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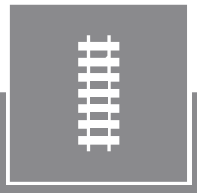

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Contents

1. Introduction

1.1. Short Description

The aim of this document is the development of a development study:

"Development of intermodal logistic centers in Albania and explore possibility of ICT connections among them".

The main purpose of this study is:

- Studying the possibility and propose the implementation of advanced ICT tools, to enable the growth and efficiency of intermodal transport activities followed by savings in energy, time and cost and a protection in a large environment.

- Designing the Pilot Action, for the implementation of a collaboration platform is intended to alleviate some of the aforementioned obstacles to the logistics performance of the corridor

Logistics service providers have a crucial role in facilitating the supply chain management (SCM) initiatives in Europe. There is an increasing trend to (re)locate manufacturing and other activities in the most favorable locations without increasing he customer lead times. In the context of evolving SCM adoption, manufacturers and retailers are increasing the outsourcing of significant parts of their logistics activities (McKinnon 1999).

As a result, the business environment for logistics service providers is becoming more and more complex and technology is playing an increasing important role posing new strategic challenges and opportunities to logistics service providers. In the today turbulent supply chain environment characterized by time compression, flexibility and agility, information technology capabilities become both a critical variable for logistics service differentiation and a significant tool to cut costs and effectively serve clients through a better customization.

Project Specific Objectives:

- To create bases for implementation of standardize model of communication between port ICT systems
- To enable increasing of a share and efficiency of intermodal transport activities implementing advanced ICT tools.

1.2. Working Team

Name Surname	Organization / Field of Expertise
FLORJAN XHELILAJ	**Albanian Institute of Transport – Project Coordinator**
BUJAR KOTRI	**Albanian Institute of Transport – Technichal Coordinator**
LUAN BASHA	**ATOM – Chief Operating Officer**
ARMAND AGOLLI	**ATOM – Chief Technology Officer**
BLERINA BASHA	**ATOM – Information Systems Auditor**

1.3. Key Issues, logistics service providers and investment's barriers

The European Commission launched a Freight Transport Logistic Action Plan (COM (2007) 607) proposing a series of measures to promote the freight transport logistics, and making intermodal transportation more competitive, in a framework which allow ports to attract investment for their modernization, putting maritime freight transport on an equal footing with other transport modes and reviewing progress made in development of sustainable mobility.

Based on that plan, this Development study will combines different approaches to reach most of the goals highlighted by the EC. Therefore, overall objective of the project is development of intermodal transport in Albania.

The aim is to create the conditions for a sustainable growth and remove the lacks of the current development of intermodal transport on more levels (in this case we can talk about the Motorways of the Sea system) within the region.

Introduction of a common coordinated, systematic, approach is in collecting bottlenecks to the principle bottom-up, in intermodal transport promotions. This type of approach is a practical implementation of the EC recommendations and a transfer of methodology and knowledge of other EU countries. Next, it is the development of a transport performance strategy that allow countries within the region to look at the effects and cost-effectiveness of planned infrastructure together, not only at national level but also at corridor levels.

Developing a quality indicator system for services offered in ports, we enable an equal level of services in any port. All contribution to the specific objective of the strategy, is to enhance capacity for an integrated transport, mobility service and multimodality in the Albania.

The transport and logistics service industry in Albania is not developed and is represented by a few small logistics companies. The most important is that during analyses is to consider that "Third-party" logistics are activities carried out by a logistics service provider on behalf of a shipper and consisting of at least transportation. In addition, other activities can be integrated into the service offering, for example:

- Warehousing and inventory management;
- Information related activities, such as tracking and tracing; and
- Value added supply chain activities, such as secondary assembly and installation of products

There are a number of features of the definition that are worthy of comment:

- Companies that provide purely transport services are included;
- The role of warehousing and the associated management of inventory, an integral part of many theoretical definitions, is cited as the first of the non-compulsory activity elements – this reflects the fact that for many logistics service providers their first foray into non-transport activities is in this area;
- The non-compulsory activity elements include both information related activities as well as elements of supply chain functionality which may be outsourced by customers;
- The word "integrated" is used to indicate the importance, where more than one service is offered, of providing a customer with a coordinated logistics solution.

The Albanian logistics service providers are very small companies that often provide a limited range of purely transport services. For the purposes of the research into ICT capability, the above logistics company definition has been narrowed to exclude very small providers that are marginal in the context of the wider supply chain.

The majority of the companies operate in local and national markets only. In Albania, wholesale trade, mineral exploitation and forest industry, building trade were the major customer of logistics service providers.

Logistics service providers' motivators for ICT implementation are:

- Improve customer satisfaction;
- Higher in-company integration;
- Improve information exchange with partners;
- Improve company competitiveness;
- Improve company's brand perception;
- Enlarge customer's base.

The most important barrier that inhibits ICT investment is related to financial factors. The size of investment and the implementation costs, together with running costs, are considered the most influential barriers to ICT investment. The barriers are:

- Investment and implementation costs
- High running costs
- Updating of personnel skills
- Lack of technological skills
- Unclear return on investment
- Lack of technological standards
- Change Management
- Difficulties in selecting ICT
- Difficulties in customer SCM system integration
- Data security

2. Development of intermodal logistic centers in Albania

2.1. National and regional development strategy for transport infrastructure and logistics

Extensive and efficient transport infrastructure is essential for well-functioning economies and the development of regions and cities. When designed effectively, transport networks can be an engine for productivity and improved quality of life for citizens. “Effective modes of transport – including high-quality roads, railroads, ports, and air transport – enable entrepreneurs to get their goods and services to market in a secure and timely manner and facilitate the movement of workers to the most suitable jobs.

Transport infrastructure investment has always been a fundamental engine of economic development. The facilitating role of transport infrastructure with respect to trade for instance can be traced back in history.

Transport infrastructure allows regions and cities to leverage benefits from agglomeration and concentration by expanding commuting opportunities for their workers. This creates benefits for places and for workers who can access better-matching and better-paid jobs without bearing the burden of moving to a different place. Intra-urban and suburban transport infrastructure serves to integrate rural regions into the local labor market of the cities located in their proximity, thereby creating a greater variety in job opportunities and raising the living standards of their inhabitants.

Transport infrastructure brings firms closer to a larger customer base and a larger pool of workers, which can stimulate hiring and investment by local firms. For instance, a firm that gains access to a broader market thanks to the reduction in transport costs that accompanies improved transport infrastructure might decide to invest more resources to enhance its competitiveness. Alternatively, a firm facing an increase in demand might choose to tap into its unutilized capacity and hire more local workers in order to serve an expanding market. An increase in production will cause an increase in the density of local economic activity further reinforced by productivity spill-overs among neighboring firms.

2.1.1. Depth Albanian Freight transport analysis, based on ANTP3-National Transport Plan

Freight flows, in the socioeconomic analysis includes a description of freight traffic in Albania, and also a characterization of main commodities transported in the country, the information is crucial for follow phases of the Multimodal. Freight transport model use a "surplus and deficit" methodology analyzes present / future demand in the intermodal transport performance system. The ANTP3 model attempt to identify the main commodities produced and consumed in Albania at the level of TAZ, to determine the main movements of freight traffic. The main commodities imported have increased their demand in the past years, being the machineries, equipment and spare parts the ones with greater increase. Nevertheless, minerals, fuels and electricity imports, although the exports have also been heavily reduced, which indicates an internal adjustment in the balance between supply and demand for Multimodality.

Table 1: TAZ and Population used for modeling

TAZ	Name	Pop 2018
1	Tropoje	18,617
2	Mallakaster	25,999
3	Belsh	18,364
4	Berat	53,893
5	Devoll	25,482
6	Bulqize	27,551
7	Mat	24,364
8	Cerrik	25,842
9	Skrapar	10,330
10	Delvine	8,188
11	Divjake	32,909
12	Dropull	3,055
13	Durres	192,997
14	Elbasan	133,436
15	Kolonje	10,559
16	Fier	115,917
17	Finiq	11,347
18	Fushë Arrës	7,197

TAZ	Name	Pop 2018
19	Gjirokaster	25,009
20	Gramsh	22,816
21	Himare	8,425
22	Kamez	122,909
23	Kavaje	47,297
24	Kelcyre	5,332
25	Klos	14,670
26	Konispol	8,885
27	Malesi e Madhe	29,957
28	Korça	72,484
29	Kruje	65,924
30	Has	15,235
31	Kuçove	28,871
32	Kukes	43,542
33	Kurbin	42,394
34	Lezha	60,107
35	Libohove	3,198
36	Librazhd	29,267
37	Lushnjë	80,374
38	Maliq	39,828
39	Memaliaj	9,295
40	Patos	22,057
41	Peqin	24,609
42	Permet	9,258
43	Diber	54,394
44	Pogradec	58,688
45	Poliçan	9,833
46	Prrenjas	24,213
47	Puke	10,758

TAZ	Name	Pop 2018
48	Pustec	3,138
50	Roskovec	20,888
51	Mirdite	20,242
52	Rrogozhina	26,127
53	Sarandë	21,798
54	Selenice	17,669
55	Shijak	30,707
56	Shkoder	131,804
57	Tepelena	7,805
58	Tirana	810,572
59	Ura Vajgurore	24,504
60	Vau i Dejes	29,335
61	Vlora	112,969
62	Vora	30,094

Table 2: Road vehicles of goods. 2017

Region	2018				
	Total	Truck & Road Tractors	Agriculture Tractors	Trailers	Technology. Machinery
ALBANIA	75,271	66,593	822	7,326	530
Berat	4,055	3,718	70	245	22
Diber	1,800	1,581	5	201	13
Durres	8,600	6,997	94	1,459	50
Elbasan	5,384	4,807	58	512	7
Fier	9,818	8,728	171	867	52
Gjirokaster	2,580	2,301	25	247	7
Korça	4,327	3,764	71	435	57
Kukes	1,548	1,322	5	211	10
Lezha	3,292	2,918	54	270	50
Shkoder	4,343	3,942	74	325	2
Tirana	23,791	21,202	117	2,231	241
Vlora	5,733	5,308	78	323	24

** Source: INSTAT*

The following figure shows the absolute number of vehicles by Prefecture.

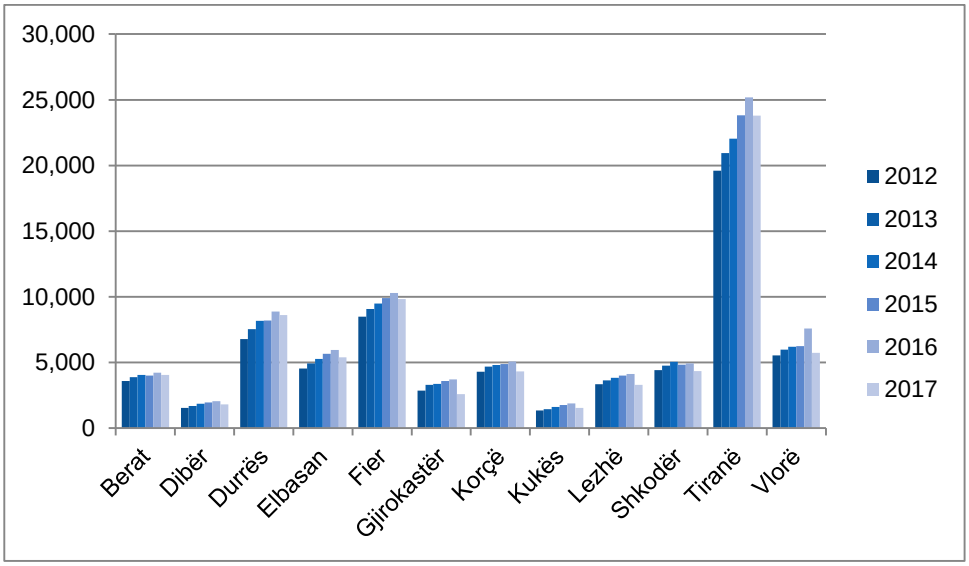

Figure 1; Total of goods transport vehicles by prefectures (2012-2017)

** Source: Statistical Yearbook 2018*

Trade - transport balance or facilitation see a significant change in export weights, with large amounts in Minerals and fuels balanced with imports and a 70% growth in the textile and footwear subsector. The other subsectors remain in similar steady increments, with the increase of Construction materials and metals and food, beverages and tobacco standing on scaling in Accordance of Albanian National Transport Plan: G1 Agriculture Products and Fertilizers; G2

Beverages; G3 Oil and derivates; G4 Construction Materials; G5 Minerals, ores and concentrates; G6 Manufactures; G7 Livestock, animal-made products. Statistical data shown herein below:

Table 3: Classified group of commodities.

Class	General classification
G1	Agriculture Products and Fertilizers
G2	Beverages
G3	Oil and derivate
G4	Construction Materials
G5	Minerals, ores and concentrates
G6	Manufactures
G7	Livestock, animal-made products

There are different sources for the data collection of the commodities in Albania. The Institute of Transport has a data base created in years by exercising the yearly update of the ANTP with the data collected.
However the source of raw data used for the freight model has been different. The main source of data is INSTAT, the Institute of Statistics in Albania, while for the exports and imports in Albania and their entry point we used the data that the IoT received from the General Directorate of Custom. However, all the data received is considered as raw materials and processed to be included in the model.

The following table shows the volume of commodities, in tons, of the different transport modes, divided by import and export.

Table 4: Foreign trade by volume of main groups, in Tons

General classification	Road		Rail		Air		Sea	
	Import	Export	Import	Export	Import	Export	Import	Export
Agriculture Products and Fertilizers	458,505	238,984	16,243	0	60	94	678,250	23,300
Beverages	108,474	19,947	278	0	3	25	51,892	3,198
Oil and derivates	24,661	492,207	12,352	0	340	11,999	1,598,295	1,185,769
Construction Materials	341,017	1,106,873	82,610	4,800	67	3	778,071	454,545
Minerals, ores and concentrates	638	483,724	0	0	0	0	42	426,570
Manufactures	658,400	382,372	8,315	0	1,987	190	1,036,888	184,111
Livestock, animal-made products	18,092	2,620	0	0	34	0	12,061	3,156

**Source: INSTAT*

This table can also be showed by commodities disaggregated:

Table 5: Foreign trade by volume of commodities, in Tons

General classification	Road		Rail		Air		Sea	
	Import	Export	Import	Export	Import	Export	Import	Export
Vegetables, fruits	76,553	204,740	0	0	8	46	62,697	10,825
Flour, wheat, corn, etc.	133,636	471	0	0	0	0	206,333	0
Prepared foods, beverages, tobacco	310,934	49,314	15,698	0	62	69	349,469	14,275
Mineral products, cement	97,054	1,351,262	0	4,800	1	0	410,706	785,742
Chemical industry products	112,594	53,995	1,648	0	683	4	191,537	10,252
Plastic, rubber and related products	58,310	13,891	14	0	67	5	82,741	8,411
Leather and related products	1,279	2,618	0	0	31	0	11,860	3,059
Wood and wood-made products	162,295	33,648	6,607	0	15	8	121,350	57,844
Paper and paper-made articles	41,750	20,282	456	0	86	58	64,265	12,940
Textile and textile articles	30,456	7,024	13	0	138	63	64,136	23,965
Footwear	5,133	4,325	0	0	42	14	15,423	26,193
Stone-made articles, plaster, ceramics, glass	147,631	227,829	9	0	14	6	387,493	24,320
Pearls, precious stones, precious metals	19	0	0	0	4	1	47	91
Metals and related articles	241,571	239,794	82,894	0	66	3	366,941	95,576
Mechanical and electrical equipment	48,735	12,033	0	0	401	18	76,190	14,523
Vehicles	32,014	3,353	0	0	49	0	83,239	3,322
Fuel, LPG, etc.	24,661	492,207	12,352	0	340	11,999	1,598,295	1,185,769
Other	85,162	9,941	107	0	486	15	62,776	3,542
TOTAL	**1,609,787**	**2,726,727**	**119,798**	**4,800**	**2,490**	**12,310**	**4,155,499**	**2,280,650**

Source: INSTAT

Given these volumes, the internal consumption and production can be calculated, as well as the imports and exports.

Table 6: Internal production and consumption. Import and Export

General classification	Internal production	Internal consumption	Import	Export
Agriculture Products and Fertilizers	1,637,284	2,527,964	1,136,815	262,378
Beverages	467,968	605,445	160,369	23,170
Oil and derivate	2,069,025	2,014,697	1,623,296	1,689,975
Construction Materials	6,984,806	6,620,351	1,119,156	1,561,421
Minerals, ores and concentrates	1,144,131	234,517	679	910,294
Manufactures	0 (*)	1,138,916	1,697,274	566,673
Livestock, animal-made products	1,324,309	1,348,720	30,188	5,776

(*) At this point, information about internal production of "Manufactures" is missing

**Source: INSTAT*

Again, this information is also shown disaggregated:

Table 7: Internal production and consumption. Import and Export disaggregated

General classification	Internal production	Internal consumption	Import	Export
Vegetables, fruits	1,637,284	1,560,930.63	139,256.69	215,610.06
Flour, wheat, corn, etc.			339,969.3	470.82
Prepared foods, beverages, tobacco	467,968	1,080,473.67	660,465.11	63,657.49
Mineral products, cement	3,694,162	2,060,120.37	507,761.83	2,137,003.46
Chemical industry products			304,813.89	64,251.72
Plastic, rubber and related products			141,117.84	22,307.16
Leather and related products			13,170.2	5,677.79
Wood and wood-made products			283,659.94	91,500.86
Paper and paper-made articles			106,101.31	33,279.57
Textile and textile articles			94,728.75	31,053.3
Footwear			20,597.74	30,532.24
Stone-made articles, plaster, ceramics, glass	4,434,806	4,717,797.23	535,137.34	252,155.45
Pearls, precious stones, precious metals			69,78	92,32
Metals and related articles			608,578.08	335,372.49
Mechanical and electrical equipment			125,326.93	26,573.49
Vehicles			115,302.04	6,675.35
Fuel, LPG, etc.	2,069,025	2,014,697.49	1,623,295.8	1,689,974.87
Other	1,324,309	1,459,341.45	148,424.35	13,498.54
TOTAL	13,627,554	12,893,360.84	5,767,776.91	5,019,686.98

**Source: INSTAT*

The main commodities imported have increased their demand in the past years, being the *machineries, equipment and spare parts* the ones with greater increase.

Nevertheless, *minerals, fuels and electricity* imports has suffered a big reduction, although the exports have also been heavily reduced, which indicates an internal adjustment in the balance between supply and demand.

Table 8: Main commodities imported in millions of Leks between 2013 and 2017

Import CIF	2013	2014	2015	2016	2017
Total	517,378	552,281	544,616	579,248	626,186
Food, beverages, tobacco	93,424	93,971	96,897	100,365	106,738
Minerals, fuels, electricity	92,657	90,225	60,164	49,842	65,963
Chemical and plastic products	68,258	72,921	74,926	80,008	86,887
Leather and leather manufactures	11,395	14,320	15,916	17,378	18,983
Wood manufactures and articles of paper	20,300	22,922	21,736	23,357	23,692
Textile and footwear	54,130	63,004	69,300	79,971	87,123
Construction materials and metals	63,323	70,805	67,541	76,002	76,624
Machineries, equipments and spare parts	98,517	105,692	117,291	130,953	134,060
Others	15,374	18,421	20,846	21,372	26,117

Source: INSTAT

The past lustrum has seen a significant change in export weights, with large decrease in *Minerals and fuels* (although balanced with imports) and a 70% growth in the *textile and footwear* subsector. The rest of subsectors remain under similar paths, with steady increments, with the increase of *Construction materials and metals* and *Food, beverages and tobacco* standing out

Table 9: Main commodities exported in millions of Leks between 2013 and 2017

Export FOB	2013	2014	2015	2016	2017
Total	246,397	255,759	243,183	243,497	272,988
Food, beverages, tobacco	14,651	16,747	21,066	25,347	30,081
Minerals, fuels, electricity	99,418	85,885	64,505	46,563	43,088
Chemical and plastic products	2,887	3,394	3,961	4,358	4,732
Leather and leather manufactures	3,195	3,076	2,897	2,596	2,966
Wood manufactures and articles of paper	8,000	9,181	8,336	7,764	8,309
Textile and footwear	69,374	85,936	90,091	106,608	117,389
Construction materials and metals	36,191	37,103	35,280	31,891	43,802
Machineries, equipments and spare parts	8,246	9,235	10,789	11,272	15,079
Others	4,436	5,204	6,257	7,098	7,543

Source: INSTAT

The following table shows the difference between exports and imports in the main commodities groups, with the bigger imbalance, in the *machineries, equipment's and spare parts*, getting even bigger. The *textile and footwear* subsector remains as the only one with bigger volumes of exports, even though the *minerals, fuels and electricity* showed back and forth tendencies during the 2013-2017 period.

Table 10: Trade balance of main commodities, in millions of ALL's between 2013 and 2017

Trade balance (Exp - Imp.)	2013	2014	2015	2016	2017
Total	-270,981	-296,522	-301,433	-335,751	-353,198
Food, beverages, tobacco	-78,773	-77,225	-75,830	-75,018	-76,657
Minerals, fuels, electricity	6,761	-4,341	4,341	-3,279	-22,875
Chemical and plastic products	-65,370	-69,527	-70,965	-75,650	-82,156
Leather and leather manufactures	-8,200	-11,243	-13,018	-14,782	-16,017
Wood manufactures and articles of paper	-12,300	-13,741	-13,400	-15,592	-15,383
Textile and footwear	15,244	22,932	20,791	26,637	30,266
Construction materials and metals	-27,133	-33,703	-32,261	-44,111	-32,822
Machineries, equipments and spare parts	-90,271	-96,457	-106,502	-119,681	-118,981
Others	-10,938	-13,218	-14,589	-14,274	-18,573

Source: INSTAT

Table 11: Foreign Trade by Border Cross Points, in Tons

No.	Type BCP	Exit customs	Entry customs
1	Bajze	4,800	119,798
2	Bllade	4,291	12,503
3	Durres port	1,204,523	2,413,729
4	Gorice	734	5,113
5	Hani i Hotit	498,638	398,773
6	Kakavije	69,015	178,253
7	Kapshtice	66,742	304,565
8	Lezha, Shengjin port	15,107	232,621
9	Morine	1,467,170	343,097
10	Morine-Tropoje		34
11	Muriqan		7,994
12	Qafe Bote	2,838	10,406
13	Qafe Prush	39,587	18
14	Qafe Thane	575,839	339,639
15	Rinas, Airport TIA	12,310	2,490
16	Saranda Port	14,301	16,068
17	Tirana	0	0
18	Tre Urat	1,872	1,648
19	Tushemisht		32
20	Vermosh		
21	Vlora Port	1,046,718	115,652
	Total	**5,024,487**	**4,502,434**

Source: INSTAT

Information about external flows than travel through the Albanian territory in their itinerary is also important to collect. A brief analysis of this data shows the biggest share coming from the relation between the Port of Durres and the Morine border cross.

After analyzing the raw data, we obtained the following result as productions by group and zone.

It has to be noted that for the group 6 productions in tons are not available at the moment, there are only data in value. Thus, production in this group has been estimated by applying the percentage of share of this group in the general production of goods. This has been estimated in 18%, and distributed by zones as in the survey. The following table summarizes the production obtained by group in each internal zone.

Table 12: Classified group of commodities by zone in tons for the last year.

Zone Code	G1	G2	G3	G4	G5	G6	G7
1	30,817	0	0	0	75,414	0	29,592
2	131,128	0	54,045	229,096	0	0	43,667
3	16,528	0	0	0	0	0	9,650
4	43,474	3,112	0	72,224	0	17,568	16,219
5	47,821	1,920	0	0	0	0	17,354
6	41,406	0	0	8,073	315,716	0	23,289
7	30,111	0	0	0	0	0	16,936
8	15,957	0	0	0	0	0	9,316
9	95,138	162	0	8,710	0	0	35,494
10	9,022	324	336	0	0	0	7,526
11	123,292	0	0	0	0	0	41,058
12	7,048	0	0	0	0	0	8,100
13	80,812	3,739	0	277,291	0	0	36,785
14	73,372	6,979	0	161,224	0	58,561	42,839
15	91,165	0	0	0	69	0	33,083
16	246,889	6,730	29,311	320,851	0	427,496	82,217
17	21,766	0	0	0	0	0	18,157
18	31,472	0	0	0	0	0	16,834
19	7,377	168,785	0	56,000	0	64,417	8,479
20	62,204	0	0	0	0	0	36,318
21	28,210	0	0	15,000	0	0	23,533
22	4,976	0	0	10,000	0	0	2,975
23	26,610	144	0	94,982	0	0	15,908
24	4,789	0	0	0	0	0	5,504
25	21,814	0	0	0	0	0	12,269
26	10,946	0	0	0	0	0	9,131
27	55,370	529	0	0	0	0	29,617
28	85,032	16,355	0	1,924,628	1,049	87,842	30,858
29	80,990	0	0	1,528,127	0	40,993	36,866
30	11,649	190	0	42,572	52,454	0	11,186
31	18,331	1,296	24,528	0	0	0	6,839
32	27,224	0	0	35,000	445,000	163,971	26,142
33	19,016	1,245	0	1,282,258	0	175,683	11,655
34	35,983	0	0	75,000	0	0	22,054
35	3,903	0	0	0	0	0	4,486
36	66,755	203	0	33,664	123,521	0	38,976
37	148,451	1,309	0	61,000	0	17,568	49,436
38	69,241	0	0	0	0	0	25,127
39	5,849	0	0	0	0	0	6,722
40	32,881	0	1,924,201	0	0	0	10,950
41	16,640	0	0	0	0	0	9,716
42	9,464	200	0	0	0	0	10,877
43	57,230	0	0	15,363	0	0	32,189
44	62,743	685	0	0	68,630	0	22,769
45	31,124	0	0	15,000	0	0	11,612
46	27,176	0	0	0	0	0	15,867
47	29,440	261	0	0	6,447	0	15,747
48	20,960	0	0	0	0	0	7,606
50	47,007	0	0	0	0	0	15,654
51	61,480	2,133	0	3,632	55,020	0	37,680
52	29,916	0	0	0	0	0	17,884
53	2,909	324	0	0	0	0	2,426
54	27,679	0	0	78,111	813	0	23,090

Zone Code	G1	G2	G3	G4	G5	G6	G7
55	22,024	0	0	0	0	0	10,025
56	50,814	2,906	0	102,000	0	35,137	27,180
57	6,779	15,360	0	45,000	0	0	7,791
58	148,588	196,736	0	180,000	0	1,885,669	88,828
59	17,911	0	0	0	0	0	6,682
60	29,062	0	0	0	0	0	15,545
61	30,419	37,331	36,604	60,000	0	0	25,375
62	11,071	0	0	250,000	0	0	6,618
TOTAL	2,705,258	468,956	2,069,025	6,984,806	1,144,131	2,974,907	1,324,309

Regarding the international trade, the statistics at each border crossing in the last year are summarized in the following table.

Table 13: Statistics in the border crossing points in Total Tons

Class	General classification	Import	Export	Import	Export	Import	Export	Import	Export
		Road		Rail		Air		Ship	
G1	Agriculture Products and Fertilizers	456,997	238,984	16,243	0	60	94	557,403	23,300
G2	Beverages	107,948	19,947	278	0	3	25	43,269	3,198
G3	Oil and derivates	24,639	492,207	12,352	0	340	11,999	1,593,224	1,185,769
G4	Construction Materials	340,562	1,106,873	82,610	4,800	67	3	725,206	454,545
G5	Minerals, ores and concentrates	638	483,724	0	0	0	0	21	426,570
G6	Manufactures	653,201	382,372	8,315	0	1,987	190	742,434	184,111
G7	Livestock, animal-made products	18,091	2,620	0	0	34	0	11,450	3,156
Total		1,602,075	2,726,727	119,798	4,800	2,490	12,310	3,673,006	2,280,650

The volume registered at the border points has been assigned to the corresponding zone. The arrival volumes have been distributed between the destination zones with the same patterns of the survey, as well as the volumes leaving the country. Once obtained the volume of freight in each group of classification, a process of surplus and deficit analysis is undertaken. Moreover, there are some trucks in the network crossing Albanian borders in transit to other destinations. Those trucks have been determined and added to the surplus and deficit vectors as well as to the matrix of vehicles.
As a result of this process, the following table summarizes the obtained results in vector form.

Table 14: Surplus Deficit vectors in the Base year in Tons

TAZ	CODE	Base year surplus_2018	Base Year Deficit_2018	TAZ	CODE	Base year surplus_2018	Base Year Deficit_2018
Tropoje	1	244	229	Peqin	41	0	343
Mallakaster	2	925	109	Permet	42	18	118
Belsh	3	3	241	Diber	43	18	650
Berat	4	0	492	Pogradec	44	149	755
Devoll	5	62	308	Poliçan	45	72	80
Bulqize	6	739	317	Prrenjas	46	12	303
Mat	7	17	300	Puke	47	88	132
Cerrik	8	0	367	Pustec	48	64	39
Skrapar	9	311	103	Rinas	49	392	287
Delvine	10	10	101	Roskovec	50	76	257
Divjake	11	299	405	Mirdite	51	299	233
Dropull	12	27	38	Rrogozhina	52	15	326
Durres	13	0	2,168	Saranda	53	0	353
Elbasan	14	0	1,314	Selenice	54	164	108
Kolonje	15	292	130	Shijak	55	0	431
Fier	16	1,281	188	Shkoder	56	0	1,629
Finiq	17	57	140	Tepelena	57	124	50
Fushe Arres	18	99	89	Tirana	58	2,942	7,199
Gjirokaster	19	534	120	Ura Vajgurore	59	0	346
Gramsh	20	165	281	Vau i Dejes	60	5	378
Himare	21	103	63	Vlora	61	38	1,426
Kamez	22	0	2,027	Vora	62	499	273
Kavaje	23	0	422	Montenegro Hani Hotit	63	0	38
Kelcyre	24	8	70	Hani Hotit BC Montenegro	64	1,680	118
Klos	25	26	180	Morine BC Kosovo	65	1,038	1,676
Konispol	26	14	109	Qafe Morine BC Kosovo	66	622	554
Malesi e Madhe	27	95	367	Bllade BC Macedonia	67	0	0
Korça	28	4,830	176	Port of Shengjin	68	1,070	411
Kruje	29	3,799	290	Port of Durres	69	5,567	6,063
Has	30	148	111	Port of Vlora	70	4,932	4,602
Kuçove	31	12	360	Port of Saranda	71	286	561
Kukes	32	1,276	351	Qafbot BC Greece	72	0	292
Kurbin	33	3,578	212	Qafe Thane BC Macedonia	73	455	374

TAZ	CODE	Base year surplus_2018	Base Year Deficit_2018	TAZ	CODE	Base year surplus_2018	Base Year Deficit_2018
Lezha	34	0	651	Tushemisht BC Macedonia	74	200	203
Libohove	35	8	39	Kapshtice BC Greece	75	333	702
Librazhd	36	424	267	Triurat BC Greece	76	67	67
Lushnje	37	173	770	Greece	77	612	589
Maliq	38	76	490	Italy Port of Durres	78	83	92
Memaliaj	39	6	129	Port of Durres Other Countries	79	0	0
Patos	40	5,249	229	Kapshtice BC Turkey	80	0	0
Total						46,807	46,807

Regarding the external trips estimation, the estimate of volume of goods accessing or leaving the Country by the different border points is based on the registered evolution of the freight volumes at the border crossings. The following table summarizes the evolution of movements of goods at the border points in the last four years by group of commodities.

Table 15: Evolution of the Import & Export freight traffic in the last years

Export	G1	G2	G3	G4	G5	G6
2013	153,495	5,826	1,125,700	1,217,527	905,286	347,362
2014	140,733	8,047	1,901,058	1,669,919	1,175,767	647,346
2015	201,392	11,731	1,537,298	1,450,928	994,622	448,136
2016	449,207	17,661	1,394,324	2,231,803	946,478	511,229
2017	262,378	23,170	1,689,975	1,566,221	910,294	566,673
Growth	14.3%	41.2%	10.7%	6.5%	0.1%	13.0%
Import	**G1**	**G2**	**G3**	**G4**	**G5**	**G6**
2013	1,047,297	111,869	1,629,671	921,618	8,988	1,183,047
2014	1,046,966	99,889	1,624,174	1,071,409	17,829	1,357,593
2015	1,034,540	112,817	1,497,472	969,185	3,077	1,351,613
2016	1,024,336	127,962	1,698,938	905,910	107,799	1,345,185
2017	1,035,620	151,851	1,630,566	1,140,705	659	1,408,395
Growth	-0.3%	7.9%	0.0%	5.5%	-48.0%	4.5%

The growth in imports and exports during the last four years is set in an annual increase in tons transported of 7.5% in exports and 2.3% in imports. From the point of view of the freight value, registered growth is opposite to the growth in volume. The value exported increases 2.6% while the value of imports increases 4.88%.

The expected growth of the import & export movements of freight is directly related to the GDP growth of the country. Thus, the registered growth of import & export is analyzed regarding the registered growth of the economy in Albania in terms of GDP growth. To do so, the statistics from the IMF have been used in the analysis. In the following figure is shown the statistics and projections from the IMF outlook agenda.

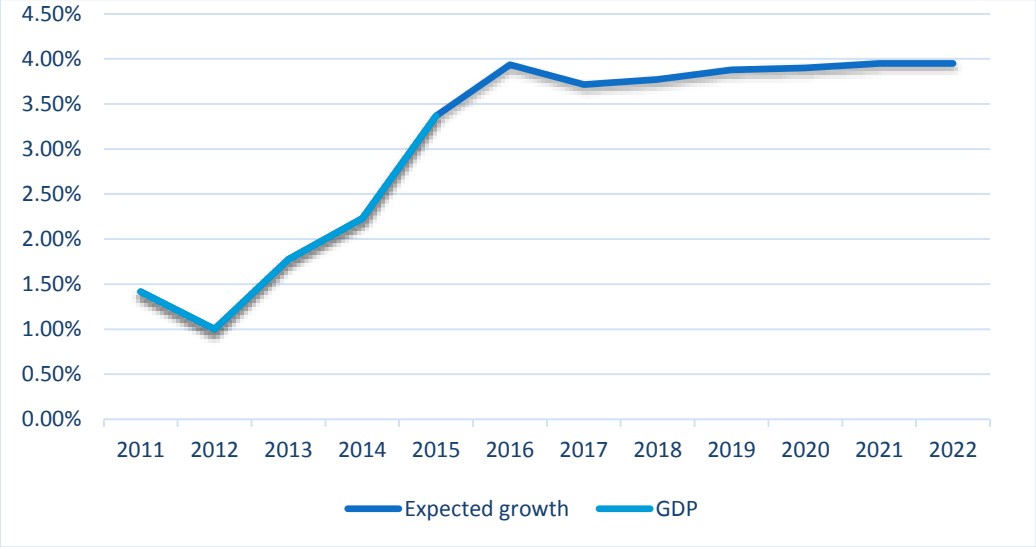

Figure 2: Registered and projections of the Albanian GDP from IMF outlook agenda

By means of a regression analysis between GDP growth and Import/Export growth, obtaining R^2 of 0.74, the resulting growth for exports is set in 5.7% annual and 4.5% in imports for the period 2018 to 2038. The internal production of the country is considered to grow in parallel to the GDP, so in consequence an increase of 3.9% is set in the period 2018 to 2038.

The transit movements between border points are related to the GDP in the neighbour countries. From the same source of IMF outlook agenda, the GDP of the neighbour countries have an average expected increase of 3.1% in the same period so this expected growth is applied to the transit movements. In the following figure is shown the projections from the IMF outlook agenda.

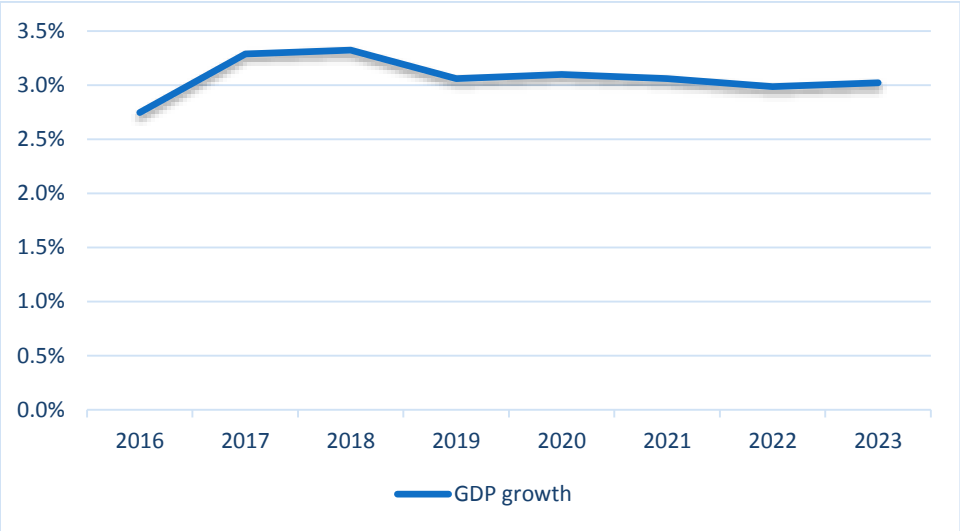

Figure 3: Projections of the Albanian neighbor countries GDP from IMF outlook agenda

2.1.2. Freight Road side Interview

For the Road Side Interviews, The special separated forms were prepared, to obtain cargo data form Lorries and other freighters.

SECOND FIVE YEARS REVIEW OF THE ALBANIAN NATIONAL TRANSPORT PLAN (ANTP3)

ORIGIN DESTINATION SURVEY - FREIGHT TRANSPORT

TYPSA CONSULTING ENGINEERS & ARCHITECTS

1. SECTION
1.1 POINT OF SURVEY
1.2 DIRECTION (N/S/E/W)

2. SURVEYOR:

3. DATE __/__/

4. FORM No.:

5.-	6.-	7.-	8.-	9.-	10.-	TRIP DATA				15. TRIP FRECUENCY		17. CARGO TYPE	18. % LOAD			19. CARGO CATEGORY	
No.	TIME	VEHICLE TYPE 1. Vans & light delivery vehicle 2. Small trucks 3. Lorries (2 axles) 4. Lorries (3-4 axles) 5. Lorries (5-7 axles) 6. Horse+2 trailers	No. OF TRAVELLERS	VEH. PROPERTY (1. Company; 2. Driver; 3. Other)	DRIVER'S GENRE (M: Male / F: Female)	11. ORIGIN Factory, Municipality, Province	12. Departure hour (hh:mm)	13. DESTINATION Factory, Municipality, Province	14. Arrival hour (estimated) (hh:mm)	1. EVERY WORKING DAY 2. TO TIMES A WEEK 3. ONCE A WEEK 4. OCASIONAL	16. How much money (ALL) would you pay to save an hour of travel in better conditions of safety, comfort, etc.?	1. FARMING PRODUCTS 2. MANUFACTURES 3. CONTAINERS WITH PERISHABLES 4. CONTAINERS WITH IMPERISHABLES 5. DIVERSE CARGO 6. LIQUID BULK 7. SOLID BULK	1. FULL LOADED	2. HALF FULL	3. EMPTY	No.	LEGEND 1 Livestock, animal-made products 2 Vegetables, fruits 3 Flour, wheat, corn, etc. 4 Prepared foods, beverages, tobacco 5 Mineral products, cement 6 Chemical industry products 7 Plastic, rubber and related products 8 Leather and related products 9 Wood and wood-made products 10 Paper and paper-made articles 11 Textile and textile articles 12 Footwear 13 Stone-made articles, plaster, ceramics, glass 14 Pearls, precious stones, precious metals 15 Metals and related articles 16 Mechanical and electrical equipment 17 Vehicles 18 Fuel, LPG, etc. 19 Other (specifiy)
1																	
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Figure 4: Road Side Interviews - Freight

Once data collection was ready for all modes (road, rail, maritime and aviation) and related parameters for transport analysis (demography, land use, socio-economic), was undertook a Transport Conceptual Analysis prior to the modelling process. The data corresponding to road network were obtained from ARA and from the survey campaign developed in this project, and the data corresponding to the other modes of transport from relevant stakeholders.
The objective was to reach findings regarding transport key issues, infrastructures performance and current mobility problems as per the received and collected data.

The Transport Conceptual Analysis has been supported by statistical assessment and geo-referenced representations according to the existing infrastructures and the performance of transport over them as per the data collected. The following are illustrative representations of the Conceptual Analysis. The first image shows the actual zoning after the territorial and administrative reform undertaken in 2015, with the new 12 Regions and 61 Municipalities. These two levels will serve as standards for the information provided in further maps.

Some of the information might be organized by the old administrative level of Districts. In this case, the consultant transposed the data to the new administrative format by means of correlations based on the distribution of population between Districts and Municipalities
The next two maps show both the Transport Network and the Transport Infrastructures, such as 2018

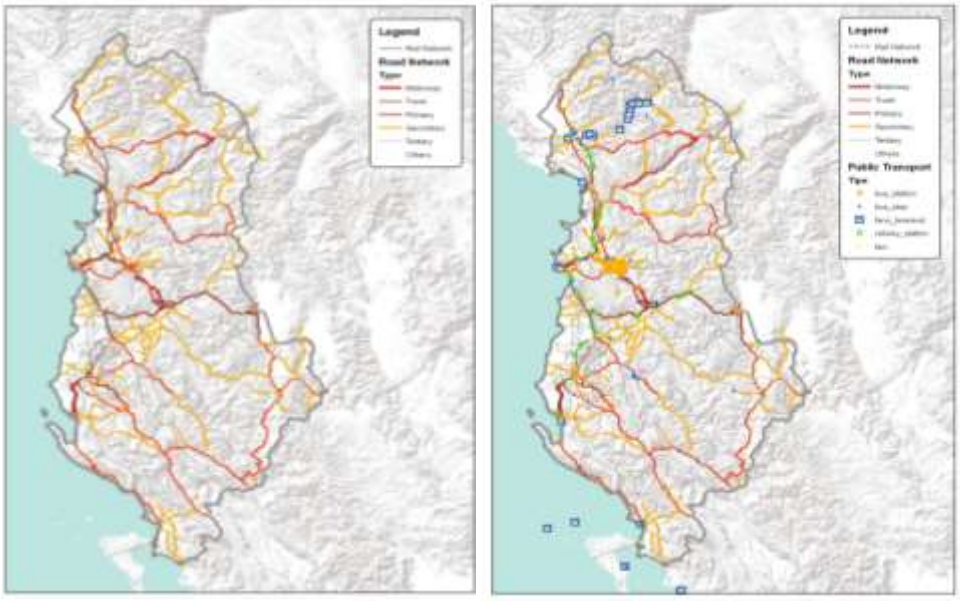

Figure 5: Transport network and Infrastructures 2018

As one of the other essential indicators for characterizing the Country, the GDP is shown below in two maps divided by regions: in absolute terms and per capita:

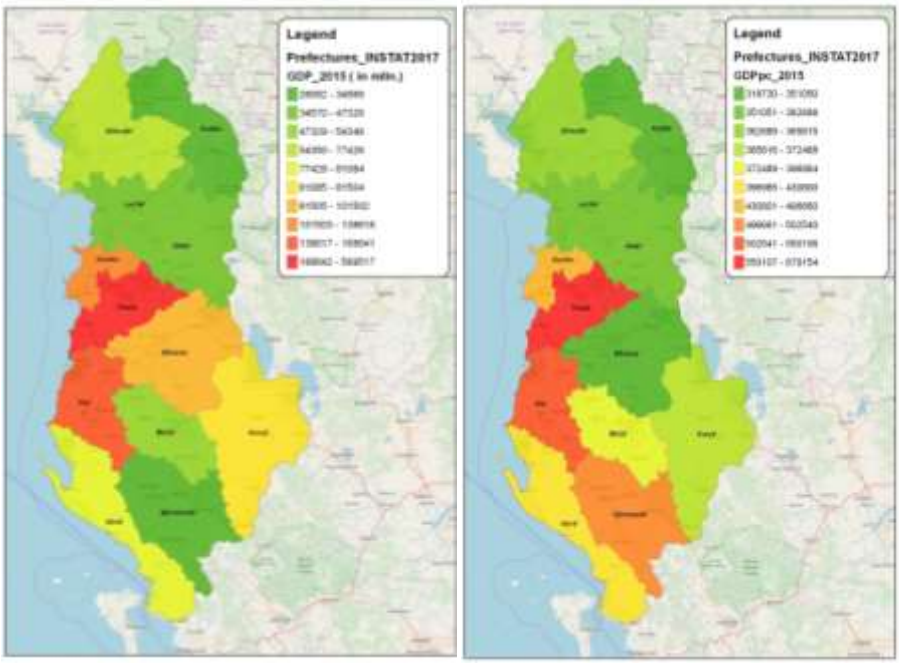

Figure 6: GDP by region and per capita

The trucks count is shown in the table below; with a large concentration in the west side of the Country motivated by the higher develop of the industrial and business fabric. The findings in the RSI section show an unexpected high incidence in the Elbasan corridor and its connection with FYROM. However, under the denomination "trucks" we also have included small trucks and delivery vans, so that unexpected high volume can be explained for that reason.

No	Road segment	IMD-TRUCKS
1	Fushe Kruje – Milot	2861
2	Tirane – Durres	4407
3	Tirane -Durres Rrepa	384
4	Rrepa – Rrogozhine	2072
5	Lushnje – Fier	1922
6	Elbasan – Librazhd	814
7	Tirane - Elbasan	341
8	Shkoder-Hani i Hotit Cross Border	319
9	Gjirokaster – Kakavije Cross Border	165
10	Korce -Kapshtice Cross Border	252
11	Burrel - Klos	599
12	Ura Vajgurore – Berat	648
13	Lezhe – Shkoder	646
14	Milot – Lezhe	829
15	Kamez – Fushe Kruje	1445
16	Vore – Fushe Kruje	2381
17	K. Shkozet – Rrepa	2925
18	Levan – Vlore	841
19	Levan – Tepelene	575
20	Elbasan – Rrogozhine	1070
21	Milot - Morine	837
22	Shkoder Muriqan Cross Border	189
23	Perrenjas - Qafe Thane Cross Border	645

Figure 7: Traffic counts – trucks 2018

In view of the results, we can conclude that some roads are only used by large trucks and some others have a mixed use. The roads only used by large trucks are those pertaining to the border crossing segments. Therefore, the international trade is mainly done by large trucks

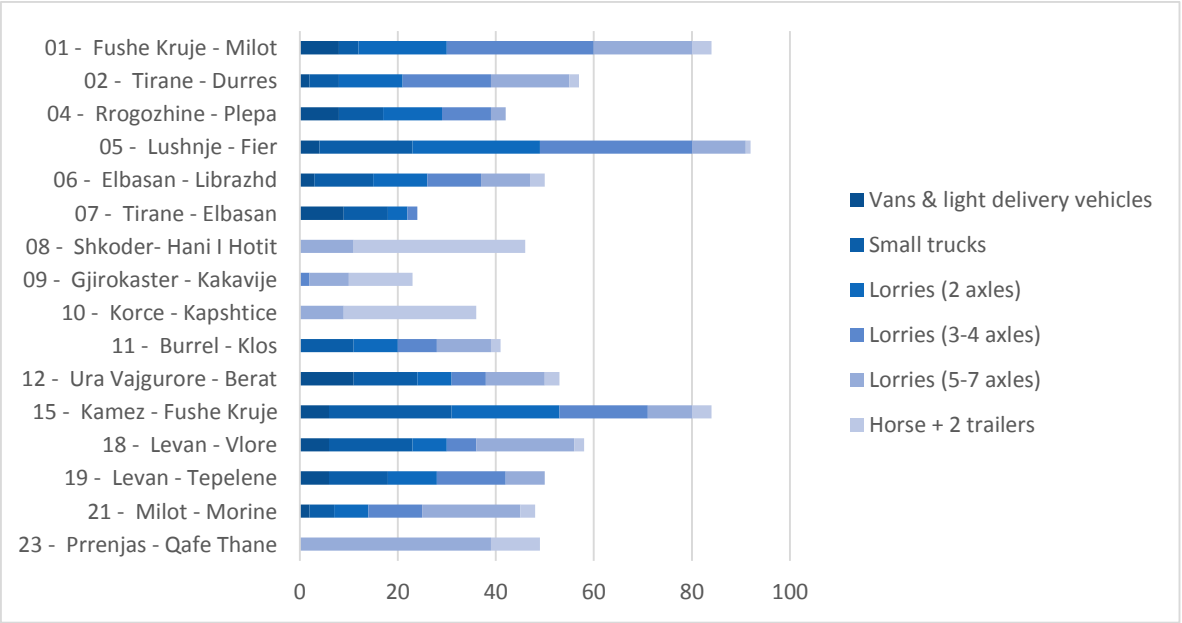

Figure 8: RSI trucks - vehicle types - distribution by surveyed segments

The chart below shows the use of each vehicle by type of trip, distinguishing between national and international origin and destination.

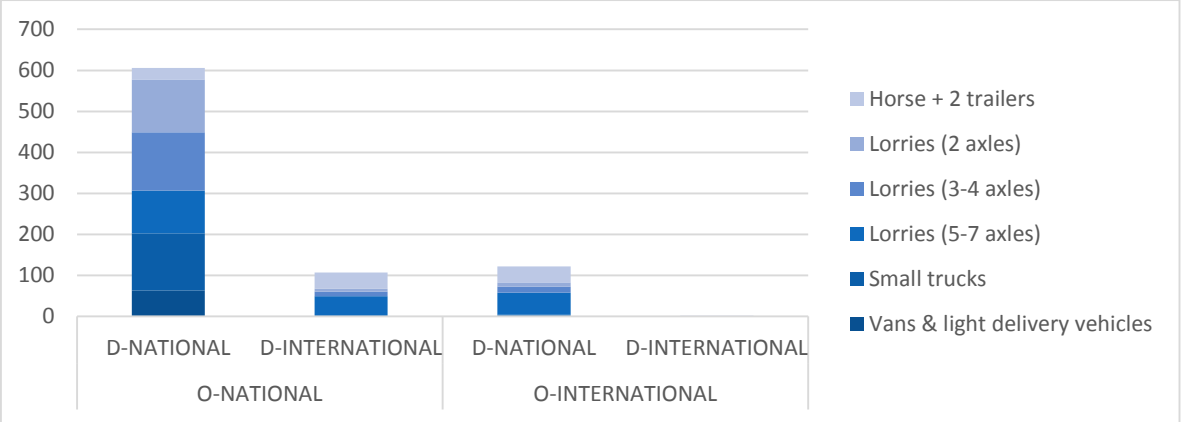

Figure 9: RSI trucks - vehicle types - distribution by OD

It should be noted that 2 vehicles were surveyed with international origin and destination. Both were type 6 (horse + 2 trailers) and were located in segments number 8 (Shkoder-Hani I Hotit) and 9 (Gjirokaster – Kakavije).

With the objective of characterize the OD matrix and its regularity, the frequency of each type of trip is defined below. It can be seen how the national-based trips have a wider spectrum, with trips distributed in each frequency. On the other hand, the international trips that cross Albania through their journey have a frequency concentrated in 1 or 2 times per week. Stands out how the export trips have a larger incidence than imports, with more daily trips, being the imports more identified as occasional. This information might conflict with the socioeconomic information, defining imports larger than exports, but it must be noted that this chart shows relative values, being the total number of importing trucks surveyed bigger than the exporting ones.

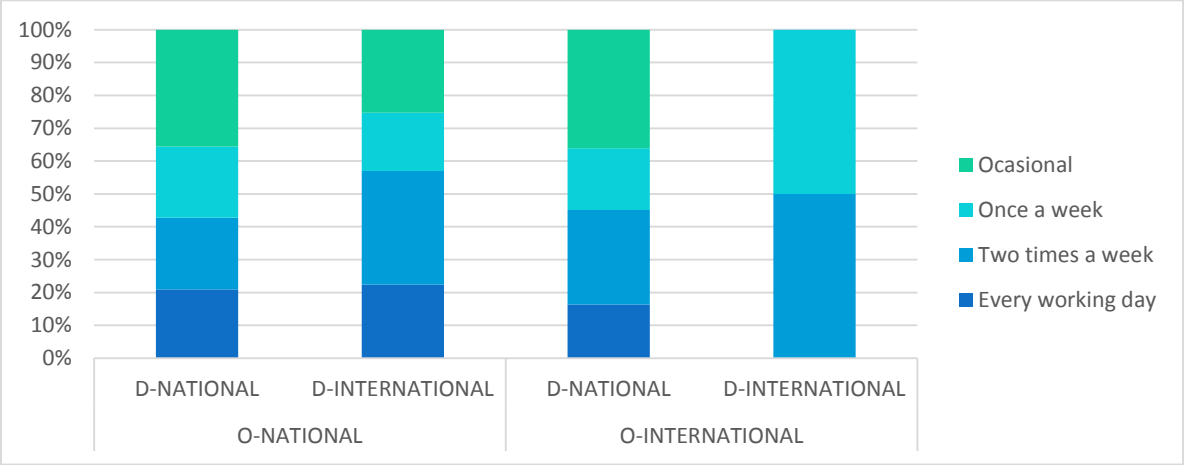

Figure 10: RSI trucks - OD distribution - frequency

In connection with the previous section, the next chart shows the frequency distribution by surveyed segment. The key transport corridor of Tirana-Durres has one of the biggest percentages of "*every working day"* trips, as well as the Lushnje - Fier corridor.

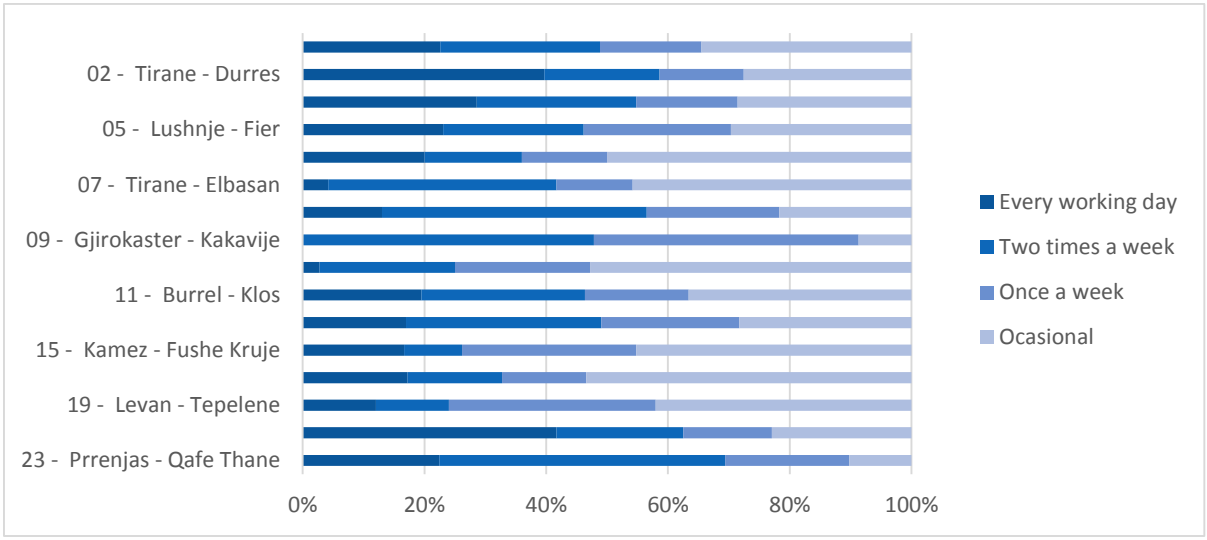

Figure 11: RSI trucks - frequency - distribution by surveyed segments

When analysing the cargo type, the *diverse cargo* stands out as the less frequent; as it is the "catch-all" category and its journeys are occasional services. On the other hand, manufactures and liquid bulk outstand as the most regular trips, among a relative regularity of the rest of types.

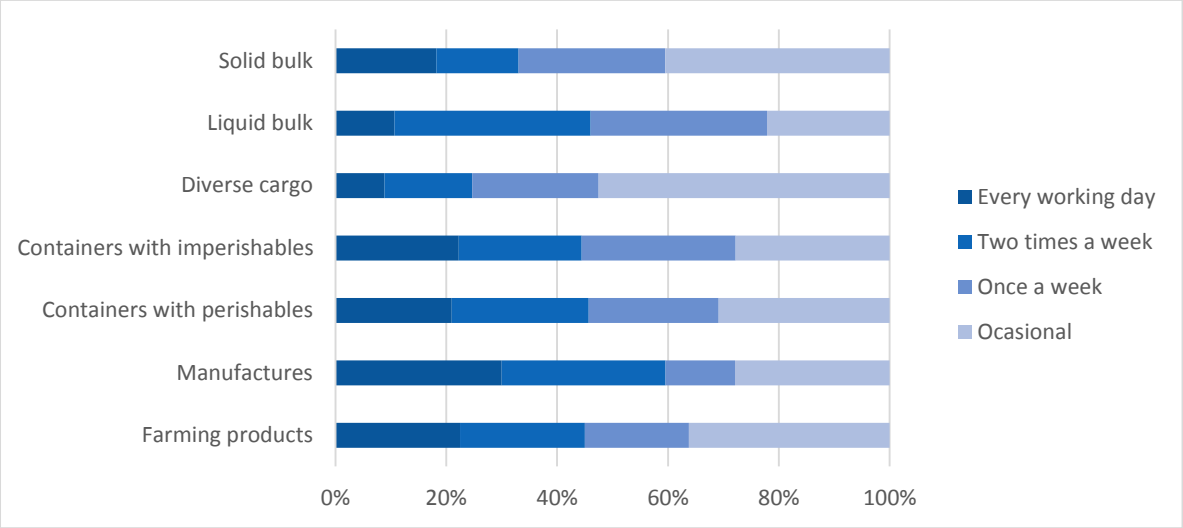

Figure 12: RSI trucks - frequency - distribution by cargo type

This section represents a great opportunity to understand the needs of the truck drivers and companies, by collecting first-hand knowledge and priorities. The first sections to analyze are the list of surveyed segments, and its stands out how the border crossing points are more eager to pay money to improve their trip (segments 10, 21 and 23). It will be further evaluated, but the segments 21 and 23 are one of the more optimized ones in terms of load percentage and have a small empty return rate. Thus, these signs show how these routes are already optimized from the companies' standpoint, so improvement of the network shall be subsequently discussed.

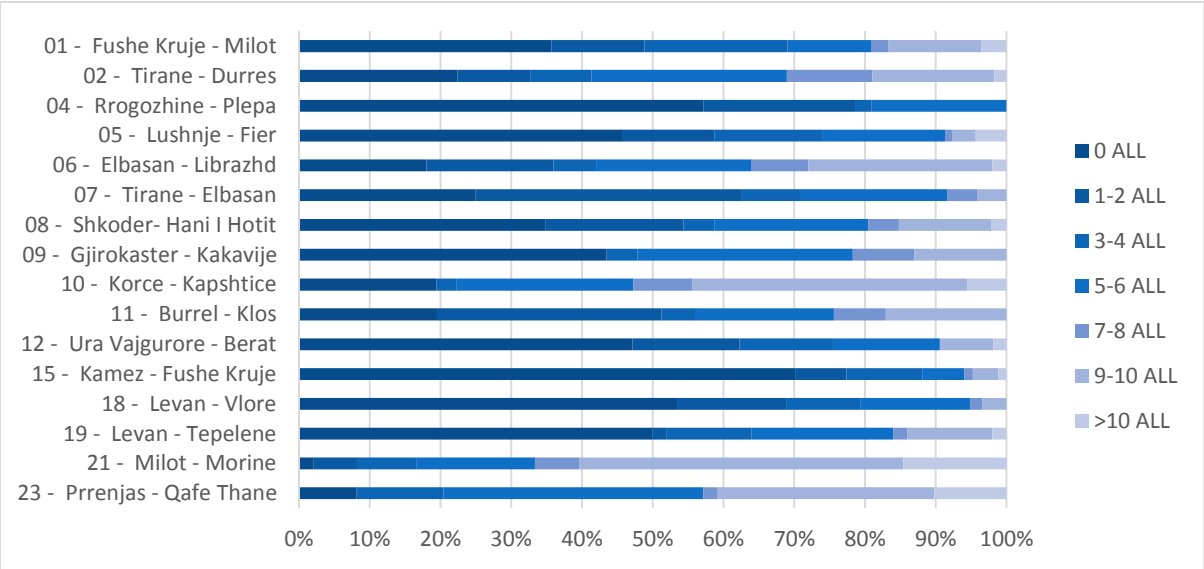

Figure 13: RSI trucks - stated preferences - distribution by surveyed segments [1]

These results must be contrasted with the type of vehicle surveyed, since bigger vehicles are more expectant to invest money in time reductions, being their trips generally larger.

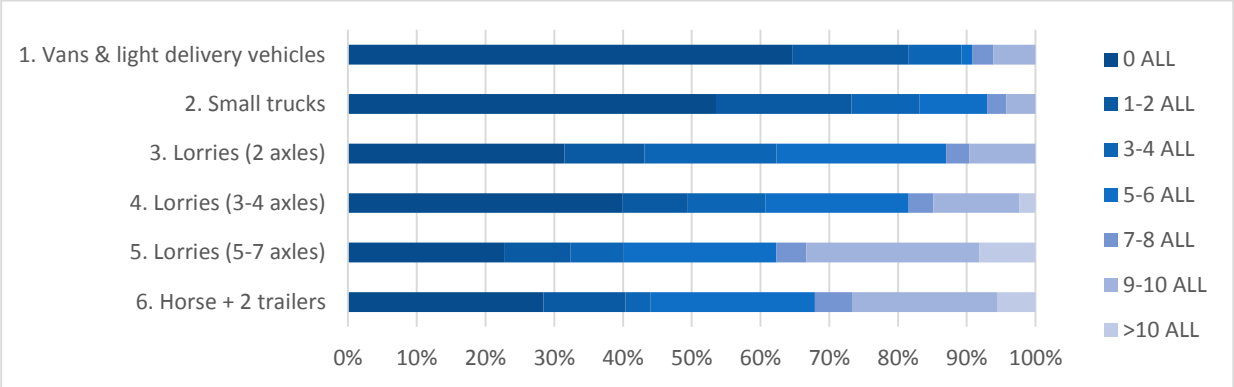

Figure 14: RSI trucks - stated preferences - distribution by type of vehicle

No additional conclusions could be extracted from the frequency of the trip, since their responses were relatively standard, with a slight correlation between incidence and investment preferences.

[1] The results are referred to 100 LEKS. 1 ALL means 100 LEKS, and successively.

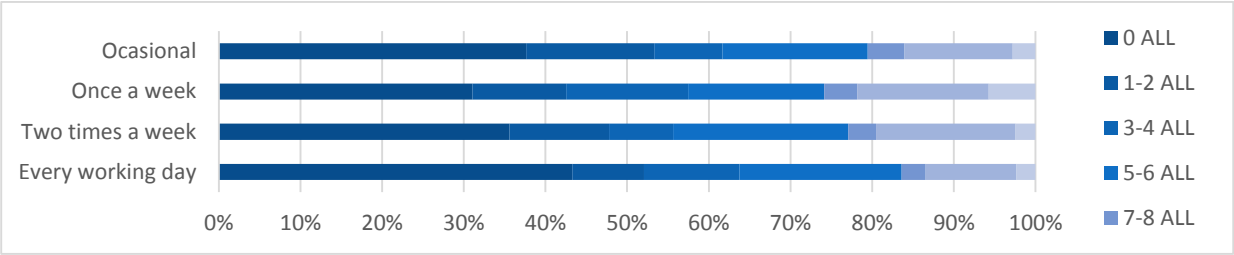

Figure 15: RSI trucks - stated preferences - distribution by frequency

The last analysis was made in terms of cargo type, so the intermodal hubs and logistics centres that are under study could be precisely evaluated.

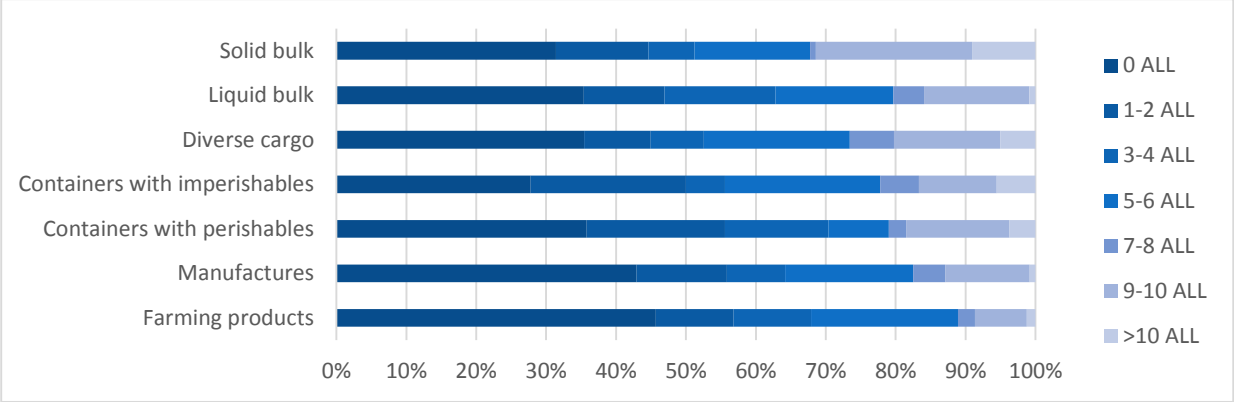

Figure 16: RSI trucks - stated preferences - distribution by type of cargo

Distribution by percentage of load

The percentage of load and empty running rates are important to identify the level of optimization of the Albanian transport system. The inefficient use of trucks leads to too many trucks on the roads and unnecessarily increases the externalities of such vehicles.

Keeping in mind the subsequent analysis of logistic and intermodal hubs, the percentage of load of the vehicles is key to identify opportunities for the implantation of new centres. The next chart shows the empty running rates of the different types of trip, segmented by origin and destination, in Albania.

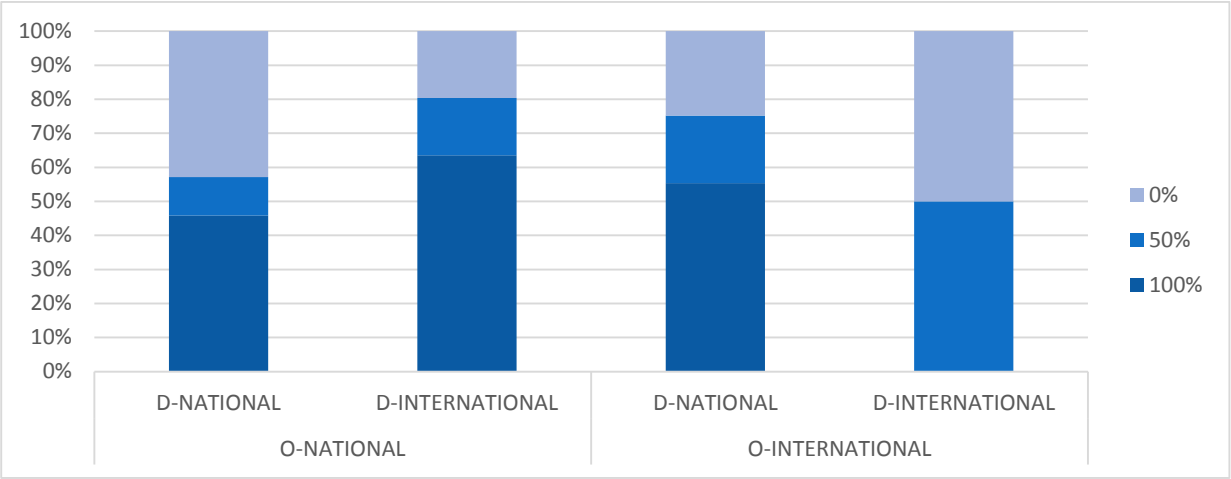

Figure 17: RSI trucks - OD distribution – percentage of load

An optimization of these rates is desirable to improve the efficiency of Albanian traffic of goods, as there is still progress to be made over these ratios.

Albania has a 43% of empty running for national trips, while imports have a 25% and exports a 20%. Compared to the EU-28, a quarter of journeys were performed by empty vehicles (25.4 % in 2016). The share of empty journeys grows to 30.3% for national transport, but is only 14.3% for international transport in 2016. It must be pointed out that the journeys with international origin and destination could not be analyzed in Albania, since only two trucks were surveyed.

The next chart shows the percentage of load by type of vehicle, with bigger trucks (5-7 axles and hose+2 trailers) being more optimized.

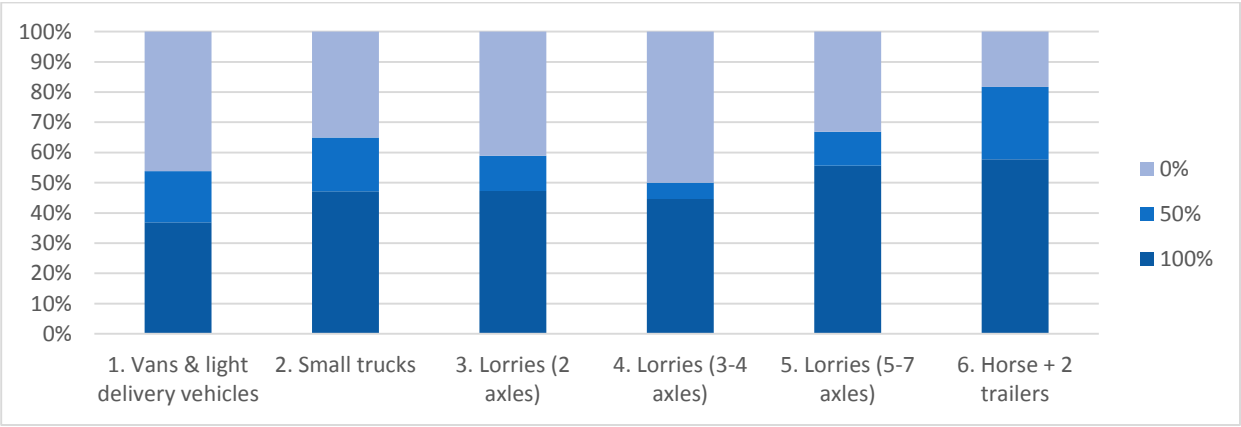

Figure 18: RSI trucks - percentage of load - distribution by type of vehicle

Albanian numbers might be increased by a reflection of the journeys carrying goods imported through ports and construction traffic, which is largely one way. Nevertheless, these rates will be further analyzed. In order to do so, the next chart shows the segments surveyed and its percentage of empty running, so the intermodal proposals can be subsequently optimized.

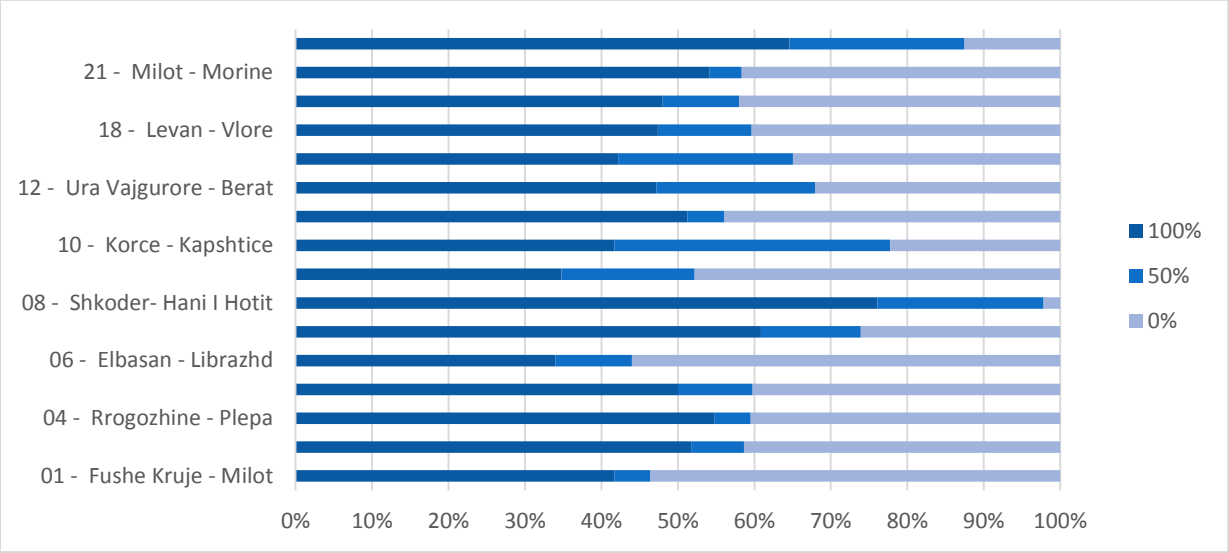

Figure 19: RSI trucks - percentage of load - distribution by surveyed segments

In connection with the next section, the different types of cargo are shown below, organized by their percentage of load. This will also be taken into account for the intermodal analysis, as for example in proposals relating to the optimization of the manufactures journeys, since they have the bigger empty return rate (49%).

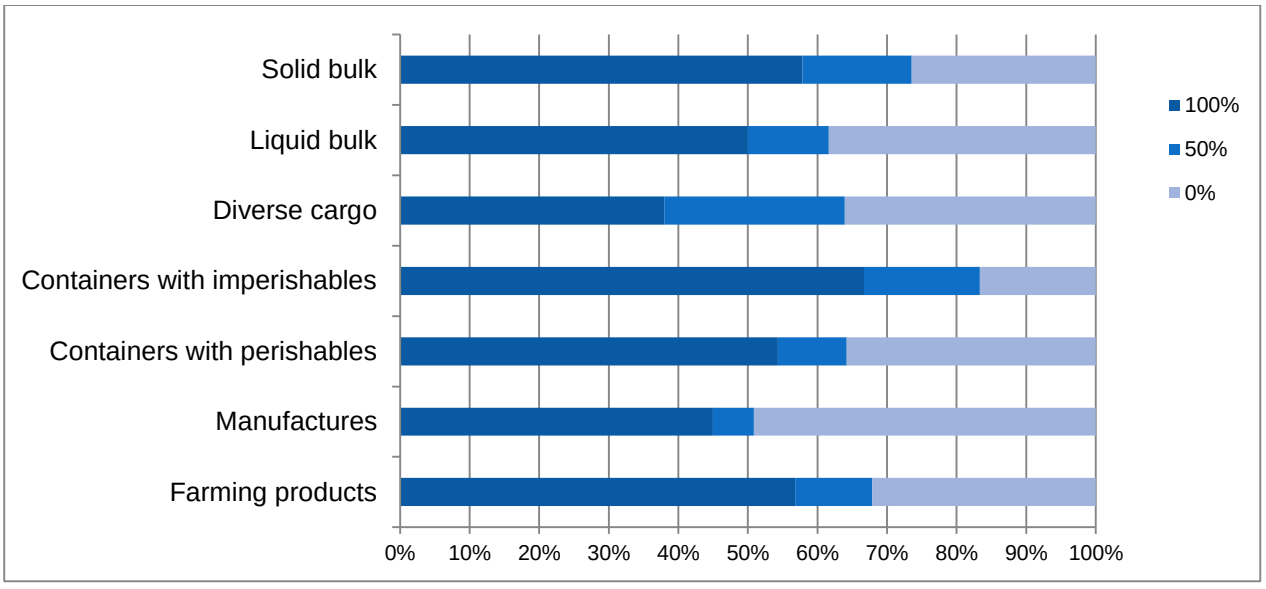

Figure 20: RSI trucks - percentage of load - distribution by type of cargo

Distribution by cargo

This section serves as a brief introduction of the Freight traffic analysis, and its main purpose is to identify the main corridors of the different markets and their characteristics.

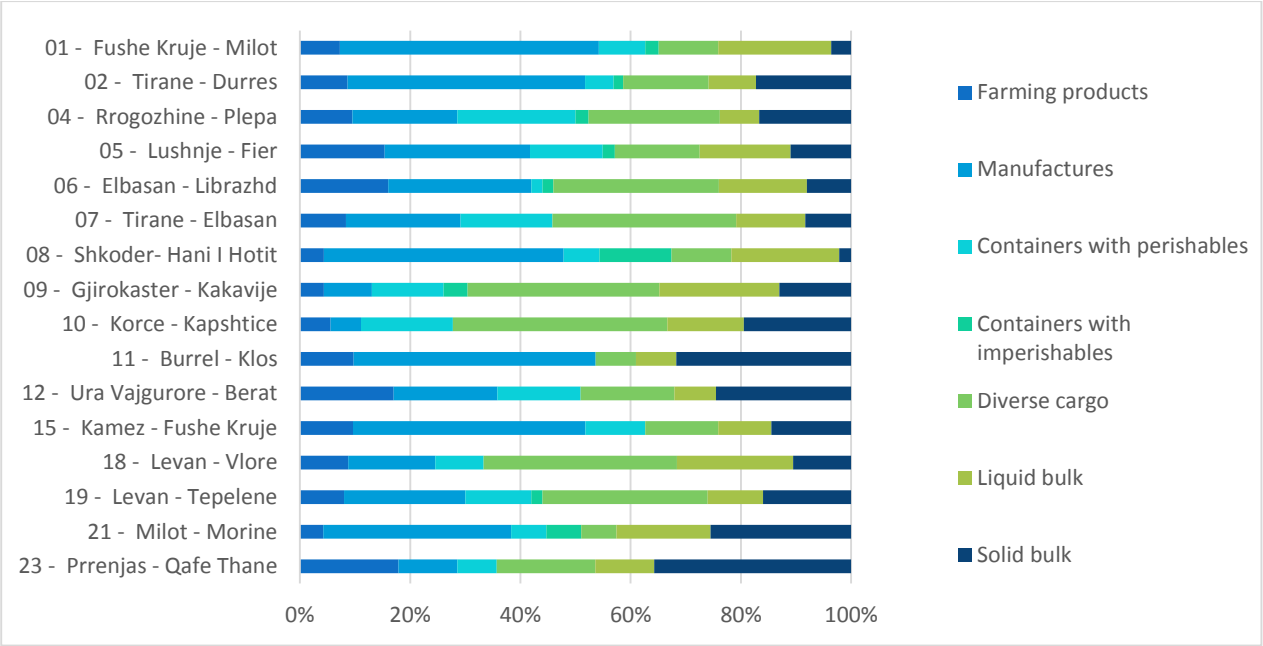

Figure 21: RSI trucks - cargo type- distribution by surveyed segment

The next chart shows the distribution of cargo types by origin and destination. It must be pointed out how the international trips cannot be considered since they were only 2 surveyed vehicles, so the sample is not globally representative.

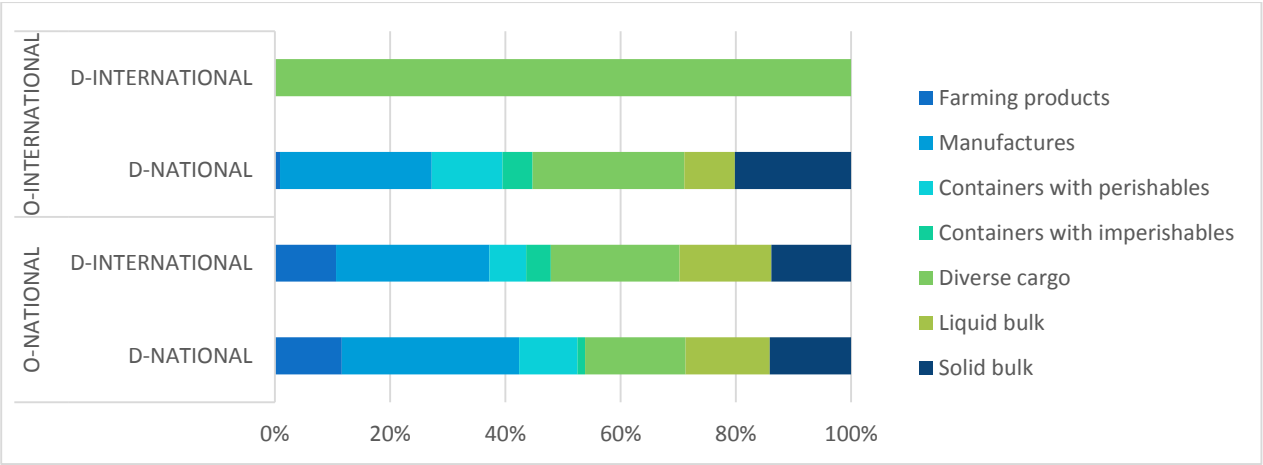

Figure 22: RSI trucks - cargo type- distribution by OD

2.1.3. Traffic forecast – Future Scenarios- based on ANTP3

The following table summarizes the main results for the base year and for the projected year 2038.

Table 16: Total number of tons transported and general performances in the base year and in the year 2038

	Base year 2018 ANTP 3	Year 2038 ANTP 3
Tons transported yearly basis	17, 085,737	40,437,620
Total truck vehicles per day	9,249	20,615
Total trucks x km per day	1,109,071	2,665,675
Average trip length in km.	119.9	129.3

In this version of the Plan, the resulting growth of the number of tons transported is set in 4.4% annually in the period 2018-2038. At the same time the number of trucks x km are foreseen to have an annual growth of 4.5% in the same period due to a continuous increase of the trip distance in 0.04% per year.
One of the main factors for the development of intermodal transport of goods is the establishment and operation of logistics nodes or as it is otherwise known logistics terminals of goods. Terminals are points of exchange within the same modal system or between different modes of transport and ensure the continuity of flows of goods through their transfer.

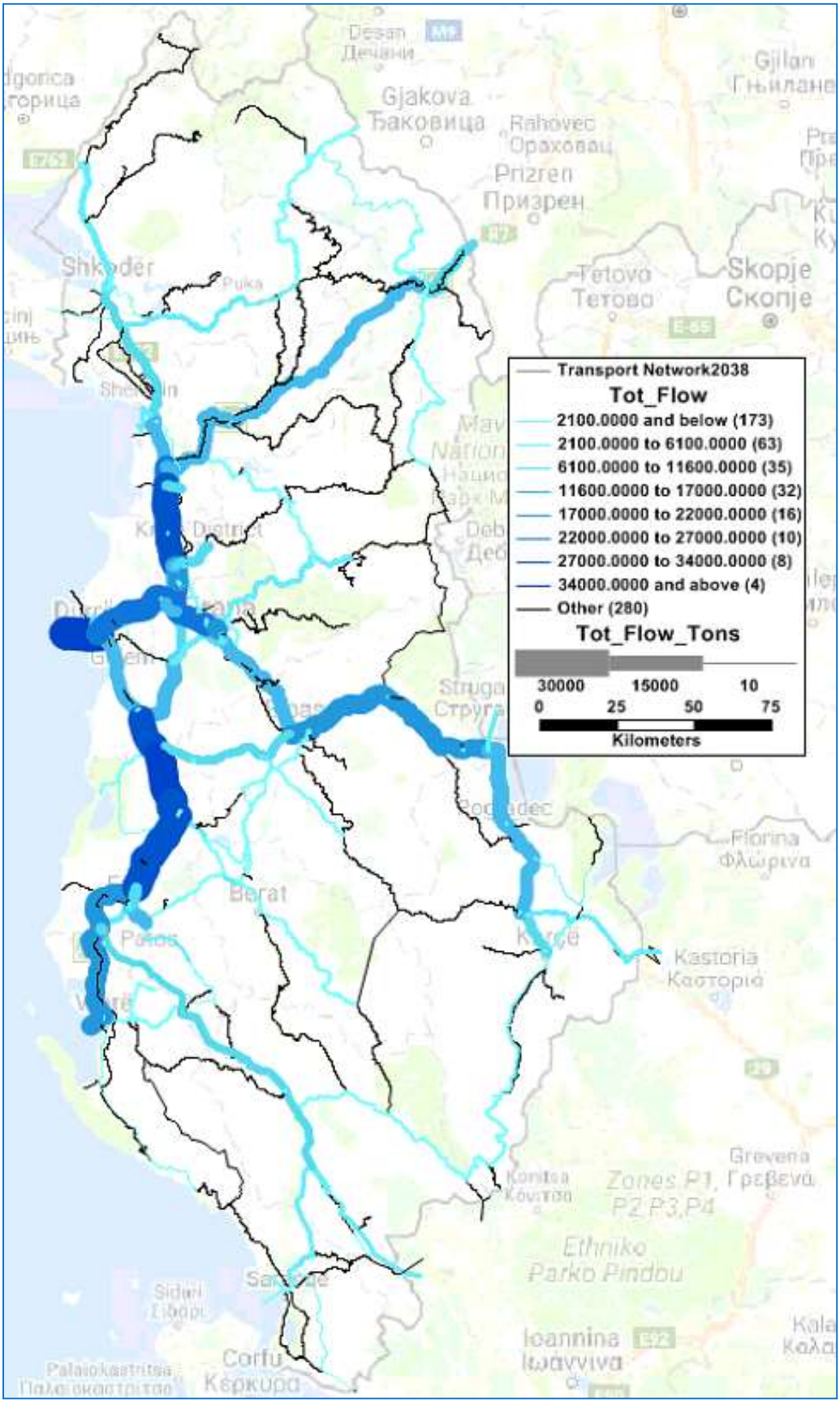

Figure 23: Total daily tons of freight flow in the Year 2038

2.1.4. Albanian National Transport Plan subsectors and interaction

ANTP-3, Sub-sector Plans have common topics and even proposals that involve two or more modes of transport. This is obvious for Intermodal Transport, which is indeed conceived by the combination of modes, particularly in freight transport but also for passengers. The coordination between modes is playing an increasingly role both in terms of infrastructure development and related services. Thereby, nowadays a maritime port extension cannot be conceived without efficient connections with road and/or rail; and also in the metropolitan transport the development of intermodal terminals facilitates passenger travels with relevant time savings and optimization of mobility.

Nevertheless, the positive impacts in terms of intermodality and combined transport for the national economy are particularly tangible in logistics. Thereby, the contribution of the transport infrastructures and measures to facilitate modal interchange are crucial to reduce logistics costs with the subsequent impact on the market and the regional economy. For this reason, the sectoral administrations should be involved in a committed and encompassed policy to improve intermodality. In this way, the ANTP3 make an effort to identify those related projects of different sub-sectors that shall be considered in the context of the Intermodal development. Thereby, particular proposals could be included both within sub-sectors and intermodal strategies. The objective is to reinforce the synergies when coordination among modes is carried out.

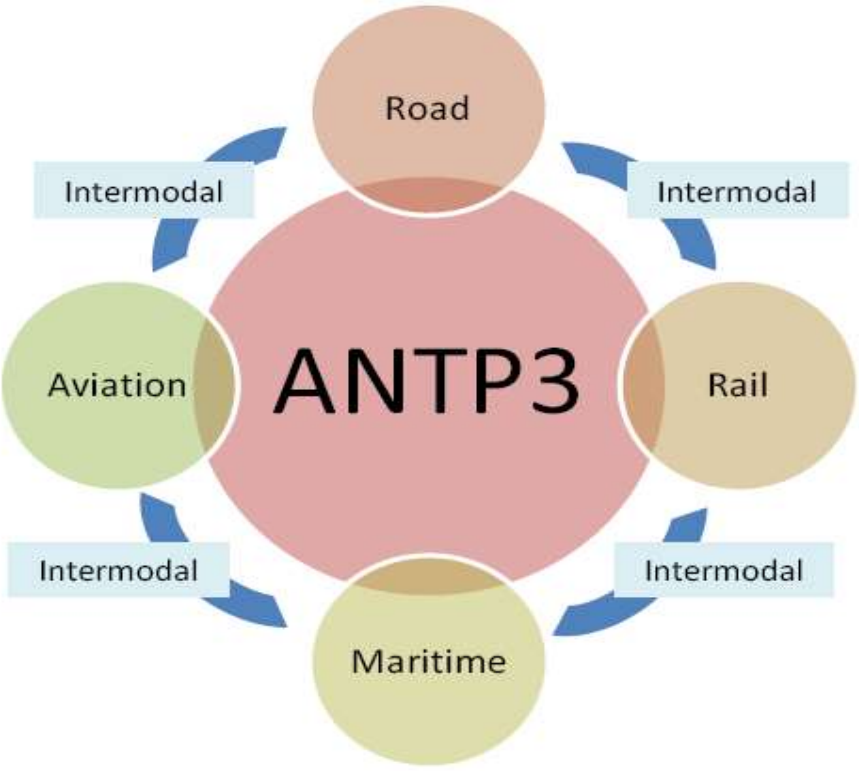

Figure 24: Albanian National Transport Plan subsectors and interaction

The focus shall be on those lacks of connection between sub-sector points and networks that handicap the intermodal transport or entail significant travel times or logistics costs. These lacks and inefficiencies can be detected both in infrastructure connections and in operational issues.

Among the actions proposed we can highlight: coordinate national policy measures to promote intermodal and combined transport, create intermodal logistics centers to facilitate multimodal transport; for instance: construction of the missing link from the western terminal in Durres to the national railway network.

Special attention also paid to the Flagship Axes Initiative and its further application to the Albanian transport.

2.1.3. The Intermodal Transport Sector Action Plan

The subsector policy for the intermodal transport has been taken from the strategy 2016-2020 approved with a Decision of the Council of Ministers:

- Coordinate national policy measures to promote intermodal and combined transport
- Create intermodal logistics centres to facilitate multimodal transport
- Construction of the missing link from the western terminal in Durres to the national railway network
- Define a Multimodal National ITS (Intelligent Transport Systems) Strategy

Table 17: Strategic Priorities of ANTP3. Intermodal and Combined Transport

NTS ACTIONS	Actions Taken for ANTP3 Action Plan		
Strategic Priority 1	**Promote intermodal and combined transport**		
Priority Action INTERMODAL 1	PA reviewed and updated in order to reinforce the creation of an efficient and integrated transport system through intermodality		
	Redefined Priority Action Intermodal I: Coordinate national policy measures to promote intermodal and combined transport	Updated Institutional & organizational Actions	Updated measure. Completion of the National Strategy for the Promotion of Inter-modality and Combined Transport in Albania proposed
Priority Action INTERMODAL 2	Redefined Priority Action Intermodal II: Increase intermodal logistics centres to facilitate multimodal transport	Updated Planning & investment Actions (in reference to the priority action under rail transport):	Updated measure. Continued roadmap and investment pipeline
Priority Action INTERMODAL 3	Redefined Priority Action Intermodal III: Construction of the missing rail links to the intermodal terminals	Updated Planning & investment Actions	Continued measure
Priority Action INTERMODAL 4	Redefined Priority Action Intermodal IV: Define a Multimodal National ITS (Intelligent Transport Systems) Strategy	Updated Institutional & organizational Actions	Continued measure Creation of a creation of a National Strategy to steer the process proposed

Review of the Strategic Priorities of NTS and actions taken for ANTP3. Intermodal and Combined Transport

Ongoing/Compromised Infrastructure Investments

Here are listed some of the infrastructure projects for the mid and long term period 2018-2033.

Logistic centers (Elbasan, Milot, Durres, Vora, Prrenjas, Kukes, Fier)

To improve significantly in the combination and integration of the transport modes, intermodal transport has been identified as one of the main challenges for the whole Western Balkan countries. Since its adoption in 2010, the ANTP2 highlighted that due to increased traffic flows both within and through Albania, in particular on roads, Albania shall start introducing some actions to support environmentally-friendly modes, such as rail or combined transport.

In the Institutional level, the subsector is managed by the following institutions:

- Ministry of Infrastructure and Energy
- Albanian Institute of Transport (IoT)
- Ministry of Finance and Economy (MFE)
- Ministry of Education and Sport (for vocational and professional training)
- The Ministry of Tourism and Environment.

The performance level of Albania in contrast with the region and the global players, it concluded that the gap compared to the Western Balkans leader has been decreasing. Initiatives like the REBIS update listed 18 priority actions to alleviate non-physical barriers in customs and transport policy. 17 of these measures are applicable in Albania and 8 of them deal with intermodal and combined transport (including customs and border crossing barriers).

Regarding the recommendations, the main conclusion to be withdrawn is that Albania should concentrate in developing a multimodal logistics center around the Port of Durres. Furthermore, the Flagship Axes initiative promoted by SEETO in 2013 selected the Corridor VIII + Route 7 (running through Albania) as one of the priority points to improve. It was structured in two phases aiming at the following topics:

Phase 1:

- Infrastructure, identifying the causes for limitation of the transport along the axis on this side.

Phase 2:

- Market access, focusing on the customer needs and multimodal competitive analysis;
- Performance, elaborating the quality, competitiveness and consistency of services;

- Border crossing, elaborating legal, technical and organisational backgrounds for the time delays.

Recommendations

- Make significant progress in meeting UNECE's national policy measures to promote intermodal and combined transport;
- Link Albanian ports with those of neighboring countries. This goal is closely related with several actions on infrastructure already mentioned in this document and in line with Albania's SSPP for Transport, but also deals with logistics development.
- Implement the 8 priority measures proposed by REBIS updating study to address non-physical barriers and dealing with customs, border crossing and intermodal and combined transport. This goal is also closely related with several actions on infrastructure already mentioned.

To meet the Key Challenges for Intermodal and Combined Transport, the Strategic Priorities for Intermodal and Combined Transport identified in the National Transport Strategy 2016-2020 have been reviewed, updated and adopted for ANTP3 when needed. This process has led to establish Strategic Priorities and action development for ANTP3. The result of this process of reviewing and updating is shown in the following tables and sections.

2.1.5. Strategy and Actions Taken for ANTP3 Action Plan

Strategic Priority 1 *Promote intermodal and combined transport*

Reinforce the creation of an efficient and integrated transport system through intermodality

- An efficient transport system, integrated in the region and in the EU network, which promotes economic development and the citizens quality of life.
- Create favorable conditions for the intermodal and combined transport and logistics.
- Attract investments.
- Reduce rail transit times and transport costs.
- Establish joint border crossings.
- Reduce logistics costs.

Priority Action INTERMODAL 1, Redefined Priority Action Intermodal I: Coordinate national policy measures to promote intermodal and combined transport

There are three step roadmap to improve coordination among stakeholders for the correct steering and implementation of a nation-wide intermodal strategy:

- Increase the budget line allocated to Institute of Transport (IoT), to further its role as a public body acting as a research and analytical centre to assist and support the Ministry responsible for Infrastructure and Energy (MIE) and other governmental entities. Hire new staff and undertake capacity-building programmes for the team. Additionally, promote IoT's role as GoA/Ministry responsible for Infrastructure and Energy (MIE) coordinator in order to comply with UNECE's national policy measures to promote intermodal and combined transport.
- Apply the recommendations of the Albanian Sustainable Transport Plan (ASTP) financed by the European Bank for Reconstruction and Development (EBRD) to all policies promoted by the Ministry responsible for Infrastructure and Energy (MIE).
- Drafting of a National Strategy for the Promotion of Inter-modality and Combined Transport in Albania by an international Consultant. A stakeholder dialogue involving the Ministry responsible for Infrastructure and Energy (MIE), local authorities and businesses should accompany the action.

Priority Action INTERMODAL 2, Redefined Priority Action Intermodal II: Increase intermodal logistics centres to facilitate multimodal transport

The Albanian Institute of Transport (IoT), as part of its annual work plan, with Ministry's request, prepared a "Study on regional areas in Albania for the construction of logistic terminals of freight transport", completed in February 2017. This study identifies the need for a minimum two potential locations for construction of intermodal freight terminals - in central north Albania and southeast Albania, in line with railway network and connected to the main Albanian ports. These terminals need to be considered as part of above discussed rail in improvements/rehabilitation on Corridor VIII and Adriatic - Ionian European corridor, part of the SEETO Core Network. These facilities will be considered as part of the investment package required for this project and as such they will be the subject of a feasibility study, cost - benefit analysis and preliminary design.

Upon finalization of PRJ-ALB-TRA-023 Feasibility Study, ESIA and Preliminary design for the construction of two logistics centres in Albania (WB18-ALB-TRA-04) (EIB), the investment pipeline is therefore defined by the following activities in reference to the priority actions under rail transport:

- Review of potential logistics centres (Milot and Elbasan) in the region of Port of Durres and provision of rail access for various projects (less than 5km from Port of Durres and very close to industrial areas on the Durres-Tirana highway), in line with i) the EU Strategy and SEETO strategy to improve multimodal transport between the Port of Durres to the hinterland region (via Corridor VIII and Route 2 – see Actions No. 11 and 25 SEETO Strategic Working Program in Priority Action 15 -), ii) EU Regulation 1315/2013 on multimodal transport with dimension (Rail – Maritime), and iii) national development objectives e.g. establishment of a multimodal transport network.
- Feasibility study for potential logistics centres in Elbasan and Milot.
- Construction of two logistics centres (intermodal dry port, storage 1000 TEU in the first phase) in the Elbasan and Milot areas in respect to the rehabilitation of the railway line. In line with the EU Strategy and SEETO strategy to improve multimodal transport between Port of Durres to the hinterland region (via Corridor VIII and Route 2). In line with national development objectives e.g. establishment of a multimodal transport network. Supports the attractiveness of the railway line.
- Invest or participate (via joint ventures) in hinterland bi-modal logistics centres alongside the corridors, with the aim of establishing seamless supply chains to their ports (hinterland logistics centres should be built up in line with the "Durana" region project). In line with the EU Strategy and SEETO strategy to improve multimodal transport between Port of Durres to the hinterland region (via Corridor VIII and Route 2). In line with the EU Regulation 1315/2013 on multimodal transport with dimension

(Rail – Maritime). In line with national development objectives e.g. establishment of a multimodal transport network.

Priority Action INTERMODAL 3, Redefined Priority Action Intermodal III: Construction of the missing rail links to the intermodal terminals

Planning & investment Actions

- The aim is to firstly undertake the construction of the missing rail links link from the western terminal in Durres to the national railway network, after that, the connection of the new hinterland bi-modal logistics centres alongside the corridors shall be undertaken.
- For the Durres connection, the public tendering (Durres Port Authority) is already ongoing. The railway link of the western terminal to the Albanian national rail network with the aim to increase the attractiveness of the port and the hinterland transport by rail is ready for the selection of investment sources, including private joint ventures.
- As said, the project is ongoing for preparing the ToR. The beneficiary has already applied to increase the necessary financing from the EU.

Priority Action INTERMODAL 4, Redefined Priority Action Intermodal IV: Define a Multimodal National ITS (Intelligent Transport Systems) Strategy

- According to the implementation of a sound and functional network of ITS systems, the preparation of a National Strategy is the main enabling factor for effective ITS deployment. The institutional set-up needs to be in place outlining the scopes and roles of the various public and private stakeholders at the regional and national levels.
- In alignment with Directive 2010/40/EU of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the fields of road, rail and maritime transport modes, the drafting of a specific Strategy by an international Consultant was requested to cover aforementioned aspects including interfaces between modes
- To undertake this task, in view of national regulatory bodies and institution on research and development of innovation, the Council of Ministers approved the Decision no. 710, dated 1.12.2017 on the adoption of the National Strategy for Science, Technology and Innovation. The National ITS Strategy could be framed in this decision.

The required undertakings involve a stakeholder dialogue involving the Ministry responsible for Infrastructure and Energy (MIE) and the traffic enforcement authorities should accompany the action. The ITS Strategy will take into account the strategic needs, budget commitments and systems already in place with regard to ITS for roads, ERTMS for railways and VTMIS for the maritime transport mode. The Strategy will also include the implementation of two ITS pilots in the road core network.

The steps already taken include the creation of a working group on planning the deployment of ITS/ERTMS in the WB6 with relevance on the Guideline on planning the ITS (art.10) and advisory group on the ITS. Within this line of action, a project that works on the Framework for implementation of ITS on the TEN-T Core/Comprehensive Networks in WB6 (CONNECTA-TRA-CRM-REG-03) already kicked-off. The aim of this Connecta sub-project is to provide a strategic framework for the ITS (ERTMS, ITS, RIS, VTMIS, e-freight) and IT system (e–documents, interfaces etc.) deployment in the SEE through targeted action plans for each mode and their interfaces.

Despite the progressive implementation of ITS measures in accordance with the EU Directives, the creation of a National Strategy to steer the process is of utmost importance.

2.1.6. Investment Plan for intermodal and combined transport

This Plan is focused on the enhancement of the actual assets of the transport network and selecting the most feasible projects to invest in, creating a priority ranking. In terms of freight transport, one of the priority actions to be undertaken is the establishment of a complete network of multimodal hubs where the freight flows can be organized, hence optimized. The following cities or areas are proposed, with their reasons being addressed subsequently.

Figure 25: Intermodals Centers proposed

Port of Durres

This shall be one of the main multimodal terminal of the Country. Given the high rates of growth in the Durres Port, the Hinterland shall have an important logistic hub where the flows coming from and to the Port can be organized and optimized.

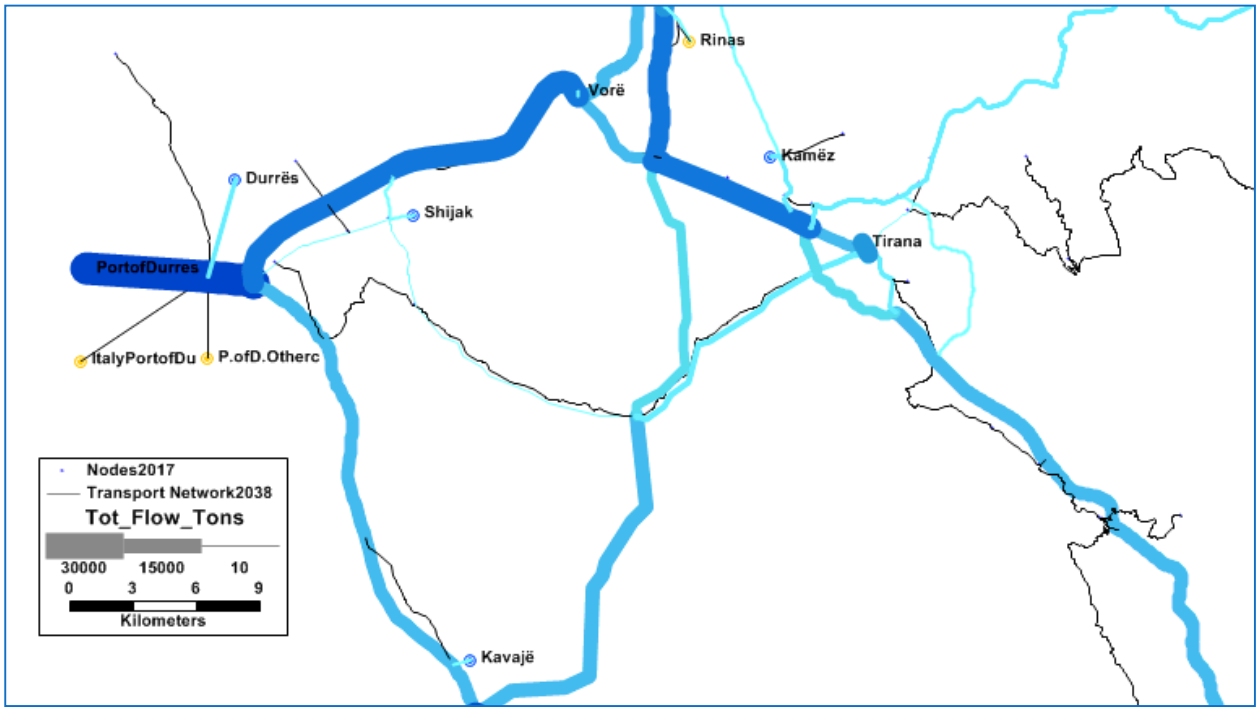

Figure 26: Durres area - freight flows - 2038

Elbasan

Given the high development of the trade relations with FYROM and Greece, Elbasan can be a key node to establish a intermodal centre, since it has rail station (pending to be upgraded) and it has connections with Rrogozhina and Tirana. Being in that strategic location, it could centralize these flows and redistribute the trucks goods.

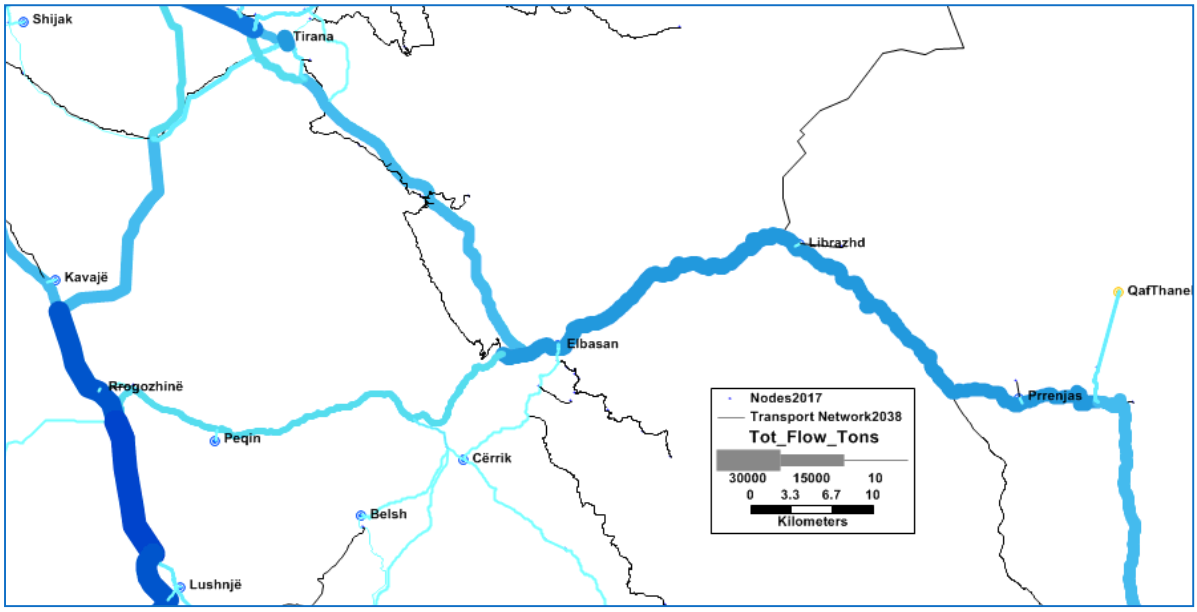

Figure 27: Elbasan area - freight flows – 2038

Milot

This logistic centre will be in charge of agglutinating the flows coming from the highly forecasted Kosovo Corridor, along with the Montenegro trades.

Figure III - 1. Milot area - freight flows - 2038

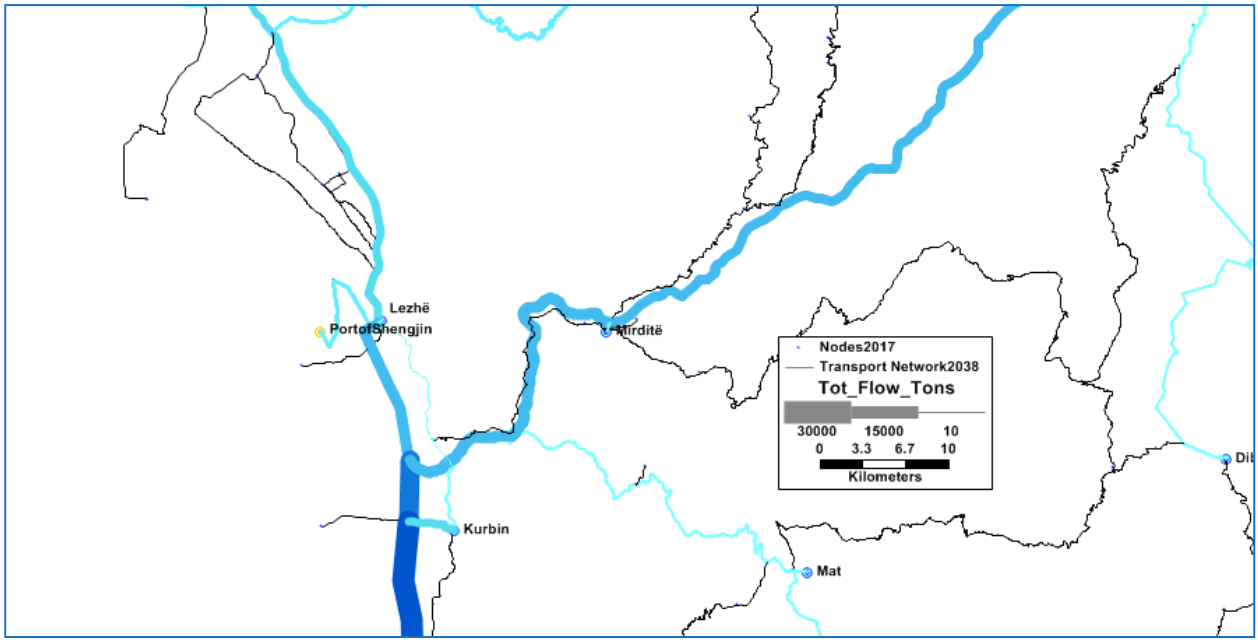

Figure 28: Milot area - freight flows - 2038

Vora

This logistic centre will need further and deeper analysis to find out its feasibility, due to the short distance to the already proposed centres of Durres and Milot. Nevertheless, the strategic situation of Vora justifies its consideration, being in the junction of three main axes (SH52 in the north, SH2 to Tirana to the east, SH2 to Durres to the west). It will also have a fourth axis heading south in the long term (Kashar-Ndroq). Moreover, the railway network reaches the Vora area from three different axis.

Figure III - 2. Vora area - freight flows - 2038

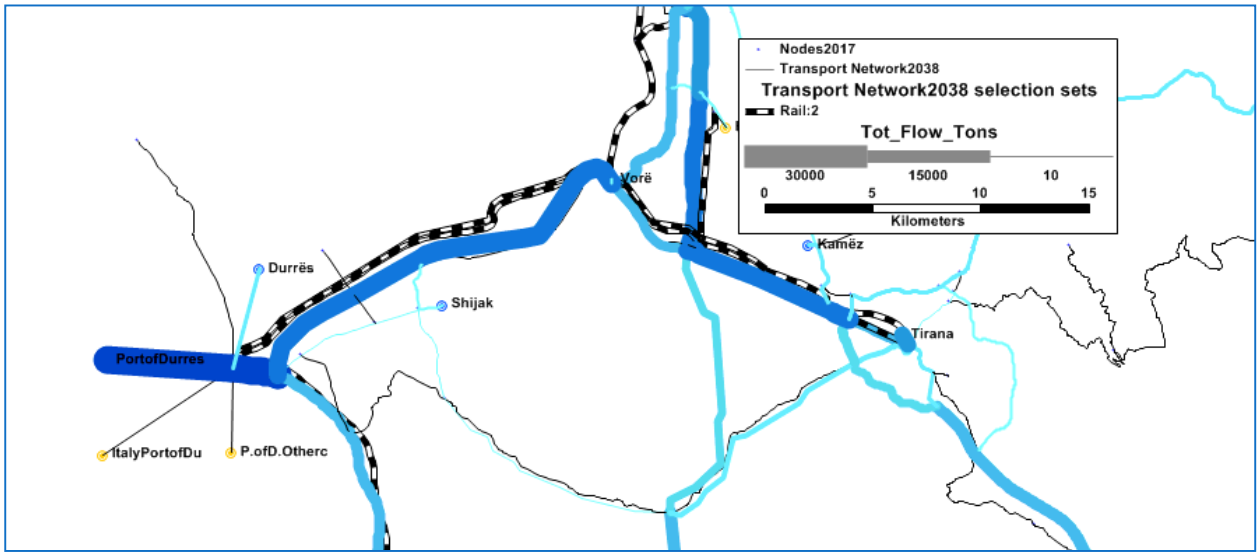

Figure 29: Vora area - freight flows - 2038

For these reasons, the Vora logistic hub could be one of the main centres of the country, combining with the Durres and Milot centres.

Prrenjas

This logistic centre is proposed due to the location, close to the border cross with FYROM. It has large forecasted projections for freight, so it will be the main centre to organize all the international trades with FYROM and Greece. Moreover, after the rehabilitation, it will have a rail station that could be connected to it.

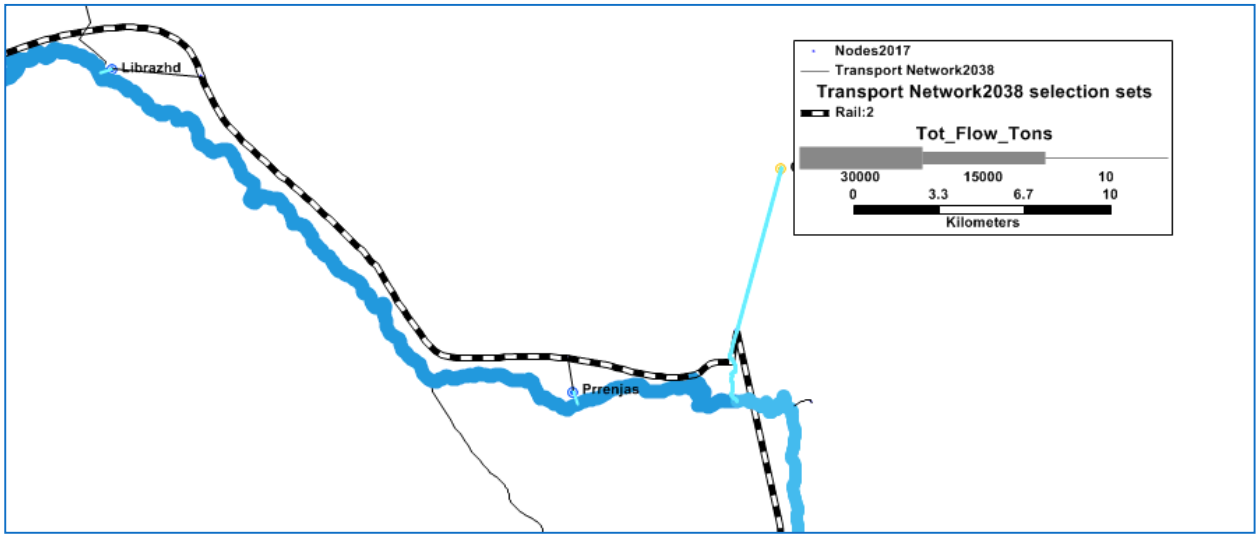

Figure 30: Prrenjas area - freight flows - 2038

Kukes

This centre is justified after the large freight projections given to the Kosovo border cross. The big distance between Kukes and Rreshen shows sufficient ground for the establishment of this logistic centre, being able to redistribute the goods along the Kukes area.

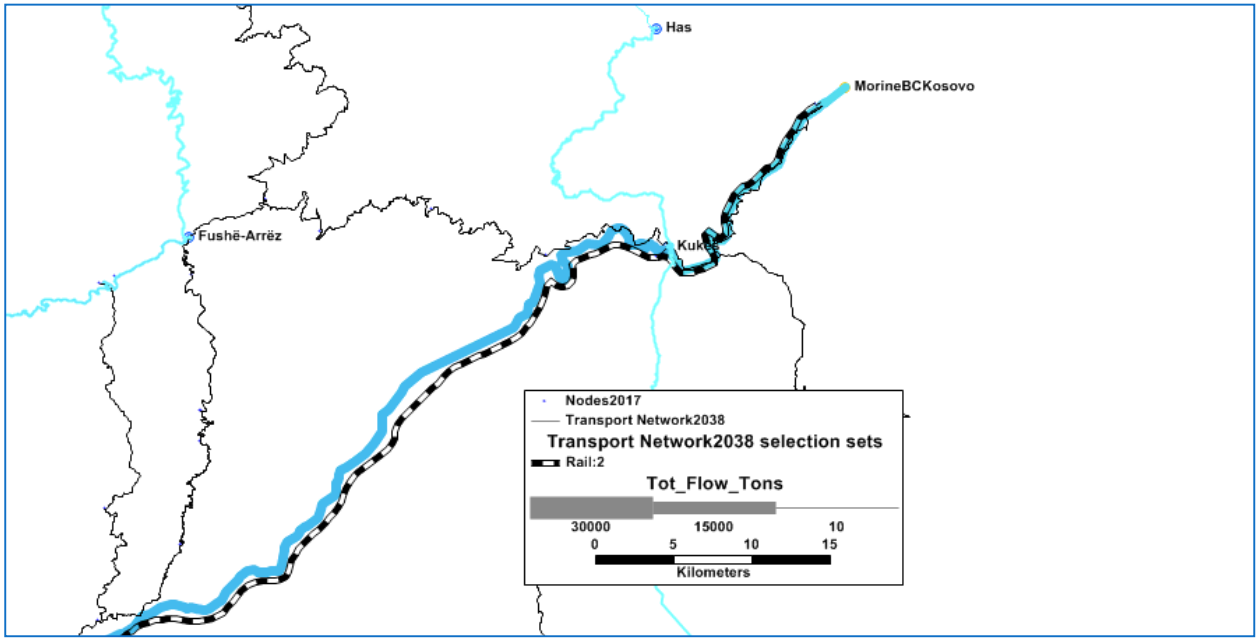

Figure 31: Kukes area - freight flows – 2038

Fier

This centre will aggregate the flows regarding the southern region of Albania. Having three (to be upgraded) rail axes gives it a competitive advantage, and the connection with the Vlora Port is also important.

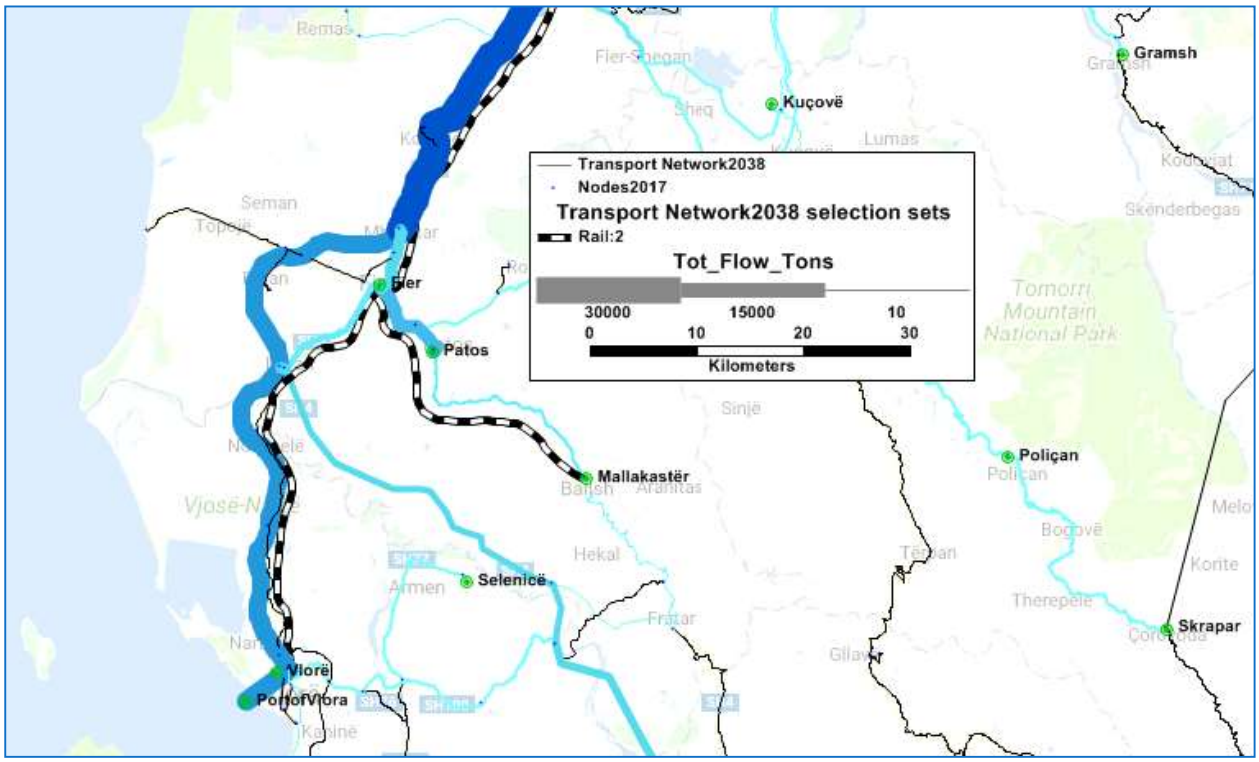

Figure 32: Fier area - freight flows – 2038

Rail connection with the Port of Durres (container terminal)

The forecasted freight flows for 2038 defines the Port of Durres as one of the centroids with the biggest amounts of tons, both as Origin and Destination. Currently, the railway only reaches the city, but has no railway branch to the container terminal. The containers (TEUs and FEUs) are the most likely freight format to be transported by railways, having a standard size and being scalable. For these reasons, a railway branch entering the Durres Container Terminal is fully justified. Moreover, the possibility of establishing the proposed *Port of Durres multimodal terminal* must be taken into account.

Figure III - 3.

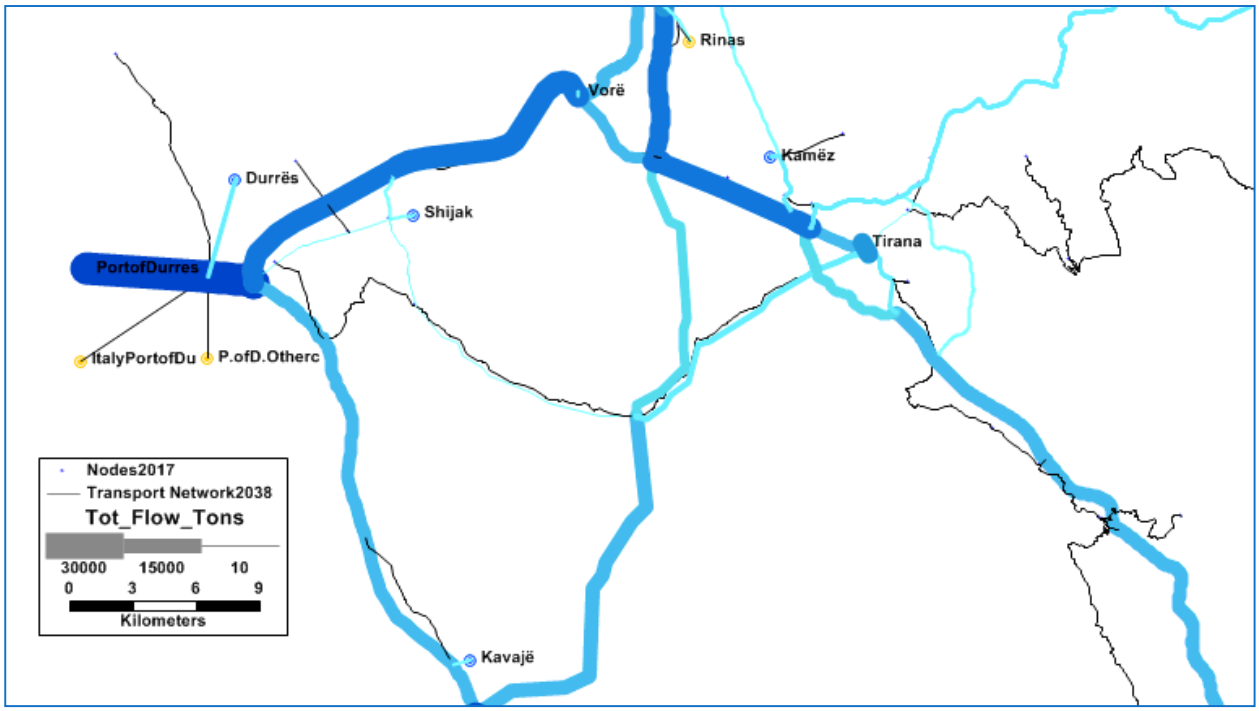

Figure 33: Port of Durres area - freight flows - 2038

Rail connection with Porto Romano (Fuel transport) and to the Energy and Industrial Park adjacent to it.

Porto Romano, placed north to the Port of Durres Container terminal, should also be connected to the railway network for the same reasons as the Container Terminal. In addition, the existence of the energy and industrial park adjacent to it justifies the investment to be assigned to this zone, due to its economic potential development.

2.1.7. Summary of Investment Plan

As a result of this extensive analysis of the surveys carried and results of the transport model, the following Investment Plan is proposed.

The information shown in the table below is their budget, the tentative time frame for the implementation, the level of prioritisation (high, medium or low), possible sources of funding, stakeholders involved (stakeholders in charge of implementing the projects) and inter-dependence with other programmes or general comments.

Type of investment	Budget (M EURO)	Time frame	Level of prioritisation	Sources of funding	Short Term	Medium Term	Long Term	Stakeholders involved	Inter-dependence / Comments
ROAD TRANSPORT									
The Adriatic – Ionian Highway (Route 2b/Corridor VIII, Route 2c)									
▪ *Thumana – Kashar / Vora road (Construction 20.4 km)*	225	2019-2022	High (92 points in WBIF Scoring Criteria)	PPP	90	135		MIE/ARA	SEETO, WBIF, NSPP
▪ *Tepelena bypass (3.5 km)*	19	2018-2020	High (84 points in WBIF Scoring Criteria)	Medium Term Budget Programme	19			ARA	SEETO, WBIF, NSPP
▪ *Construction of the Lezha - Muriqan Road*	208	Medium term	High	IFI		208		MIE/ARA	
▪ *Milot - Balldren (doubling) road including Lezha bypass road*	140	2019-2021	Medium (Lezha by pass 78 points in WBIF Scoring Criteria)	PPP	56	84		MIE/ARA	SEETO, WBIF, NSPP
▪ *Tirana bypass (Construction 22 km)*	133	Detailed Design 2018-2019	High (92 points in WBIF Scoring Criteria)	WBIF		133		MIE/ARA	SEETO, WBIF, NSPP

Type of investment	Budget (M EURO)	Time frame	Level of prioritisation	Sources of funding	Short Term	Medium Term	Long Term	Stakeholders involved	Inter-dependence / Comments
▪ *Gjirokaster bypass (8.7 km)*	6.8	2019	High	State budget	6.8			MIE/ARA	NSPP
▪ *Fier bypass*	37	2018-2019	Very High	EBRD/EIB	37			ARA	NSPP
SEETO Route 7 Nis – Pristina – Durres									
▪ *Rreshen – Milot upgrade (doubling)*	64	Medium term	High (84 points in WBIF Scoring Criteria)	IFI/PPP		64		MIE/ARA	WBIF, NSPP
▪ *Bridge and tunnel in the Morine – Kukes segment*	15	2018-2021	High	PPP	15			MIE	SEETO, NSPP
Corridor VIII Tirana-Elbasan									
▪ *Completion of Tirana Elbasan Road*	50	2019	Under construction	IDB, Abu Dhabi Fund, OPEC	50			MIE, ARA	NSPP
▪ *Construction of Kukes Qafe Plloce Road Lot1-3*	80	2019	Under construction	IDB, Saudi DF	80			MIE, ARA	NSPP
▪ *Elbasan bypass*	50	Detailed Design 2019-2020	High	Italian Cooperation for Development		50		ARA	NSPP
▪ *Upgrade of Korça – Kapeshtice*	50	Medium term	Medium	State budget		50		ARA	NSPP

Type of investment	Budget (M EURO)	Time frame	Level of prioritisation	Sources of funding	Short Term	Medium Term	Long Term	Stakeholders involved	Inter-dependence / Comments
▪ *Upgrade of Elbasan – Qafe-Thane*	250	Long term	Medium	State budget			250	ARA	NSPP
Albanian National Road Network									
▪ *Vlora Bypass Road*	36	2019-2021	High	BEI, EBRD, EU	36			ARA	NSPP
▪ *Reconstruction of the Vlora River Road*	110	2017-2021	High (94 points in WBIF Scoring Criteria)	Medium Term Budget Programme + SFD	60	50		ADF	WBIF
▪ *Construction of the Arbri Road*	271	2018-2023	High (92 points in WBIF Scoring Criteria)	PPP	108.4	162.6		MIE/ARA	WBIF, NSPP
▪ *Construction of Kardhiq - Delvine (Saranda) Road*	74	2018-2021	High	Medium Term Budget Programme	74			ARA	NSPP
▪ *Reconstruction of Tirana-Durres road on the direction Tirana-Ndroq-Plepa*	17	2019-2020	High	PPP	17			MIE/ARA	NSPP
▪ *Completion of Tirana Outer Ring Road (Northern section)*	200	2019-2023	High	State budget	20	80	100	MIE/ARA	NSPP

Type of investment	Budget (M EURO)	Time frame	Level of prioritisation	Sources of funding	Short Term	Medium Term	Long Term	Stakeholders involved	Inter-dependence / Comments
▪ *Permet-Skrapar*	130	Medium term	Medium	State budget		130		MIE/ARA	
▪ *Korça Erseke Lot 2*	18	Short term	High	State budget	18			MIE/ARA	NSPP
▪ *Kashar-Rrogozhina motorway*	215	TBD		Toll road				MIE	NSPP
▪ *Widening Tirana Durres Highway*	170	2019-2021	Very high	Toll road				MIE	NSPP
▪ *Orikum-Llogara*	43	2019-2021	High	PPP	43			MIE	NSPP
▪ *Vlora-Saranda road connection*	200	Long term	Low	State budget			200	MIE, ARA	NSPP
▪ *Tirana-Fushe-Kruje Road*	80	Long term	Low	State budget			80	MIE, ARA	
Maintenance									
▪ *Annual Investment for road maintenance (Primary and Secondary Roads)*	100	2017-2022	Very high	WB, GoA	100			ARA	NSPP
URBAN TRANSPORT									
▪ *New Bus terminal in North West entrance of Tirana*	18	Short term	High	State budget and Municipality budget	18			MIE, Tirana Municipality	

Type of investment	Budget (M EURO)	Time frame	Level of prioritisation	Sources of funding	Short Term	Medium Term	Long Term	Stakeholders involved	Inter-dependence / Comments
▪ *New tramway in Tirana*	30.112	Long term	High	EBRD and State budget	0.112		30	MIE, Tirana Municipality	Concept project for the PTT - Train Station Tirana. Law N 3/2018 dt. 25.01.2018
RAIL TRANSPORT									
On the extended TEN-T Comprehensive network									
▪ *Construction of the new railway Pogradec- Korça – border to Greece (CBC Railways)*	151.35	2018-2029	High (96 points in WBIF Scoring Criteria)	Interreg, IPA and EIB	0.350	75.5	75.5	MIE, AR	WBIF, NSPP
▪ *Rehabilitation of the railway Durres-Pogradec-Lin and construction of new railway link to the Macedonian border (CORRIDOR VIII) (the existing 151 km Durres-Elbasan-Pogradec and a new 2.8 km Lin-border with FYR Macedonia)* Comprehensive Network Rail CORRIDOR VIII	206.72	Technical Assistance: 04/2017-11/2018 Estimated Investment Q1 2020-Q3 2021	High (98 points in WBIF Scoring Criteria)	WBIF and EIB	0.720	52	154	MIE, AR	SEETO, WBIF , NSPP
On the extended TEN-T Core network									

Type of investment	Budget (M EURO)	Time frame	Level of prioritisation	Sources of funding	Short Term	Medium Term	Long Term	Stakeholders involved	Inter-dependence / Comments
▪ *Rehabilitation of the railway Durres- Tirana Public transport terminal PTT (34.1km) and construction of the new railway Tirana-Rinas branch, approximately 5 km and its interchange, including signalling and telecommunication systems, and new train station (CORRIDOR VIII)*	90.45	2018- Q2 2021	High (98 points in WBIF Scoring Criteria)	WBIF, EBRD	90.45			MIE, AR	SEETO, WBIF NSPP
▪ *Rehabilitation of the railway Durres - Vora - Shkoder - Hani Hotit, border with Montenegro Section (140 km), within the railway corridor (Mediterranean Corridor Rail R2 ROUTE 2)*	169.5	2018-2022	High (98 points in WBIF Scoring Criteria)	WBIF, EBRD	4.5	165		MIE, AR	SEETO, WBIF, NSPP
Other railway projects									
▪ *Connection Milot-Kukes-Kosovo border*	750	Long term	Low	Mixed (State budget, IFIs, etc.)			750	MIE, AR	A future connection incl. IPF6 in the Project WB16-ALB-TRA-01
Other investments									

Type of investment	Budget (M EURO)	Time frame	Level of prioritisation	Sources of funding	Short Term	Medium Term	Long Term	Stakeholders involved	Inter-dependence / Comments
▪ *Railway maintenance*	55	Short term	High	IFI and National budget	55			MIE, AR	FS Connecta/EC and PBA (MTBP) NTS rail priority #7
▪ *Investments in rolling stock. Replacement of the current units with DMUs – Diesel Mobility Units for passenger transport*	9	Short term	High	IFI and National budget	9			MIE, AR	FS on modernization of AR Locos under MoU ACRI and MIE
▪ *Railway electrification*	100	Long term	High	WBIF, IFI and National budget			100	MIE, AR	Interconnectivity in DCM 504, dated 13.9.2017 on determination the State responsibility area of MIE, energy, transport, waste, innovation, urban development, and telecommunication
MARITIME TRANSPORT									
▪ *Construction of Marina in near the Port of Durres*	13.5	Short term	High	Toll project				MIE, Durres Port Authority, GMD	NSPP
▪ *Reconstruction of the Quays Nº 1 and Nº2 at Port of Durres*	50	2020-2022	High	EBRD	50			MIE, PDA	NSPP
▪ *Dredging of the Port of Durres*	8	2019	Very high	GoA	8			PDA	

Type of investment	Budget (M EURO)	Time frame	Level of prioritisation	Sources of funding	Short Term	Medium Term	Long Term	Stakeholders involved	Inter-dependence / Comments
▪ *Upgrading the commercial port of Vlora (rehabilitation of port infrastructure and superstructure)*	15.3	2019	High	Italian Cooperation for Development	15.3			MIE	NSPP
▪ *Expansion of Passenger Terminal at Vlora Port*	2.1	Short term	High	State budget	2.1			MIE	
▪ *Coordinated Master Plan for Ports*	1.5	Short term	High	State budget	1.5			MIE, GMD	
AIR TRANSPORT									
▪ *New Southern airport (PPP)*	107	2020-2022	Medium	PPP, GoA		107		MIE, ACAA	NSPP
▪ *Expansion of the Tirana Airport beyond 2025*	TBD	TBD	Low	TIA				MIE, ACAA	
▪ *Kukes airport upgrading and operation*	8	2020-2022	Medium	Toll project				MIE, ACAA	NSPP
▪ *Airport Master Plan for Albania to consider helipads drones and general aviation taking account of traffic forecast considering economic and tourism development*	1	2019-2020	High	IPA	1			MIE, ACAA	NTS
INTERMODAL AND COMBINED TRANSPORT									

Type of investment	Budget (M EURO)	Time frame	Level of prioritisation	Sources of funding	Short Term	Medium Term	Long Term	Stakeholders involved	Inter-dependence / Comments
▪ *Multimodal logistics centre around the Port of Durres.*	5	Short term	High	Toll project				MIE, AR, PDA	NSPP
▪ *Rail connection with the Port of Durres (container terminal)*	1.5	2019	High	National budget		1.5		MIE, AR, PDA	NTS action plan Intermodal priority action #3
▪ *Rail connection with Porto Romano (Fuel transport) and to the Energy and Industrial Park adjacent to it.*	15	Medium term	High	PPP		15		MIE, AR, GMD	WB Intermodal Connectivity in the WB6 Project 06/2018-06/2019
▪ *Logistic centres (Elbasan, Milot, Durres, Vora, Prrenjas, Kukes, Fier)*	18	Medium term	High	Toll projects				MIE	NTS intermodal priority #2 and FS IoT on logistic centres reached by rail-road terminals and sea and air and combined transport

The Action Plan has been also prepared based on the update of the National Transport Strategy and the establishment of the Priority Actions explained in the chapter 9. The Action Plan will constitute the roadmap of actions to be implemented in the next 20 years in the transport sector. As in the Investment Plan, the Action Plan includes their budget, the tentative time frame for the implementation, the level of prioritization (high, medium or low), possible sources of funding, stakeholders involved (stakeholders in charge of implementing the projects) and inter-dependence with other programmes or general comments

Table 18: Investment Plan

Type of action	Budget (M EURO)	Time frame	Level of prioritisation	Sources of funding	Stakeholders involved	Inter-dependence
LOGISTICS AND COMBINED TRANSPORT						
▪ **Coordinate national policy measures to promote intermodal and combined transport**	1	2019-2038	High	National Budget	MIE	NTS
▪ **Define a multimodal National ITS (Intelligent Transport System) Strategy**	0.5	Medium term	Medium	State budget	MIE	
▪ **Implementation of organizational arrangements in order to facilitate adequate services to transport companies.**	N/A	Short term	High	N/A	MIE	

2.1.8. Indicators

This section presents the list of proposed monitoring indicators for the Sub-Sector Plans. The list starts from the updated version of the indicators of the strategy, which has been suitably adapted. For its elaboration, the same philosophy has been pursued based on the mix of 3 types of indicators for the correct monitoring in three differentiated levels:

- Indicators to measure the degree of implementation of a Priority Action. In this case, the indicator will be defined as INPUT INDICATOR, given that they provide quantitative or qualitative assessment of the progress towards a final objective. Focus is on the PRIORITY ACTION or GOAL
- Indicators to assess the outputs and results of an already implemented Priority Action. In this case, the indicator will be defined as OUTPUT INDICATOR, as they indicate to what extent an implemented –or partially implemented- project is benefiting its target. Focus is on the STRATEGIC PRIORITY
- Indicators to evaluate the overall course of the sector. The finality of these indicators is to account for sector-wide achievements instead of specific goals. Those indicators will be defined as OUTCOME indicators, as they represent the improvements of every Priority Action. Focus is on the SECTOR.

Table 19: Classification of Transport Indicators. Intermodal Sector

		INPUT	OUTPUT	OUTCOME
Strategic Priority 1	**Promote intermodal and combined transport**			IN-02 Increase of share of railway in freight transport (share of transport performances of railway in %)
Goal 1.1	**Reinforce the creation of an efficient and integrated transport system through intermodality**			
Priority Action INTERMODAL 1	Coordinate national policy measures to promote intermodal and combined transport	IN-04 Number and amount of transport intermodality contracts signed.		
Priority Action INTERMODAL 2	Create intermodal logistics centres to facilitate multimodal transport	IN-03 Number of calls for proposals for intermodal/stations works	IN-01 Number of logistic centres	
Priority Action INTERMODAL 3	Construction of the missing link from the western terminal in Durres to the national railway network			
Priority Action INTERMODAL 4	Define a Multimodal National ITS (Intelligent Transport Systems) Strategy			

2.1.7. Conclusion

The investment programs are directly defined by the Connectivity Agenda and its Single Project Pipelines in Transportation. In this sense, the strategic investments designated by the Western Balkans Investment Framework (WBIF) have been prioritized. That is why the backbone of the ANTP3 infrastructure program is marked by the extension of TEN-T Core Network, like the reconstruction of Durres Port, Quays 1 & 2, works on the Mediterranean Corridor (Rail CVIII): Rehabilitation of Tirana - Durres Railway Line and Construction of New Line to Rinas Branch and the general upgrade of the National Road Network. The railway upgrade proposed in ANTP3 is part of a larger initiative that has been pushed forward with ERBD funding and aims to support connectivity in the region.

Following WB6 Connectivity Reform Measure Management plan (CRMMP), the establishment of functioning maintenance system ensuring no section in poor/very poor condition by 2020 has been included in every sub-sector plan, with focus on the Core Network Road and Rail Maintenance Plans.

Additionally, required infrastructure investments in border crossing points located on the indicative extension of TEN-T Road Core and Comprehensive Network to the Western Balkans have been addressed following the recommendations of the EU mission undertook by Connecta experts.

2.2. Albanian National Intermodal transport performance strategy and action plan (2021-2026).

The Albanian Strategy and Action Plan (2021 – 2026) is one of the most important initiative, which is representing the Multi-disciplinary approach to developing the intermodal programs in Albania, we hereby consider it, a great opportunity for improving the inter-institutional cooperation for our multimodal transport development, in the region. Aiming to the best-case scenario, this is an excellent coordination toward our Multi approach efforts for performance-based improvement and promotion of transport sector.
Significantly improving the combination into mobility transport units toward the EU integration of the transport modes, the open data are exchanging through intelligent transport systems for the inter-modality identified the main challenges for the Western Balkans incl. Albania and Montenegro in the Multimodal.

Meeting Key Challenges for Intermodal Transport, Albanian Strategic prior actions are:

- Coordination on national policy measures to promote intermodal and combined transport with the new establishment of a National Intermodal promotion center in Tirana and its affiliates in Durres and Saranda
- Increase 7 intermodal logistics centers, facilitate intermodal transport at ports, airports and dry ports in the hinterland territory widely in Albania, Durres, Kukes, Vora, Elbasan, Milot, Prrenjas, Rrogozhine or Fier
- Construction missing rail links to the intermodal terminals by rail facility operators or rail related services.
- Multimodal National Intelligent Transport Systems Strategy with research and development/ innovation.
- Main financial instrument to intermodal transport network priorities in our Albanian transport sector is the 2nd Review National Transport Plan with its financing and action plans of 20 years in Albania.

A new strategy for Albania 2020-2025 has prioritized the railway Durres-Tirana-Rinas, a new airport in the south (the Vlora international airport in the Ten-T comprehensive network), road safety incl. LC level crossings, and the quays 1 and 2 in the port of Durres. From EIB a country strategy paper has been doing and it shall implement the Durres to Rrogozhine railway line, Rrogozhine to Pogradec and Krystallopigi/Ieropigi cross border railway in the initiative for linking port of Durres to port of Piraeus in Multimodal.

With the Multimodal a new pilot testing project has resulted feasible for port of Saranda in the Adriatic motorways of the sea and the key node for tourism and cruisers in the short sea shipping with Greece and Italia in the Multimodal, in the EU Adriatic and Ionian strategy region with Croatia and Slovenia.

2.2.1. General objective

Strategic goals prioritization due to the Albanian participating in the EU programming, inter alia:

- Circular Bio-Based Improvement or transformation of the Albanian transport system to the EU
- Clean transport system and subsystems, in a single market and European transport area SETA
- Climate neutral technologies and integration to the energy saving systems and EU value chain
- Deliver of the EU Green Deal objectives of 75% freight shifting from road in rail greener mode
- Strengthen research and development and innovation capacities and rapid response to risks
- Innovative transformation toward competitive and exhibit the feasibility integration to the EU

Key digital technologies encompassing electronic components and marketing/banding service Smart networks and services support technological development in the regional connectivity.

The European Commission launched a Freight Transport Logistic Action Plan (COM (2007) 607) proposing a series of measures to promote the freight transport logistics, and making intermodal transportation more competitive, in a framework which allow ports to attract investment for their modernization, putting maritime freight transport on an equal footing with other transport modes and reviewing progress made in development of sustainable mobility. Based on that plan, project Multimodal approach combines different approaches to reach most of the goals highlighted by the EC. Therefore, overall objective of the project is development of intermodal transport in Adriatic-Ionian region. Multimodal project will create a model that will be able to measure the effect of each new investment, in relation to the existing situation, in a simple and logical way. Hence, it's possible to bring objective and rational decisions about future investments in intermodal infrastructure, in the area of the entire Adriatic-Ionian region.

The overall objective of the strategy is to foster the development of intermodal transport in the Adriatic-Ionian region. The aim is to create the conditions for a sustainable growth and remove the lacks of the current development of intermodal transport on more levels (in this case we can talk about the Motorways of the Sea system) within the region.
Introduction of a common coordinated, systematic, approach is in collecting bottlenecks to the principle bottom-up, in intermodal transport promotions. This type of approach is a practical implementation of the EC recommendations and a transfer of methodology and knowledge of other EU countries. Next, it is the development of a transport performance strategy that allow countries within the region to look at the effects and cost-effectiveness of planned infrastructure together, not only at national level but also at corridor levels.

Developing a quality indicator system for services offered in ports, we enable an equal level of services in any port. All contribution to the specific objective of the strategy, is to enhance capacity for an integrated transport, mobility service and multimodality in the Adriatic-Ionian.

The major problem of the regional intermodal market is un-coordination, which can be seen in the daily work, where ports, private operators (shipping companies, railroads), agents, freight forwarders, etc. carry out their own activities without any consultations or standardization on a

national or regional level. This results in the emergence of many bottlenecks in the transport system, both nationally and regionally. This is solved only by introducing a coordination body, whose members are the representatives of all states and interest groups i.e. the Albanian ITN.

Freight flows, in the socioeconomic analysis includes a description of freight traffic in Albania, and also a characterization of main commodities transported in the country, the information is crucial for follow phases of the Multimodal. Freight transport model use a "surplus and deficit" methodology analyzes present / future demand in the intermodal transport performance system.

Based on Projection, The model attempt to identify the main commodities produced and consumed in Albania at the level of TAZ, to determine the main movements of freight traffic. The main commodities imported have increased their demand in the past years, being the machineries, equipment and spare parts the ones with greater increase. Nevertheless, minerals, fuels and electricity imports, although the exports have also been heavily reduced, which indicates an internal adjustment in the balance between supply and demand for Multimodality.

Trade - transport balance or facilitation see a significant change in export weights, with large amounts in Minerals and fuels balanced with imports and a 70% growth in the textile and footwear subsector. The other subsectors remain in similar steady increments, with the increase of Construction materials and metals and food, beverages and tobacco standing on scaling:

2.2.2. Systematization of bottlenecks

Multimodal project aims at development of intermodal transport in Adriatic-Ionian region. Our Multidisciplinary approach project combines different approaches to make Albania's intermodal transportation more competitive in the region. The first approach is focused on systematic collection and providing solutions to all bottlenecks, both on national and regional platform. This IT approach innovatively and systematically performs promotion of the intermodal transport from us in the region and also creates a network of promotional centers.

Thus, to assure high quality service, project designed specific port 43 quality measures indicators (KPIs). This is in synergy with EU transport paper, which is directed towards the implementation and development of a Europe-wide connectivity, railways and road network, IWW, maritime shipping routes, ports, airports and rail-road terminals. It is manifested in development of the Trans-European Transport Network (TEN-T), and financing of all projects that stream to achieve that goal. For Albania it is of enormous importance enhancing the maritime transport regulatory system and infrastructure. Action linked with policy instruments of the enlargement process, such as:

- Economic Reform Programs (ERPs); policy guidance agreed annually at joint conclusions;
- MoM meetings held in context of Multimodal Memorandum of Agreement (article 4);
- National Plan for the Adoption of the EU Acquis (where applicable) and National Strategy for Transport in Republic Albania 2016-2020 the draft 2021-2027 and the ANTP3 the 2nd review.
- According to the National Strategy Strategic Priority 1 it is provides that there is a need for Albania to improve maritime regulatory performance and standards and align the maritime legislation with the IMO and EU legislation.

- According to the Priority Action 7 for maritime the Albanian National Transport Sector strategy provides that there is a need for improvement of port capacities planning and performance against future traffic growth and market trends and develop quantified and integrated operational and strategic action plan for port growth and modernization.
- Priority Action Maritime 9 rehabilitation and modernization of port infrastructure and services.
- The United Nations Conference on the Human Environment, widespread concerns about air pollution led to international cooperation. Air pollution from "noxious gases from ships' exhausts" was already being discussed internationally. On 2 November 1973 the International Convention for the Prevention of Pollution from Ships was adopted and later modified by the 1978 Protocol (MARPOL 73/78). MARPOL is short for Marine Pollution.
- Convention on Long-Range Tran boundary Air Pollution, the "first international legally binding instrument to deal with problems of air pollution" was signed. In 1997 the regulations regarding air pollution from ships as described in Annex VI of the MARPOL Convention were adopted.
- These "regulations set limits on sulphur oxide (SOx) and nitrogen oxide (NOx) emissions from ship exhausts and prohibit deliberate emissions of ozone-depleting substances. "The current convention is a combination of 1973 Convention and the 1978 Protocol. It entered into force on 2 October 1983.
- According to the IMO, a United Nations agency responsible for the "safety and security of shipping and the prevention of marine pollution by ships", as of May 2013, 152 states, representing 99.2 per cent of the world's shipping tonnage, are parties to the convention.

2.2.3. Strategic and regional cooperation

The governing involved in the strategic and regional cooperation, synergies, and cohesion:

- Ministry of Transport of Croatia and Ministry of Infrastructure of Albania and/or Ministry of Economy of Croatia and Ministry Economy of Albania; due to their participation of the Croatian Transport Cluster and Port of Ploce Authority (Croatia); Ministry of Transport Slovenia and Ministry of Infrastructure of Albania, responsible for transport; due to their direct participation and membership into International Transport Network Multimodal; Albanian Ministry Infrastructure Energy and Transport and Maritime Ministry of Montenegro and its Italian Ministry economic development or Greek Ministry Transport, Infrastructure and network

- Sign the memorandum of understanding of multimodal with the extension of Article 4 of the existing MOU on the scope of developing the CEF instruments. For Albania it is a must to have prior endorsement of at least an EU MS to co-apply in the CEF, after that agree on the CEF instrument for transport (maritime) program and investment projects.

- The Albanian Ministry of transport and the Croatian Ministry of Transport have had joint workshop on how organize the CEF together, but the Joint Agreement is not endorsed yet so far. In the context of the MULTIMODAL, this ensure continuance of investments and development of testing pilot in Saranda and other ports which are endorsee of the Multimodal (all seaports in AL).

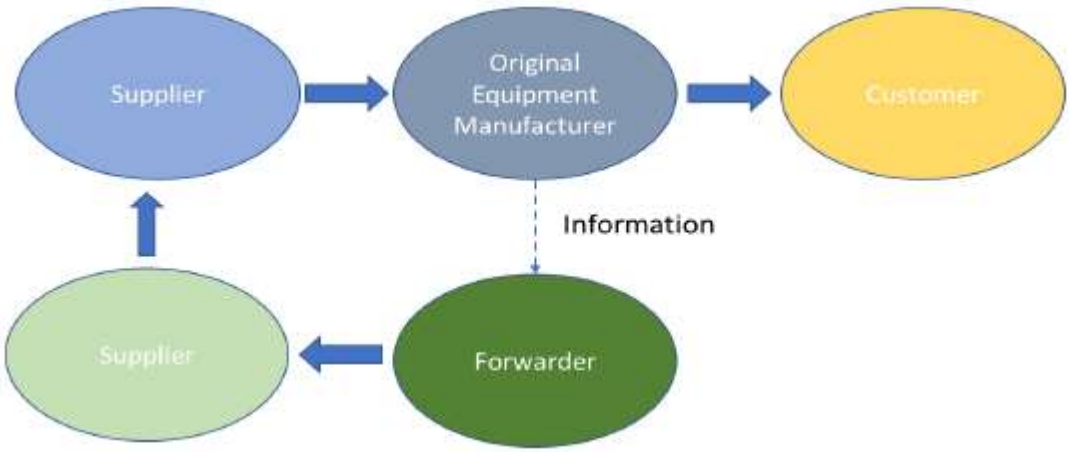

Figure 34: Organization of transport chain actors

Globalization and flexibility in supply chains require advanced logistics. Logistics includes a wide range of activities dedicated to the rapid transport and delivery of goods and related information.

A terminal is a system, the operation of which requires full integration into the logistics chain in order to fully fulfil its function. The efficiency and quality of service provided by the intermodal terminal requires a developed infrastructure, convenient connections to other modes of transport, motivated management, and skilled employees.

The quality, efficiency, and price of terminal services are the factors that affect the competitiveness of the terminal, along with its accessibility and road / rail connections. Thus logistics investments include:

- Infrastructure, such as terminals,
- Operations, including types of transport and equipment,
- Human resources related to work, management, research and development.

In Albania, the demand for the construction of intermodal terminals of goods is driven by these components, respectively:

- Increasing the volume of trade in import / export goods in the country.
- Increasing the level of container trade that passes through the port of Durres.
- Increased demand for goods from the main border countries where most of enlarge passes transit through our country.
- Increasing the internal flow of goods in the country.

Background development consider the systematic bottom up approach in the geographical area covering for the country Albania. The area is characterized by a different geographical and climatic profile. It presents sharp contrasts, as in it alternate mountains, hills, rivers, lakes and the sea shore very close to each other. The program area has several national parks, protected areas and landscapes that reflect rich biodiversity and environmental differences. The Albanian territory rely on agriculture, services, wholesale and retail markets, some others in the interconnection of coastal regions for the Adriatic and Ionian, show a developed industry, and the level of tourism is much more developed.
All towns and counties are economies in the market development and great potentials, whereas they still have to find ways and opportunities to take advantage of comparative Mediterranean advantages.

The structure of economic operators in the program area is dominated by small and medium enterprises. Higher productivity and further investment in the expertise and use of innovation technologies are a prerequisite for becoming more competitive nationally and internationally. Most small and medium enterprises (SMEs) operate in the service sector. Strengthening business support mechanisms remains a challenge for that a lot of soft and hard measures (national short and midterm goals) to support economic development proposed.

On available transport infrastructure, there is a number of the EU preparation or investment in Albania. There is a rich historical-cultural heritage in the coastal area, incl. connects the hinterland, which must be preserved / protected by law and several projects. Evaluating historical cultural heritage has contributed, strengthening the identity of Multimodality seen as an asset to its economic development.

3. Proposal of advanced ICT tools, to improve logistic performance connections through the logistic centers

3.1. Intermodal Transport and Supply Chains

3.1.1. Definition “Intermodal”

The term “intermodal” has been used in many applications that include passenger transportation and the containerization of freight. A more descriptive term for this process would be “multimodal,” because of a lack of effective and efficient connectivity for both freight and information among and between the various modes on shipments under a single freight bill. Intermodal freight transport is defined as the use of two or more modes to move a shipment from origin to destination. An intermodal movement involves the physical infrastructure, goods movement and transfer, and information drivers and capabilities under a single freight bill. The "concept of logistically linking a freight movement with two or more transport modes is centuries-old". The recent focus has been on containerization; however, intermodal transportation, as defined, encompasses all single-bill shipments using multiple modes.

Intermodal transportation, with the options of integrating multiple modes, provides a flexible response to the changing supply chain management requirements in global markets and distribution systems. The integrating of modes requires a process or systems approach for execution and "a higher degree of skill and broader knowledge of the transportation/supply chain processes . . . information, equipment, and infrastructure”.

Intermodal transport, as it moves from a focus on infrastructure components to a holistic focus on process or systems, will have more viability and applicability in the world of global supply chain management. A supply chain is defined as a set of three or more organizations directly linked by one or more of the upstream and downstream flows of products, services, finances, and information from a source to a customer, and supply chain management is defined as the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.

The components of supply chains, much like the modes of transportation, have existed for many years.

It is in this time of information and communications technology and capability that the supply chain processes, and the modes supporting those processes, are gaining the capability of being integrated. This integration can permit the optimization of trade-offs between the components of supply chains as well as between the service and cost aspects of the modes within supply chains. Information capability and supply chain relationships will require careful balancing of all the business objectives of both the customers and the providers. Supply chain participants must respond and compete in the global marketplace, which is evolving rapidly.

An integrated intermodal transport system is a significant and critical factor in the successful execution of supply chains, both domestically and internationally. The awareness of and requirements for options in the intermodal execution of supply chains are being driven heavily by information and communications systems. One example that is gaining global implementation and effectiveness is the use of relational databases—the electronic ability to integrate and operationalize related but different data sets. This comprehensive ability to understand and assess the total supply chain capability and performance will place new demands on supply chain participants, including the transport system. New demands on the transport system will require a rethinking of transportation policy and investment.

3.1.2. Definition "Supply chain"

Supply chain represents a cluster of physical elements, their activities and processes through which their mutual interaction takes place, with the aim of making the flow of material goods from the initial supplier to the end user possible [32]. Similarly, another definition of supply chain also gives, where the term supply chain is understood as flow of matherials, information and finances which pass through and among organizations connected by a certain number of factors such as relationships, processes, activities and integrated information systems (Figure 1).

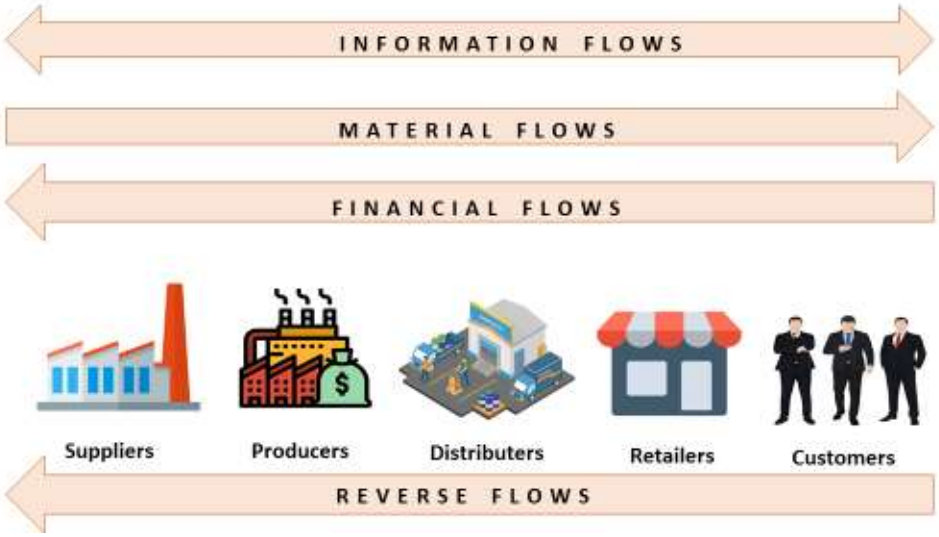

Figure 35: Schematic diagram of supply chain

It should be stated that Figure 1 represents the picture of flows global direction, and that in the real systems both the flow of materials and finances could be two-way. Typical elements which compose a supply chain are suppliers, producers, distributors, wholesalers, retailers and end users. These physical elements form the structure of a chain and represent its fixed part, i.e. its basic infrastructure. Forming a given structure is the issue of strategic nature. The executable part of a supply chain is made of certain modes and rules for the realization of some logistic activities and processes and it is by its nature more tactical or operational.

Management of the executable part and designing of a fixed part of the supply chain together make the management of the supply chain, or supply chain management.

The term supply chain management was used for the first time in practice during 80-ties in the past century with the aim of developing a vision of demolishing functional silos which meant independent functioning of production, marketing and distribution, defines supply chain management as a group of approaches used for efficient integration of suppliers, producers, distributors and retailers so that the right goods are delivered in the right quantity, to the right destination and at the right time with the aim of minimizing total costs and simultaneously satisfying the required service level. According to supply chain management, where the accent is on the importance of integration of activities, represents the function responsible for transportation and warehousing of material goods on their journey from suppliers, over intermediary operations to end users.

Main activities of intermodal supply chain are shown in Figure 2.

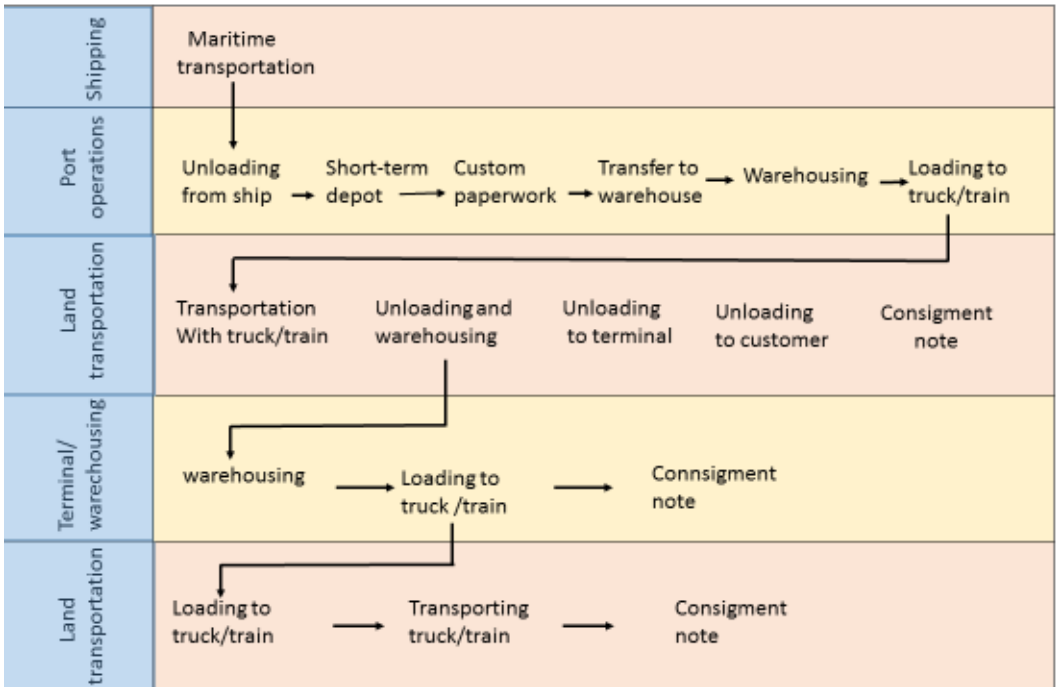

Figure 36: Main activities of intermodal supply chain

In providing maximum available, flexible and reliable transportation services in a supply chain, intermodal transport systems have become of essential importance. Intermodals is the basis of advanced logistic strategies which the biggest transportation companies in the world apply. Because of this, the efficient supply chain management requires understanding of basic technologies and intermodal transport systems, basic characteristics of its services as well as advantages which may be achieved by its appropriate application. It is highly important to know the intermodal transport terminology itself as well as any elements of which the intermodal transport system is composed and types of connections present within the system.

3.1.3. Definition of Intermodal Supply Chain Management

Supply chain management and logistics are strongly influenced by the global economic, social and ecological trends. New challenges arise from the trend of the globalization itself: the stronger international division of labour, the demand for sustainability and corporate responsibility force companies and governments to create innovative solutions. Logistics and supply chain management are seen as enablers for the growing global economy. However, in this dynamically changing environment supply chain management has to enable not only the transport of goods from source to sink, but has to ensure security and safety of international transport chains and has to deal with challenges such as on-demand delivery, that effects changing structure of transport goods and an increasing cost pressure.

Furthermore, the Supply Chains themselves are dynamically changing. While in the first decade of the 21st century Supply Chains focus on reducing sourcing costs, e.g. by the concentration of suppliers and transport volumes, recently we are facing an evolution towards a major significance of costs for relationships with suppliers and service providers, towards the active identification of risks and the development of dyadic business relationships.

3.1.4. Definition of Intermodal transport system

The European conference of ministers of transport defined intermodal transport in the document from 2002 as moving of goods in the same load unit or road vehicle which uses two or more modes of transport without touching the load during transshipment from one transportation mode to another defines intermodal transport through three basic conditions which have to be fulfilled for a transportation to be considered intermodal:

1. existence of standardized load units in which goods are transported from initial to end destination;
2. basic load units have to be in the form of ISO containers, swap bodies, semi-trailers and specially designed containers; and
3. Load units have to change at least two modes of transport during realization of a transport chain.

Therefore, it can be concluded that the first basic characteristic of intermodality is a multiple transportation during the transport of goods from initial to end destination, while the second characteristic is related to the form of transport of goods which represents standardized load units such as containers, swap bodies and parts or whole road vehicles. Intermodality can be observed as a qualitative indicator of the level of integration of transport modes in the sense that greater intermodality means greater integration and complementarity among transport modes which ensures better conditions for efficient functioning of the transport system.

The economic basis for intermodality means the usage of certain advantages of basic transport modes and their combining into an integrated transport "door to door" chain, with the aim of improving the whole transportation system. The integration is needed both at the level of infrastructure and at the level of operative procedures and legal relationships among the participants. Therefore, intermodal transport chains require the existence and development of appropriate infrastructure and technological solutions which should ensure seamless realization of goods flow. Besides, in the realization of an intermodal transport chain, a great number of different types of subjects (participants) take part with different mutual relationships, which all together makes the intermodal transport system a highly complex system.

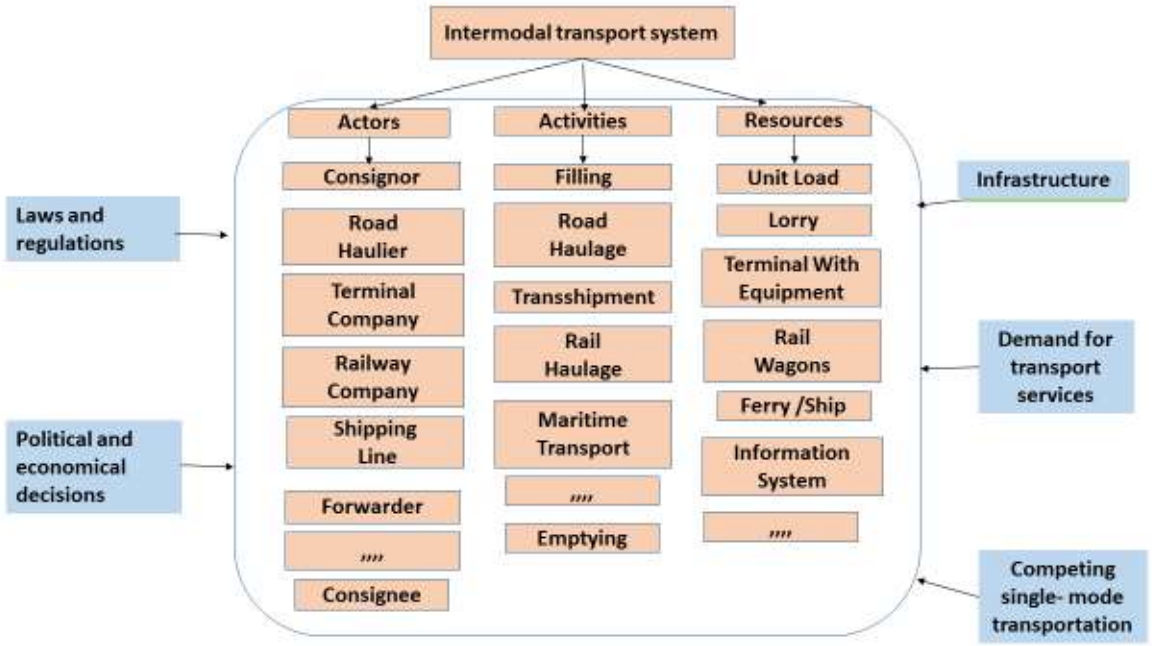

Figure 37: Intermodal Transport System

3.1.5. Intermodal direction for the future: "FASTER, BETTER, SMARTER, AND MORE PROFITABLE"

Customers of global supply chains in the future will continue to demand faster supply chain delivery of their commodities and products. Speed—or total transit time through the supply chain—will continue to be a necessary factor for intermodal transport. Customers will demand better execution of the supply chains, represented by quality and reliability.

Customers will also have more access to information through the use of information communications capabilities only dreamt of in the past, and that information will drive higher expectations of performance as well as provide the foundation for alternatives, options, and continued change. Finally, customers and supply chain operators will want all of this done more cheaply, or in a more appropriate perspective, more profitably. Therefore, evaluating the life-cycle cost of prospective technology applications is essential.

Intermodals will be a significant and critical factor in the success of hyper competition among supply chains of the future. Its more significant role in global supply chains will require an understanding of supply chain management, the needs and requirements of the marketplace, the capabilities and advances in information and communications technology, and the continuing challenges and constraints on transport infrastructure. It might be argued that the future driver of the intermodal process and options in supply chains needs to come from the demand or supply chain side of the equation rather than the traditional supply or mode-carrier side. But from wherever the future impetus for intermodals comes, additional insights need to be gained through measuring it in its broader definition and not just the historical containerized context. An increased awareness of the scope and magnitude of broadly defined and measured intermodals will heighten the need for intermodal education and training for those being asked to manage and execute both new intermodal technologies and information-communications systems and the increasingly constrained infrastructure of intermodals.

3.2. Transport Policy for Efficient and Sustainable Supply Chain Management

3.2.1. General Role of Transport Policy in Economy and Society

General Role of Transport Policy in Economy and Society is very important. On one hand society and economic markets demand for and benefit from freight transports. On the other hand transport processes cause external effects.

Hence, transport enables distributed production systems and realizes competitive advantages, but distances between facilities, sources and customers lead to transports and thus environmental pollution by emissions and noise, landscape disruption by infrastructure and damages by the traffic itself. In this context, transport policies need to create conductive conditions for all market participants and reduce negative effects of transport. These interests are obviously conflicting.

The main tasks are: The extension and maintenance of infrastructure to meet the demands of public and freight transports as a basis for a wealthy economy and society, considering all social benefits and costs, funding by public as well as private investment. Furthermore, transport policy aims at the improvement of efficiency and quality in transport markets. This is accomplished for instance by encouraging fair competition and applies to regulation as well as to enforcement.

Additionally, policies are supposed to foster the standardization of today's wide spectrum of technological and organizational solutions at all levels of the supply chain. Furthermore, international objectives, as for instance the Kyoto Protocol to reduce environmental impacts caused by traffic (e.g. health risks, damaging vegetation, crops, CO2 emissions), need to be implemented within national transport policies. In this context actions and measures to regulate and support transport avoidance, modal shifts and efficient logistics concepts, as well as the application of new technologies play a major role. Finally, security aspects in terms of the social costs caused by accidents, dangerous goods and vulnerability of transport systems are considered.

Political responsibilities in Intermodal Transport

Since transport processes enable globalized and distributed production systems by intermodality and internationality, the development of transport policy and implementation takes place at all political levels − local, regional, national and EU. Sharing responsibilities subsidiary is the working principle: the highest political level acts as soon as the stated objectives cannot be reached by the lower levels. In intermodal transport, with cross-border operations, international transactions of the EU policies are mostly relevant. Here the main tasks are to promote the coordination of national policies and to coordinate actions in other fields, like target setting for emissions and standardization.

National transport policies are the key players regarding infrastructure development. This applies to rail, road and waterway infrastructure as well as to interconnection-points like ports, terminal, logistics parks, and maintenance and traffic management. Furthermore, the degree of promotion of, for instance, intermodality and innovations in transport is dependent on national governmental decisions. Hence, especially combined transports deal with challenges like time-consuming customs processes at borders and delays, due to their dependency on other transports.

Modal Shift Policies and Intermodal Transport Promotion

Efficient intermodal supply chains are characterized by the right mix of transport modes with respect to distances and transport durations. In this context, transport policies aim at sustainable and equitably utilized infrastructure networks in order to avoid capacity bottlenecks.

Consignments sent by air freight, for instance, generally include high-priced goods of sensitive value which need to be transported over fairly long distances, with short transit times that have to be met with a high degree of reliability and for which express shipment is therefore deliberately requested by customers. This is countered by continuously rising kerosene prices which represent an additional burden on air freight when it comes to competing on cost. In addition, air travel in general and air freight in particular are in the crossfire of the discussion about CO2, which may lead to stronger regulations and duties within emission trade in the context of modal shift policies.

3.2.2. Impact of Political Instruments on Efficient Intermodal Transport

Political instruments and measures give the framework for the transport market, but also govern and control market developments. Reasons for regulatory policies are either from an economic or a managerial point of view. Economic reasons are a high market share of governmental enterprises, specific shift policies to reduce external effects or balance capacity usage. In this context political instruments such as regulations, traffic specific taxes and duties, infrastructure development, as well as international harmonization and standardization may lead to positive effects through modal shifts, but may induce negative effects in terms of market deformations by competitive advantages for certain transport modes. Whereas managerial aspects encompass, for instance, imbalanced transport volumes, high fix costs shares, low price elasticity of consumers or heterogeneous market participants.

3.2.3. Regulatory Policy

Regulation policy contains measures to control and accomplish competition neutrality within transport markets. Therefore, regulations need to be considered transport mode specific. In road transport this encompasses, for instance, control measures regarding driving and rest times, such as the digital tachograph and an enforcement of road controls as stated in the EU directive 2006/51 EC.

Furthermore, these contain speed limitations, but also driving prohibitions within time frames or in specific sectors, such as urban areas or environmental zones as stated in the particulate directive 1999/30 EC.

For rail transportation, the organization of railway companies and their regulation towards fair conduction of inter- and intermodal competitive conditions is discussed. Moreover, the realization of interoperability of railway technology and safety systems, namely the ETCS as the European standard for railway safety systems, European driving licenses for locomotives and the implementation of environmental standards for traction vehicles and wagons plays a major role.

Similar regulations are also given for air transports with respect to night flight prohibitions and operation times of air hubs and airports. Basis for further regulations are the standards of the International Civil Aviation Organization (ICAO) regarding to human resources, interoperability and specification on feasible plane sizes. Furthermore, standards of the European Aviation Safety Agency (EASA) are considered.

On one hand regulatory policy variously influences logistics processes und thus, supply chain performance. On the other hand regulatory policy sets the boundaries for integrated international transports and therefore quality of freight transport modes. As a conclusion, political regulations influence the service level of logistics processes, but also costs and pricing, which both effect the transport mode decision of consignees and logistics service providers, especially when it comes to hinterland transports.

3.2.4. Traffic Specific Taxes and Duties

Traffic specific taxes and duties effect the costs and therefore the competition constraints of companies. Therefore, tax harmonization within the European Union is of strategic relevance. Traffic specific duties on the other hand aim at an internalization of resource usage, finance assurance as well as management of transport demands. In this context the height of tolls and its EU emission classification, as well as the internalization of external costs due to the change within EU-road tax directive need to be contemplated and discussed.

For rail transports traffic specific taxes and duties refer to railroad prices and financing of siding tracks. In this context transport policy also deals with the harmonization of track prices and usage dependent costs for freight and passenger transports.

In air transport for instance "route charging" is practiced since a couple of years, which means that air traffic control companies are working on a cost covering basis. Furthermore, the Single European Sky Project aims at a harmonization of air traffic control in all member states.

3.2.5. Infrastructure and Technology Policy

The government is financing road, rail and waterway infrastructure by public means and from toll returns. These services build the basis of infrastructure policy and result in an infrastructure network connecting consignees and logistics service providers. All further infrastructure capacities as siding tracks, handling areas and connection on company areas need to be provided by the users.

Nevertheless, the avoidance of capacity bottlenecks requires an active influence of transport demands by a combination of measures regarding infrastructure development and maintenance, but also application of feasible automotive engineering as well as transport management and optimization through the use of telematics systems.

Infrastructure development and maintenance implies the building of roads and railways considering priorities with respect to capacity bottlenecks as well as increase of reinvestments to maintain these. Furthermore, this encompasses the optimization and coordination of construction sites.

In addition, technology policy support for instance the feasibility of automotive engineering in context of vehicle heights, weights and lengths, which are often interconnected with infrastructure capacities. Moreover, telematics systems give opportunities to control transport flows by the provision of traffic information and suitable actions for network users. In this context, the support and realization of Galileo and interconnected applications within the European transport market play a major role in technology policy.

3.2.6. International Harmonization and Standards

Supply chain and logistics networks and thus, source-sink and transit traffic as well as the responsible operators are characterized by its internationality. Hence, international harmonization and standards are a main political goal and consider especially tax conditions, infrastructure usage duties, working conditions, standards in telecommunication or even permission regulations.

The named segments overlap with various fields of transport policy. In practice international policies are only given in air and sea transport, whereas all other directives and implementation guidelines are substituted by EU policies. As a result from the described case-study international harmonization and standards do especially lack simplification of administrative and customs efforts.

3.2.7. Corporate Initiatives and Transport Policy

Whereas corporations initiate logistics optimizations with respect to transport avoidance, modal shift and efficiency improvement by intelligent consolidation strategies to utilize their network structure sustainably and sufficiently, transport policy plays a superior role when it comes to infrastructure planning and maintenance. But also regulation policy, taxes and duties as well as international standards and technology promotion are of significant relevance, since they influence company decisions and the development and operation of global supply chains.

Considering global trends such as security and risk management, but also sustainability in supply chains, the influence of transport policy especially on intermodal long-distance transports will increase and operators will have to cope with rising requirements regarding for example transparency and reduction of greenhouse gas emissions. On the other hand transport policy opens up and supports the implementation and usage of telematics systems, which have a significant impact on the offered service level and the efficiency of supply chain networks.

Moving global economy and realize efficient supply chain networks depends therefore on both sides: corporate initiatives and transport policy.

3.3. ICT solutions supporting intermodal transport sector

ICT is an umbrella term that encompasses a wide array of systems, devices and services used for data processing (the information side of ICT) as well as telecommunications equipment and services for data transmission and communication. ICT can have a significant influence on the mobility of people and goods. ICT is also a potentially important enabler of change in social and organizational practices, thus affecting the demand for transport in spatial and temporal terms. Technological trends will meet the demand for comfort, safety and speed through advances in ICT in the field of telematics. This covers systems for traffic and transport management, travel information and reservations, vehicle guidance, and mobility cards.

Over the last few years firms operating in the transport and logistics sector have made significant progress in their adoption of new technologies, particularly those linked to the internet and e-business.

The conceptual framework outlined is mostly applicable to e-business in the transport and logistics services industry. However, as this broad sector covers diverse segments such as freight transport and passenger transport, the focus of ICT usage and e-business differs between the sub-sectors.

In freight transport and logistics, the management of logistics services is the vary nature of the business activity; ICT are mainly used to support the management of complex logistical processes (e.g. for fleet control in larger transport firms with a large fleet of vehicles). In passenger transport, by contrast, online passenger services are a key issue in this sector, notably the online provision of tickets.

Although the key applications differ between the various sub-sectors, all basic goals of e-business are relevant:

- reducing costs by increasing the efficiency of processes (notably in logistics),
- optimally serving the customer (relevant in all sectors),
- And enabling growth and expansion by increasing the market reach.

3.3.1. Development of ICT tools supporting transport decisions

Transport topic appeared in IT systems supporting company management created in the 70s and 80s. MRP I (Material Requirements Planning) and MRP II (Manufacturing Resource Planning) systems were developed at that time, and in the 1990s transformed into w ERP (Enterprise Resource Planning), its complex resource planning system. Delivery schedule specifying transport tasks depends of sales plans, production, supply as well as stock plans for materials and finished goods. Defined volumes of materials, goods and delivery dates are basis to prepare of specific transport orders. Operational handling of the transport process was outside the ERP system.

Around 2000, ERP systems were complemented by, among other things, a complementary application to the management of not only the processes taking place in the enterprise but the whole supply chain – Supply Chain Management (SCM), this solution was an electronic communications platform linking the supply chain management company with all their suppliers, customers as well as logistics and transport operators, this allows for efficient synchronization of the flow of materials and goods through the supply network.

Except internal issues related to supply, production and distribution, SCM is coordinating inventory levels throughout the supply chain, optimizing the flow of materials and goods between the company and their suppliers and receivers.

This system can work effectively thanks to the development of the Internet and electronic communications system (EDI) for exchanging electronic messages, automatic cargo identification (ADC) systems, and vehicle and cargo traffic monitoring systems (track & trace).

SCM systems are most often used by large and medium-sized manufacturing companies with a distributed structure including their own production and distribution networks2, which will strive to reduce inventory in their transport network, using a broad range of JIT rules, i.e. small but often complementary supplies. It promotes road transport, which in the most flexible way adapts to market segments requiring short delivery times.

In case of rail or intermodal deliveries are concerned, the potential is related to large quantity of goods shipped in wholesale lots, full trucks (FTL), e.g. between consolidation and distribution centres. It would also be important to have full transport control by the company managing the supply chain, which would make possible to optimization of transport system.

While ERP or SCM systems are managed by manufacturing companies with large batches of loads, the response of the logistic sector was to develop systems for managing the transport process TMS (Transport Management Systems).

The simplest applications of this type are managed by road carriers and usually have the following structure:

- Transport order management module. Thanks to which documents are exchanged between the shipper and the carrier, such as; inquiry, offer, transport order and confirmation of accepting an order to execution,
- Route planning module to minimize the number of vehicles involved, distance travelled etc.
- Track & trace module – monitoring by GPS or GSM devices, vehicle traffic on-line,
- Fleet Management used to manage drivers (work time, payroll, accident record) and equipment (repairs, failures, technical tests, certificates, insurance, etc.),
- Mobile communication module between the dispatcher and the driver, explaining the reasons for changing the agreed route, setting a new transport task etc.,
- Invoicing module.

In recent times, multimodal TMS has been developed, providing the opportunity to consider alternative cargo transport routes using different transport modes.

These solutions have form of an electronic platform managed by a neutral market organization, equipped with a daily updated cargo database, as well as a list of carriers with information on the routes they offer, rates offered, declared transport times, equipment list, historical KPIs etc. Such platforms enable shippers (as well as freight forwarders) to optimize planned transports and carriers to obtain additional transport orders.

Another IT system support intermodal transport is PCS (Port Community Systems), it's also an electronic platform for communicating and transmitting documents between ship holders, freight forwarders, container terminal, rail and road carrier, all companies cooperating in the process of loading and unloading containers in ports. Another important functionality is the cooperation of enterprises with the customs tax administration in order to efficiently carry out customs clearance of cargo in ports.

More and more providers of ICT tools supporting logistics processes are providing software consolidating functionalities, which were previously available separately in various programs, for example Freight Capacity Exchange, whose functionality is now an integral part of the freight exchange.

3.3.2. Stakeholder that needs ICT tools for functional multimodal supply chain process

The main participants of intermodal supply chains:

- Shippers;
- Road carriers;
- Rail carriers;
- Container terminals;
- Intermodal operator;
- Freight forwarders.

Shipper is a person who purchases services as shipment of goods. A shipper can be either an individual or a business, e.g. a trader, who is a direct producer of goods or who buys or sells goods. The strong position of shippers on the mainly international market means that they have a real impact on the activities of carriers. In addition, shippers may set up organized purchasing groups which dominate the carriers, thereby strengthening their negotiating position with regard to the provision of transport services

The road carrier is primarily responsible for the physical transport of goods on the road. The carrier determines the optimal routes for the drivers and controls their working time. Throughout the transport process, he should at all times be assured that the goods are adequately secured (depending on the instructions he has received). It can carry out transport on request from a customer or a forwarder.

Rail carrier provides the transport services under a license using the railway infrastructure. However, this infrastructure is managed and made available to rail carriers by the infrastructure managers. The tasks of rail carrier are to check the availability of the wagons ordered by the Intermodal Operator, to order the journey, to place the wagons at the terminal, to carry out the transport between the points of departure and destination.

A container terminal is a facility where containers are transshipped from one mode of transport to another for further transportation. Transhipment can take place between container ships and land vehicles (trains or lorries), in which case it is a sea container terminal. Transshipments can also be carried out between land vehicles, usually between train and truck, in this case the terminal is described as an inland container terminal. Sea container terminals are usually part of a larger logistics facility - a seaport - and are located in or near large cities. Inland terminals are usually located close to the so-called sales markets - places of consumption and production. Both types of terminals: sea and inland, usually also provide storage yards for both loaded and empty containers. Loaded containers are stored for a relatively short period of time as they wait for the next leg of the journey. Empty containers, on the other hand, can be stored for a longer period of time depending on the plan of their reuse. Container terminals are managed with the use of comprehensive IT solutions, i.e. Terminal Operating System (TOS). Dynamic development of

IT technologies and increasing efficiency of container terminals necessitates constant improvement of TOS functionality. TOS is now becoming an essential tool for optimizing loading and unloading processes.

An intermodal transport operator is a company which arranges the transport of goods (using at least two modes of transport) all the way from the place of loading (shipper) to the place of unloading (receiver), after concluding a contract with the customer (shipper or forwarder). He is responsible for every leg of the transport, including its damage. That's why he signs contracts on its own behalf with other carriers (road and rail) in order to comprehensively perform the whole transport.

The Freight Forwarder organizes the dispatch or collection of the goods and coordinates other processes related to shipment service in his own name, but on the Customer's account. Freight Forwarder is obliged to perform the carriage, carry out his own transport or choose the carrier in such a way as to meet the expectations of the Customer. The forwarding company supervises the transport in every respect and at every stage, even after handing over the goods to the carrier. The Freight Forwarder is responsible for contacting the Customer in crisis situations - such as delays or accidents - and for resolving problems during loading and unloading.

3.3.3. Basic categories of ICT tools supporting intermodal transport

Basic categories of ICT tools in transport processes, especially those related to multimodal transport, have a high degree of complexity. Therefore, the role of tools supporting transport decisions both at the level of concluding a transport contract and controlling its implementation is high.

At the negotiating phase of the transaction, scheduling of deliveries is important, meaning that the choice of the best carriers on a given section multimodal supply chain is optimal, so as to achieve the optimum result of the entire supply from transport costs or service time side.

The final stage of the transactional part of the transport process is to book the service with the individual carriers, who will be required to carry out the service according to the planned supply chain by the decision maker (which may be directly the shipper or representing him freight forwarder or ship-owner).

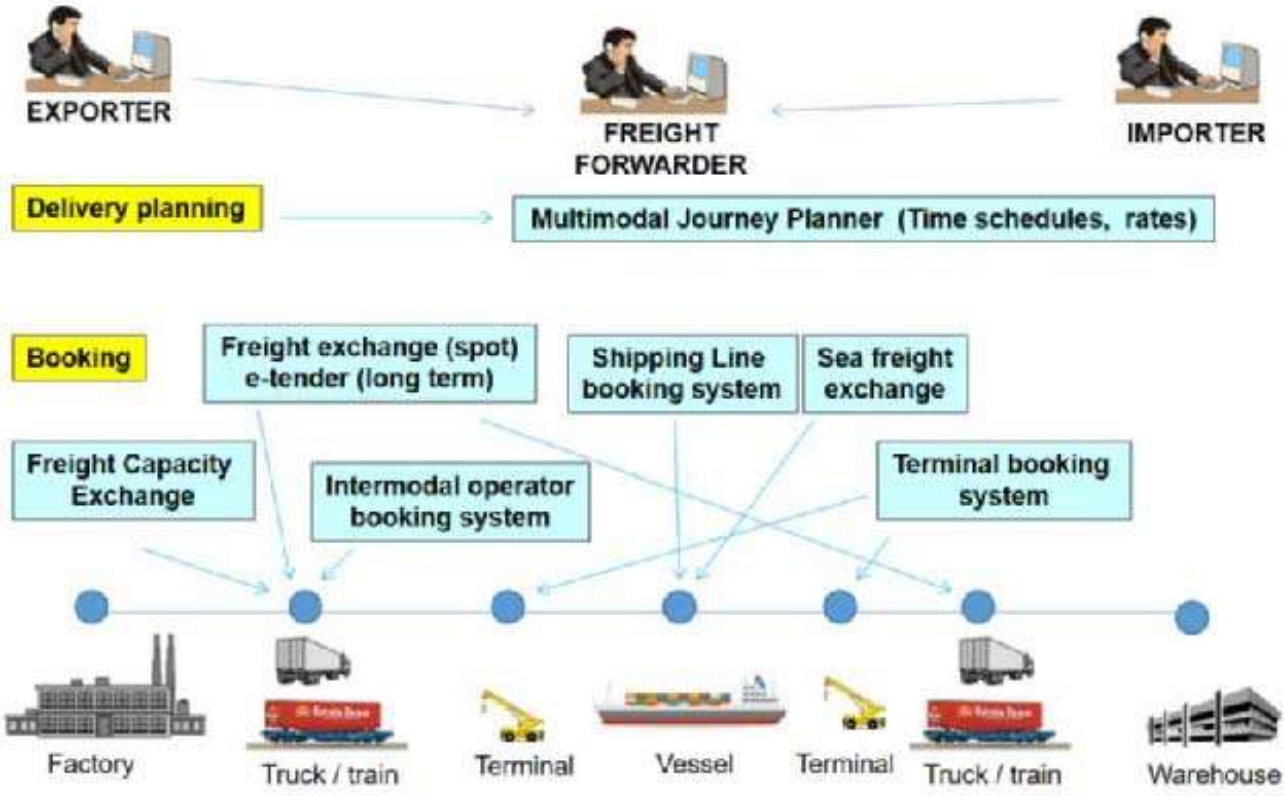

Figure 38: ICT in Supply Chains Support on of freight contracts

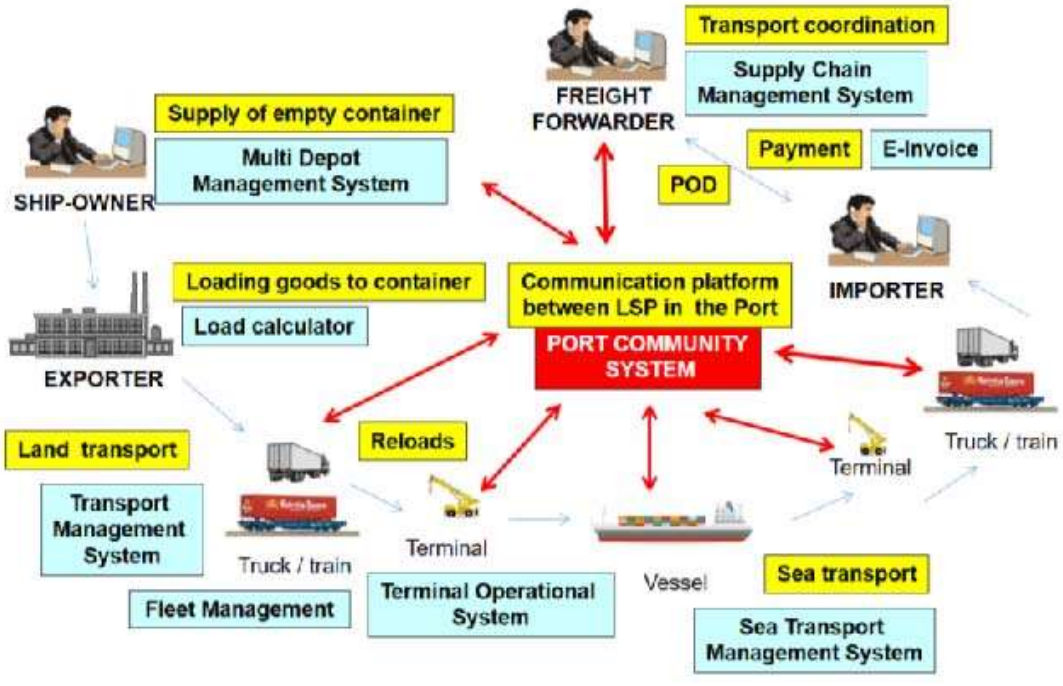

Figure 39: ICT in Supply Chains Support on operational processes

There are nine basic categories of IT tools supporting intermodal transport, each of them contains a detailed description. Within each category, detailed inventories of ICT tools available on the market have been carried out in accordance with the structured as:

- Load calculator;
- Intermodal Route Planner;
- Freight Exchange;
- Logistic Platform / Electronic Transaction Platform;
- Multi Depot Management System;
- Transport Management Systems;
- Terminal Operation System;
- Supply Chain Management;
- Port Community Systems.

This wide range of ICT solutions supporting the process of communication and management in the industry. These include a wide scope of management support - from location tracking, internal and external communication to handling management, mode selection and spare capacity. Decisions made in this regard may be assisted by electronic tools, as described in detail in the followings.

3.3.3.1. Load calculator

It is a simple tool which is useful for every shipper, suggesting how to load a truck, wagon, container, depending on the dimensions of the vehicle's cargo space, unit dimensions of loads and weight of consignments.

Basic functionality: Container Load Calculator simulates placing goods inside a container and determines their optimal positioning within. User specify the type of cargo and input its parameters (width, height, length, weight and number of units), there is possibility to pack cargo on pallets or directly into a choosing container. The application will display the most optimal way to position the goods.

Architecture and functionality: Load Calculator renders a 3D image with the optimal positioning of goods inside a container or truck. It displays the best way to load mixed size products into vehicles and containers. The tool comes with a handful of templates for pallets with standard dimensions, weight and other parameters. User can customize the position in which crates, cartons, boxes or other types of cargo are loaded. This feature is especially important for loading dangerous, fragile and oversized goods. In few easy steps user can define:

- Container type (select equipment: container or truck
- Cargo type (select cargo type: boxes, BigBags, Barrels, Sacks)
- Cargoes (cargo parameters: name, length, width, height, weight, quantity, colour)
- Loading type (equipment for cargo loading: cargo stuffing directly into transport, pre-shipment cargo palletizing)
- Pallets (Pallets parameters: length, width, height, weight, payload, max loading height level, thickness of separating plate)
- Containers (Container list)
- Packing parameters (Spacing settings of cargo in container)
- Results (graphical presentation of the optimal loading of the goods, including information about, quantity of packages, cargo volume, weight)

Technical description:

- web access
- Internet access is required
- registration not required
- informational character

Benefits:

- cargo names and values are saved, so they can be re-used for next loading
- possibility to import cargo dimensions
- different cargo types can be mixed in the calculation
- wrong data warning
- file to print/download: packing blocks, packing sequence, PDF stuffing report
- free 3 months trial version

3.3.3.2. Intermodal Route Planner (IRP)

The basic element of this tool is a database including a list of logistics service providers along with tariffs and timetables. The IRP is a resource to identify and plan optimal, more efficient and cost-effective journeys through more sustainable freight routes. Based on world map and real data from providers, the IRP calculates the fastest freight route by road, rail and sea against estimated journey times across Europe, and provides associated costs. It is online route planner to allow different combinations of journey for all modes across Europe and which provides cost estimates. This integrated approach helps freight providers find feasible alternatives to road transport, therefore reducing CO2 emissions and air pollution.

Companies for which ecology is important, take into account the use of more "green transport branches" in their route selection: rail, ferries, boats, feeders especially in cases where a short delivery date is not an important contractual condition

Basic functionality: Planning possible transport connections for intermodal transport // inland shipping, rail and sea

Architecture and functionality: Planner – user enter needed transport (origin and destination, which can be entered via a map or by directly address field), using Find connections display the list of possible connections, clicking on a table row shows route main information (operators, terminals, transport time per day, frequency per week, way of transport).

After select interesting route, user will see details, map, how many time will take exact part of route, which operator will hang it, also additional information if it's needed:

- Catchment area – map with ports and transportation lead time
- Terminals - terminals overview (table with name, country, city)
- Operators - list of operators included in the Planner (if operator didn't find his details can add it by sending an email)
- Instructions – short description how does it works
- Contact – contact details
- Disclaimer – information's and warnings about risk and benefits related to use Planner

Target groups: all who need to plan possible intermodal transport, or want to check route (Freight forwarder, Intermodal operator, Rail carrier, Road carrier, Shipper)

Technical description:

- web access
- Internet access is required
- registration is not required
- informational character

Benefits:

- planning a possible transport route, providing information about terminals and logistic operators, and delivery time at each stage
- planned route can be exported in pdf format
- planner provide hyperlinks to the logistic operators websites, which makes contact with them easiest, but the process is not integrated
- available for free

Gap analysis:

- data in the Planner can be outdated because of the sources which don't always mention the period for which the services are valid,
- the sources don't always mention the name of the terminal, but suffice to show the place of departure or arrival. This can result in unnecessary inter-terminal transport,
- not all direct links within Europe have been included in the Planner, it's possible that connections with a detour will be shown

Remarks: (Challenges, expected problems, implementation bottlenecks)

- lack Information about CO2 emission
- errors may occur, tool provider don't guarantee the accuracy and completeness of the information and is not liable for damages caused by using the presented results
- lack information about freight price,
- add new functionality like: book transport, contact with logistic operator by planner, enter cargo weight, cargo consolidation
- Little information on the website about this tool.

3.3.3.3. Freight Exchange

While the above planning tools don't provide opportunity to negotiate terms, the transport exchanges are an ideal tool for determining the final freight rates. Mainly on freight traffic markets, such as the full truck market. It is a platform for the exchange of information between carriers and freight forwarders, supporting communication and speeding up transactions in the transport sector.

Transport exchanges use the Internet as a tool, where in real time it is possible to find or place freight or vehicle, contact a contractor and conclude service contracts, this is similar to tender bids. The use of the freight exchange allows transport companies to reduce empty freight, optimize the use of cargo space, top up and secure additional transport orders, thereby reducing the cost of service provision. Two main elements of the freight exchange include:

- freight exchange - including transport offers (this includes free cargo to be transported)
- vehicle exchange - collecting information on available means of transport and/or cargo spaces (monitoring of vehicles and freight - analysis and selection of transport route, analysis of storage space)

Recently was created specialized freight exchange for container transport. At moment, they are focused on optimizing cruises without the possibility of concluding a land transport contract.

Initially, the transport exchange was used for communication between the seeking cargo and the transporting goods, currently its functionality is much larger and regularly developed.

Figure 40: Freight exchange graph

Basic functionality: Platform for exchanging information between carriers, freight forwarders and shippers. They facilitate communication, transaction processing, and acquisition of new orders. First and foremost, they allow for minimizing empty running and optimizing the use of the cargo area, and - consequently - reducing costs.

- transport exchange,
- tendering platform,
- tracking platform,
- warehousing exchange,
- business directory.

Architecture and functionality:

- The freight exchange - connects road haulers, freight forwarders and companies from manufacturing and trade. There is something in for anyone: Up to 750,000 freight and vehicle offers are offered in the freight exchange by more than 120,000 users from across Europe – tendency is increasing.
- Freight offers - user can offer and also find all types of goods at the freight entry and freight summary section. Describe consignment's size, type, weight, origin and destination with as much detail as possible. This makes it easier for those searching for freight to find exactly what they need and user will be contacted more quickly. Because to find an adequate load for available vehicle space quickly, those searching for freight use the list in the freight search. The contractor can see contact data by clicking on offer and can contact directly.
- Vehicle offers - on the transport platform user can find freight overview and a vehicle entry section to help optimize vehicle's space capacity. As a contractor, user can enter vehicle space offers with information on vehicle type, volume/weight, date, current location and destination of the vehicle. This way user avoid empty runs as well as unnecessary costs. With one click on offer, verified customers can get in contact with directly and conclude a transport order
- Warehouse offers - the warehousing exchange on transport platform helps to reduce empty warehouse space and make the most of capacity. If, on the other hand, user are looking for warehouse space, either long-term or due to bottle-necks, have access to up to 30,000 warehouse and logistics spaces spread across 44 European countries. Simply click on a warehouse offer to receive contact information on potential business partner, and get in touch with them directly. The warehousing exchange is included in every price package

Additionally:

1. **Transport tenders**

- Tendering system
- Service provider search
- Current tenders

2. **Transport orders**

- Quote request – possibility to send transport quote request digitally to various business partners simultaneously.
    a. Simple networking by sending requests to business partners directly on the platform
    b. Save process costs and time by digitally requesting transport quotes
    c. Order agreements without additional communication tools
    d. Information from business partners on daily prices in real time
    e. Select and compare received transport quotes
    f. Central overview of all operations and their status
    g. Possible additional orders by means of specific transport quote requests
    h. Create templates for repetitive requests and use them at any time
    i. Receive messages on relevant operations
- Order handling - carry out all transport orders in "Order handling" with business partners. In doing so all order operations are documented and managed centrally
    a. Simple networking by handling directly on the platform
    b. Save process costs and time by digitally assigning orders
    c. Order agreements without additional communication tools
    d. Mutual assurance with a binding contract document
    e. Central overview of all operations and their status
    f. Transport orders with the company logo, documents and a personalized order number generator
    g. Create templates for recurring orders and use them at any time
    h. Receive messages on relevant operations

3. Tracking

- Vehicle localization - The powerful tracking solution combines all standard telematics systems in transport platform. User can view relevant positional data in a clear bundled form. In addition, with the route planning and calculation tool, user can directly determine the corresponding route and estimate the resulting transport and additional costs from the freight and vehicle exchange.
    a. All vehicles can be tracked on our transport platform, no matter which telematics systems is using
    b. No need to log into several different telematics systems
    c. Separately mark vehicles that user have temporarily activated for tracking in "Enter vehicle"
    d. Use user current location as a starting point for searching for freight nearby
    e. Save vehicle location in the route planning to calculate
    f. Get a clear picture and ensure transparency at all times
    g. Create trust and enhance credibility when assigning jobs and contract processing
    h. Save valuable time with reduced need for communication
- Integrated telematics providers

4. Connecting customers

- Business directory - access to a logistics network of over 38,500 verified companies from all across Europe
- Messenger - enables, as a contractor and customer from manufacturing and trade, freight forwarding agencies and transport companies to chat with each other directly. The service is available to either fix offers or chat in general. With the Messenger user can negotiate simultaneously with various potential business partners.
    a. Offer-related chat including an export function – perfect in order to handle and document binding offer related (price) negotiations
    b. Synchronization of contacts and chats across mobile devices – using it on tablet or smartphone is possible from anywhere
    c. A clear layout as well as filtering and administering of chat subjects and business partners within one window – all essential by offer-related requests
    d. Verified business partners as well as compliance with the data protection guidelines guarantee security in the accustomed TimoCom quality
    e. General chat functions to network before and after a transport job
- Mobile - app for tablets and smartphones

Target groups: Road carriers, freight forwarders, shippers

Technical description:

- Access by website or installed software
- Internet access is required
- Registration required
- Fee required

Benefits:

- Helps to avoid expensive empty runs
- Up to 750,000 international vehicle and freight offers daily
- More than 120,000 users from all across Europe
- More than 516 million tons of freight per annum
- Special offer for Courier / Express / Package service
- The highest possible level of security for national and international transport thanks to security network
- Reasonable monthly flat-rate access to our transport platform
- User can find freight and offer vehicle space wherever he is via the transport barometer app
- Allows user to react flexibly to bottle-necks, reduce empty space and make full use of capacity
- Possibility to test it for free up to 4 weeks, including a personalized introduction to the functions in user native language
- Access up to 30,000 warehouse and logistics spaces across 44 European countries

Gap analysis: lack Information about CO2 emission

3.3.3.4. Logistic Platform / Electronic Transaction Platform

It is an Internet tool used to support business operations of enterprises. Using the platforms, it is possible to plan purchases and sales, negotiate, invest, as well as to conduct controlling process. It operates on the basis of an open or closed B2B platform and is used through appropriate software or any web browser.

The idea behind the platform is to expose companies to the demand for goods or services. Such a demand includes specific requirements for the good itself as well as for the suppliers. It is also important to choose the way of offering and selecting a supplier.

At the moment there are many types of trading platforms available on the market. They are based on outsourcing of purchases or constitute open transaction platforms. The main modules of the platform are as follows:

- internal procurement flows
- qualification of suppliers,
- transaction,
- booking,
- suppliers notification
- suppliers assessment,
- dashboard

The completion of the negotiation process of delivery conditions is the booking of transport from the carrier. Once it is confirmed, a transport order is created - delivery obligation according to agreed conditions.

The transport process is also monitored by service providers and shippers. There are many instruments supporting operational staff to facilitate the impact on the efficiency of transport processes at various stages of the service.

Basic functionality:

1. **Request a Freight Quote**
2. **Services on map**
    - Container tracking
    - Distances and time
    - Logistic Route Planner
    - List of world sea and air ports
    - Sea Lines Explorer
    - Route Explorer
    - Sea Freight Exchange

3. **Smart tools referring to DIMENSIONS**
   - Load calculator
   - Containers Dimensions
   - Pallet Dimensions
   - Containers types and dimensions (for air freight)
   - Types and dimensions of railway wagons

4. **Additional Tools:**
   - Demurrage and Storage
   - Incoterms 2010
   - IMO classes
   - Currency converter
   - Unit converter
   - Abbreviations
   - Liner terms
   - Services & Fees
5. **Inspection Services**
   - Product Testing Services
   - Pre-Production Inspections
   - First Batch Inspection
   - During Production Inspection
   - Pre-Shipment Inspection
   - Container Loading Inspection
   - On-site Sorting Service
   - Supplier Verification
   - Step-by-Step Order Tracking
   - Surprise Factory Visit
   - Price and Terms Negotiations
   - Product Sourcing
   - Quality Assurance
   - Engineering
   - Lab Testing Advice

Architecture and functionality:

1. **Request a Freight Quote**

Shippers and forwarders may obtain knowledge about rates for LCL, FCL containers as well as bulk

- seaport – seaport
- airport - airport
- port – destination (road haulage or rail freight)

2. **Services on map**

Container tracking

The tracking system allows us to define the current position of the container on the world map (Google Map) and determine the port and the time spent in port of congestion. To track the location of the container, user must specify its number and the shipping line. The result will be displayed on the map showing the current location of the container.

Distances and time

Distances and Time - Online tool for calculation distances and shipping rates between air and sea ports. Whether user need "port-to-port" or "door-to-door" transit time and distances, just need to choose place of loading and discharging of the shipment. In several seconds will get the duration of transit time, including inland transportation of cargo to the port of loading. Data on the transit time of shipping lines is calculated in a combined way, based on the statistical data obtained from "container tracking" service. All the data will be informatively represented on Google Map.

User also get a layout of the estimated time costs in accordance with basic terms of delivery (Incoterms).

Logistic Route Planner

No matter what mode of transport is using (air, land or multimodal), customers will be sure where their cargo is located and when it will be delivered. User plot personal route for every client with own booking number. Therefore customer can check cargo location anytime, just enter booking number.

Sea Lines Explorer

The service is very simple and quick in use. In order to get the most complete information about the nearest container terminals and shipping lines in the region chosen, the only thing user need is to select the place of origin and destination of the shipment. Within a few seconds will get an informative image of ports and container terminals in the selected region on Google map. In addition, the service includes information regarding all shipping lines operating on the routes chosen.

Routes Explorer

- Find the best ocean freight from the top Shipping Lines as well as the most competitive transportation rates from Rail handlers, Freight Forwarders and Transport companies.
- From any origin to any destination in the world.
- From small airfreight to full ship loads.
- Place request on SeaRates.com, then simply wait for the top carriers to quote.
- User can choose who is best suited to move freight and at rates which both agree

Sea Freight Exchange

- Helps make booking easy, enjoyable, and safe.
- Verify personal profiles and rates, maintain a smart messaging system so carriers and clients can communicate with certainty.

3. Smart tools referring to DIMENSIONS (as support for loading process)

- Load calculator – for optimal loading of trucks and containers
- Containers Dimensions
- Pallet Dimensions
- ULB Containers types and dimensions (for air freight)
- Types and dimensions of railway wagons

4. Additional Tools supporting purchasing process

- Demurrage and Storage
- Incoterms 2010
- IMO classes
- Currency converter
- Unit converter
- Abbreviations
- Liner terms
- Services & Fees

Target groups: Shippers, freight forwarders, carriers, Intermodal operator

Benefits:

General

- It's free
- User can choose from a large list of competitive quotes.
- An innovative online platform that allows to book and pay for shipments.
- Fast quotes from the most active carriers.
- Instant visibility with online chat.
- Track shipment on our interactive map.

Container tracking

When visiting the website with container tracking the client gets the chance to complete the request and establish new business ties.

Logistic Route Planner

Allow to:

- add any point of shipment to the route (city, port, terminal, etc.);
- plot shipping route with unique booking numbers;
- edit the route during the shipment;
- track the customer's shipments on website.

Complete list of ports, terminals and shipping port-to-port connections

Technical description:

- Access by website or installed software
- Internet access is required
- Registration required

Gap analysis: Lack information about integration with other software's

3.3.3.5. Multi Depot Management System

The first step in the shipment of containerized goods realized as part of the export transaction is to deliver the empty container to shipper for loading of the goods. Container owners are ship-owners which put empty containers on the network, where they expect to be transported to the customer or to the port operator indicated by the ship-owner. Ship-owners need IT tools which allows them to make optimal use of the network, to provide customers with empty containers from the nearest depot.

Basic functionality: Depot Management System is way of managing the movement and maintenance of containers in container yard.

Architecture and functionality:

Systems functionality includes:

- Record Containers Gate In/Out, Status changes, Yard services, transfers, complete Container Tracking, with detailed History.
- Auto charge calculations for Handling, Daily/Weekly Storage.
- Repairs [M&R], Miscellaneous costs Repair Estimates and billing [advanced costing grids, inc. Reefer repairs], repairs profitability & stock control.
- Multi Depot, Multi Cost Centre, Multi Country.
- Multi Language.
- Full container & transaction history with detailed drilldown.
- Detailed Reporting, Daily Log etc. Client Revenue Reporting with graphs, inc. export to Excel, PDF, or email.
- Unique 'Generic EDI' - import/export any EDI files, makes EDI easy.
- Embedded SQL Query with export to Excel for 'ad hoc' reporting.
- Quick On-Line Container Status Enquiries/Release requests.

Options include:

- Hand Held Repair Estimates - portable data terminals on-line via our unique very long range radio modems.
- Hand Helds for Gate In/Gate Out/Yard Services/Releases etc.
- Imbedded Delphi Report Generator.
- Operating Country selector with invoice/tax rules for country selected.
- Internet client access and enquiries & Estimate approvals with WEBPARK.
- Fork Mounted RF Units, etc., plus many more unique features.

Target groups: Ship holders

Technical description: Runs on an MS SQL Server database - a top quality & robust environment

Benefits:

- A full featured system with extensive reporting and analysis, Multi country, Multi Depot, Multi cost centre, Multi Language.
- Have unique animated 3D On-Screen Visual Depot, for easy depot control.
- Includes auto-charge calculations for Handling, Daily / Weekly Storage, Repairs, and Miscellaneous costs, and our unique 'Generic EDI' - which automates and makes EDI easy. User can record Containers Gate In / Out Status changes, Yard Services, transfers, complete Container Tracking with detailed history.

Gap analysis: Lack information about integration and communication with other systems

3.3.3.6. Transport Management Systems (TMS)

TMS is a specialized computer software that supports transport, logistics, as well as distribution and trade processes. It can be implemented in any type of enterprise, however, it works best in transport, forwarding, logistics and warehousing departments as well as other companies owning or renting a car fleet.

TMS systems provide access to a number of functionalities facilitating the performance of basic tasks of forwarders and carriers, as well as access to extensive analytical and reporting modules. Modern TMS systems cooperate with GPS systems (possibility of integration with telematics systems and digital maps) and can be operated by websites, and contacts with contractors are made by text message, e-mail or fax and by means of specially created accounts, which guarantee quick access to information. So far, the data has been stored mainly on a local server, but nowadays an increasingly popular solution is to build systems available through Internet platforms, which store data in the so-called CLOUD (software provider's server). The most important functionality of TMS systems are:

- planning and optimizing of transport routes
- fleet management
- monitoring & management of transport orders (real time vehicle tracking, analyze deviations from the planned route, control the use of designated parking lots and petrol stations)
- control of transport costs (amount of purchased fuel and its level of consumption, drivers working time, technical reviews)
- clearing transport services
- statistics and analyses

Transport Management Systems was designed to handle other branches of transport, such as sea or rail, take into account their specific characteristics.

Figure 41: Schematic example of MercuryGate (TMS)

Basic functionality:

- Multimodal deliveries planning based on the database of rates, schedules and carries capacities supported by database of historical rates, trends and forecasts.
- Shipments optimization by consolidating parcels, groupage and part loads, securing backhauls and searching for the best multimodal transport solutions.
- Procurement of the multimodal and multi-leg transport services including electronic bid solutions and freight exchange mechanism.
- Paperless management of freight transaction (orders management, cost allocation, creation and reconciliation of invoices, paying commissions' e.tc).
- Control Tower securing end-to-end shipment visibility of multimodal, multi-leg shipments for all trading partners.
- Easy-to-read dashboards supporting executives with comprehensive analysis of transport services progress.
- Fleet management including vehicle monitoring, diagnosis and maintenance as well as drivers' management.

Target groups:

1. shippers

- Negotiate and procure the optimal transport rate
- Simultaneously optimize inbound and outbound transportation
- Select the optimal mode, carrier and rate
- Achieve control tower visibility & decision support
- Conduct effective freight audits and manage fully landed costs
- Centralize & standardize to reduce costs
- React quickly to the changing global market
- Optimising delivery plan to minimize costs
- Shippers negotiate for rates from a position of strength
- Selecting the best carrier for every load
- Adapt to changes quickly and effectively

2. Freight forwarders, freight brokers, 3PL (third party logistics)

- Deliver multiple services with a single scalable platform
- Rapidly on-board new clients
- Negotiate rates and select the optimal carrier
- Simultaneously optimize inbound and outbound shipments globally
- Provide control tower visibility and decision support
- Allocate fully landed costs, audit & pay invoices, and pay commissions
- Rely on powerful analytics and reporting
- Configure workflows, user roles, and interfaces

Architecture and description of tool functionality:

A. Module for Transport Optimization - dedicated for SHIPPERS

The Basic part of the tool is data base of current rates of approved carriers, their specified capacities and transit times. After importing current shipments from shipper's TMS, ERP, WMS or spreadsheet, automatically determines the most cost effective route and load to consolidation. Optimization goes across all modes, including parcel, LTL, TL, rail, intermodal, air freight, ocean and multimodal. Pooling points and back haul may be considered as well as multiple modes or international shipments.
The application will also determine the optimal ship dates and delivery appointments based on carrier resources, available docks, and delivery windows. Optimization is based on the cost, mileage and CO2 emissions reduction for the planned shipments compared to point-to-point loads. When the loads are optimized shipment details are sent to TMS to the operational personnel.

B. Module for carrier management – dedicated for freight forwarders and shippers

The heart of the system is centrally managed a large carriers database that is interactively updated by carriers.
Shippers may keep here documentation of all carriers that serve them, together with the all reports.
With accurate information about each carrier's locations, equipment, and preferred lanes, the TMS will have everything it needs to suggest the best carrier for every load shipped.
Using this module, the process may be set up and user roles defined. LSP may collect and evaluate information before releasing carriers for transportation planning processes. Carriers can share the burden of keeping their information current. Using a web portal, carriers enter critical information about their insurance, equipment, contacts, preferred lanes, and much more.

C. Module for procurement of transport services– for shippers, freight forwarders and freight brokers.

This module, supports effectively procure and manage both long-term contracts and spot rates. Eliminate repetitive manual work and streamline document creation, bid generation, bid response normalization and contract creation. Perform lane-by-lane analysis and evaluate bid responses holistically leveraging real life shipment data. Rank carriers based on pre-defined criteria and compare with market benchmarks. Post contract award, monitor compliance of execution with contracts and ensure things go according to plan.

Consolidate and work with different business units to forecast capacity requirements and combine volumes to negotiate better rates with carriers. Carry out iterative bids with carriers to fine tune rates. Leverage carrier portals to enable active participation from carrier community.
Leverage what if simulation to evaluate lanes, pool points, cross docking and impact of different modes on total transportation spend. Analyzes bid responses with actual shipment data from TMS. Evaluate carrier bids to identify least cost provider, carrier mix and mode.

D. Module for fleet management by carriers.

Module allows carriers to manage drivers, equipment and operations. Carrier's safety records may be protected by analyzing driver performance based on history of accidents, incident, and violations
Using algorithms of Driver Safety Management System driver scores may be predicted. Expirations of inspections and registrations may be better managed. Breakdowns may be avoided by proactively managing service cycles. Easy access to specifications and warranty information expedites repairs.
Optimization of transport execution and improvement of assets utilization by:

- Enabling two-way communication drivers via mobile applications
- Tracking equipment in real time with control tower visibility
- Optimizing combination of private fleet and common carriers
- Elimination of redundancy with one system for drivers, equipment, and operations by
- Eliminating redundancy in business processes and data entry with an integrated TMS and Fleet Management system
- Managing by exception across entire transportation network- drivers, equipment, and operations
- Enabling efficient operations and make smarter decisions with comprehensive visibility

E. Module of the global freight market index (for all modes : Air, Sea, Road, Rails and Intermodal)

Whether comparing spot quotes or evaluating contract bids it is good to know what others are paying and where the market is headed.
This module provides a clear and accurate picture of market rates, information can be used to drive down transportation costs. Compare existing contracts with spot-market rates. Identify carriers that may be overpriced. Find the most cost-effective mode for any shipment. Quote rates with confidence
And index data is updated nightly, with over 120,000 new loads added every 24 hours...

F. ICT tools for monitoring cargo flow

a. Control Tower Visibility Tool

- This is door-to-door transportation visibility.
- Helps clients determine where their goods are located within the transportation chain.
- Keeps track of items placed in boxes stacked on skids located in a container.
- Combined with the location of the goods and allows users to see the location

b. Tracking tool with the use of mobile technologies

- The only shipment tracking solution built to work on any cell phone,
- Real-time Tracking Updates: Compatible with both single and multi-stop shipments, delivers third-party validated tracking updates.
- Off Schedule Dashboard: This 100% automated system provides instant insight into which loads are "on schedule", behind schedule", or "in trouble".
- Mapping: The dashboard will map the exact path a shipment has taken during transit
- Automated Arrival and Departure Alerts: Featuring geo-fencing, sending updates as shipments are leaving or nearing their origins and destinations.

c. Locations Tool

- Integrates the location data from telematics servers with weather and traffic information to create actionable insights for customers.
- Location Updates: Updates every 15 minutes on the location of loads.
- Exception Alerts: Email and system alerts to always know if a truck will be late or is off-course.
- ETA Updates: Always recalculating ETAs based on the current truck location, weather and traffic data.
- Automatic Arriving, Picked-up and Delivered Updates: Always know when truck is arriving or leaving the pick-up or delivery locations
- Innovative Workflow: The unique workflow always protects the sensitive fleet information of trucking companies.

G. Tools for analyzing transport processes

a. External sources Tool

- Merge data from multiple sources (Data can be pulled from all TMS tools as well as external sources)
- Automate calculations (Determine commissions, cost savings, and over-payments)
- Create instant info graphics (Export data to create charts, graphs, and tables)
- Analyze: (Profitability analysis, Shipment analysis, Commission analysis, Carrier analysis, Manage margins and profitability)
- Monitor Carrier Data Quality: Timeliness, accuracy, and completeness, Tender accept / reject ratios,
- Claims and freight bill accuracy, Overall carrier score
- Reporting: Monitor shipment processing time, Verify and monitor carrier updates, Audit carrier performance standards, Validate shipment rates.

b. Embedded Analytics Tool

- Increase/decrease the number of loads offered to carriers based on historical availability, superior acceptance percentage, and on-time performance (and within the limits of volume incentive agreements)
- Allocate premium appointment slots to the carriers that habitually demonstrate the best on-time performance so that facilities operate smoothly during peak periods
- Give preferential treatment to the best carriers or trading partners, and reward them with expedited payment to influence load acceptance and on-time performance
- Utilize load/unload and historical transit times to validate appointment duration and current trip time between appointments.

Benefits:

1. General advantages:

- Supports all modes, including: Parcel, LTL, TL, Rail, Air, Ocean, and Intermodal
- Useful for small companies with low volumes to large global conglomerates with huge volumes
- Manage brokerage business regardless of mode for any business perspective from a small sales force to a nationwide agency model
- Supports all types of freight management business models including buy/sell, management fee, gain-share and more
- Manage global shipments and operations
- Supports optimization across all modes, even parcel, across all clients or subsidiaries
- Customers access the information user want them to see from the web and can create their own quotes and track progress

2. Shippers:

- Real time access to global logistics data makes shippers smarter
- Modelling scenarios using real shipments, actual carrier rates & KPIs, and locations delivers transportation plans optimized to deliver minimal costs.
- Easy access to information by all trading partners provides the ability to quickly adapt and change the plan when things don't go as planned.
- Supercharged shippers negotiate for rates from a position of strength.
- Easy access to historical and current industry rates, carrier's past performance, and expected load volumes insures always use the best available carrier at the best available rate
- An integrated transportation management system can make a difference in the company's ability to exploit new market opportunities and be more competitive.

3. Freight forwarders, freight brokers, 3PL (third party logistics):

- Planning for shipments that span multiple countries can be complex and often requires multiple legs, such as rail, dray, ocean and air.
- TMS seamlessly optimizes these legs, enabling to maintain control over costs and single-system visibility to the entire transaction.
- It is also possible to consolidate of LCL shipments into full containers and reduce costs

3.3.3.7. Terminal Operation System (TOS)

Seaport container terminals are a meeting place for many, not only for cooperating, but also for competing entities. Terminal Operation System (TOS) must meet the requirements and respond to the needs of terminal employees and its clients, e.g.:

- The operators of the reloading equipment need simplicity;
- Planners responsible for the appropriate planning and coordination of reloading and storage processes, expect intuitiveness and comprehensive visibility in the graphical scheme,
- Truck drivers need flexibility in the ability to enter data.

Integration of all needs in the organizational and operational level is the main task for TOS. The capabilities of the software used and its functionality result from the nature of the specific terminal.

TOS is the basic tool for recording, planning, controlling and monitoring for modern container terminals. TOS serves and is supported by planners (both ship, yard and rail) as well as forwarders and ship-owners. TOS has a strong impact on both strategic and tactical activities aimed at increasing the efficiency of the terminal's operation and improving cooperation with customers. It is also a key part of the supply chain and, above all, it aims to control the flow of cargo within the terminal area.

The aim of TOS is to provide the necessary set of computer procedures for managing the flow of goods, machine work and people leading to increased process efficiency. The basic functions of the TOS system are:

- Documentary function - unification of all terminal documentation,
- Information function - enables to log in to the terminal database via a web browser: shippers can find out container status (e.g. unloaded, cleared, detained for inspection, etc.); intermodal operators, ship agents or ship-owners can submit loading lists to their trains/ships and define notification of arrival to the terminal
- Planning function – allows for detailed planning transhipment process of ships, trains, trucks, as well as handling of containers inside the terminal.
- Identification and tracking function – automated tracking of goods in the supply chain, support for the exchange of information on the location and current status of containers.
- Economic analysis function – plans and manages revenues and expenses, verifies the compliance of the financial and accounting system with the previously defined requirements of the company.

Basic functionality:

Software used for Terminal Operating System (TOS), solves the complex problem of managing a variety of mixed cargo. It provides a single integrated, real-time view of all operations and data, allowing user to make smarter decisions faster, resulting in improved productivity and operational efficiency

Support all port's cargo types, equipment, planning processes, and reporting:

- Full cargo support covers conventional sized containers (20' and 40'), specialized sizing including 30', 45' and 53' containers, break bulk of all types, motor vehicles and bulk, steel and forest products, rolling cargo, and all local general cargo varieties.
- Support for equipment includes chassis, underslung and nose mounted generators, cassettes, MAFIs, and trailers.
- Over-dimensional cargo support crosses road, rail, ship and yard.
- Full support for IMDG hazardous cargo segregation across road, rail, ship and yard.
- Highly configurable reporting and data queries covers all cargo types.
- Data export is available in multiple formats, both standard and user-defined.
- Advanced notification engine lets users decide which notifications to receive, and create custom notification events.
- Data access is instantaneous, for all data at all times. As the database size increases. Performance is not affected.
- Full audit trail and exception handling capabilities allow configurable warnings and error reporting.
- Planning is supported whether manual, semi-automatic or fully automatic.
- Fully automatic background task scheduler runs reports and scheduled tasks.

Architecture and functionality:

a. Yard operations

Define terminal and yard areas for all types of cargo and operations, create user-specific terminal layout views that let each user see the areas that matter most to them, and see all cargo in real time, using current, short-term, or long-term planning modes. Fully audit all planning operations, provide support for labor working within site, and automatically plan yard locations for any operation and all cargoes. Prioritize, categorize, and schedule next day's work, create 'To Do' tasks on containers and cargo, and track Key Performance Indicators (KPIs) on yard operations.

b. Gate operations

Manage gates in real time on touchscreen and mobile devices, controlling and monitoring truck and cargo movements to increase efficiency. Keep detailed information about vehicle visits, instantly control and monitor gate flows, and integrate gate operations with both pre-advice processing and truck visit appointment system. Get real-time updates on all truck processing within the terminal, monitor and analyses detailed KPIs, and speed up inter-terminal cargo transfers by allowing rapid access with no data entry. PIN and gate touchscreen kiosks ensure paperless rapid throughput.

c. Voyage planning and operations

Make fully informed decisions, with ship and yard operations integrated in one seamless system. Define vessels, see and control operations in real time, and report and compare a full history of vessel visits. Allocate jobs between crane resources, and track progress with graphical displays. Plan break bulk, bulk, and general cargo in detail, and handle Lift-On/Lift-Off (LOLO) and RORO planning and operations. Configure and automate cargo stops, and aid management decision-making by monitoring vessel operation performance.

d. Mobile applications

Use handheld and vehicle-mounted mobile devices wherever cargo goes, including in the yard, on ship, and within warehousing and general cargo operations. Convenient and flexible, mobile device applications access Master Terminal using Wi-Fi or cellular connections, feature touch screens with easy to follow graphical user interfaces, and support for multiple languages. Role-based security allows system administrators to configure which mobile device functions are available to each handheld application user.

e. Rail

Manage and track train schedules and wagon fleets, and easily share the right data with train companies. Control all weight and dimension rules for rail wagons, handle containers of varying sizes, and manage full train scheduling. Control operations in real time, see graphical views of trains and rail areas for planning and operations, complete planning before trains arrive, and automatically plan train load and discharge.

f. Reporting

Use powerful and flexible built-in reporting to create an extensive range of reports and save them in accessible formats such as CSV, PDF, XML, or HTML. Reports can be customized to meet specific requirements, integrated into users' menus so they are easy to find, and automatically scheduled to be sent to email recipients. Data can be exported for archiving, data warehousing, or processing by other systems.

g. Invoicing

Configure and track charges and invoices for every cargo event. Automatically charge for all cargo and vessel activities, including yard storage, in real time, with fully configurable invoice creation. Handle flexible tariffs and rates, multiple currencies, and cash payments. Integrate with standard invoicing systems, output invoice data for auto-emailed invoices, and track and trace any invoice back to its source.

h. Interfaces

Integrate Terminal with general ledger system, port hardware, peripherals, and more. Mechanisms for interfacing to third-party systems include EDI, file export, web services, SQL, and real-time TCP/IP connections. Over 80 standard EDI formats are supported, plus custom EDI formats can be defined. Peripheral devices are supported, including printers, barcode scanners, radio data terminals, in-machine electronic scales, weigh bridges, and external gate systems.

i. Warehousing

Warehousing functionality allows you to easily and efficiently manage cargo storage – a key way to attract new business and revenue streams. Define any terminal area as a general cargo area for warehousing. Within this area, user can define any combination of ground and rack locations and assign them unique identifiers. View current capacities with a highly graphical display, use handheld applications to manage cargo, and configure billing by storage area, operator, or cargo attributes

j. Harbor management

Managing harbor requirements is easy with software harbor management solution. The highly intuitive graphical user interface allows user to easily manage the complex problem of scheduling vessel visits, resources, and personnel in busy ports. Harbor management is multi-terminal-capable, allowing user to schedule visits across terminals with multiple harbors and berths. Dynamic tidal modelling provides intelligence to safely manage arrival and departure movements in harbors with significant tidal movement.

k. Access control and data security

Control access to the system with a unique username and password for each user, and grant permissions to control exactly what each user can view and update. Securely store data within a high-performance database and export data to an SQL server for archiving or data warehousing. Protect data with full disaster recovery from built-in replication technology and Master Care's expertise.

Target groups: Ports and terminals operators

Technical description: User can run on standard hardware as it easily scales to fit operation. One system covers whole port, in real time, for everyone.

- One workstation application and a companion mobile app suite unite seamlessly to give entire enterprise real-time access to information.
- Industry standard, distributed client-server architecture can be scaled
- Horizontally and vertically to the size of operation.
- Windows/Intel servers and workstations are all user need—no specialized or expensive hardware.
- A high-performance database with enterprise-class resilience and scalability, bundled with the product, guarantees the ultimate application performance.
- Thin clients and a Rich Internet Application are fully integrated, so user get tailored, direct access to the system.

Benefits:

- Single integrated system - real-time view of activity and cargo across entire port.
- A stable solution capable of forming the core of port's information systems.
- Supports all cargo types and is available for all styles of ports.
- Scalable, reliable, and flexible, can be customized to fit business.

3.3.3.8. Supply Chain Management (SCM)

The development of SCM-class systems is related to the progressive evolution of the supply chain concept. Over the years, their functionality and the complexity of the supported logistics processes have changed significantly. In SCM systems, priority is given to the secure flow of information accompanying key business processes throughout the entire supply chain. They have become more comprehensive solutions used to support strategic goals of the supply chain, whose main task was focused on multifaceted business integration of all cooperating enterprises.

Currently we can notice rapid development of SCM information systems. The solutions offered on the market are technologically advanced and usually form a group of integrated applications dedicated to various sub-areas of the supply chain. It should be pointed out here that SCM systems operate only at the information layer of the supply chain.

The information available in the SCM system is derived from the MRP II or ERP class system (usually ERP). The ERP system integrates all information within one application, and individual SCM system applications use it as a source of current data.

Individual SCM applications therefore use ERP as the primary source of data. Therefore, the implementation of the SCM system in the enterprise requires an inseparable implementation of the ERP class system. SCM optimizes the most important business processes in the company and what is essential, supports electronic channels of information exchange between the participants of the chain with suppliers, partners or clients, ensuring transparency at the level of goods flow, inventory control, forecasts or plans created.

The implementation of the SCM class system in the enterprise translates into a number of benefits, among which the most important ones include:

- Processing and consolidation of data coming from various sources of the ERP system and then making them available in the form of precise information on current needs and requirements of clients, reported demand to all partners cooperating within the supply chain. Thanks to the accuracy and speed of the information obtained, you can make adjustments to the selection of production resources on an ongoing basis, adjust the production volume to the reported needs, or more efficiently manage inventory, significantly reducing storage costs.
- Response to changes occurring anywhere along the supply chain. Changes in demand and other unforeseen events or errors are immediately reported in the system to all its participants. Thanks to this, interested parties can quickly take appropriate corrective actions in current supply or distribution production plans.
- Savings thanks to better planning of supply, production or distribution. The processed data from the ERP system regarding the production plan at the customer's site, made available in SCM, are also a delivery schedule for suppliers. We are dealing here with full synchronization of the chain parties' activities which significantly contributes to the market needs reported to the client.
- Lowering the level of stocks to the necessary minimum. The availability of information about the current and expected level of production allows to synchronize production plans with the volume of deliveries within the framework of the Just in Time concept. As a result, the level of inventory is reduced and the production capacity is more evenly used. With SCM systems, therefore, it is not justified to apply a traditional approach to planning the level of stocks based on the economic size of the order.

There are significant differences between the implementation of the Enterprise Resource Planning (ERP) and Supply Chain Management (SCM) systems. Unlike ERP systems, SCM solutions require a data model that allows real-time support of a large number of complex transactions. Until now, in order to obtain comprehensive solutions, it was necessary to integrate specialized software with its own ERP system and create special interfaces supporting external data sources. This method brings results, but it involves high costs. The benefits of implementing the SCM system are as follows:

- Increasing profit in cooperation with suppliers,
- Improving customer service and reducing material shortages,
- Reduction of costs related to the transport of materials,
- Optimization of supply chain value to reduce costs and increase profit,
- Reduction of operating costs at the enterprise level and reduction of manufacturing costs of finished products,
- Increasing competitiveness by optimizing the flow of materials and goods and reducing storage costs, as well as material flow planning,
- Achieving the transparency of the supply chain, including among trade partners,
- Efficient adaptation of enterprises to changing market conditions and situations for the customer.

SCM systems have evolved significantly over the last dozen or so years. In the currently implemented solutions, the main emphasis is placed on the close integration of the company with its business partners (suppliers and customers). Consolidation of various functions within key business processes, supported by SCM class systems, leads to creating a new dimension of supply chain value, also processing into an increase in the competitive advantage of its individual participants.

Basic functionality:

Real-time delivery network management with complex supply chain management (SCM) processes - from demand planning to inventory management. Optimizing supply and demand through technologies such as the Internet of Things, RFID and advanced analytical tools.

Architecture and functionality: Functional Modules

- Module: Financial Accounting.
- Module: Controlling.
- Module: Customer Relationship Management.
- Module: Customer Service.
- Module: Enterprise Controlling.
- Module: Environment, Health & Safety.
- Module: Fleet Management.
- Module: Financial Supply Chain Management.
- Module: Human Resources.
- Module: Investment Management.
- Module: Materials Management.
- Module: Product Life Cycle Management.
- Module: Plant Maintenance.
- Module: Production Planning.
- Module: Product Costing deals with Plan Costing + Actual Costing of Finish Products.
- Module: Project Systems.
- Module: Quality Management.
- Module: Real Estate.
- Module: Sales and Distribution.
- Module: Service Management.
- Module: Treasury.
- Module: Warehouse Management.
- Module: Logistics General.

Target groups: Shippers

Technical description:

Option Integrated Business Planning, each of the solutions can be subscribed to individually:

- Integrated Business Planning for sales and operations
- Integrated Business Planning for response and supply
- Integrated Business Planning for inventory
- Integrated Business Planning for demand
- Supply Chain Control Tower

All subscriptions include the following:

- Cloud database
- Cloud Integration for Data Services (SAP HCI-DS)
- Smart Data Integration (SDI)
- Single sign-on (SSO) authentication via SAP Cloud Identity (SCI)
- Software maintenance and support
- System operations and support

Benefits: Responding to new market expectations with real-time supply chain planning features that help to meet demand profitably. Engaging and connect with stakeholders across organization with cloud-based features that combine sales and operations, demand, response and supply planning, and inventory optimization.

- Cloud deployment
- Integrated planning
- Sales and operations planning
- Inventory optimization
- Real-time supply chain management
- In-memory technology
- Fast implementation

Integration with others supply chain optimization systems, this collaboration platform equips user to work safely and easily with multiple tiers of contract manufacturers and suppliers across key supply chain planning and execution processes.

- Possibility to share production forecasts, orders, quality, and inventory information with suppliers and obtain their responses in real time.
- Anticipate and resolve supply assurance problems quickly with collaboration dashboards that alert to supply and demand mismatches.

3.3.3.9. Port Community Systems (PCS)

A special type of information system is Port Community Systems (PCS), these are systems managed by the port authority (or its commission) being communication platform for the exchange of information and electronic documents between all transport companies realizing transport services, storage, transshipment and customs services for port cargo. Its mean: sea terminals, ship-owners, freight forwarders, road and rail carriers, container train operators, authorities and customs offices. At the same time, the same platform serves to exchange information between companies serving ships in port (for example: towing companies or receiving impurities). Some PCS systems allow shippers and forwarders to complete the shipping planning process and conclude a maritime or land transport contract.

Basic functionality:

1. ***Logistics & cargo***

- Booking maritime transport by shipper or freight forwarder
- Shipping instruction (B/L)
- Notice of arrival import cargo (ocean vessel)
- Notification booking containers
- Planning request (barge)
- Pre-announcement container delivery and collection (road, rail)
- Loading/discharge order containers (ocean vessel)
- Loading/discharge order containers (barge, rail)
- Loading/ discharge order break bulk (ocean vessel)
- Loading/discharge order break bulk (inland transport)
- Container release
- Stowage position information
- Track & trace containers
- Electronic invoicing
- Electronic payments

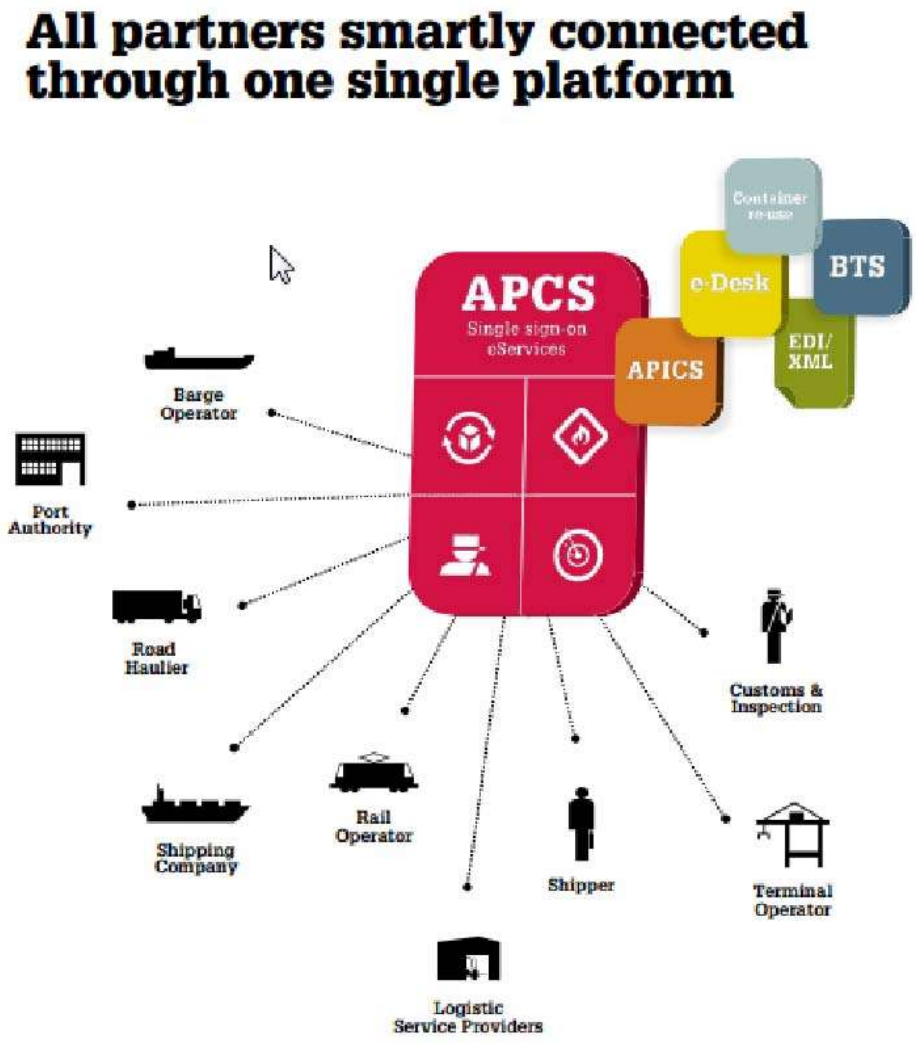

Figure 42: Schematic PCS called APCS, in use in Antwerp

2. Customs

- Customs declaration
- Declaration export manifest
- Declaration import manifest
- Declaration ISPS
- Exchange of MRN
- Notification of arrival (ocean vessel)
- Notification of arrival export cargo
- Notification of departure (ocean vessel)
- Notification of incoming ocean vessel
- Notification transshipment

3. Hazardous goods

- Consultation IMDG-register
- Declaration hazardous cargo
- Notification of arrival/departure hazardous cargo
- Notification SafeSeaNet

4. Nautical

- Berth reservation (ocean vessel)
- Consult lock planning
- Declaration berthing dues
- Declaration waste collection
- Disposal notification
- Electronic invoicing
- Ordering pilot, tug and mooring services
- Planning request (barge)
- Position request
- Pre-announcement (ocean vessel)
- Terminal planning (barge)

Architecture and functionality:

1. Logistics & cargo

a) Booking maritime transport by shipper or freight forwarder: The shipper/forwarder sends an IFTMBF message to the shipping company or the vessel's ship's agent with all the details of the order. This contains all details of the order. This data can also be entered in the INTTRA web portal. The shipping company checks whether the booking can be accepted on the desired vessel and sends a response: the IFTMBC message.

b) Shipping instructions: The forwarder sends the shipping instructions to provide basic information to draw up the bill of lading. The forwarder collects this information based on the orders he received from the shipper.

c) Notice of arrival import cargo (ocean vessel): By sending the notice of arrival the ship's agent informs the consignee the goods are available. In the notice of arrival the ship's agent reports the 'expected time of arrival' (ETA) of the vessel and the provisions for collection of the goods. Based on this information the consignee or his forwarder is able to make preparations for an efficient delivery of the cargo.

d) Notification booking containers: The ship's agent receives a transport order of the forwarder and passes this on to the Terminal operator. The ship's agent sends the information regarding the booking to the Terminal operator. Based on this the Terminal operator is able to include the container in his Terminal planning based on the vessel's

planned berth. The Terminal operator informs the ship's agent about these container movements on the Terminal, including transport mode and possible damage.

e) Planning Request (barge): By sending the notice of arrival the ship's agent informs the consignee the goods are available. In the notice of arrival the ship's agent reports the 'expected time of arrival' (ETA) of the vessel and the provisions for collection of the goods. Based on this information the consignee or his forwarder is able to make preparations for an efficient delivery of the cargo.
f) Pre-announcement container delivery and collection (road, rail): The carrier uses this message to notify the Terminal operator that a truck will be arriving to load or discharge. This pre-notification enables the Terminal operator to plan the loading and/or discharging of the trucks.
g) Loading/discharge order containers (ocean vessel): The ship's agent gives the Terminal operator the order to load or discharge containers in or from the ocean vessel. The Terminal operator sends a confirmation of execution to the ship's agent afterwards.
h) Loading/discharge order containers (barge, rail): Transparency about the time of handling and the number of containers to be handled. Less turnaround time on the Terminal and precise estimate of the required manpower and equipment at the Terminal.
i) Loading/ discharge order break bulk (ocean vessel): A shipping order for conventional break bulk which the forwarder sends to the Terminal operator and which must be confirmed by the ship's agent.
j) Loading/discharge order break bulk (inland transport: The ship's agent/forwarder gives the Terminal operator the order to load or discharge non-containerized goods in or out of a truck, wagon or inland barge. The load order applies for goods coming from an ocean vessel; in case of a discharge order, the cargo has an overseas destination.
k) Container release: The Container Release message is the commercial release of a Container. Containers discharged from the ocean carrier by the Terminal operator are blocked in stack on the Terminal until they are released by the ship's agent. Only then can the Terminal operator load the containers on a truck, wagon or inland barge.
l) Stowage position information: This functionality allows shipping companies and Terminal operators to exchange stowage plans electronically.
m) Track & trace containers: Track 'n trace makes sure that all parties involved in the consignment are able to follow up the status of the consignment.
n) Electronic invoicing: This functionality allows paperless invoicing for the user in accordance with European regulations. This comprises both the incoming and the outgoing invoicing process. For instance, a forwarder is able to receive invoices of the shipping company or carrier, but also send invoices to his customers/shippers.
o) Electronic payments: Twi key is a user-friendly electronic solution to replace payments by paper cheque. This fully paperless process cuts down on the mountain of paperwork that forwarders, shipping agents and banks have to deal with.

2. Customs

a) Customs declaration: The customs broker has to declare all cargo entering, leaving or staying in transit in the EU, to Customs. Excisable goods have to be declared. These three types of declarations have been streamlined on European level: they are PLDA, NCTS and EMCS respectively. PLDA (Paperless Customs and Excise) was developed for the electronic submission and processing of import and export declarations. NCTS (New Computerized Transit System) applies to transit goods that are transported under customs supervision. EMCS (Excise Movement and Control System) replaces the accompanying paper document of the excisable goods by an electronic acceptance process.
b) Declaration export manifest: According to the European Export Control System (ECS) the ship's agent must submit a cargo manifest to Customs. This allows Customs to register the cargo that has left the European Union. Customs can use it to verify whether an export declaration was submitted for this cargo.
c) Declaration import manifest: The Customs Import Manifest is a summary declaration of the cargo transported over sea and discharged in at Belgian port.
d) Declaration ISPS: The International Ship and Port Facility Security Code or ISPS code stipulates that vessels wanting to call at a EU port, need to provide certain information in the form of an 'ISPS Declaration' to the authorities.
e) Exchange of MRN: According to the European Export Control System (ECS) the 'trader at exit' must notify the arrival of the cargo in the area of the Customs office of exit. In the port of Antwerp it is agreed the Terminal operator is the 'trader at exit'. He sends the arrival notice to Customs on the physical arrival of the cargo at the Terminal. The Terminal operator needs the data of the customs declaration of the customs broker. The e-Desk application facilitates this process by simplifying the flow of information from the customs broker to the Terminal operator.
f) Notification of arrival: This message notifies Customs electronically of the arrival of a vessel in port.
g) Notification of arrival export cargo: Under the European Export Control System (ECS) the 'trader at exit' must notify the arrival of the cargo in the area of the Customs office of exit. In the port of Antwerp, it is agreed that the 'trader at exit' is the Terminal operator. He sends the arrival notice to Customs on the physical arrival of the goods at the Terminal. The Terminal operator receives the data of the customs declaration from the declarant or his broker.
h) Notification of departure: This message electronically informs Customs of the departure of a vessel from the port.
i) Notification of incoming: Before the arrival of the ocean vessel, the shipping company/ship's agent notifies Customs of the incoming ocean vessel using the Benelux 20 declaration.
j) Notification transshipment: The Transshipment Notification is a procedure that can be applied when containers of an incoming ocean vessel are transshipped to a departing ocean vessel, to avoid the need to draw up NCTS documents.

3. Hazardous goods

a) Consultation IMDG-register: The IMDG register is the dangerous goods database which is used as reference file in the Antwerp Port Information and Control System (APICS) to validate dangerous goods declarations.
b) Declaration hazardous cargo: Handling of dangerous goods in the port of Antwerp is subject to the provisions of the Dangerous Goods Codex, as well as EU legislation, Belgian national legislation and Belgian regional decrees. By "handling" is meant: inward transport to the port, onward transport from the port, loading, unloading, interim storage on quay or in warehouse, and keeping aboard. The ship's agent/forwarder must declare dangerous goods to the Harbormaster's Office. The latter in turn uses these declarations to draw up a safety dossier, so that it knows which dangerous goods are located where in the port at any moment.
c) Notification of arrival/departure hazardous cargo: The information contained in the IFTDGN declarations submitted by the forwarders and ship's agents is supplemented with the effective handling times by using the information from the CODECO and COARRI terminal reports submitted by the terminal operators.
d) Notification SafeSeaNet: SafeSeaNet is an exchange platform of maritime information about vessels and their cargo between the EU member states, Norway and Iceland. The aim of this platform is to react quickly and effectively to incidents and pollution and detect high-risk vessels early in the process. SafeSeaNet is managed by the European Maritime Safety Agency (EMSA) in Lisbon. According to European directive 2002/59/EC and the amended version 2009/17/EC, every member state of the EU must provide maritime data or be able to request data from SafeSeaNet, 24/7, via its own NCA-organisation (National Competent Authority).

4. Nautical

a) Berth reservation: The ship's agent/shipping company needs to list a preferred berth to the Harbormaster's Office. This berth reservation is done using the message.
b) Consult lock planning: Terminal and barge operators the opportunity to consult the planning of the locks in the port.
c) Declaration berthing dues: Every vessel calling at the Port owes berthing dues to the Port Authority. To calculate these dues, the ship's agent needs to specify the type and amount of cargo that was discharged and loaded when the vessel was in port to the Port Authority.
d) Declaration waste collection: To protect the environment, ocean vessels need render their waste in seaports with recognized collection facilities. The Port Authority charges vessels a waste contribution irrespective of the actual delivery. If the ocean vessel's waste is effectively collected, it receives a subsidy depending on the amount and the nature of the waste, broken down according to MARPOL I and MARPOL V categories. For a precise calculation of the subsidy, all waste dropped off needs to be declared to the Port Authority

by the waste collection companies. This data also allows the waste flows to be meticulously monitored.

e) Disposal notification: The ship's agent/shipping company is required by law to declare the ship's waste on board to the Harbormaster's Office 24 hours before arrival at the port. This waste concerns, among others, oil residue, plastic, empty bottles, empty paint pots, chemicals, kitchen waste, wood and rope.
f) Electronic invoicing: For sustainability reasons the Port Authority opts for electronic invoicing as much as possible. The Port Authority makes invoices and credit notes available online for all its customers.
g) Ordering pilot, tug and mooring services: The ship's agent/shipping company can inform the Harbormaster's Office what additional services the vessel requires before entering the port. E.g.: sea, river and dock pilots, and tugs on the Scheldt and in the docks, crew members, fenders ... This request is made via the message.
h) Planning request: Container barges often call at several Terminals in the port during the same call. To limit the administration regarding a port call as much as possible, an electronic platform allowed container barges to request a handling slot for all the Terminals in a uniform manner.
i) Position request: The opportunity to request the positional data of inland barges. Terminal operators are able to request the position of every known inland barge. Barge operators are only able to request the positions of their own inland barges.
j) Pre-announcement: The ship's agent/shipping company is required by law to provide information to the Harbormaster's Office about the ocean vessel calling at or leaving the port. This is done by the pre-notification of arrival- message.
k) Terminal planning: To limit the administration regarding a port call as much as possible, a unique electronic platform allowed container barges to request a handling slot for all the Terminals in a uniform manner. Based on the received requests the Terminal operator can optimize his Terminal planning.

Target groups:

- Consignee
- Forwarder
- Shipping company
- Ship's agent
- Shipper
- Inland barge operator
- Rail operator
- Terminal operator
- Road carrier
- Customs agent / Customs authorities
- Port authorities
- Waste collection facility

Benefits:

A. Logistics & cargo

- data does not have to be entered manually: less mistakes and cost saving reuse of booking data in the transport order and shipping instruction
- Diminished administrative workload
- Less errors
- Electronic processing of container data enormous efficiency increase of the loading and discharge orders
- Transparency in the supply chain stakeholders are able to follow their consignment exception report: customer is notified in case of deviation
- Cost savings (no paper, postage, archiving, manual action)
- Increase of the quality of the invoicing process: less errors and discussions, less lost invoices, possibility of correspondence with the purchase order
- Environmentally-friendly solution
- Secure way of invoicing that meets all legal requirements
- Just as secure as a cheque Approved by the banks
- Control over the date of execution
- Easy and fast with ID
- No more need for credit lines
- No more running to the bank
- No more paperwork

B. Customs

PLDA:

- goods released sooner
- numerous validation rules
- calculation module for owed duties and taxes
- easily capture data
- user-friendly

NCTS:

- fast and efficient declaration
- fast acceptance by Customs
- fast clearance and release of securities
- fast intervention in case of abuse

EMCS:

- administrative simplification
- efficient procedure and therefore faster release of security
- Immediate notification in case of cargo that is not acceptable
- faster and reliable feedback of the proof that the cargo has reached the final destination
- limited risk that the cargo is sent to the wrong consignee

C. Hazardous goods

- Whether transport permits from other public bodies are required and whether quantity restrictions apply.
- The Harbormaster's Office has all the required information in electronic format.
- Arrival/departure of dangerous goods at or from the terminal is always notified in real time.
- The safety dossiers for the seagoing ships and terminals are always up to date.
- Single point of contact efficient manner to meet the European obligation

D. Nautical

- Efficient and reliable way to reserve a berth Faster service (time savings)less errors
- planning can be adjusted by the Terminal operator
- Terminal request can be adjusted by the barge operator
- the skipper knows best what lock to use
- the skipper can optimize his speed
- efficient way to meet all obligations less administrative work reuse of ship's details based on the vessel and waste notification
- Efficient, fast and reliable notification process better follow-up of the waste flows protection maritime environment
- electronic overview of invoices and credit notes per call data can be uploaded into the Customer's accounting package no postage less paper
- efficient and fast services efficient and reliable way to order additional services
- uniform method to create planning requests and to give Terminal planning feedback
- shorter waiting times for inland barges at Terminals
- less errors (efficient, single data entry and proactive conflict notification)
- efficient interactive planning of arrival and handling
- permanently available and up-to-date ship register, Terminal information and planning data
- transparent and cost-effective
- planning can be adjusted by both Terminal operator and inland barge better estimate of times of arrival the barge operator is able to optimise his speed
- simple, quick and reliable notification process improved service level
- less errors by single data entry and proactive conflict notification
- efficient interactive planning of arrival and handling
- permanent available Terminal information and planning data
- transparency
- efficient, flexible and uniform way to request a Terminal
- cost-efficient, fast handling
- shorter waiting periods and less congestion for inland barges

3.4. Strategy for Application of Intelligent Systems in the Road Transport in Albania

The "Strategy for Application of Intelligent Systems in the Road Transport", was approved by Minister of Infrastructure and Energy on 2020 year. This Strategy establishes a set of objectives as well as the policies and priorities which are to be applied during the years to come and shall provide a framework for concrete decisions to be taken in Albania, in the short, medium and long term. Albania's main objectives to be pursued through ITS, are:

- improved traffic safety and reduced likelihood of accidents
- improved traffic flows and mobility, and reduced traffic congestion
- improved efficiency and predictability of freight traffic, both within Albania and also internationally d) improved enforcement of existing laws and regulations, including joint enforcement across borders e) gradual integration of some of the Albanian transport corridors into the Trans- European Transport Network (TEN-T) through compliance with ITS-related provisions in European Directives and in the Transport Community Treaty (TCT) signed by Albania.

Vision statement

Transport Systems will help to make Albania's main transport corridors part of a safe, integrated and multimodal European Transport system, thereby facilitating Albania's access to the European transport market and serving the needs of Albanian citizens.

Mission Statement

Albania shall gradually introduce Intelligent Transport Systems on the basis of the objectives, policies and priorities established in its National ITS Strategy, and in line with the relevant European acquis, European Directives and the provisions of the Transport Community Treaty of July 2017.

Intelligent transport system (ITS) means a system as specified in the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport

The Strategy takes into account the provisions of the following key documents:

- Albania National Transport Strategy and Action Plan 2016-2020, which establishes as a strategic priority the "Completion and Modernization of Albania's primary and secondary road network" and defines the development of a "National ITS Road Strategy" as Strategic Priority Action.
- Transport Community Treaty (TCT), shall develop efficient traffic management systems, including intermodal systems and Intelligent Transport Systems, and shows the roads and other transport infrastructure within Albania which are considered for the indicative future extension of the Trans-European Transport Network (TEN-T).
- Guideline of the Albanian Ministry of Transport and Infrastructure "On Rules for Implementation of Intelligent Systems in field of road transport and connection with other modes of transport", which established close linkages with the Directive 2010/40/EU.
- "Report from the Commission to the EU Parliament and Council on the implementation of Directive 2010/40/EU on Intelligent Transport Systems" of 2019.
- "Strategic framework for the Implementation of ITS in the TEN-T Networks in the Western Balkans" developed with EU funding and completed in early 2019.

When introducing ITS in Albania, two policies shall be applied systematically:

- Sustainability of ITS: Only such Intelligent Transport Systems shall be deployed (i) for which the funding of the annual operation and maintenance cost can be fully budgeted from regular domestic resources, and (ii) for which the institutional roles and responsibilities for their deployment and operation have been clearly established, either by law or by other appropriate legal instruments.
- Compatibility and interoperability of ITS: All Intelligent Transport Systems to be deployed in Albania are to be designed on the basis of common European Directives, Specifications and Guidelines.

Within the Roads transport sector, priority for ITS deployment is given to:

a) Those inter-urban roads which are identified in the Transport Community Treaty (TCT), "Maps of the indicative TEN-T extension to the Western Balkans", and starting with the Tirana – Durres and Tirana – Elbasan motorways;

b) Those urban road sections on which problems of road safety, congestion and/or air pollution are particularly severe.

Standards and Specifications

In the selection and deployment of ITS projects in the road sector, Albania shall apply the Standards, Specifications and Guidelines developed on the basis of "Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport", as described above.

Albania will also adhere to those standards and specifications developed by CEN/TC 278 and adopted by the European Commission that are relevant for the systems to be deployed in Albania. This is however without prejudice to the right of Albania to decide freely on the deployment (or not) of ITS applications and services on its territory, in accordance with its actual needs and the financial resources available.

Albania's commitment to apply the Standards and Specifications following EU Directive 2010/40/EU is already established in the Transport Community Treaty (TCT), signed in July 2017 between the EU and six Western Balkan countries (WB6) including Albania.

Initial investments for ITS

The deployment of Intelligent Transport Systems in Albania will require substantial investments, both for the initial installation and also for the periodic upgrading and expansion. In most if not all cases, these investments will have to be made by the State who for that purpose must mobilize funding. Funding for the initial deployment of ITS may come either (i) from regular internal budgetary revenues, (ii) from internal borrowing by Albanian institutions, or (iii) from external loans, credits or grants.

The deployment of ITS in Albania on the basis of European Standards is part of Albania's agenda towards its planned integration into the European Union as a future member country. On March 26, 2020 the European Council endorsed starting negotiations with Albania on EU accession.

Therefore, for the funding of ITS investments, whenever possible Albania will seek to obtain external grants or low-interest funding from either the European Union or from European development funding institutions, such as the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD). World Bank loans shall also be considered.

Institutional Framework

The deployment of Intelligent Transport Systems in Albania shall be under the overall leadership and coordination of the sectorial ministry in charge of transport, namely the Ministry of Infrastructure and Energy (MoIE), which shall develop Albania's overall ITS architecture, which is a set of high-level views that enable plans to be made for designing and integrating different ITS applications and services, covering not only technical aspects but also the related organizational, legal and business issues. The existence of a national ITS architecture helps to ensure that the resulting ITS deployment:

- can be planned in a logical manner;
- integrates successfully with other systems;
- meets the desired performance levels;
- has the desired behavior;
- is easy to manage, maintain and extend; and
- Satisfies the expectations of the users.

For the road sector technical aspects of ITS design and implementation, MOIE shall delegate responsibility as follows: - The Albanian Road Authority (ARA), as a beneficiary and manager of the system, also, General Directorate for Road Transport Services (GDRTS) or other institutions with special rights, according to an agreement signed between the parties.

Two projects:

A. Design and implementation of a central Traffic Management Center, including the ITS infrastructure, hardware, software, display screens and communication equipment. Traffic Management Centers are the nerve center of highway monitoring and operations. Engineers, radio operators and other staff work there to:

- monitor traffic and identify problems, using the images from cameras located along the roads equipped with ITS infrastructure;
- use data from traffic detectors on the roads to get a real-time picture of traffic conditions;
- coordinate response with the police and other law enforcement and emergency response crews when responding to incidents on the highway or elsewhere;
- coordinate activities of incident response teams who help stranded drivers, move disabled vehicles, and also help keep traffic moving safely while emergency responders help people involved in accidents;
- operate reversible lane control systems and ramp meters to help manage traffic flow and reduce congestion;
- provide up-to-the-minute information to drivers about what is happening on the roadways, including weather conditions, incidents, construction, and travel times, using highway advisory radios, electronic signs, the internet, and the emergency service phone system;
- provide up-to-the-minute information to news reporters, particularly radio and television reporters.

B. The deployment of ITS equipment (sensors, cameras, electronic road signs, etc.) along several road sections, in particular on the Tirana – Durres and the Tirana - Elbasan motorways, but also on other road sections yet to be identified in line with the priorities of this Strategy. There is a large array of equipment which can potentially be deployed on the roadway, for various functions, such as:

C.

- Traffic sensors embedded in or above the pavement, for real-time traffic counting and monitoring. Traffic sensors are among the most important tools used to keep track of what is happening on the roadways and Axle load sensors for Weight-in Motion measurements to support the enforcement of weight limits for trucks.
- •Variable message sign (VMS) monitoring and control: These are electronic signs used to provide travelers with information about traffic congestion, incidents, roadwork, travel times, special events or speed limits on the highway.
- Traffic cameras, mostly closed-circuit cameras to help detect and quickly respond to congestion, incidents and other problems on the roads. The camera images are received and monitored by the Traffic Management Center, sent to the internet for road users, to the media for information purposes and to the police for law enforcement purposes.
- Active Traffic Management (ATM) systems use a combination of congestion management techniques to dynamically manage traffic based on current and near-term expected conditions.
- Access ramp metering and access control: Ramp meters are traffic signals on highway access ramps that alternate between red and green to control the flow of vehicles entering the highway.
- Traffic light control and coordination systems which modify traffic light phases in response to varying traffic conditions, thereby optimizing traffic speed and road capacity.
- Road Weather Information System (RWIS) monitoring

Expanded both in scope and scale of the deployment of ITS

During the initial phase (short term, until 2025) only some of those services shall be implemented, both because of limited funding available for the initial investment, but also to avoid excessive complexity of the system during the initial phase, which could lead to operational problems and excessive annual operational and maintenance cost. In the medium and long term, the scope of services to be provided through ITS for the road sector shall gradually be expanded, based on actual needs and economic feasibility.

Scale is referring to the length of roads (or the portion of the road network) on which ITS is deployed. Over the years to come, as experience with ITS for the road sector shall be gained in Albania, the perception and appreciation of its benefits by government agencies, direct users and the broader public will grow. It will become easier to calculate the real value of ITS benefits, both in terms of economic and social benefits.

Also, it is uncertain how the unit cost per km of ITS deployment will develop and if economies of scale can be achieved on the side of suppliers, bringing down the unit cost per km of road equipped for ITS. Over the years to come, only the continued evaluation of costs and benefits of ITS will allow to make rational decisions on the expansion of its scale and scope in Albania. Today it is difficult to predict how fast the expansion of both scale and scope of ITS application will happen in the road sector and how far it will go.

4. Designing the Pilot Action of developing the ICT communication platform among the users and logistic centers in Albania

4.1. Logistics Analysis of the Corridors in Albania

In Albania, the demand for the construction of intermodal terminals of goods is driven by these components, respectively:

- Increasing the volume of trade in import / export goods in the country.
- Increasing the level of container trade that passes through the port of Durres.
- Increased demand for goods from the main border countries where most of enlarge passes transit through our country.
- Increasing the internal flow of goods in the country.

Background development consider the systematic bottom up approach in the geographical area covering for the country Albania. The area is characterized by a different geographical and climatic profile. It presents sharp contrasts, as in it alternate mountains, hills, rivers, lakes and the sea shore very close to each other. The program area has several national parks, protected areas and landscapes that reflect rich biodiversity and environmental differences. The Albanian territory rely on agriculture, services, wholesale and retail markets, some others in the interconnection of coastal regions for the Adriatic and Ionian, show a developed industry, and the level of tourism is much more developed.

All towns and counties are economies in the market development and great potentials, whereas they still have to find ways and opportunities to take advantage of comparative Mediterranean advantages.

The structure of economic operators in the program area is dominated by small and medium enterprises. Higher productivity and further investment in the expertise and use of innovation technologies are a prerequisite for becoming more competitive nationally and internationally. Most small and medium enterprises (SMEs) operate in the service sector. Strengthening business support mechanisms remains a challenge for that a lot of soft and hard measures (national short and midterm goals) to support economic development proposed.

On available transport infrastructure, there is a number of the EU preparation or investment in Albania. There is a rich historical-cultural heritage in the coastal area, incl. connects the hinterland, which must be preserved / protected by law and several projects. Evaluating historical cultural heritage has contributed, strengthening the identity of Multimodality seen as an asset to its economic development.

4.1.1. Context analysis by sectors:

A. Road Transport

The main challenges in the road sector for the current planning period are:

- Harmonize the national legislation with the EU acquis for road transport of goods and passengers;
- Complete the construction of the national road network, including strategic arteries;
- Complete the feasibility study for the Adriatic-Ionian Highway North-South,
- Reform the intercity passenger road transport network;
- Accelerate the amelioration of Albania's road safety performance (maintenance of road transport infrastructures according to EU technical standards, regular implementation of Road Safety Audits & Inspections, elimination of Black Spots, deployment of ITS systems).

All the investments in roads sector (Foreign Financing and Albanian Budget), during the period 2016-2018, are mainly concentrated on the Albanian Core Network as follows:

- The Feasibility Study for Adriatic – Ionian Highway/Expressway (This highway/expressway in the Albanian territory includes the following projects:

a) Construction of Lezha By-pass
b) Construction of Tirana By-pass,
c) Upgrade of Thumana – Kashari,
d) Construction of Tepelena Bypass,
e) Construction of Gjirokastra By-pass,

- The status of the other road infrastructure projects is as follows:

a) Fieri By-pass (Part of the North – South Corridor)
b) Vlore By-pass is under construction.
c) Tirana – Elbasani road (Segment 1),
d) Qukësi – Qafë Plloça road segment,
e) Vlore River Road
f) Peshkopi-Selenica-Superstrada
g) Arbri Road
h) Kardhiq – Delvina
i) Tirana Ring

B. Rail Transport

The main challenges in the rail sector for the 2016-2020 planning period are:

- Reform the rail system to set up an open market for public and private investors whether in terms of market regulation, infrastructure management or rail operations;
- Strengthen human capacities and resources at all levels, in particular to effectively build up the legal and institutional structure that are necessary to ensure a smooth operation of an open market;
- Create favorable legal and institutional conditions for attracting foreign investment; and
- Create a level playing field with other modes of transport.

Already are identified the railway development projects and included these in the Single Sector Project Pipeline (SSPP) for transport sector. The projects for the improvement of the railway infrastructure include:

- Rehabilitation of railway Durres – Tirana and construction of the new railway branch to Mother Teresa (Rinasi) International Airport
- Rehabilitation of the railway line Vora – Hani i Hotit. The preparation of the detailed design has started and is financed
- Construction for a new railway Pogradeci – Korça border to Greece: The pre-feasibility study for the rail link Albania – Greece by Kapshtica is a joint application between the Greek Railways and the Albanian Ministry of Infrastructure and Energy, under the INTERREG Program regional cooperation Albania – Greece
- Rehabilitation of Durres – Pogradeci – Lin railway and the construction of a new railway link Lin – border to North Macedonia (part of rail Corridor VIII). The feasibility study for this project was finished and the preliminary design of the Durrësi – Rrogozhina railway line, 34 km, (part of this project) is completed.

C. Maritime Transport

In the maritime sector the main strategic objectives are:

- Improvement of technical capacities of maritime administration and the institutions involved;
- The development of maritime legislation to achieve EU standards;
- Development of port infrastructure;

The current status of projects:

- Already is working on the adoption of IMO and EU rules and regulation. Examples of regulated activities in the maritime sector include, but are not limited to, flag and port state control, maritime safety and security, environmental protection, maritime training and labour, and port health and safety. Several regulatory standards have been developed to ensure the safety, security, and environmental sustainability of maritime and port operations.
- The establishment of the VTMIS as Priority Action Maritime , is a top priority for the Ministry of Infrastructure and Energy and is included in SEETO MAP and in the SSPP list for the Transport Sector.
- Task foreseen in Priority Action Maritime 8 are progressing well. The detailed design for the extension of quay for cruises has been approved and we are looking for the financial resources.
- Rehabilitation of Port of Vlora with the financing from Italian Cooperation has started, and has been completed almost 90% of constructional works, currently the construction work is paused from Italian Cooperation side because of some disputes with the construction company.
- The expanding of Passenger Terminal in Port of Vlora has already started and finished.
- Reconstruction of Passenger Terminal (berths 7 & 8) and Processing square in Durres Port Authority – This project is already finished.
- Dredging of Durres Port basin feasibility study is finished. With own funds DPA is planning to finish the implementation of this project within 2019.

Regarding the priority infrastructure projects, along with the projects mentioned above several other improvements were achieved in the Albanian Road Network. In addition, the rehabilitation and expansion of port infrastructure and superstructure (the ports of Durrësi and Vlora) is being carried out in order to increase capacity and standards of operation, service effectiveness and tourism development.

The first multimodal terminal in Albania at the port of Durrësi is operational. Our priority for the coming years is to increase the standards in the Port of Vlora and probably even Port of Saranda so that they can meet the requirements for their inclusion in the Core TEN-T Network. Regarding the railway infrastructure, the rehabilitation of the sector is intended, initially through some internal measures, aiming to increase the transport volumes, mainly from the Port of Durrësi railway connection.

One of the priorities of the Government in the field of development of port infrastructure is the construction with PPP of the new ports (touristic and commercial). During the reporting period the status of concession.

D. Air Transport

The main challenges in the aviation sector for current planning period are:

- The development and construction of new airport infrastructure;
- The creation of suitable conditions for a more competitive market with liberalized air services which will bring the possibility to reduce travel costs for passengers;
- The implementation and unification of international standards for air safety.

The Priority is preparation of a National Airport Master Plan study for Albania for next 20 years.

Tasks planned in 2017, such as Kukësi Airport concession / PPP granting procedure and the "Feasibility Study of an airport in the south of the country" yielding Vlora as the most favorable location, were completed.

Implement EC regulations and directives in respect of market access, insurance requirements for carriers, and competition rules to enable mix of scheduled and low cost flights, and possible investments for air operators by Albanians and others, is progressing on track and the following were undertaken:

- Albania has prepared the draft Law "The Air Code of the Republic of Albania", according to recommendations of the experts of the European Commission, in the framework of the Multilateral Agreement,
- Albanian air transport legislation is largely aligned with the EU acquis. Albania has met the conditions for completing the first phase of the Multilateral Agreement on the Establishment of the European Common Aviation Area (ECAA), thus including in the national legislation, the EU legal framework set out in Annex I of the ECAA.

E. Intermodal Transport

The main challenges in the aviation sector for current planning period are:

- Create favorable conditions for the intermodal and combined transport and logistics by attract investments, Reduce rail transit times and transport costs, establish joint border crossings and reduce logistics costs
- Develop a level playing field for all modes of transport (strengthening the position of multimodal and rail transport).
- Integrate existing logistics centers in the corridor management by review of potential logistics centers (Milot and Rrogozhine-Elbasan) in the region of Port of Durres and provision of rail access for various projects, multimodal transport between the Port of Durres to the hinterland region (via Corridor VIII and Route 2) and establishment of a multimodal transport network.
- Construction of two logistics centres (intermodal dry port, storage 1000 TEU in the first phase) in the Elbasan and Milot areas in respect to the rehabilitation of the railway line.
- Invest or participate (via joint ventures) in hinterland bi-modal logistics centres alongside the corridors, with the aim of establishing seamless supply chains to their ports (hinterland logistics centres should be built up in line with the "Durana" region project), in line with national development objectives e.g. establishment of a multimodal transport network.

Figure 43: Freight traffic flow among existing and forecast Albanian logistic centers

Nevertheless, the positive impacts in terms of intermodality and combined transport for the national economy are particularly tangible in logistics. Thereby, the contribution of the transport infrastructures and measures to facilitate modal interchange are crucial to reduce logistics costs with the subsequent impact on the market and the regional economy. For this reason, the sectoral administrations should be involved in a committed and encompassed policy to improve intermodality. In this way, the ANTP3 make an effort to identify those related projects of different sub-sectors that shall be considered in the context of the Intermodal development. Thereby, particular proposals could be included both within sub-sectors and intermodal strategies. The objective is to reinforce the synergies when coordination among modes is carried out.

The focus shall be on those lacks of connection between sub-sector points and networks that handicap the intermodal transport or entail significant travel times or logistics costs. These lacks and inefficiencies can be detected both in infrastructure connections and in operational issues.

Among the actions proposed we can highlight: coordinate national policy measures to promote intermodal and combined transport, create intermodal logistics centers to facilitate multimodal transport; for instance: construction of the missing link from the western terminal in Durres to the national railway network.

Special attention also paid to the Flagship Axes Initiative and its further application to the Albanian transport.

Figure 44: The currently monitored indicators for the Intermodal sector in Development Study

4.2. Design the ICT communication platform among the transportation users and logistic centers as a "Pilot Action"

4.2.1. The platform offers

There are a number of factors impeding the efficiency of transport logistics along the corridors. These vary from high level governance and regulatory issues, to factors that would directly impact the implementation and success of a collaboration platform. Customs regulations, for example, that place certain restrictions on the ability to consolidate depending on the destination of the consignment, reduce the benefits of such a platform.

Similarly, a highly concentrated freight forwarder industry with sizeable fleets could also reduce the benefits of a collaboration platform. This however, does not negate the value and importance of such a platform to address a number of issues and an information market failure; it points to the need to address the policy and regulatory inefficiencies in the transport market.

The Albanian transport and logistics sector efficiency is hindered by structural factors:

- Customs regulations with an impact on time, mileage and load factor
- Market imbalance due the structure of Albanian international trade
- Closed market, small size and lack of outsourcing culture
- Asset-intensive concentration structure of the value chain
- Dual market split between a few asset-heavy big players and a multitude of very small operators
- Market rigidity, where control is more important than efficiency

This situation is due to a combination of factors, the most important of which are highlighted below:

- The size of Albania's logistics market is small because of the size of the economy but also due to the lack of an outsourcing culture among Albanian companies. According to the private sectors interviews carried out within the context of this study, Albanian companies tend to control all the supply chain through their own resources (van, trucks, and warehouses).
- Rigid structure of the market where the client and supplier have long term contracts and informal personal bonds are frequently more important than efficiency.
- Few foreign companies have entered Albania's transport/logistics market so far. Due to the opacity in transport regulations, most foreign companies are reluctant to access the Albanian market on their own and prefer to partner with local powerful players. This point was confirmed during the interviews. Interviewees referred to the lack of clarity in the allocation of international transport licenses as one example of opacity in the logistics market.

- Due to the trade imbalance, the international transport cost is high in comparison to other European countries. For every 10 imported truck loads, there are only a 2-3 truckloads for exports.
- The current truck fleet is old and there are a small number of dealers supplying new fleets because most of the trucks are purchased used. The financial position of trucking companies is weak and according to ANALTIR, there is a lack of initiatives to provide credit for truck fleet renewal.
- The road transport sector will need to go through a transformation process similar to those experienced in other European countries mature to become regionally integrated and offer specialization and value-added services in response to market demand.

By assessment of the Albania Logistics Sector, the Pilot Action will be better to focus on the Tirana-Durres Corridor, as the main freight traffic flow. A collaboration platform can be a helpful tool to boost the competitiveness of the Albanian industry, creating an array of opportunities for all stakeholders:

- Reducing costs by optimizing the use and ownership of resources (fleet and facilities)
- Increasing transparency through the provision of relevant regulatory and operational information
- Enhancing competition and preparing the market for regional integration
- Upgrading quality standards as a result of service evaluation through the platform
- Fostering networking and knowledge sharing
- Mitigating seasonality impacts by trading excess of fleet capacity
- Fostering the development of a logistics market offering more value-added services

4.2.2. Platform concept and outline

The platform provides opportunities to all stakeholders involved in the logistics chain:

- Freight forwarders and logistics providers, shippers, importers, wholesalers and retailers will be able to find a logistics operators by comparing prices and quality reviews between companies
- Transport and warehouse operators will be able to more efficiently use their resources by increasing asset utilization through better planning and access to new customers
- Public bodies and trade organizations will be able to benefit from the platform by increasing transparency in the market through publishing relevant regulatory and procedural information.

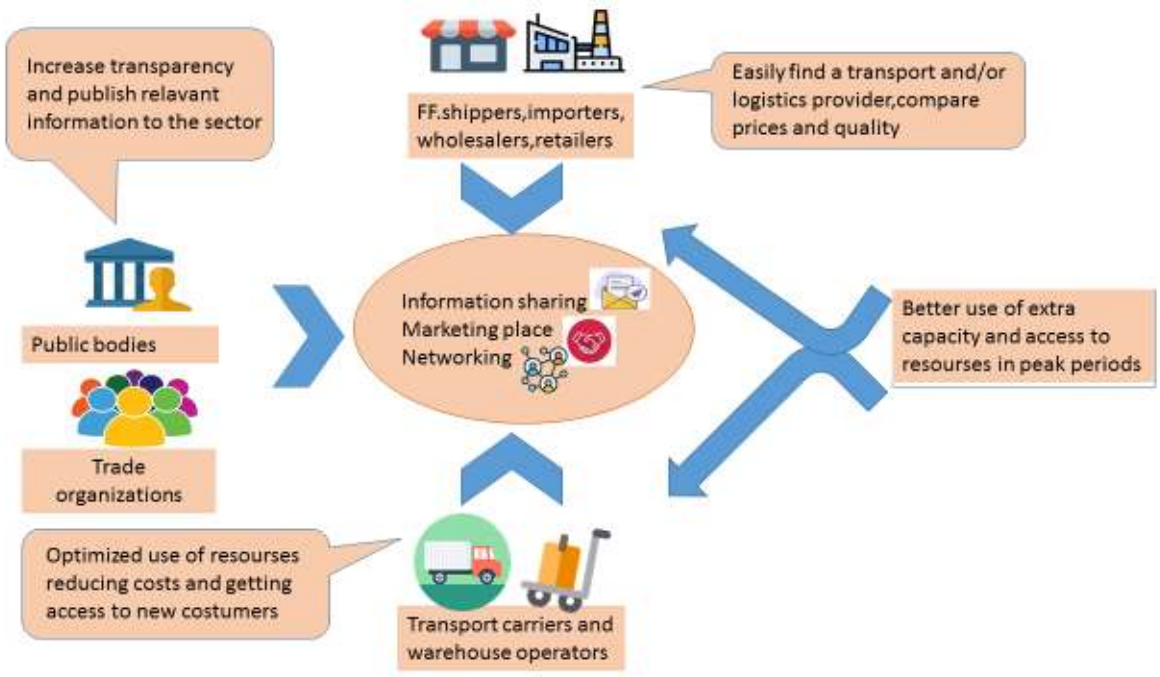

Figure 45: Platform outline

General scope providing an answer to an existing challenge. The scope of the obstacles to be resolved needs to be clearly specified along the following lines:

- Approach: information sharing, marketplace or both
- Operational
- Flows to be targeted: Urban logistics vs corridor logistics, domestic vs international, type of goods

Users: A platform and regulatory information sharing needs:

- Type of logistics, like any market works on the basis of buyers and sellers, hence it is crucial to identify both parties who will benefit from market use. The role of the government in facilitating the development of this market by providing regulatory information and initial financial support is critical for support.
- Functionality: addressing the main services and information that the platform should provide to its users (potential ancillary services)
- Model: A sustainable operating model needs to be identified in close cooperation with the government, including the ownership of the platform, its O&M model and the production deployment architecture. The business model needs to be addressed, as per the monetization of transactions and the financial sustainability and scalability of the platform going forward
- The platform concept needs to be defined, integrating all the previous elements.

The definition of the platform concept, was done by analyzed the key building blocks of a complete platform concept including its scope and functionality, the platform's users, its sustainability through an adequate governance, and it business and operating models.

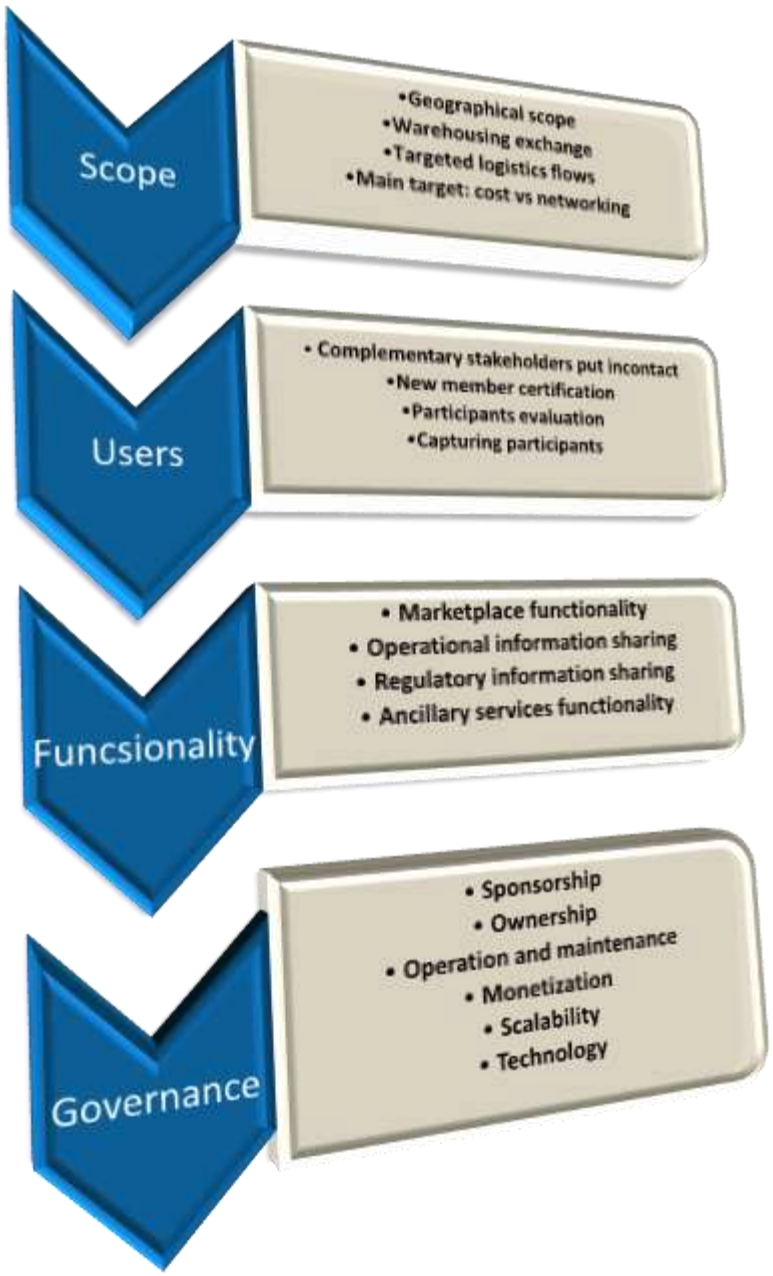

Figure 46: Blokes of Platform

In order to ensure sustainability, platforms define different monetization strategies, where there is a very clear difference in strategy and purpose between platforms working on flat fees and those which base their model on variable fees for transactions. Different models for service charging have been identified:

- Freemium: users have free access to the platform and freight but pay a fee for user-friendly functions and additional services. This model encourages participation and is supported by value-added services
- Two-sided flat fee: both shippers and carriers pay an all-inclusive flat fee without additional costs for use. Premium ancillary services may be charged separately
- One-sided variable fee: shippers or carriers pay a variable fee based on transactions, thus the platform actually becomes a new intermediary in the market, which is not recommendable in non-mature markets
- One-sided flat fee: only one kind of player, shippers or carriers, pays a flat fee. This model tries to attract a specific type of user by giving them free access

Based on the above analysis was defined the following integrated platform concept for Albania corridors:

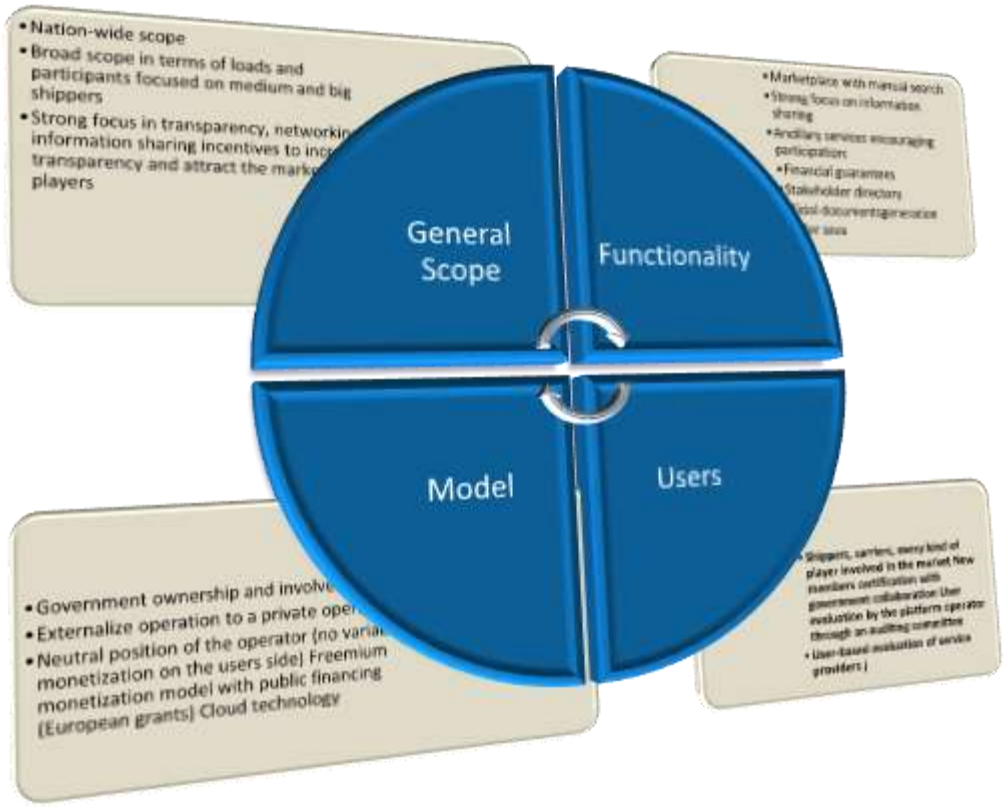

Figure 47: Concept of Platform

The platform offers great potential to improve logistics operations through virtual and more open collaboration between all stakeholders. However, many of the small players still operate through word-of-mouth and an informal network, with limited use of digital technologies for professional purposes. As such, greater business development and capacity building efforts and culture change are necessary to attract all players to the platform. The platform operator, leveraging strong on-the-ground presence, will need to use suitable communication channels to engage small trucking companies and free-lance truckers in particular.

4.2.3. Architecture and Methodology of the platform of Piloting

Designing a Platform with the short-term agility to build the pilot following a tight schedule while providing the long-term scaling up capabilities, the platform was built upon the existing and market-tested Interoperability Middleware Platform as best example: "Sofia2".

Two of the key aspects of the platform are its scalability and modular design, built-in features of Sofia2. The modular-oriented approach eases development stages by focusing on leveraging each separated module, while also enables scalability by adding or removing modules as needed. The following layout shows the modules that have been used in the pilot phase as well as those that Sofia2 can provide in order to be incorporated in future extensions of the Pilot project.

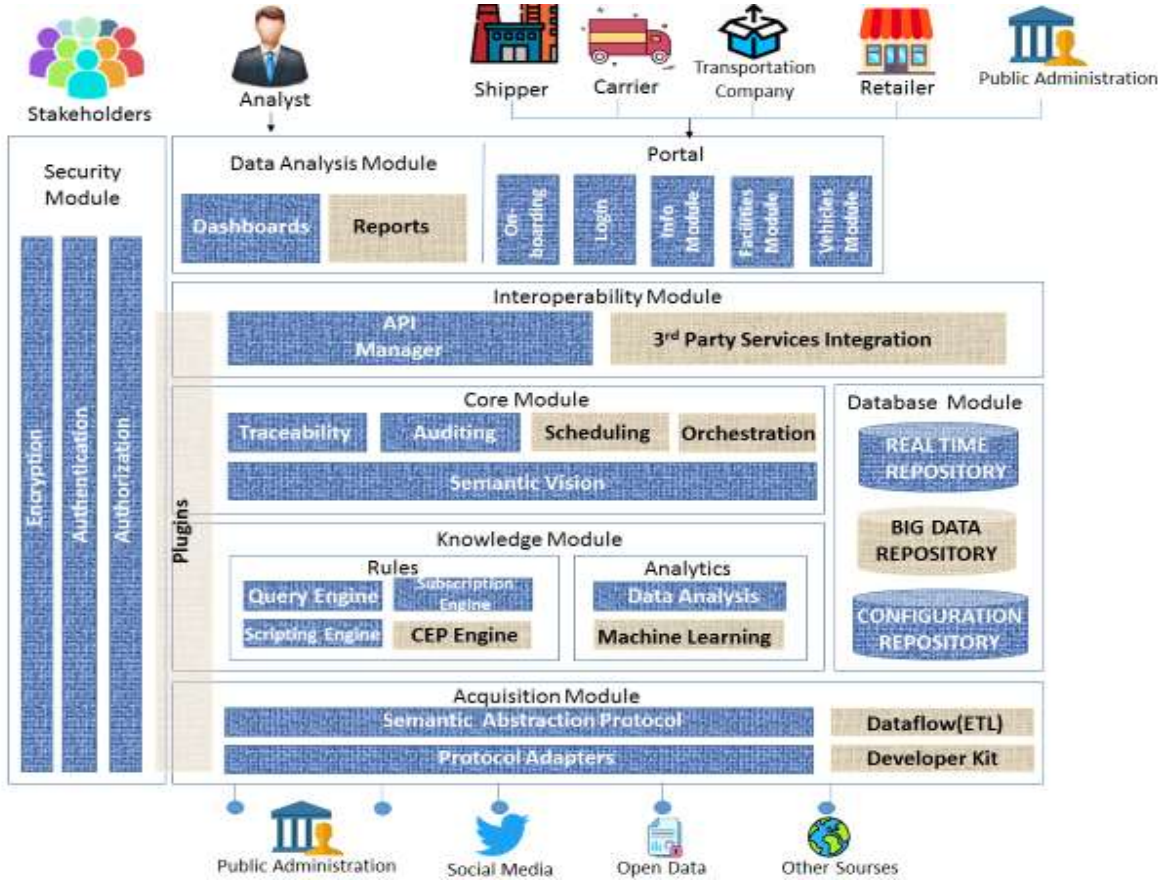

Figure 48: Platform architectures

The platform development has been conducted following the agile paradigm under a scrum iterative methodology. The functionalities built in each steps were:

- First Step: The main goal of the first sprint was the deployment of the ready-built Sofia2 Platform in order to commence its configuration for the Durres-Tirana Corridor, as well as building the first user interfaces of the Collaboration Portal to enable Information Sharing. The project team was therefore able to show to stakeholders, end-to-end functionality in just two weeks
- Second Step: A first end-to-end version of the Facility Sharing and Vehicle Sharing modules was built. This intermediate version of the Collaboration Platform was presented in a workshop in Albania to get first-hand feedback from the stakeholders to confirm all relevant information was being captured and shared across all interested parties of the project
- Third Step3: In parallel to the presentation of the other two sprints in Albania, the development team continued building the rest of functionalities: The On-boarding Module, opening the Portal to all interested users while controlling data privacy of existing users, and the Data Analysis Module, providing the necessary dashboards to analyze and understand the main concerns of the users making use of the Platform
- Forth Step: This last sprint was focused on the application of the feedback obtained during the development of the project (mainly after the presentation of Sprint 1 and Sprint 2 in Albania), as well as in the public launch of the Collaboration Platform, deploying the Portal into Production

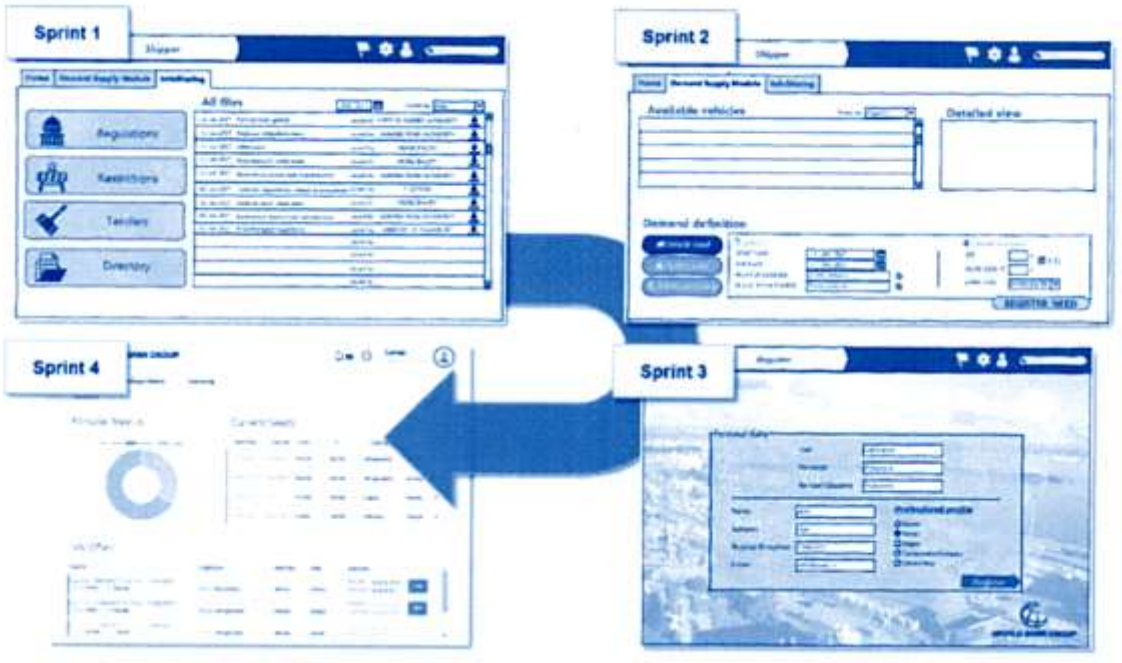

Figure 49: Steps of development mock ups

4.2.4. Functionality of platform

Four Modules was design for the Platform to be functional:

- Information Sharing Module
- Demand Supply Module
- On Boarding Module
- Data Analysis Module

Information Sharing Module

This module allows public institutions and users to share information they find relevant to the industry such as transport certification requirements, custom regulations or regulations concerning truck circulation restrictions through Albania.

During the pilot phase, the platform's administrator was the only user allowed to upload documents into the Information Module.

In order to easily find the desired information, the users can filter documents according to category and upload the relevant data. Four main data categories were defined for that purpose:

- Regulations: customs/ports regulations, transport information, urban areas restrictions....
- Useful links: repository of useful external information
- Tenders: public and private stakeholders can publish tender documents in this section. After the pilot phase, registered users will be able to upload tender documents on their own
- Directory: relevant business and contact data from all registered platform users

The platform features a subscription engine allowing users to be alerted to new upload. During the pilot phase, alerts and notifications were implemented as SMTP message (e-mails), a low-cost, widely-adopted tool to communicate with users.

Demand Supply Module

The goal for this module is to establish a marketplace where shippers can publish service transport and warehousing requests and service providers can publicize spare transport and facilities capacity. Through the module, service providers can apply to published service requests (shippers' needs). A typical transaction flow is as follows:

- A shipper generates a demand (a transportation need, for example). The demand is characterized by the type of vehicle and cargo, start and end dates, pick-up and delivery place, tonnage and other relevant features of the need
- If the demand does not match any current availability (offer) from service providers it will be posted on the Current needs area (active requests)
- Service providers have access to all of the active requests within the platform. They can also receive notifications if they wish to
- When a match occurs, both parties receive an e-mail with their contact details so they can arrange the final details

Demand/supply module includes three sub-modules:

- Vehicle Sharing Module, a marketplace for transport services
- Facility Sharing Module, a marketplace for warehouse services
- End-to-end Module, which is a generalization of shippers' demands, combining vehicle sharing and facility sharing to provide an end-to-end service capability. Shippers use this module when they need a shipment from Point A to Point B without having to manage transport and warehousing in between.

On Boarding Module

The purpose of the On-boarding module is to manage the type of platform users:

- Unregistered users, who are not allowed to use the platform at all
- Registered users, allowed to access (read) information sharing documents, but not to publish information or to access supply/demand module information
- Collaborators, allowed to access and publish items on the Supply/Demand module

The system includes a usable on-boarding module, which allows new users to register. The purpose of this module is to remove entry barriers to any company, agency or citizen willing to register and collaborate with other platform users while ensuring an identity validation to protect sensitive professional data.

- To register to the website, users need to fill in the authentication process form by providing the following information: role in the platform (shipper or carrier), username, password, full name and e-mail
- Users who have self-registered in the Platform will be by default provided the User Role, which will allow them to access to a read-only view of under categories that have previously been configured as "Public", but will not be provided publishing rights until they have been validated by the administrator as a privileged user. Users in the "User Role" will therefore have only access to non-sensitive data such as directory or some documentation

To gain access to specific content related to their reference group (shipper or carrier) as well as to start publishing information on the Platform, users need to be upgraded to Collaborator Role. To switch roles from User to Collaborator, users have to request the role modification through the Platform. Once done, the Administrator will then verify the request, and approve (or disapprove) the role upgrade based on the information provided on registration.

The Administrator Role has all privileges to include and remove permissions to users as well as managing all elements of the Platform. During the pilot, this Administrator uploaded the documents to the information sharing module.

Data Analysis Module

One of the basic goals of the project is to extract value from the information about the platform usage. To that end the data analysis module was implemented. The modules allow configuring a dashboard containing the relevant metrics of the platform which will be accessible to the platform Administrator. This module was used during the pilot phase to support pilot evaluation and provide insights for future scaling up.

4.2.5. Implementation Plan

The Pilot Project, extended over one year period (12 month). After announcing the end of the development phase and the beginning of the pilot the information needs to be sent to all stakeholders, where they were encouraged to participate with real transactions. Pilot project participants received a user guide as well.

The following calendar shows the detailed tasks to be performed during the pilot:

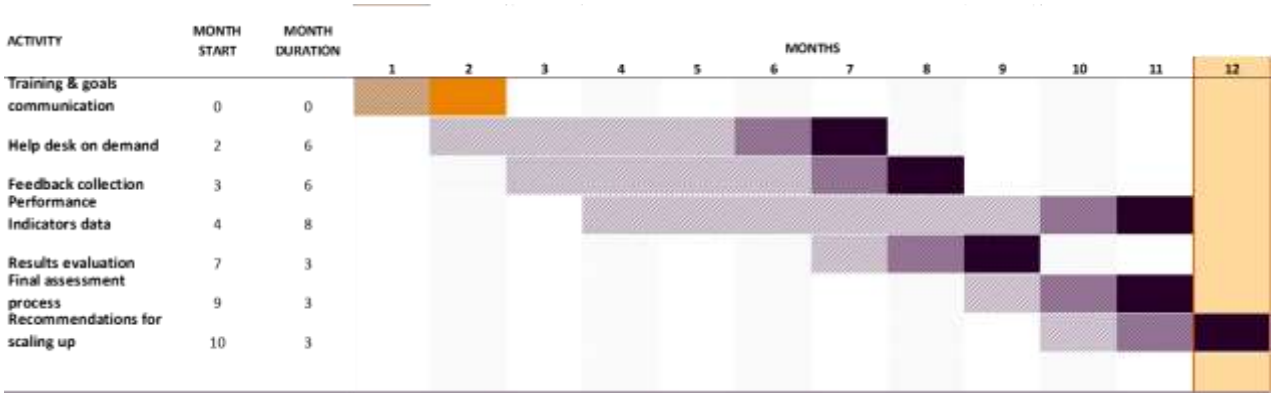

Figure 50: Gantt chart of implementation Plan

During the pilot project phase, the team has been organized through two groups with differentiated tasks: one team was dedicated to provide technical helpdesk support and the other to encourage stakeholders to use the platform and to clarify any doubt they might have by phone.

The main objective of the Pilot project was to test with real transactions the suitability and acceptance of the platform concept for Albania and identify the lessons learned for the growth phase, more specifically:

- Verify the acceptance of the general platform concept and functionality by the participants in the pilot through their feedback and comments
- Fine-tune the main areas of interest form a business perspective to adapt the platform to the real needs of the market, once it is tested in real market conditions during the pilot phase
- Analyze the activity of the platform by measuring the volume and type of transactions and their categorization

- Fine-tune the technological performance of the platform through software bugs resolution and helpdesk transactions processing
- Fine-tune the functionality and usability adapting them to users' needs and making the platform simple to use
- Identify improvement and growth paths to draw up recommendations for scaling up
- Assess platform sustainability to define business model by assessing the activity volumes

The initial participants of the pilot were most companies including importers and distributors, manufacturers and freight forwarders.

An analysis of key indicators will be carried out during the Pilot in order to identify growth opportunities going forward. These indicators, will monitor and analyze through the data analytics module and the pilot project helpdesk taskforce, defining as follows:

- Volume, analyzed through the number of users, requests, transactions and their evolution through the pilot
- The reliability of the platform concerning its proper operation, which is mainly assessed by measuring the number of helpdesk queries, functionality change requests and identified software bugs
- The characterization of transactions provided information about the suitability of the solution. Transactions can be characterized by type of user, type of transaction, origin/destination and type of load and volume
- The functionality and suitability of the information-sharing module, which is analyzed through its usage. The main metrics to be monitored are: information sharing visits and users vs transaction users

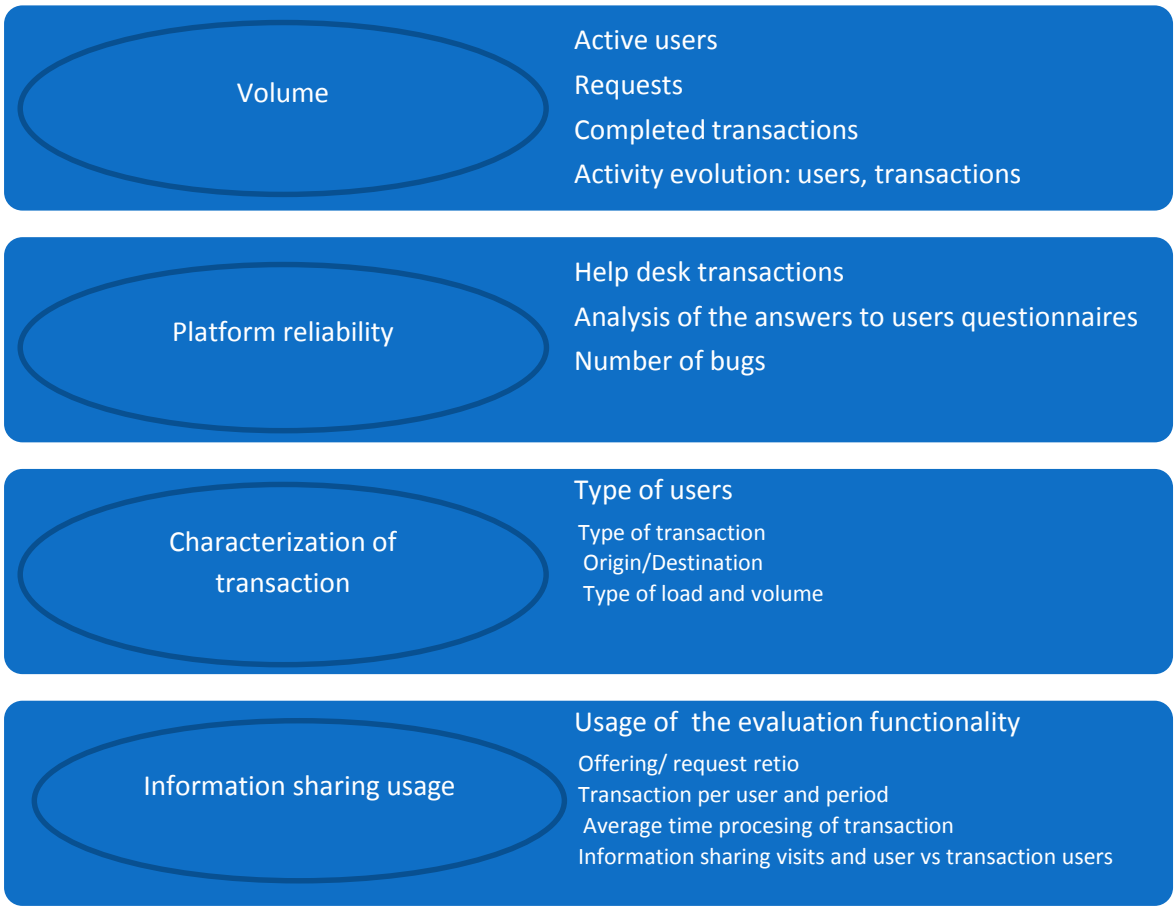

Figure 51: Monitoring of key indicators

The acceptance of the platform concept and functionality is assessed through feedback provided by participants during the pilot phase through different channels. The goal is to assess the general acceptance of the platform when operating in a real-transactions environment. The usage of the platform under real business conditions provides useful insights as per its functionality and usability, but also concerning its usefulness and future scaling-up drivers.

Measures

- KPIs
- Comments and feedback provided by participants
- Satisfaction questionnaires
- Training
- Communication of platform progress to key public stakeholders

Key aspects addressed

- Functionality
- Usability
- Usefulness
- Platform future scaling-up recommendations

4.2.6. Risks and mitigation measures

In order to properly manage the pilot implementation risks, are identified the key risks faced during the Pilot and addressed mitigation and hedging measures.

The main risks identified were:

- Small number of users. As a mitigation measure, the consultant defined specific targets of platform usage (number of transactions) for each participant in order to have realistic objectives. Moreover, the consultant also kept in touch with the complete stakeholders' database generated along the project;
- User passivity, a weekly schedule of one-on-one phone calls was planned in order to encourage people to participate, voice their concerns and hear proposed solutions. A mid-pilot visit to Albania was considered and finally took place in order to directly engage the participants;
- Lack of time or participants personnel to use the platform. For this matter, the core functionality used in the pilot is simple and based on the functionality core;
- Technological and user-related difficulties: In order to deal with technological issues, the project team created the helpdesk task force.