin to destination) and transport corridors facilitate for trade (transport volume and routes) and economic growth between the regions. Attracting **transit cargo flows depends on the development of multi-modal transport systems along BSR and EaP transport corridors**, supported by modern logistics facilities and services, and strongly focused on containerized cargo. As **solutions for closer transport/logistics market integration between the BSR and EaP countries stakholders indicated the removal of political frictions**. Economic growth of the Baltic states should level up with the average EU economical level that will convince decision-makers of EaP countries of the border that **open markets bring more benefits to the society than costs**. trains. Stakholders indicated the **organisation of conferences** for market incumbents e.g. a special event on transport & logistics.

The main obstacles for connection transport markets in the EaP countries with the BSR that is related to the administrative and regulatory barriers, especially in different **custom regulations and procedures system at broader crossing points that causes delays at borders** that is **the main bottleneck for improvement of logistics system**. It could be improved by adopting EU legislation practice and persuading EaP countries to adopt the technical specifications set for the CNCs.

For **improving the competitiveness** along BSR and EaP direction indicates **raising awareness for the private sector about new services and current and planned infrastructure development projects** in the region, notably in the area of new logistics hubs, railway lines, road and port infrastructure. As the transport corridor competitiveness is based on **cost, time and reliability**.

Involvement of the private sector is crucial for development of the corridor infrastructure. This can be achieved by a combination of **direct measures** (promoting PPP, creating favourable investment conditions, involving stakeholders in consultation processes, etc.) and **indirect measures** (raising awareness of infrastructural plans, learning from best practice of private sector participation, etc.).

The outcomes in the 5.4 research have shown that **service quality** (transport time, service and waiting time, handling time, working hours, reliability, frequency of service, cargo safety and security) **is the most important indicator impacting synchromodality**.

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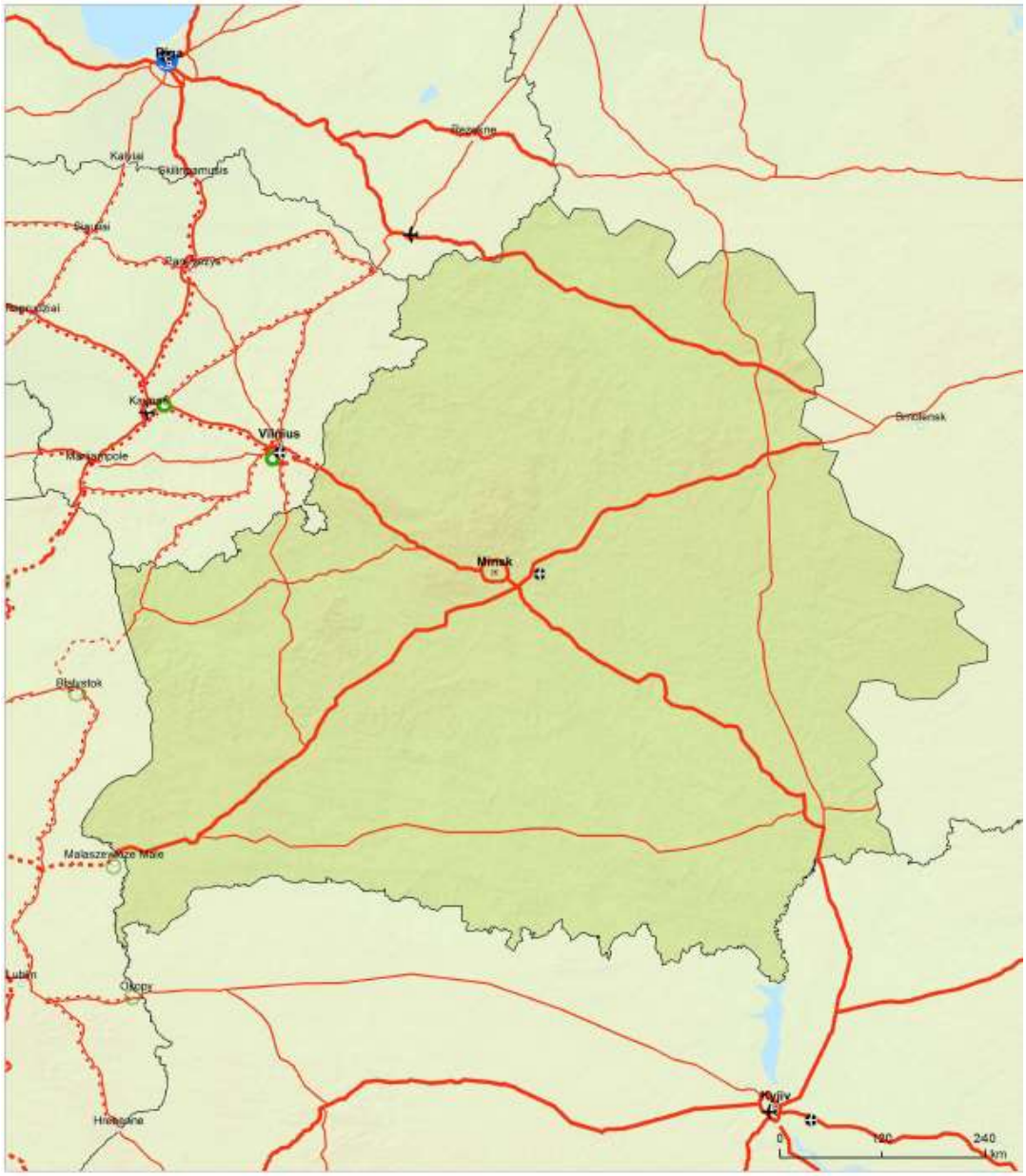
Appendices

Appendix 1 – Indicative maps of the core networks in EaP countries (road and railway)

Indicative maps of the core network in Belarus, roads

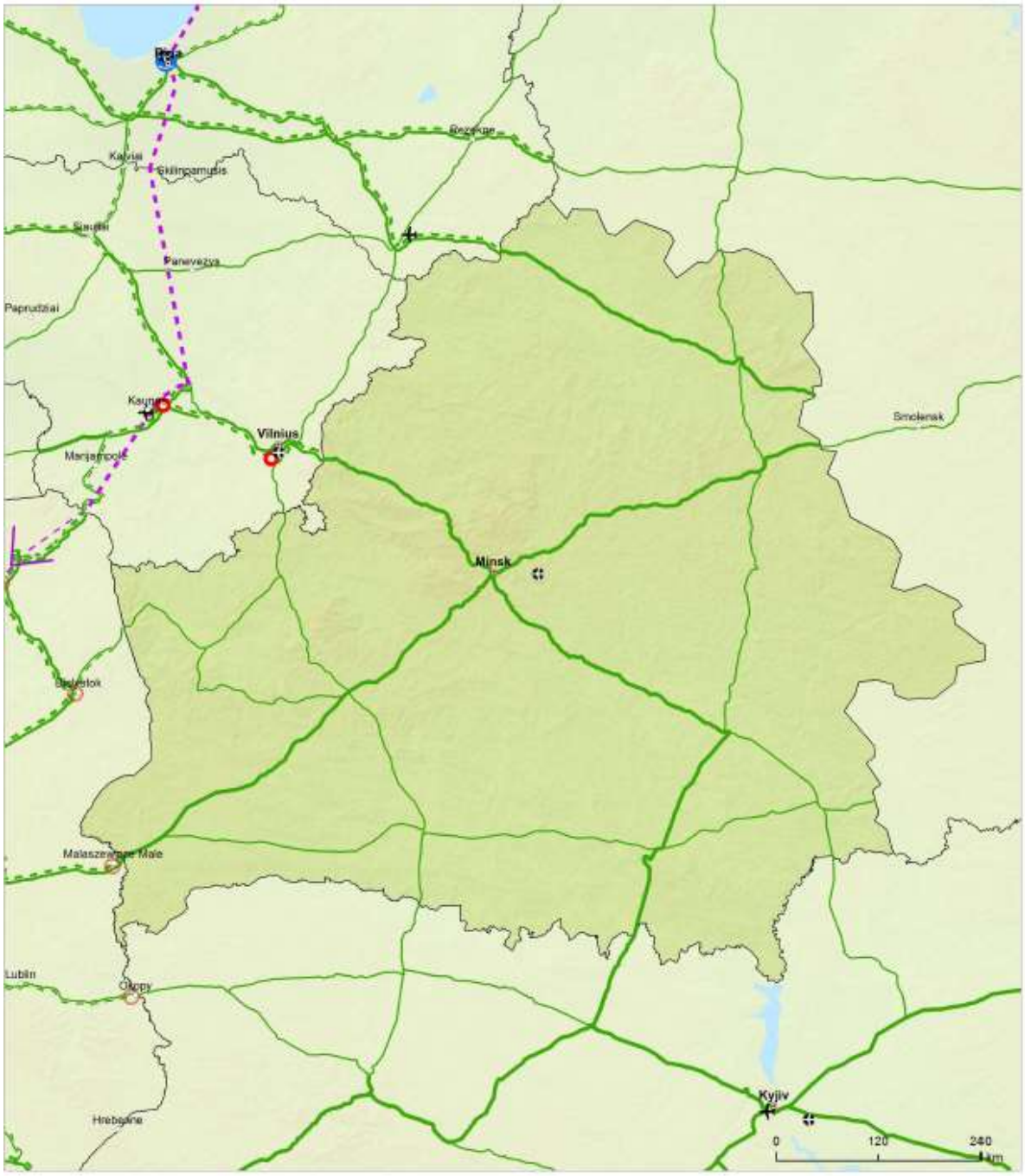
Comprehensive & Core Networks: Roads, ports, rail-road terminals and airports

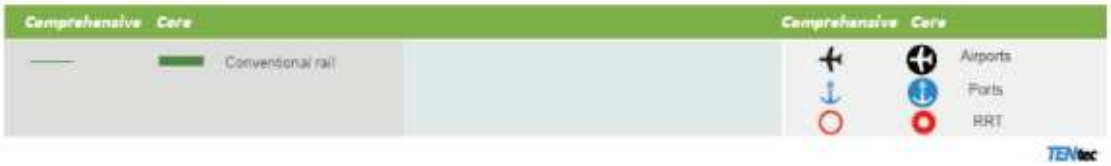
Eastern Partnership Transport Network: Belarus



Indicative maps of the core network in Belarus, railways

Comprehensive Network: Railways, ports, rail-road-terminals and airports
Core Network: Railways, ports, rail-road-terminals and airports
Eastern Partnership Transport Network: Belarus





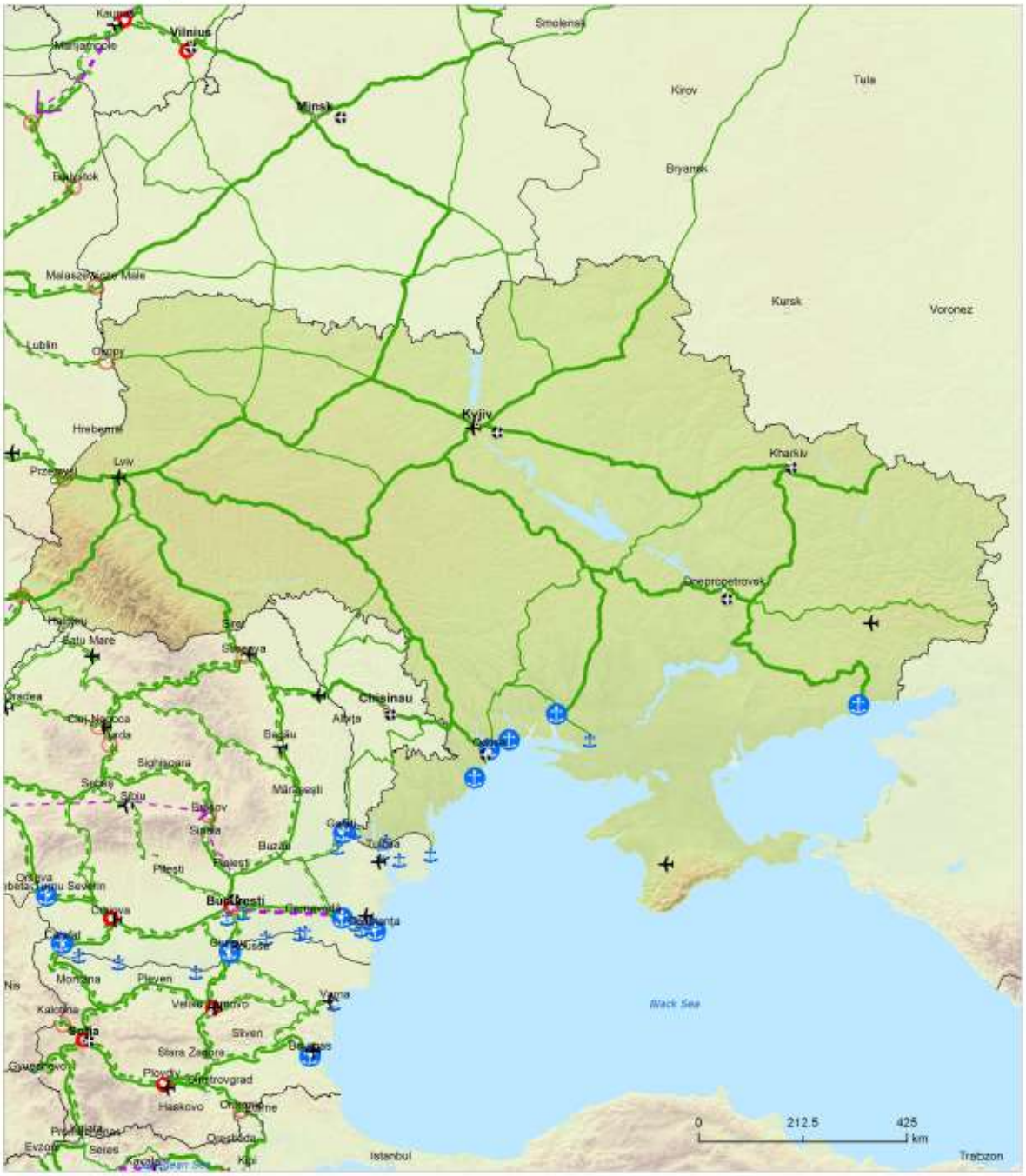
Indicative maps of the core network in Ukraine, roads

Comprehensive & Core Networks: Roads, ports, rail-road terminals and airports

Eastern Partnership Transport Network: Ukraine

Indicative maps of the core network in Ukraine, railways

Comprehensive Network: Railways, ports, rail-road-terminals and airports
Core Network: Railways, ports, rail-road-terminals and airports
Eastern Partnership Transport Network: Ukraine



Indicative maps of the core network in Republic of Moldova, roads

Comprehensive & Core Networks: Roads, ports, rail-road terminals and airports

Eastern Partnership Transport Network: Republic of Moldova

Indicative maps of the core network in Republic of Moldova, railways

Comprehensive Network: Railways, ports, rail-road-terminals and airports
Core Network: Railways, ports, rail-road-terminals and airports

Eastern Partnership Transport Network: Republic of Moldova

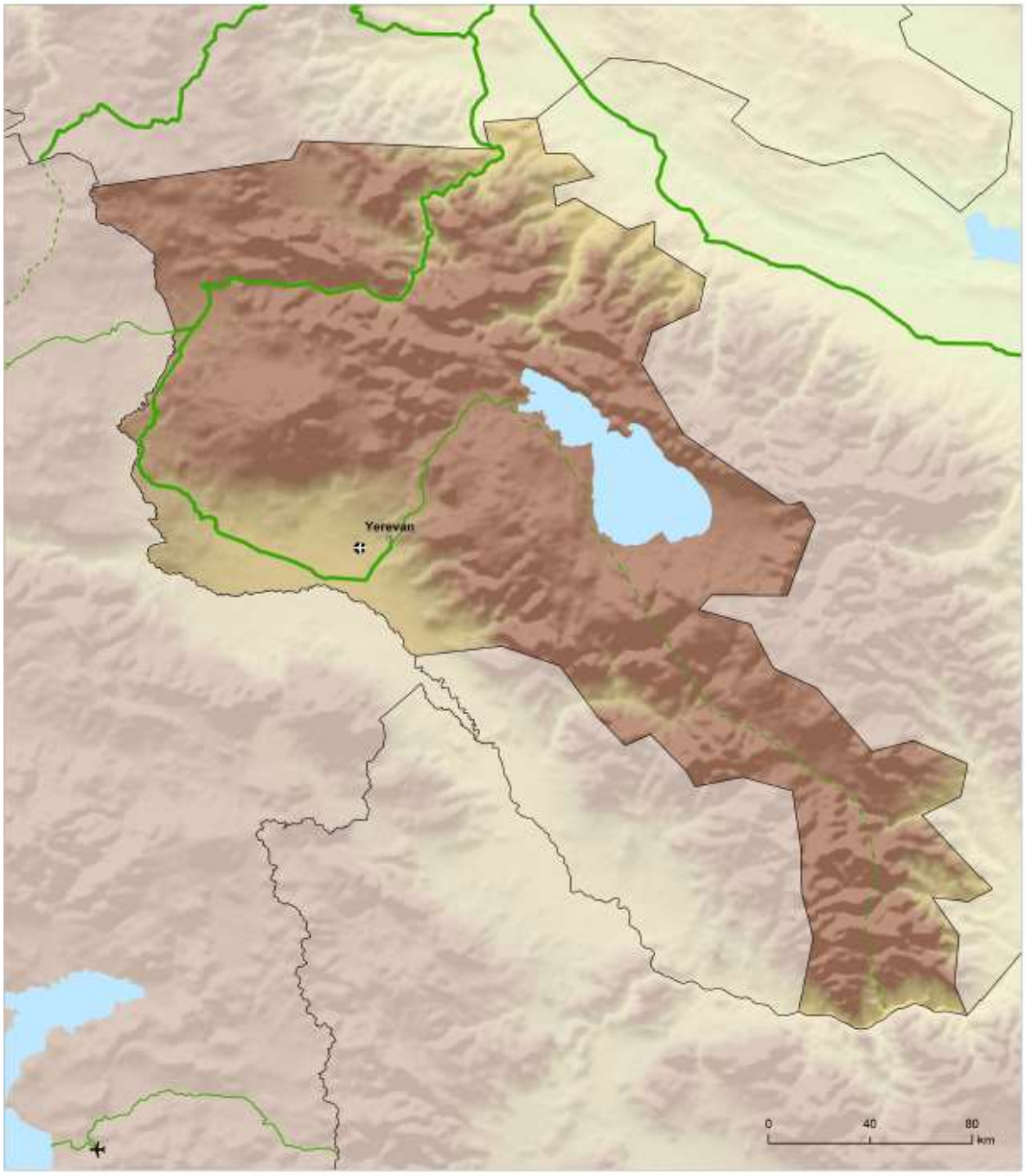
Indicative maps of the core network in Republic of Armenia, roads

Comprehensive & Core Networks: Roads, ports, rail-road terminals and airports

Eastern Partnership Transport Network: Republic of Armenia

Indicative maps of the core network in Republic of Armenia, railways

Comprehensive Network: Railways, ports, rail-road-terminals and airports
Core Network: Railways, ports, rail-road-terminals and airports
Eastern Partnership Transport Network: Republic of Armenia



Comprehensive	Core		Comprehensive	Core	
		Conventional rail / Completed			Airports
		Conventional rail / Planned			Ports
					RRT

OL2013 Adopted version of the Turkish data

TENtec

Indicative maps of the core network in Azerbaijan, roads

Comprehensive & Core Networks: Roads, ports, rail-road terminals and airports

Eastern Partnership Transport Network: Azerbaijan

Comprehensive	Core	Comprehensive	Core	Comprehensive	Core
	Road		Ports		Airports
			RRT		

GL2013 Adopted version of the Turkish data

TENtec

Indicative maps of the core network in Azerbaijan, railways

Comprehensive Network: Railways, ports, rail-road-terminals and airports
Core Network: Railways, ports, rail-road-terminals and airports
Eastern Partnership Transport Network: Azerbaijan

Appendix 2 – Infographic - Towards a stronger Eastern Partnership

Source: http://www.consilium.europa.eu/en/infographics/towards-stronger-eastern-partnership/

Appendix 3 – Trade in goods with the EU-28, 2014-2016 (million EUR)

	2014	2015	2016
EXPORTS			
Armenia	329	397	438
Azerbaijan	8 707	5 510	3 567
Belarus	8 029	7 702	5 111
Georgia	470	582	517
Moldova	940	1 097	1 205
Ukraine (1)	11 202	7 036	21 599
IMPORTS			
Armenia	759	683	642
Azerbaijan	2 336	2 643	1 927
Belarus	7 111	5 255	4 988
Georgia	1 785	1 876	2 001
Moldova	1 935	1 765	1 783
Ukraine (1)	13 005	9 451	20 234
TRADE BALANCE			
Armenia	-430	-286	-205
Azerbaijan	6 372	2 867	1 640
Belarus	918	2 446	123
Georgia	-1 316	-1 294	-1 484
Moldova	-995	-668	-578
Ukraine (1)	-1 802	-2 415	1 366

Note: as reported by ENP-East countries.

(1) 2014: excluding the illegally annexed Autonomous Republic of Crimea and the City of Sevastopol. 2014-2016: excluding the territories which are not under effective control of the Ukrainian government.
Source: Eurostat and United Nations (Comtrade)

Source: http://ec.europa.eu/eurostat/statistics-explained/index.php?title=European_Neighbourhood_Policy_-_East_-_statistics_on_trade_flows_with_the_EU

Appendix 4 – LPI, 2010 - 2016

Country	Year	LPI Rank	LPI Score	Customs rank	Customs score	Infrastructure rank	Infrastructure score	International shipments rank	International shipments score	Logistics competence rank	Logistics competence score	Tracking & tracing rank	Tracking & tracing score	Timeliness rank	Timeliness score
Armenia	2010	111	2.52	125	2.10	92	2.32	123	2.43	79	2.59	139	2.26	77	3.40
	2012	100	2.56	116	2.27	110	2.38	96	2.65	115	2.40	99	2.57	92	3.07
	2014	92	2.67	75	2.62	107	2.38	90	2.75	79	2.75	114	2.50	98	3.00
	2016	141	2.21	148	1.95	122	2.22	146	2.22	137	2.21	147	2.02	139	2.60
Azerbaijan	2010	89	2.64	117	2.14	104	2.23	55	3.05	91	2.48	91	2.65	100	3.15
	2012	116	2.48	147	1.92	101	2.42	120	2.43	143	2.14	80	2.75	74	3.23
	2014	125	2.45	82	2.57	68	2.71	113	2.57	149	2.14	148	2.14	143	2.57
Belarus	2010	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	2012	91	2.61	121	2.24	65	2.78	107	2.58	89	2.65	98	2.58	114	2.87
	2014	99	2.64	87	2.50	86	2.55	91	2.74	116	2.46	113	2.51	93	3.05
	2016	120	2.40	136	2.06	135	2.10	92	2.62	125	2.32	134	2.16	96	3.04
Georgia	2010	93	2.61	81	2.37	109	2.17	95	2.73	83	2.57	89	2.67	111	3.08
	2012	77	2.77	44	2.90	58	2.85	91	2.68	70	2.78	93	2.59	115	2.86
	2014	116	2.51	131	2.21	100	2.42	138	2.32	119	2.44	102	2.59	87	3.09
	2016	130	2.35	118	2.26	128	2.17	131	2.35	146	2.08	112	2.44	117	2.80
Ukraine	2010	102	2.57	135	2.02	79	2.44	84	2.79	77	2.59	112	2.49	114	3.06
	2012	66	2.85	88	2.41	70	2.69	83	2.72	61	2.85	50	3.15	68	3.31
	2014	61	2.98	69	2.69	71	2.65	67	2.95	72	2.84	45	3.20	52	3.51
	2016	80	2.74	116	2.30	84	2.49	95	2.59	95	2.55	61	2.96	54	3.51
Moldova	2010	104	2.57	124	2.11	123	2.05	78	2.83	132	2.17	61	3.00	97	3.17
	2012	132	2.33	129	2.17	98	2.44	145	2.08	142	2.15	116	2.44	126	2.74
	2014	94	2.65	98	2.46	85	2.55	52	3.14	118	2.44	131	2.35	109	2.89
	2016	93	2.61	99	2.39	100	2.35	94	2.60	103	2.48	85	2.67	86	3.16

Appendix 5 – Map of OSJD Railway transport corridors

Appendix 6 – Multimodal transport's strengths, weaknesses and opportunities in Ukraine

Source: Updated National Transport Strategy of Ukraine, Part 2, 2016

TRANSPORT SECTOR	INTERNAL AND EXTERNAL FACTORS
STRENGTHS	• Existing capacities for processing multimodal traffic (container terminals, multimodal railway stations, ferry lines, deep sea berths) • Existing cargo flow that could be potentially transported by multimodal transport • Private operators of transport and stevedores operate at Ukrainian sea ports; container lines making calls to Ukrainian sea ports • River transport operators deliver containers to Ukrainian sea ports (short shipping) • Available vessels, railcars and cargo handling equipment
WEAKNESSES	• Small share of multimodal transport in total freight turnover • Bureaucratic procedures in obtaining permits for constructing road and railway approaches • Unbalanced container and RoRo traffic; high share of empty (or partially full) transport units in return direction • Slow turnaround of railcars, especially in rail platforms • Majority of containers belong to cargo owners; the share of containers operated by container lines still small • Uncompetitive disbursement fees at Ukrainian sea ports • Opaque and unclear railway tariff setting; long waiting to obtain quotations
OPPORTUNITIES	• Less time required for loading-unloading operations at Ukrainian sea ports • Regular container and RoRo service increase their operation • Facilitation of the side of customs formalities; implementation of electronic documentation exchange

Appendix 7 – Political interview

1. Information about company, main functions along the European Union Eastern Partnership countries corridor

Background of the Respondents

Company/organization name *

Name, last name and position of the representative of the company/organization *

Address of the company/organization *

Respondent's e-mail *

Mission, vision and main task of company/organization *

2. Are you aware on present and future development of core network corridors with interconnection in nodes that provides for connections between European Union Member States and with European Union Eastern Partnership countries' transport infrastructure networks? Please provide Your point of view

3. Are you interested in connecting transport markets in the European Union Eastern Partnership countries with European Union Baltic Sea Region? Chose one option

Is there any obstacles or problems for connection? Please provide Your point of view on this matter

4. Are you involved in activities to strengthen accessibility of core network corridors between European Union Baltic Sea Region and European Union Eastern Partnership countries?

Which activities you are involved in?

Are you interested to be more involved in future activities?

How you can contribute in development of this transport network?

5. How to improve the interoperability between the core network corridors and the transport networks of European Union Eastern Partnership countries? Please provide Your point of view

6. Your proposal how to connect transport markets in the Union Eastern Partnership countries to core network corridors?

What business, cooperation or collaboration scheme would You propose?

7. Solutions for closer transport/logistics market integration between European Union Baltic Sea Region and European Union Eastern Partnership countries? Please provide Your point of view

8. Stakeholders interest in development of extended core network corridors between European Union Baltic Sea Region and European Union Eastern Partnership countries?

What is the current situation?

Is this interest stronger from European Union Eastern Partnership countries or European Union Baltic Sea Region?

9. Your recommendation how to extend an operational/geographical range of core network corridors by a strengthened interoperability of its nodes with the transport networks of the Union Eastern Partnership countries? Please provide Your point of view

10. Would you like to participate actively in the cooperation initiative , including synchronization, along TEN-T and European Union Eastern Partnership countries transport connections? Choose one option

11. Would you like to participate actively in the cooperation initiative , including synchronization, along Baltic-Black sea transport link and European Union Eastern Partnership countries transport connections? Choose one option

12. Has the company the necessary precondition for Information technology centres integration along TEN-T and European Union Eastern Partnership countries transport connections? Choose one option

Appendix 8 – Technical interview

Dear expert,

Vilniaus Gediminas Technical University (VGTU) carries out INTERREG Baltic Sea Region (BSR) project TENTacle. One aim of this project is to investigate further development of transport networks and operational activities between EU BSR and EU Eastern Partnership countries.

This goal is aimed to implement by creating optimal model for synchronisation of activity of intermodal freight terminals and model of integration of intelligent transport systems along a chosen transport corridor.

We believe that synchromodality between the main multimodal transport nodes in transport corridors can be defined by these main manager and executor levels:

- Goods supply chain level;
- Service supply level;
- Infrastructure level;
- Technical and technological level of intermodal freight terminals.

We have chosen the key performance indicators of transport synchromodality, which we listed in the survey (Appendix 1).

To assess objectively importance of these indicators for synchronisation of activity of freight terminals we ask You to rank them by using your competence, knowledge and experience.

Rank it as follows: most important – 1, second most important – 2 and etc. There cannot be same ranks for two or more indicators.

Interview

GROUPS OF KEY PERFORMANCE INDICATORS AND KEY FACTORS		RANK
Importance of KPI **group** (ranks):		
Efficiency	Absolute limit cost and alternative cost (€)	
Service quality	Transport time, service and waiting time, handling time, working hours, reliability, frequency of service, cargo safety and security.	
Infrastructural sufficiency	Congestion, bottlenecks, obstructions	
Technical properties of terminals	Availability of technical means to service multimodal transport at main multimodal transport nodes.	
Interaction of technologies	Accessibility of seaports, airports, railway stations, inland waterways, logistics centers; loading according to requests received in advance.	
	Sum	
Importance of **factors of KPI groups** (ranks)		
A1. Absolute limit cost (€)	Used for comparisons of transport solution on the same route.	
A2. Alternative cost (€)	Used for comparison of transport solution on different route in the same transport consider or in different transport corridors.	
B1. Transport time	Expressed either in absolute terms (s, days) or in relative terms (average speed), of transport time of multimodal cargo.	
B2. Service and waiting time at terminal	Expressed in absolute terms (minutes, hours, days) of service and waiting time at intermodal terminals.	
B3. Handling time	Expressed in TEU or tons per hour, in main intermodal terminals.	
B4. Working hours	Expressed in days and hours (sea and land multimodal terminals.	
B5. Reliability	Expressed as the percentage of on-time deliveries to terminals.	

B6. Frequency of service	Expressed as number of shipments available per week between intermodal terminals.	
B7. Cargo safety and security	Expressed as percentage of safety incidents over total number of shipments and as percentage of security incidents over total number of shipments.	
C1. Congestions, bottlenecks, obstructions	Expressed in either absolute terms (average delay in hours) or in relative terms (ratio of average delay over total transport time). Alternatively, congestion can be expressed in money terms, if the average delay is multiplied by a proper 'value of time'.	
	Sum	
Technical and technological factors of describe capacity of terminal and efficiency of different transport interactions. Bigger terminals with bigger infrastructure and availability of technical equipment more attractive they are intermodal transport in international transport corridors.		
D1. Railway infrastructure	Expressed in number of railway networks and length (m) in intermodal terminal.	
D2. Road transport infrastructure	Expressed as area (m^2) of road infrastructure in terminal (parking area and road transport service area).	
D3. Area of cargo storage	Expressed as number of different transport units (TEU and ro-ro) available to store or area of cargo storage (m^2).	
D4. Technical equipment	Expressed by number of equipment to service intermodal cargo as refrigerated cargo containers, equipment to eliminate accidents of hazardous cargo, and area (m^2) for containers servicing (repairing).	
D5. Loading equipment	Expressed in number of frontal loaders and other equipment needed to service intermodal cargo.	
	Sum	
E1. Seaports accessibility	Expressed in km	
E2. Railway stations accessibility	Expressed in km	
E3. Airports accessibility	Expressed in km	
E4. Logistics centers accessibility	Expressed in km	
E5. Inland waterways accessibility	Expressed in km	
E6. Roads accessibility	Expressed in km	
E7. Railway Accessibility	Expressed in km	
E8. Operational interaction of intermodal transport	Loading carried out in order according prior enquires expressed as percentage per month.	
	Sum	

Appendix 9 – The list of factors and their sub-factors indicating that the most important criteria of the main factor groups influencing synchromodality of transport flows in the EWTC corridor

INDEPENDENT FACTORS (CRITERIAS)	SUB-FACTORS
A. Efficiency. Absolute limit cost and alternative cost (€)	A1 Absolute limit cost (€) used for comparisons of transport solution on the same route. A2 Alternative cost (€)which used for comparison of transport solution on different route in the same transport corridor or in different transport corridors.
B. Service quality. Transport time, service and waiting time, handling time, working hours, reliability, frequency of service, cargo safety and security.	B1 Transport time, expressed either in absolute terms (s, days) or in relative terms (average speed), of transport time of intermodal cargo. B2 Service and waiting time at terminal expressed in absolute terms (minutes, hours, days) of service and waiting time at intermodal terminals. B3 Handling time which expressed in TEU or tons per hour, in main intermodal terminals. B4 Working hours expressed in days and hours (sea and land intermodal terminals). B5 Reliability which expressed as the percentage of on-time deliveries to terminals. B6 Frequency of service, which expressed as number of shipments (ITU) available per week between intermodal terminals B7 Cargo safety and security (expressed as percentage of safety incidents over total number of shipments and as percentage of security incidents over total number of shipments.
C . Infrastructural sufficiency. Congestion, bottlenecks, obstructions	C1 Congestions, bottlenecks, obstructions expressed in either absolute terms (average delay in hours) or in relative terms (ratio of average delay over total transport time). Alternatively, congestion can be expressed in money terms, if the average delay is multiplied by a proper 'value of time'
D. Technical properties of terminals. Availability of technical means to service intermodal transport at main intermodal transport nodes.	D1 Railway infrastructure expressed in number of railway networks and length (m) in intermodal terminal D2 Road transport infrastructure expressed as area (sq.m.) of road infrastructure in terminal (parking area and road transport service area). D3 Area of cargo storage expressed as number of different transport units (TEU and ro-ro) available to store or area of cargo storage (sq.m.). D4 Technical equipment expressed by number of equipment to service intermodal cargo as refrigerated cargo containers, equipment to eliminate accidents of hazardous cargo, and area (sq.m.) for containers servicing (repairing). D5 Loading equipment expressed in number of frontal loaders and other equipment needed to service intermodal cargo.
E. Interaction of technologies. Accessibility of seaports, airports, railway stations, inland waterways, logistics centres; loading according to requests received in advance.	E1 Seaports accessibility expressed in km. E2. Railway stations accessibility expressed in km. E3 Airports accessibility expressed in km. E4. Logistics centres accessibility expressed in km. E5 Operational interaction of intermodal transport loading carried out in order according prior enquires expressed as percentage per month. E6. Roads accessibility expressed in km. E7. Railway Accessibility expressed in km. E8 Inland waterways accessibility expressed in km.