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Analysis of RO-LA Transport Systems, Possibilities of Implementation in Romania

Marius GÎRTAN¹, Valeriu Stelian NIȚOI² Constantina CHIRIAC³

Abstract

The paper brings to the fore the need for state support by making investments in railway infrastructure, in order to maintain and ensure the success of railway transport of trucks by introducing RO-LA transport in rail traffic. Using this mode of transport reduces the cost of maintaining road infrastructure, protects the environment, reduces fuel consumption, and reduces road traffic congestion. RO-LA transport is an alternative solution to auto transport and contributes to the streamlining of traffic of goods and people.

Keywords: RO-LA transport, traffic decongestion, loading-unloading, transfer maneuver, environmental impact, traffic, fuel.

Introduction

The concept of carrying road or armored vehicles on railway wagons appeared during the First World War, as a solution for their rapid supply in areas where complex military operations were taking place. Subsequently, starting with the fourth decade of the twentieth century, the solution was transferred to civilian activities, and a number of French, German or American companies conducted experiments with semi-trailers loaded on railway flat wagons. The first trains carrying heavy vehicles were put into service only in 1954, by the West German Railway (DB), on the Mühlheim - Hamburg and Frankfurt am Main - Hamburg routes, then in 1960 by the French National Railway Company (SNCF), and in 1964, in Switzerland, on

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the Basel - Lugano route (Wenger, 2001). The system for the transport of heavy road vehicles on railway wagons has been associated with the acronym "Ro-La", from the German expression "Rollende Landstrasse", which can be translated as "rolling highway". It is equivalent, in English, to the terms "rolling motorway" (acronym "RoMo") or rolling highway. Alternative names are also used in various documents, such as "route roulante" or "chaussée roulante", with the acronym "CR", in Switzerland. In France, the name "autoroute ferroviaire" is being employed, for both the transport of complete road vehicles and semi-trailers.

2. Technical solutions

The first Ro-La trains in Germany implemented a solution based on Rmmso 33 type 2-axle flat wagons, without uprights, with a floor at a height of 1250 mm above the top of the rail. The components of an articulated vehicle were loaded separately, on the sides of the wagons, by means of a concrete platform located at floor level, as follows: the front part (tractor head or truck) on a wagon while the rear part (trailer or semi-trailer) was loaded separately, on the next wagon in the train composition (Wenger, 2001).

Subsequently, over a period of more than 50 years, in France, Germany, Austria, Switzerland and Russia, concepts and technical solutions have been developed adapted to the characteristics and traffic conditions of the national infrastructures in these countries.

In the countries of northern, central and eastern Europe, wagons with small wheels and sunken platform, on 8, 10 or 12 axles, were spread, which were designed taking into account the need to frame the wagon - road vehicle within the limits imposed by the dimensions of free passage through alpine areas (especially when passing through tunnels). These wagons meet the conditions imposed by UIC Sheets no. 571-4 and 571-6, and each wagon can carry a single complete heavy vehicle (truck, road train consisting of a truck with a trailer or tractor unit and a semi-trailer). Depending on the characteristics of the route used (mountain, lowland), trains can consist of 19 - 26 Ro-La wagons and passenger wagons for driver transport.

The loading and unloading of road vehicles is carried out gradually, one by one, by means of a mobile ramp located at one of the ends of the train set. For safety reasons, the movement of road vehicles on the wagons is only allowed in the "forward" direction, with speeds of no more than 5 km / h, and a wagon-length room should be maintained between two successive moving vehicles (Rail Cargo Group, n.d.). The process of loading

road vehicles on wagons takes between 30 to 45 minutes, while the process of unloading them is faster, taking between 20 to 30 minutes. In the worst case scenario, a heavy vehicle runs for about 10 minutes on specialized wagons (Direction des Affaires Economiques et Internationales Mission des Alpes et des Pyrénées, 2007).

Ro-La terminals can be built as independent facilities (e.g. Freiburg terminal), but also as sections inside logistics centers or container terminals (e.g. Ro-La terminals in Wels, Trento or Regensburg). They have a relatively simple configuration, and their facilities consist, in addition to lines, in concrete platforms located at the ends of clogged lines or between rails and lines for maneuvering road vehicles while loading / unloading on / off wagons, parking spaces, gates gauge, traffic lanes that connect the parking spaces and the loading - unloading platform of heavy vehicles and buildings with spaces for carrying out the various formalities in the terminal.

The solution of wagons with small wheels and submerged platform is criticized (Saint Pulgent & Pellegrin, 2006; International Transport Forum, 2009; Railway Council, 2020) for:

- a) very high pressure from the wheel-rail contact, which:
  - requires the production of parts and components made of special steel, involving high costs for the purchase of wagons;
  - generates higher rail wear than in the case of regular wheel wagons;
- b) the higher number of complete rotations of the wheels per kilometer than in the case of regular size diameter wheels, which:
  - leads to rapid wear of the wheels and bogie components, and consequently the need to carry out maintenance and repair operations after covering 80,000 - 100,000 km, much more frequent than in the case of wagons with regular-size wheel. The high cost of maintenance is a direct consequence.
  - causes wheel heating phenomena, which require the trains to stop on the way, resulting in an increase in transport time.
- c) difficulties in transmitting the braking power to the rail surface, which required sophisticated and expensive solutions for the braking systems;
- d) difficulties in cornering;
- e) the risk of derailment when crossing overpasses, due to the small diameter of the wheels.

In addition, according to data provided by the Swiss combined transport operator Hupac, the purchase costs of wagons with small wheels and sunken platform are double while the maintenance costs are about 4 times higher than container-dedicated wagons (Hupac, n.d.).

Due to the mentioned disadvantages, the wagons with small wheels and sunken platform were not approved in France (Saint Pulgent & Pellegrin, 2006). The manufacturer Lohr designed and produced articulated wagons, with two low platforms, but with regular size diameter wheels (first generation Modalohr wagons), adapted to the conditions on the French railway infrastructure. A flat wagon may be loaded, as appropriate, with two tractor heads or a semi-trailer. The main feature of the wagons is that they allow the simultaneous and "horizontal" loading or unloading of road vehicles, and the development of these processes requires 30 ° rotation of the wagon platforms by means of special equipment, located between the tracks of the terminal (Modalohr, 2008; Lohr Group, n.d.).

The first generation Modalohr wagons are used on the Aiton - Orbassano Alpine Railway Highway and can be composed of shuttles consisting of a passenger car for truck drivers, 14 Modalohr articulated wagons (2 end wagons and 12 intermediate wagons) and 2 interoperable locomotives, which can run both in France and Italy. The transport capacity of such a shuttle is 18 complete trucks or 28 semi-trailers (Modalohr, 2008).

The advantage of the Modalohr system is the reduction of terminal parking times for road vehicles and wagons. Thus, the duration of the process which includes the unloading of the arrived trucks and the loading of others is about 40 minutes, in case of a set consisting of 14 wagons. At the same time, the trainset can only park in the terminal for one hour and 50 minutes (Direction des Affaires Economiques et Internationales Mission des Alpes et des Pyrénées, 2007).

Modalohr wagons have higher acquisition costs, but also lower maintenance and repair costs than small wheeled and sunken platform wagons.

The manufacturer Lohr also designed and made second and third generation Modalohr wagons, adapted and used only for the transport of semi-trailers.

A solution encountered in the case of the normal gauge (1435 mm) is the one adopted in the case of shuttles running through the Channel Tunnel, on the Coquelles (France) - Folkestone (UK) route and which was made possible due to the generous free passage gauge of the tunnel design. The wagons were designed as special, semi-open structures, with regular size diameter wheels and platforms located at normal heights above the top of the rails (Eurotunnel Le Shuttle Freight, n.d.; Societe, n.d.).

Eurotunnel operates 18 sets consisting of 2 locomotives, 1 passenger car (club), 3 wagons for loading - unloading heavy vehicles on / off Ro-La wagons and 30 or 32 Ro-La wagons for transporting a similar number of road vehicles. Out of these sets, 6 train sets are made up of Breda Fiat

wagons, 9 are Arbel wagons, and 3 sets are made of WBV wagons. The latter entered the Eurotunnel park in 2017 and were purchased for EUR 40 million, which means a price of about EUR 400,000 / railcar (Eurotunnel Le Shuttle Freight, n.d.).

In the bilateral traffic between Romania and Bulgaria, between 1992 and 1995, liners consisting of Rgs type wagons with normal wheels were used, belonging to the Bulgarian national railway carrier BDZ, adapted to the transport of heavy vehicles. The loading and unloading of the vehicles was also performed in this case, serial, at one of the ends of the train set, by using a movable ramp (Railway Council, 2020; Tănăsuiță, 2012).

Table no. 1 shows the technical specifications of Ro-La wagons.

3. Organization of RO-LA transport services

Ro-La services are organized and operate according to the “shuttle” model, without stops for attachments - detachments of wagons or loading - unloading of road vehicles, between the same two terminals, located along the major road transport routes. Trains run according to established routes and frequencies based on the level of transport demand, regardless of the loading rate at any given time (Tamma, 2017; Hupac, n. d.; Okombi, n.d.; RALPIN AG, n.d.; Rail Cargo Group, n.d.).

Accompanied combined RO-LA transport requires specific activities and procedures that lead to resource consumption and have significant specific durations regardless of the technical solutions and the organization adopted, such as:

- a) road transport, from the sender to the loading terminal of the road vehicle on the Ro-La train, respectively from the unloading terminal to final consignee;
- b) administrative formalities in terminals;
- c) loading / unloading of road vehicles on / off the indicated wagon;
- d) the transfer maneuvers of the wagons between the Ro-La terminals and the stations servicing these terminals or vice versa, with train composition / decomposition, if the lengths of the lines in the terminals do not allow for such operations there;
- e) railway transport;
- f) the technological processes executed in the dispatching stations, along the way and from the destination, in accordance with the railway regulations and the prescriptions of the wagon manufacturers.

As a result, in Central Europe, users of Ro-La trains should show up at the terminal 2-3 hours before the train leaves. At the destination, they

spend another hour in the terminal and the station that serves it (Hupac, n.d.; Okombi, n.d.; RALPIN AG, n.d.; Rail Cargo Group, n.d.). This time can be seen by road hauliers as unproductive times, in which their own resources are used inefficiently. During the use of Ro-La services, they still incur certain expenses, such as depreciation or rent of road vehicles.

Table no. 1: Ro-La type wagon specifications (Federal Finances Administration, n.d., Austrian Federal Ministry of Transport, Innovation and Technology, n.d., Hupac, n.d.; Saint Pulgent & Pellegrin, 2006)

Wagon series / type		Saadkms 690 Bombardier	Saadkkms 741 Greenbrier	Sdmmrs	Modalohr AFA (first generation)	Eurotunnel - ARBEL		Flat wagon - model 13- 4095 (Ukraine)	Flat wagon model 13- 9961 (Russia)	BRN flat wagon adapted (India)	
						To load	To carry				
Gauge		[mm]	1435	1435	1435	1435		1520	1520	1676	
Axle number			8	10	12	4		4	4	4	
Tare weight	End wagon	[kg]	19500	21300	23600	40000	54000	34000	28000	30500	24390
	Intermediary wagon		18000	20000							
Length between buffers / automatic coupling	End wagon	[mm]	19745	20200	19060	32480	:	22520	21440	:	
	Intermediary wagon		19090	19390							
Useful length	End wagon	[mm]	18600	18400	18800	2 x 14010	25200	20000	17800	20000	:
	Intermediary wagon		19000	18750							
Width		[mm]	2990	3000	2600	3095	4380	4120	3045	3200	:
Useful width		[mm]	-	2520 / 2560	:	:	2700		2500	3000	:
Maximum payload	End wagon	[t]	Standard 42 44	53.7	48.5	2 x 38	44	48	55,5	56,88	
	Intermediary wagon			55							
Maximum axle payload		[kg]	8,25	7.5	6	18,5–22,5– 18,5	22,5		:	21,5	:
Wagon wheelbase		[mm]	13700	12730	15900	2 x 14400		:	17800	15500	:

Bogie wheelbase		[mm]	750-700-750	4 x 700	2200	2000-1800-2000	:	:	:	:
Floor height above the top of the rail on empty wagon		[mm]	Standard 410/450 High tare 430/470 Ultralow310/450	480	:	200	:	968	1100	:
Floor height above the top of the rail at a payload of 13 t (empty vehicle)		[mm]	475	465	410	:	:	968	:	:
Wheel diameter	New	[mm]	360 / 380	380	360	840-920-840	:	:	957	:
	Wear (Used)		355	335	325	:			:	:
Minimum cornering radius for single wagon			80	120	:	150	:	:	:	:
Minimum cornering radius for wagons in composition of train sets		[m]	150	150	150	150	:	:	:	:
Maximum speed		[Km/h]	120	120	120	120	140	120	120	Loaded: 65 Empty: 75
Loading gauge		-	Fișa UIC 505-1	Fișa UIC 505-1	Fișa UIC 505-1	UIC GB1 și GI3	UIC GC	0 – V - M	1 – T	Konkan Railways
Maintenance cost		[€/km]	0,08 - 0,15	0,08 - 0,15	:	0,062	:	:	:	:
Price		[€/buc]	150,000	150,000	:	350,000-457,000	around 400,000 for WBV wagons	:	:	:

4. Operation of the Ro-La system involves:

a) allocation of human resources in terminals and related expenses for their operation;

b) choosing the most convenient railway routes (from the point of view of costs, duration, traffic conditions, etc.) which can result in significant differences compared to normal road routes. These may lead to greater distances for the whole of the combined transport segment (composed of the distance for rail and road transport in the initial and final segments) than those specific to door-to-door road transport. A relevant example is on the route Bucharest - Arad, where the usual road route (Bucharest - Pitești - Râmnicu Vâlcea - Sibiu - Deva - Arad) is about 550 km, while the cheapest railway routes, through Orșova and Livezeni, respectively, are completely different, at a distance of over 600 km.

c) the transport of "deadweight" of about 13 tons / wagon, related to the road vehicle's own weight. The negative impact can be illustrated with the example of a Ro-La train that would run on the route Bucharest Progresu - Chiajna - Videle - Caracal - Craiova - Filași - Târgu Jiu - Livezeni - Simeria - Glogovăț, consisting of 21 Ro-La wagons with small wheels and the Saadkms series submersible platform, each loaded with a 33 gross tons heavy vehicle, a berth wagon and a generator wagon. In this case, the "deadweight" amounts to 273 tons, which represents 23.1% of the train's gross tonnage. Assuming that the goods inside the road vehicles (i.e. 420 tons) are carried in a train consisting of only 10 Eacs type wagons, based on calculations and data from CFR Marfă, the deadweight plus the wagon's own mass and the generator wagon's own mass lead to:

- an increase by 3.85% of the infrastructure track access charge;
- an increase by 34.1% of diesel consumption;
- an increase by 30.6% of electricity consumption for traction.

d) the ratio between the weight of the goods in road vehicles (the actually carried load – payload) and the low floor wagon's own weight as compared to conventional wagons. Thus, under the most favorable situations, i.e. in which the vehicle has a gross mass equal to the maximum allowed on roads and highways (44 t) and carries 31 net tons of goods.

e) a reduced transport capacity compared to trains composed of conventional wagons or container trains (Tănăsuică, 2012; Hupac, n.d.; Railway Council, 2020). Thus, a Ro-La train composed of wagons with small wheels or Modalohr wagons can carry goods with a mass of about 400 - 600

tons, compared to values that reach 2000 tons, in the case of conventional traffic (especially for bulk goods). In mountain areas, which are limiting the composition of trains from 18 to 21 small wheeled wagons, resulting in the transport of a similarly reduced number of road vehicles, that is equivalent to a maximum of 40 TEU (container loading capacity), which means half of the average performance of container trains (about 80 TEU);

f) the expenses with the acquisition and maintenance of small wheeled wagons or Modalohr wagons are much higher than for other types of wagons.

5. RO-LA Bussines Organization

In the early years, the West German Railways (Deutsche Bahn) carried out all the activities related to their development (the “single enterprise” model). In France, Switzerland or Austria, partnership management was preferred, in which the railways ensured only the traction of trains, while transport organizers / combined transport operators ensured the general organization, coordination of activities, marketing of the service, customer relations, supply of specialized wagons, and services related to Ro-La transport (the “specialized enterprise” model). Later, the West German Railways outsourced as well the activities to transport organizers (for example, to Kombiverkehr) (Wenger, 2001).

It is noticeable that many of the combined transport operators were either directly set up by the railways in various countries or with their participation.

There are also cases where these companies have been wholly acquired by national railway undertakings (e.g. Oekombi in Austria).

Over the last ten years, the Ro-La transport business has undergone a number of reorganization processes, as follows:

a) in the case of the Alpine Aiton - Orbassano Railway Motorway, the French and Italian authorities tried, in 2009, to concession its operation, but the procedure eventually failed. This led further on to its operation by the joint venture Autostrada Ferroviaria Alpina (AFA), created by the national railway operators of France and Italy, which provide the towing of trains.

b) in Austria, until 2013, the general organization, coordination of activities, supply of wagons, customer relations and services related to Ro-La transport were carried out by the Oekombi combined transport operator. Oekombi ceased its activities following the decision of its owner, the national railway operator Rail Cargo Austria, to carry out these activities

directly, by taking over the wagons and by means of its own dedicated internal structures, in which it placed the staff transferred from Oekombi. The reasons for the decision were to simplify processes, better communicate with customers and achieve internal synergies (Rail Cargo Group, n.d.).

c) in Switzerland, the federal authorities required in 2011, through the terms of conditions of a financial support program, that Ro-La traffic be managed by a single company. As a result, the Hupac company handed over the related activities related to the Basel-Lugano route to the Ralpin company, to which it also leased the related wagons in its ownership (Federal Finances Administration, 2018).

The current situation on the operational relations is set out in table no. 2 and can be characterized as follows:

a) the general organization, coordination of activities, customer relations, provision of wagons and services related to Ro-La transport were and are carried out both by transport organizers / combined transport operators (many owned by incumbent railway operators) and by operators, incumbent railways;

b) the towing of Ro-La trains was and still is provided only by traditional railway operators (most of them state-owned enterprises);

c) newly private railway operators entering the market do not show interest in putting Ro-La trains into service;

d) there is a tendency to concentrate activities on as few companies as possible. In some cases, these activities are taken over by a single company, which is also an incumbent railway carrier.

Table nr. 2: Ro-La transport routes over the period 2018-2020
(Tamma, 2017; Hupac, n.d.; Okombi, n.d.; RALPIN AG., n.d.)

Route	Direction	Year	Transport organizer	Wagon / Owner/ Supplier	Railway carrier	Distance [km]	Maximum height of the road vehicle [m]	Composition	Number of trains/day								Transport prices [EUR/road vehicle]		
									Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	<= 40 t	<= 42t	<= 44t	
Brenner (Austria) –Worgl (Austria)	Brenner - Worgl	2010	Oekombi	Oekombi	Rail Cargo Austria	94	4	Vagons Saadkms Bombardier , Sdgmms	19	19	19	19	19	15	6	132	139	184	
	Worgl - Brenner								19	19	19	19	19	13	8				
	Brenner - Worgl	2018	Rail Cargo Austria	Rail Cargo Austria					17	18	18	18	18	14	9	98 - 133	188	221	
	Worgl - Brenner								17	18	18	18	18	13	10	120 - 163	210	249	
Salzburg (Austria)- Fernetti (Trieste, Italia)	Salzburg – Fernetti (Trieste)	2010	Oekombi	Oekombi	Rail Cargo Austria, Mercitalia	382	4	Vagons Saadkms Bombardier , Sdgmms	2	2	3	2	3	2	2	360			
	Fernetti (Trieste) - Salzburg								2	2	3	2	2	2	3				
	Salzburg – Fernetti (Trieste)	2018	Rail Cargo Austria	Rail Cargo Austria					1	0	1	0	0	1	0	700			
	Fernetti (Trieste) - Salzburg								1	0	1	0	0	1	0				
Wels (Austria)- Maribor (Slovenia)	Wels - Maribor	2010	Oekombi	Oekombi	Rail Cargo Austria, SZ	341	4	Vagons Saadkms Bombardier , Sdgmms	3	3	3	3	3	2	1	One way: 345 Return trip: 640			
	Maribor - Wels								4	3	3	3	3	1	1				
	Wels - Maribor	2018	Rail Cargo Austria	Rail Cargo Austria					2	2	2	2	2	3	1	One way: 446 Return trip: 862			
	Maribor - Wels								3	2	2	2	2	2	1				

Route	Direction	Year	Transport organizer	Wagon / Owner/ Supplier	Railway carrier	Distance [km]	Maximum height of the road vehicle [m]	Composition	Number of trains/day							Transport prices [EUR/road vehicle]		
									Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	<= 40 t	<= 42t	<= 44t
Worgl (Austria)- Trento (Italia)	Worgl - Trento	2010	Oekombi	Oekombi	Rail Cargo Austria, Mercitalia	233	4	Vagons Saadkms Bombardier , Sdgmms	5	5	5	5	5	0	3	299	324	349
	Trento-Worgl								5	5	5	5	5	3	0			
	Worgl - Trento	2018	Rail Cargo Austria	Rail Cargo Austria					1	1	2	2	2	0	1	217 - 326	373	419
	Trento-Worgl								1	1	2	2	1	1	0			
Freiburg i. Br (Germania).- Novara (Italia) via Elveția	Freiburg i. Br. – Novara	2010	Ralpin	Ralpin	SBB, BLS	482	3,96	Vagons Saadkms Cattaneo	9	10	11	11	7	5	7	Empty vehicle: 300 Loaded vehicle: 480 - 550		
	Novara - Freiburg i. Br.								10	11	11	11	9	5	3			
	Freiburg i. Br. – Novara	2018							8	10	10	10	9	5	7	Empty vehicle: 390 Loaded vehicle: 520, 620, 650		
	Novara - Freiburg i. Br.								10	10	10	10	10	5	4			

6. REQUEST for RO-LA transport

Between 1969 and 2018, Ro-La services were provided in Europe on a regular basis by at least 53 connections (13 domestic and 40 international) [9]. Of these, only 14 routes were operational in 2010, of which 4 are domestic and 10 international, while in 2018 only 9 routes are still operated, of which 2 are domestic and 7 international (table no.2) (Tamma, 2017; Hupac, n.d.; Okombi, n.d.; RALPIN AG., n.d.; Eurotunnel Le Shuttle Freight, n. d.).

Also, pilot Ro-La trains were tested on several routes, as follows:

a) Istanbul - Sofia - Belgrade - Ljubljana - Wels, in 2006. Transport was unaccompanied, with drivers traveling by plane and bus to the Wels terminal and back to Turkey. The experiment was considered technically successful, but was not followed by the organization of regular services, as no attractive rates could be offered on the market (International Transport Forum, 2009);

b) Moscow - Helsinki, Moscow - Poland and Moscow - Novorossinsk, Moscow - Kaliningrad or Moscow - Ekaterinenburg. The first tests, carried out before 2010, ended with negative results, for technical reasons. Improved solutions have been provided and recent experiments showed that the movement of Ro-La trains is possible (Bakkal et al., 2009; Vrenken et al., 2013).

c) Bucharest Progresu - Videle - Craiova - Filiași - Livezeni - Simeria - Glogovăț, in 2009. The distance of 611 km was covered in 15 hours and 40 minutes (Tănăsuiță, 2012);

d) Curtici - Simeria - Livezeni - Filiași - Craiova, in 2018. The train covered 411.8 km in less than 12 hours.

In what concerns the two experimental trains in Romania, the transport times corroborated with the durations spent in the terminals, upon loading and unloading vehicles on / off the wagons were longer than the possible transport times on the road.

In Romania, Ro-La trains ran regularly only in international traffic, on the following routes (Tănăsuiță, 2012; Railway Council, 2020):

a) Bucharest Progresu - Kaspichan (Bulgaria), between 1992 and 1995. The trains consisted of wagons from the adapted Rgs series, belonging to the Bulgarian national railway carrier BDZ. The traffic was enabled by the comparatively long waiting times registered at the crossing of the Romanian - Bulgarian border and it stopped after the modernization of the Giurgiu Border Crossing Point;

b) Glogovăț - Sopron (Hungary), in 1998. The trains were composed of small wheeled 8-axle wagons with sunken platform owned by the Hungarian national railway operator MAV (today, Rail Cargo Hungary) and it carried only 89 road vehicles, being canceled shortly after their putting into circulation, due to the lack of transport demand.

c) Bradu de Sus - Kaspichan (Bulgaria), in 2000. Adapted Rgs wagons were also used, and the trains only ran temporarily for a very brief period of time, due to the road carriers' lack of interest in such services.

d) Glogovăț - Wels (Austria), between 2002 and 2006, with Saadkms type 10-axle wagons with small wheels and sunken platform, in CFR Marfă's fleet;

e) Episcoplia Bihor - Wels (Austria), between 2004 and 2006, also with Saadkms type 10-axle wagons with small wheels and sunken platform, in CFR Marfă's fleet.

The decline in the Ro-La traffic volume in Europe in 2018, as compared to 2010 can also be seen from the data specified in table no. 3.

Table no 3: Ro-La trains currently running in Europe (Tamma, 2017; Hupac, n.d.; Okombi, n.d.; RALPIN AG., n.d.; Eurotunnel Le Shuttle Freight, n. d.)

Route	Unit	2010	2018
Eurotunnel	[Trains/day and direction]	96 – 144	96 – 168
Other relations in Europe	[trains/ day]	Sunday: 52 Wednesday: 10 8	Sunday: 45 Wednesday: 80

In Austria, there is a general trend of significant decrease in traffic volume, measured in vehicles / year (Fig. No. 1). Given the disappearance of subsidies in some neighboring countries (e.g. Hungary) and the volume of demand, the national rail operator Rail Cargo Austria has restructured and concentrated traffic, with the result that services on some connections have been canceled and the total number of trains circulates on each operational relationship has decreased. Compared to 2010, the domestic services performed on the Salzburg - Villach route, the import - export traffic related to the Wels - Szeged route (Hungary) and the transit traffic Trento (Italy) - Regensburg (Germany) disappeared (Okombi, n.d.; Rail Cargo Group, n.d.). Transport demand is maintained due to subsidies granted by the Austrian authorities and their environmental and road protection policy, which is reflected in high tolls (especially on the Brenner motorway) and the granting of a very small number of transit permits for road hauliers from non-EU

countries (Austrian Federal Ministry of Transport, Innovation and Technology, n.d.; European Commission, n.d.; Tănăsuiică, 2012).

In Switzerland, stagnation is the general trend (fig. No.2). This is due to the combined subsidies for accompanied transport and the very high tolls imposed by the federal authorities (Federal Finances Administration, 2018).

On the Aiton - Orbassano Alpine Railway Highway, the traffic volume has a generally growing trend, but not at the level desired by the French and Italian authorities (fig. 3). Demand is supported by significant subsidies (European Commission, n.d.; Saint Pulgent & Pellegrin, 2006).

Fig 1-Ro-La traffic volume in Austria (Eurostat data source)

Fig. 2: Ro-La traffic volume in Switzerland
(Federal Finances Administration, 2018)

Fig. 3: Ro-La traffic volume on the Alpine Railway Highway (Saint Pulgent & Pellegrin, 2006)

The services organized through the Channel Tunnel stand as a success story, being favored by the geographical factor and the very high transport demand associated with economic exchanges between Great Britain and the countries of Continental Europe. They also have the advantage that their only competition comes from ferries, which are much slower and subject to occasional bad weather negative influence and sailing conditions at any given time. Although the French and British authorities do not grant subsidies, the volume of Eurotunnel traffic has a growth trend in general (fig. No. 4) (Eurotunnel Le Shuttle Freight, n.d.).

Fig. 4: The volume of Ro-La traffic through the tunnel under the English Channel (Eurotunnel Le Shuttle Freight, n.d.)

Table no. 4 presents the situation of Ro-La transports, on the relationship between Romania and Austria, from 2003 to 2006 (Tănăsuică, 2012)

YEAR	2003	2004	2005	2006
Number of trains	596	890	805	506
Number of wagons	12939	18563	13685	10850
Number of road vehicles	10991	14082	11549	8080

In 2007, after the accession of Romania and Bulgaria to the European Union, the transport demand vanished, as the customs formalities at the Romanian-Hungarian border were eliminated, and the movement of goods road vehicles registered in Romania or Bulgaria was overall smoother across the internal borders within the European Union, without transit authorizations that were previously granted in limited numbers. The same reasons affected the Ro-La Szeged (Hungary) - Wels (Austria) traffic (Railway Council, 2020; Tănăsuică, 2012).

Studies conducted by various organizations and the experience of combined transport organizers accumulated over 50 years reveal that the following aspects have an important impact on transport demand and the development of highways (Danielis et al., 2010; Federal Office of Transport, 2018; Ministère de la Transportation Ecologique et Solidaire, 2018; Railway Council, 2020; Tănăsuică, 2012; Wenger, 2001):

a) real benefits provided to customers. From this perspective, the applied tariff is essential and must be at a level that would result in a cost of the combined transport (railway tariff plus costs related to the initial and final road segments) which is lower than the door-to-door road transport. The transport time is the second most important element and must also be shorter than the time obtained by trucks on the road. It depends on the rail tracks' condition and other features of the railway infrastructure. Customers also appreciate the quality (especially punctuality) and flexibility of the service (especially the requirements for presentation at the terminal).

b) the running distance of Ro-La trains. Studies developed under the auspices of the International Union of Road Railway Combined Transport Companies (U.I.R.R.) show that the optimal traffic distance is about 300 - 400 km. At the same time, distances greater than 1000 km in conjunction with train travel times of 18-20 hours become unattractive for car drivers, who gave rejection feedbacks.

c) the free passage gauges of the railway lines, in Europe, preferring the routes allowing road vehicles of at least 4 m in height;

d) natural or geographical factors, which may favor Ro-La services, as happens when crossing the English Channel.

e) the support granted by the public authorities through various measures (subsidies, traffic restrictions, high tolls, exemptions from paying taxes, etc.).

As such:

During the periods and on the routes where it enjoyed various advantages, the Ro-La train service reached remarkable average load rates (for example, 85% in case of trains from Austria or Switzerland, from Freiburg i. Br. - Novara);

- the disappearance of subsidies also generated the disappearance of Ro-La services (the case of services performed in domestic traffic in Germany and those on the Dresden-Lovosice and Szeged-Wels routes);

f) other political, economic or social factors such as:

- the accession of Eastern European countries to the European Union had negative effects, as the requirement to hold transit authorizations disappeared and customs formalities at the borders were eliminated. The consequence was the disappearance of the interest for accompanied transport and the cancellation of the circulation of some Ro-La trains, such as those on the relations Dresden (Germany) - Lovosice (Czech Republic), Glogovăț - Wels or Episcopia Bihor - Wels;

- the volume of traffic decreased during the economic crisis, which occurred in 2008. As the case may be, Ro-La services actually disappeared from some connections (e.g. Szeged - Ljubljana) or recorded significant losses in traffic volume due to the decrease in trade exchange between the European Union and Turkey.

- road transport companies face the risk of labor migration to competing companies, if they require their drivers to use Ro-La trains, especially if they establish their wages based on the distances actually traveled by road (as it happens in Romania).

Attempts to outline profiles of companies interested in Ro-La services lead to [6]:

- a) companies that operate parks with less than 10 vehicles;

- b) companies that do not have their own logistics network;

- c) companies shipping goods on routes with unbalanced or irregular traffic volume;

7. RO-LA Transport costs

The average costs of the Ro-La transports services are presented in table no.5.

Table no. 5: The cost of Ro-La transport versus the cost of road transport, in Austria 2019

Traffic type	Road transport [Euro/1000 tkm]	Ro-La transport [Euro/1000 tkm]	Ratio between road transport cost and Ro-La transport cost [%]
Domestic traffic	56	119.8	46.74%
Import – export traffic	56	81.8	68.46%
Transit traffic	56	103.5	54.11%
National average	56	102.5	54.63%

The comparison between road transport and accompanied combined transport, carrying a vehicle with a gross weight of 40 metric tons, over a distance of 825 km, between Lüdenscheld (Germany) and Lecco (Italy), in transit through Switzerland, highlights the following costs (Federal Finances Administration, 2018) :

- a) road transport cost: EUR 1,303 / vehicle;
- b) the cost of combined transport along with:
  - the cost of road transport on the initial and final segments: EUR 733 / vehicle;
  - the cost of railway transport on the Novara - Freiburg i. Br.: route: EUR 865 / vehicle;
  - total: EUR 1,598 / vehicle.

With regard to the Alpine Railway Highway, in publicly available documents (European Commission's decisions not to object to aid granted by the French and Italian authorities, etc.), the current costs have the status of confidential data (European Commission, n.d.). However, given the amount of total subsidies granted annually, the number of vehicles transported annually and the intensity of aid granted annually indicated in reports prepared by the Inspectorate General of Finance and the French Court of Auditors (Saint Pulgent & Pellegrin, 2006), simple calculations allow for the following values to be established as total costs:

- a) EUR 1,003.50 / vehicle, in 2010;

b) EUR 585.90 / vehicle, in 2020.

In Romania, the difference between the total cost of accompanied combined transport and the total cost of road transport leads to a need for state aid with an intensity of 60% of the total cost of accompanied combined transport (Fig. No. 5) European Commission, n.d.).

Fig. 5: Comparison between the total cost of the accompanied combined transport and the total cost of the road transport, in Romania (CFR Marfă source) transport less attractive in terms of environmental protection policies, as it generates a quarter of total greenhouse gas emissions in the European Union.

Fig. 5: Comparison between the total cost of the accompanied combined transport and the total cost of the road transport

8. Possitive effects of Ro-LA transport

The founders of RO-LA transport believe that this system is a solution for decongesting road maintenance costs, reducing the number of road accidents and protecting the enviroment by reducing pollutants, noise and water pollution. By comparation, it makes road transport less attractive in terms of enviromental protection policies, as it generates a quater of total greenhouse gas emissions in the European Union.

However, for RO-LA transport to be a reliable solution, the responsibility for its development and success lies with the states by financing transport infrastructures that generate value. The economic crisis of 2008 and the COVID-19 pandemic reduced investments in the transport sector.

Table no.6 Budgetary resources allocated to the EU transport sector for the period 2007-2020 (European Court of Auditors, 2018)

Tools	Eur bilion		
	2007-2013	2014-2020	Total
FEDER and CF/ ESI funds	81,8	68,5	150,3
TENT	8,00	0,00	8,00
Marco-Polo	0,50	0,00	0,50
PC 7 Transports	4,20	0,00	4,20
Orizont 2020 Transports	0,00	6,30	6,30

Source: European Court of Auditors (2018) based on data available to the public

Table no. 7: External costs calculated with the unit values specific to the Romanian transport modes

Route	External cost item	Traffic data		External unit costs in Euro / tkm		External costs –Road Transpo rt	External costs – Accompanied combined transport				Savings external costs			
							Road segments		Diesel traction		Electric traction			
		Road vehicles / route	Net tones / road vehicle	Road Transpo rt	Rail transp. - Diesel traction	Rail transp. – electric traction	km	Euro / train	km	Extern al cost in Euro / train	km	Extern al cost in Euro / train	km	Extern al cost in Euro / train
Bucharest – Arad of which	Air pollution	5	20	0,024	0,0131	0,0033	553	1327,2	50	120	27,4	35,89	583,6	192,59
	Climate change	5	20	0,0116	0,0026	0,0016	553	641,48	50	58	27,4	7,12	583,6	93,38
	Noise	5	20	0,0029	0,0015	0,0009	553	160,37	50	14,5	27,4	4,11	583,6	52,52
	Accidents	5	20	0,0005	0,0014	0,0008	553	27,65	50	2,5	27,4	3,84	583,6	46,69
	Traffic congestion	5	20	0,0034	0,0001	0,0001	553	188,02	50	17	27,4	0,27	583,6	5,84
	TOTAL	5	20	0,0424	0,0187	0,0067	553	2344,72	50	212	27,4	51,24	583,6	391,01
Bucharest - Timisoara of which	Air pollution	5	20	0,024	0,0131	0,0033	538	1291,2	100	240	27,4	35,89	583,6	192,59
	Climate change	5	20	0,0116	0,0026	0,0016	538	624,08	100	116	27,4	7,12	583,6	93,38
	Noise	5	20	0,0029	0,0015	0,0009	538	156,02	100	29	27,4	4,11	583,6	52,52
	Accidents	5	20	0,0005	0,0014	0,0008	538	26,9	100	5	27,4	3,84	583,6	46,69
	Traffic	5	20	0,0034	0,0001	0,0001	538	182,92	100	34	27,4	0,27	583,6	5,84

	congestion													
	TOTAL	5	20	0,0424	0,0187	0,0067	538	2281,12	100	424	27,4	51,24	583,6	391,01
Bucharest - Oradea of which	Air pollution	2	20	0,024	0,0131	0,0033	586	562,56	140	134,4	27,4	14,36	583,6	77,04
	Climate change	2	20	0,0116	0,0026	0,0016	586	271,9	140	64,96	27,4	2,85	583,6	37,35
	Noise	2	20	0,0029	0,0015	0,0009	586	67,98	140	16,24	27,4	1,64	583,6	21,01
	Accidents	2	20	0,0005	0,0014	0,0008	586	11,72	140	2,8	27,4	1,53	583,6	18,68
	Traffic congestion	2	20	0,0034	0,0001	0,0001	586	79,7	140	19,04	27,4	0,11	583,6	2,33
	TOTAL	2	20	0,0424	0,0187	0,0067	586	993,86	140	237,44	27,4	20,5	583,6	156,4
Giurgiu Nădlac of which	Air pollution	5	20	0,024	0,0131	0,0033	646	1550,4	116	278,4	27,4	35,89	583,6	192,59
	Climate change	5	20	0,0116	0,0026	0,0016	646	749,36	116	134,56	27,4	7,12	583,6	93,38
	Noise	5	20	0,0029	0,0015	0,0009	646	187,34	116	33,64	27,4	4,11	583,6	52,52
	Accidents	5	20	0,0005	0,0014	0,0008	646	32,3	116	5,8	27,4	3,84	583,6	46,69
	Traffic congestion	5	20	0,0034	0,0001	0,0001	646	219,64	116	39,44	27,4	0,27	583,6	5,84
	TOTAL	5	20	0,0424	0,0187	0,0067	646	2739,04	116	491,84	27,4	51,24	583,6	391,01

According to a study carried out by the Austrian national operator in collaboration with the Austrian Federal Office for the Environment, on the Wörgl - Brenner route (92 km), each Ro-La train put into operation with a maximum load rate leads to reductions in carbon dioxide emissions of 70 kg in the Wörgl-Brenner direction, and 56 kg, respectively, in the other direction (Rail Cargo Group, n.d.).

In what concerns the Alpine Aiton - Orbassano Railway Motorway, the modal shift of freight traffic from the road to the railway system allows the reduction of carbon dioxide (CO₂) emissions by 5000 tons / year. Ro-La trains also make it possible to avoid the transport of dangerous goods by road, between France and Italy, via Ventimiglia, on routes of more than 700 km, provided that the movement of heavy road vehicles loaded with such goods is prohibited in the Mont Blanc Tunnels and Frejus (European Commission, n.d.).

As for Romania, table no.7 presents the external costs saved by putting in operation a Ro-La train on the Bucharest Progresu - Glogovăț route, calculated on the basis of the unit values specific to each mode of transport, indicated in the document "External - cost calculator for Marco Polo freight transport project proposal", developed by the Joint Research Center of the European Union.

9. Supporting RO-LA transport

Subsidizing Ro-La transport in the Member States of the European Union is only possible in compliance with the provisions of the OJEU (2008 / C / 184/07) "Community guidelines on State aid for railway undertakings". They restrict the possible state aid intensity as follows:

- a) "in the case of aid for the use of infrastructure, 30% of the total cost of rail transport, up to 100% of the eligible costs";
- b) in the case of aid to reduce external costs, 30% of the total cost of rail transport, up to a limit of 50% of the eligible costs";
- c) exceeding the mentioned intensities is allowed exceptionally, provided that it can be argued that "the aid does indeed have a stimulating effect for the modal shift to the railways".

According to the European Commission's practice (n.d.), aid for the use of infrastructure means covering the infrastructure charge, the costs of transfer maneuvers between the railway stations and the Ro-La terminals they serve and the terminal charges. Also, by deciding not to object to the projects concerning the Alpine Railway Highway (France, Italy) or to the program promoted by the Administration of the Romanian Environmental

Fund, it admitted aid intensities that only cover the difference between the cost of combined transport and the cost road transport.

Calculations made with data from Austria show that the normal intensities provided for by Community law do not allow for the compensation of all specific transport costs (European Commission, n.d.). Even when exceeding them is approved, the limitations imposed lead to rail fares comparable to the cost of door-to-door road transport. In such case, in the accounting systems of the road operators, the savings / reductions of diesel expenses, vehicle maintenance, personnel and some other taxes, which are brought forth as strengths by the promoters of the Ro-La system, will be canceled by the amounts paid for rail transport. With approximately equal total costs, road carriers will evaluate Ro-La transport according to criteria such as transport duration or quality of service. From this perspective, the transport times by rail together with the durations spent in the terminals (about 3 hours) and with the travel times of the initial and final road segments may exceed the duration of door-to-door road transport (as it was the case in Romania, demonstrated by tests and 2018). This fact does not virtually bring any real benefit to customers and does not guarantee the development of subsidized combined transport. It is therefore necessary that direct financial assistance be granted at the same time as other support measures.

Specifically, the Austrian authorities have supported and continue to support motorways by (Asfinag, n.d.; Austrian Federal Ministry of Transport, Innovation and Technology, n.d.; Tănăsuiță, 2012):

a) direct financial support for the operation of Ro-La trains, which fall within the standard limits of European regulations, with the amounts indicated in table no.7. The beneficiaries of the aid can only be railway operators;

Table no. 8: Ro-La transport financial support in Austria (Austrian Federal Ministry of Transport, Innovation and Technology, n.d.)

Corridor	Route	Distance to Austria	Total distance	Subsidy 2010 [Euro / vehicle]		Subsidy 2018 [Euro / vehicle]	
				Day	Night	Day	Night
Corridor Brenner	Brenner-Worgl	94	94	90	45	77	33
	Wörgl-Rocanfort (Trento)	96	233	90		77	33
						+ grants in Italia (33 euro)	

					/vehicle)	
	Rocanfort (Trento)- Regensburg	73	463	90	Day	94
					Night	47
					Trains canceled	
Corridor Phyrn - Schober	Wels - Maribor	325	341	75	77	
Corridor Tauern	Salzburg- Ferneti (Trieste)	212	382	80	81	
				+ grants in Italia (33 euro /vehicle		
	Salzburg- Villach	180	180	70	Trains canceled	
Corridor Dunărea	Wels - Szegeđ	293	648	70	- No subsidy is granted.	
				+ grants in Ungaria (6€ / tren-km, max 2500 € /tren)	-Trains canceled.	

- b) aid for the construction and development of terminals;
- c) aid for the purchase of equipment used in combined transport;
- d) exemption from the payment of the tax for road vehicles used exclusively in combined transport;
- e) reimbursement of 15% of the monthly toll for road vehicles, for each ride on Ro-La trains;
- f) exemption from the payment of tolls for foreign road carriers, within a radius of 70 km around the Wels terminal;
- g) traffic bans for heavy vehicles, exceeding 3.5 t:
  - on Saturday, between 15:00 and 24:00;
  - on Sundays and public holidays: 00:00 - 22:00;
  - bans during summer holidays: every Saturday,
  - traffic bans at night, for vehicles exceeding 7.5 t and which do not comply with the noise rules: 22:00 - 05:00;

Excepted from these prohibitions are those journeys carried out within a radius of 65 km around the combined transport terminals, including Ro-La.

- h) granting additional transit authorizations for users of Ro-La services from non-EU member countries.

In all of the countries where Ro-La transport services are provided, the time spent by the road drivers on the Ro-La train is recognized as rest time.

Romania is a special case, due to the contradictory conditions in which highways can operate. Thus, on the one hand, a number of measures have been adopted to stimulate and develop them, and on the other hand, other measures continue to be favorable to the road system. The most important form of support for accompanied combined transport is direct financial support (subsidies), which can be granted by the Administration of the Environmental Fund, in the period 2018 - 2020, in amount of 60% of the VAT-free value of the invoice issued by the railway transport operator and with a maximum value RON 115 million over a three year period. In addition, there is in principle the decision of the Romanian railway infrastructure manager, adopted in May 2018, to grant 33% discounts to the track access charge for trains providing intermodal traffic, including Ro-La trains.

The incentive effect of those measures is adversely affected by the existence of a general framework for providing rail or road transport services, which consists of the following:

a) the total amount of the track access charge (TUI) is high. For instance, in table no. 9, the actual values registered in the case of a road vehicle carried on a Ro-La train on the Bucharest Progresu - Glogovăț route are set out.

b) the road tax involves the payment of the so-called “rovignette” price, in amount of EUR 1,210 / year for trucks with the maximum total authorized mass over or equal to 12 t, with a minimum of 4 axles (inclusive). Given that such a vehicle drives on the average about 110,000 km / year, it is equivalent to EUR 1,210 / year: $110,000 \text{ km / year} = \text{EUR } 0.011 \text{ / km}$. As a result, for a road trip from Bucharest to Arad (550 km), the cost of using public roads is $\text{EUR } 0.011 \text{ / km} \times 550 \text{ km} = \text{EUR } 6.5$. Therefore, the differences between this value and the railway track access charge are huge, as shown in table no. 9.

Table no. 9: The fee for using the railway infrastructure (TUI) versus the price of the rovignetă, in the case of the Bucharest - Arad route

Transport by train Ro-La București Progresu – Glogovat					Road transport	Raport Whole TUI road taxes	Low TUI report / toll
Number of Ro-La wagons / train	Number of vehicles / train	Train load	TUI integral [euro / vehicle]	TUI 33% discount [euro/vehicle]	Road taxes [euro/vehicle]		
21	17	80%	112,94	75,67	6,05	18,66	12,50
21	21	100%	92,30	61,84	6,05	15,25	10,22

c) compared to other states, the price of the rovignette is 23-35 times lower than the normal toll in Austria and about 38 times lower than in Switzerland. At the same time, the average value at the network level of the Romanian railway track access charge was, until the adoption of the intermodal traffic trains discount measure, of about 3.3 - 3.6 euro / km, higher than in Austria, France, Italy or Slovenia and almost at the same value as in Switzerland.

d) a discount by 33% to the full amount of the railway track access charge may only be granted if the concerned railway operator incurs no overdue obligations or debts whatsoever to the payment of track access charges for other trains older than 30 days (which is an additional form of penalty, given that the infrastructure access contract provides anyhow for such interest penalty charges and the railway infrastructure manager may take, for example, the measure of stopping trains).

e) of the Competition Law no. 21/1996, as amended and republished in 2014, prohibiting economic agents from using their dominant position on the market (in this case, CFR SA) to apply to their trading partners (in this case, debtor railway operators with arrears to the payment of the track access charge) “unequal conditions to equivalent services, thus causing, to some of them, a disadvantage in their competitive position” (Romanian Parliament, 1996).

f) in Romania, the railway track access charge levels for passenger trains are lower than those for freight trains, unlike the countries in Western Europe, where the situation is the opposite. Given that rail passenger

transport is subsidized, it can be stated that the approach of the authorities in Western countries also provides indirect support (non-existent in Romania) for rail freight traffic, including for trains related to combined or unaccompanied traffic.

g) the railway operators do not benefit from any kind of exemption or reduction of the excise tax included in the price of diesel fuel used in Diesel traction, as it happens in the road system. Given that part of the amount collected from excise duties is used for road maintenance, it follows that railway operators actually support road transport.

h) the Romanian authorities grant a significant number of transit authorizations for heavy road vehicles registered in non-EU member countries;

i) the Romanian authorities have not granted, so far, an exemption from the payment of the tax on means of transport (currently, tax) for vehicles used on the initial and final segments of the combined transport of goods, as provided by Directive no. 92/106 / EEC of 7 December 1992 on the establishment of common rules for certain types of combined carriage of goods between Member States, as amended following Romania's accession to the European Union (Eur-lex, 1992);

j) traffic restrictions or prohibitions for road vehicles with a maximum total authorized mass of more than 7.5 tons were imposed, by Government Decision no. 1777/2004, as subsequently amended, and the Order of the Minister Delegate for infrastructure projects of national interest and foreign investments no. 481 of December 20, 2013 / Order of the Minister of Internal Affairs no. 8 of January 23, 2014, on Fridays, Saturdays, Sundays and public holidays, as well as the periods and time intervals subject to restriction only on 4 sectors of European road and motorway and only during certain periods of the year and between certain hours.

It should also be noted that the mere existence of subsidies does not guarantee the emergence and development of Ro-La transport services.

This state of affairs can be motivated by the way in which the administrative processes required by the grant awarding procedures are carried out.

10. Conclusion

Based on the experience in Central and Eastern Europe or on the Alpine Railway Highway, it can be stated that Ro-La transport is a controversial solution, being simultaneously:

a) very attractive, for the activists who militate for environmental protection and sustainable development, as well as for the general public who is not their direct user;

b) popular, for public authorities;

c) expensive and inefficient for traditional railway carriers;

d) uninteresting for the railway operators newly entered on the market;

e) at most indifferent, for road carriers;

f) unpopular, for drivers of heavy road vehicles.

The design and construction of Ro-La components has been and remains a challenge for engineers, but the marketing and development of roadways is only possible if road carriers make real gains from using them. As shown in the case of Eurotunnel, the success of Ro-La services occurs when natural and geographical factors are favorable and / or alternatives offer less favorable conditions. Otherwise, although Ro-La transports bring overall benefits to the population and can contribute to the sustainable development of society, it is utopian to rely on the civility and altruism of road transport companies, given the fierce competition between them.

The political and administrative factor can positively influence the transport demand by:

a) direct financial support (subsidies) for the operation of the Ro-La system;

b) direct financial support (subsidies) for the construction and modernization of terminals, and for the acquisition of specialized rolling stock, respectively;

c) fiscal measures (exemptions or reductions of taxes and duties);

d) the pricing policy of the railway infrastructure, respectively of the road infrastructure;

e) introduction of traffic restrictions for heavy road vehicles;

f) drastic limitation of the number of transit authorizations;

g) granting bonuses for Ro-La train users;

h) recognition of the duration of transport by Ro-La train as rest time for drivers;

i) internalization of external costs.

Support for the Ro-La system must be provided in an intelligent manner, so that no limitations and conditions would nullify the benefits it offers to road hauliers and the society. From this perspective, it is necessary to revise and amend accordingly the regulations setting out the procedures for granting direct financial aid for railway transport.

The analysis made in this paper highlights the development and evolution of Ro La (2010) transport as a future solution in European rail transport.

This paper studies the efficiency of Ro La (2010) transport over various distances and shows the importance of this type of transport for economic and social development.

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