

**Marin MARINOV**

Instituto Superior Técnico - CESUR at Technical University of Lisbon  
Av. Rovisco Pais, 1049-001 Lisboa, Portugal  
*Corresponding author.* E-mail: marinov@ist.utl.pt

## **RAIL FREIGHT IN THE EU: A PROBLEM-ORIENTED SURVEY (PART I)**

**Summary.** This paper consists of a survey on rail freight in the EU, where the prime objective is to reveal the current situation of the rail freight in the EU and raises looming questions for discussion. The paper is organized in three chapters, as follows: 1. Overview reveals the current situation with the European railways and raises questions about the future of these systems; 2. Levels of Operation discusses how the European railways are viewed at both International and National level and suggests some steps for action; and 3. Synthesis. It should be noted that this paper is the Part I of III Problem-Oriented Surveys dedicated to rail freight issues of today.

## **ЖЕЛЕЗНОДОРОЖНЫЕ ГРУЗОПЕРЕВОЗКИ В ЕС: ПРОБЛЕМНО-ОРИЕНТИРОВАННЫЙ ОБЗОР (ЧАСТЬ I)**

**Аннотация.** Эта статья состоит из обзора железнодорожных грузоперевозок в ЕС, где главная цель состоит в том, чтобы показать текущую ситуацию железнодорожных грузоперевозок в ЕС и обсудить возникающие при этом вопросы. Статья состоит из трех частей: 1. Краткий обзор показывает текущую ситуацию с европейскими железными дорогами и анализирует вопросы о будущем этих систем; 2. В части Операционные уровни обсуждается, как европейские железные дороги рассматриваются на международном и национальном уровнях и предлагаются некоторые шаги для усовершенствования; и наконец; 3. Синтез. Следует отметить, что настоящая статья, Проблемно-ориентированный обзор (Часть I), посвящена проблемам железнодорожных грузоперевозок сегодня.

### **1. OVERVIEW**

Economic growth and integration have sent freight traffic soaring in the European Union, but railroads have failed to keep pace. The trends appear to be not very promising. In the past 30 years, the rails' share of all freight transport in the EU has dropped to less than 8 percent from 21 percent - compared with 40 percent of all freight in the United States - EU transportation officials say (refer also to [1]).

Market shares of inland freight transports for 2006 in %, according to EUROSTAT are shown in the following Table 1 [10]. One observes that in most European country the road mode dominates the market. Exceptions are Estonia and Latvia, only.

Speaking of European Freight Transport Performances, one observes in Table 2 [10], below, that, in general, freight transport by Rail in the EU27 increased by 5% between 2005 and 2006, and thus reached 435 bn tkm. The highest increases is observed in Finland (+14%), Luxembourg (+13%),

Hungary (+12%) and Austria (+11%), while Ireland (-32%), Latvia (-15%) and Romania (-5%) recorded the largest decreases.

Unfortunately, these figures are not promising and further effort is required. But, what effort should that be? Should that be *an effort of political sort* or should that be *an effort of operational sort*?

The new European Union railway policy is based on encouraging the competition in the railway market by implementing vertical disintegration in the sector. More precisely, vertical disintegration in terms of European Union Railways means: separation of railway infrastructure from operation, where further opening of the railway market for entry of new railway operators (also called “undertakings”) has been expected. Moreover, every Railway Operator must possess an operating certificate and must pay fees for infrastructure use (“access fees”). This new policy has been underpinned by a number of regulations, which have stipulated and framed the pace of the railway structural and legislative reform in Europe. We shall not provide a detailed discussion on this matter since the discussion is not new, but has been debated and all the information can be sourced from the official site of the European Commission, i.e., [http://ec.europa.eu/transport/rail/index\\_en.html](http://ec.europa.eu/transport/rail/index_en.html), consulted on Nov., 5, 2008).

Generally, the main tendencies have been towards opening of the national markets, stimulating competition and promoting integration with the intention of encouraging the rail freight operators to have a more commercial attitude and hence better performances. However, except for a few successful stories reported in some Case Studies (see [2] e.g.) and in the web page of the EC dedicated to rail transport and interoperability ([http://ec.europa.eu/transport/rail/market/freight\\_en.htm](http://ec.europa.eu/transport/rail/market/freight_en.htm), consulted on Nov., 5, 2008 i.e.): “*On some major European rail corridors such as the one between Rotterdam and Genoa, traffic performance has increased in recent years from around 5% to 10%. This growth has been realised mainly due to block train/shuttle train activities where the new entry of railway undertakings has so far been the strongest*”, the situation in the European Rail Freight Sector remains unchanged seen in *no competitive environments* at national markets, which is confirmed by the fact that there is a downright dominant rail freight operator on every national rail network.

Looking at the German example, e.g. [3] ... *After 10 years of open access, the new traction companies in Germany have faced enormous obstacles to gain a small market share. Many of the difficulties are being resolved, but there exists the fundamental inequality of market dominance by DB Group. This pattern is likely to be repeated in the other states, such as France, Spain and Italy, where the former national railroads are only recently and with great reluctance relinquishing their unique market powers. Opening rail freight to competition is unlikely to produce the results hoped for, at least in the short and middle term, at least as suggested by the German example.*

A comprehensive study dedicated to “Analysis and Evaluation of Formation Yard Performances” has been fulfilled [4]. The rail freight operator under study is CP Carga, the Portuguese Railway Freight Operator (“*CP - Comboios de Portugal*”). There, a problematic cycle caused by multiple inadequacies involving commercial department, tactical management and operation was addressed, which of course contributes to low utilization of the moving assets and low efficiency in providing the freight transportation service which further generates a significant increase of average costs in long term and the operator suffers “*diseconomies of scale*”. From the customer viewpoint, this awkward situation contributes to unreliable service seen in infeasible contracts, unfulfilled expectations and finally customer dissatisfaction and thus the operator cannot build up a reputation as a reliable provider of freight transportation services.

Also, as stated in a recent paper on ‘The role of Government Policy towards Railway Freight Transport’ [5], “... *the main problem of EU railways remains unchanged in many countries: operators (in the public sector) are allowed to run large yearly deficits and are not under real pressure to deliver value-for-money to their clients. ...*”

What is the future of such rail freight operators and how will they operate in the conditions of Open-Market in the forthcoming future? How about their role in providing Inter-modal and Multimodal freight transportation services? More pressure by the rigorous iron hand of the EC might be a solution, however there are some arguments that these services are yet not well understood and the benefits that they bring along. More effort at business level, at educational level involving also vocational training as well as at exploitation and dissemination levels is needed in order for the rail

freight operators to realize and benefit from providing *Inter-modal* and *Multimodal* freight transportation services.

Table 1

## Shares of Inland Freight Transport, 2006, %

	Road	Rail	Inland waterways	Oil pipelines
<b>EU27</b>	73	17	5	5
<b>Belgium</b>	69	14	14	3
<b>Bulgaria</b>	68	27	4	2
<b>Czech Republic</b>	74	23	0	3
<b>Denmark</b>	76	7	-	17
<b>Germany</b>	64	21	12	3
<b>Estonia</b>	35	65	-	-
<b>Ireland</b>	99	1	-	-
<b>Greece</b>	98	2	-	0
<b>Spain</b>	92	4	-	4
<b>France</b>	75	14	3	8
<b>Italy</b>	86	9	0	4
<b>Cyprus</b>	100	-	-	-
<b>Latvia</b>	34	54	-	12
<b>Lithuania</b>	54	38	0	8
<b>Luxembourg</b>	91	5	4	-
<b>Hungary</b>	67	22	4	6
<b>Malta</b>	100	-	-	-
<b>Netherlands</b>	61	4	31	4
<b>Austria</b>	56	30	3	11
<b>Poland</b>	62	26	0	12
<b>Portugal</b>	95	5	-	-
<b>Romania</b>	69	19	10	2
<b>Slovenia</b>	78	22	-	-
<b>Slovakia</b>	59	26	0	15
<b>Finland</b>	73	27	0	-
<b>Sweden</b>	64	36	-	-
<b>United Kingdom</b>	83	11	0	5

- Not applicable

On the other hand, nowadays booming systems are high-speed trains, which provide faster transportation services. European high-speed trains have revived passenger services and over the next decade will connect more major cities in Europe, with further opening of new rail lines. But high-speed track and rolling stock is a high cost, and for freight traffic, it is something of a distraction, i.e., for the time being unthinkable - is that true, *however*?

The answer for increasing the market shares of the rail freight transport in Europe, *the knack of the game*, might be in encouraging the different and new forms of freight transportation. How would that be? Inter-modal, multimodal, co-modal, logistic chains' concepts – what is the role of rail here and how is this role understood by the rail freight operators? – *Questions that remain unanswered*.

Table 2

## Freight Transport Performance, 2006

	Road		Rail		Total*	
	Billion tkm	Growth 2006/2005, %	Billion tkm	Growth 2006/2005, %	Billion tkm	Growth 2006/2005, %
<b>EU27</b>	<b>1 887.4</b>	<b>5.3</b>	<b>434.8</b>	<b>5.2</b>	<b>2 594.9</b>	<b>4.7</b>
Belgium	43.0	-1.9	8.5	4.3	62.0	-0.1
Bulgaria	13.8	-4.2	5.4	4.5	20.3	-1.6
Czech Republic	50.4	15.9	15.7	5.9	68.5	12.9
Denmark	21.3	-8.8	1.9	-4.3	28.0	-7.8
Germany	330.0	6.4	107.0	12.1	516.8	6.3
Estonia	5.5	-4.8	10.4	-2.1	16.0	-3.0
Ireland	17.5	-2.6	0.2	-32.3	17.7	-3.0
Greece	34.0	43.1	0.7	8.0	34.8	42.1
Spain	241.8	3.7	11.6	0.0	263.5	3.4
France	211.4	3.0	40.9	0.5	283.2	2.9
Italy	220.4	4.1	24.2	6.2	255.9	4.0
Cyprus	1.2	-16.4	-	-	1.2	-16.4
Latvia	10.8	28.1	16.8	-14.9	31.2	-1.1
Lithuania	18.1	14.0	12.9	3.5	33.7	2.8
Luxembourg	8.8	0.0	0.4	12.5	9.6	1.0
Hungary	30.5	21.2	10.2	11.8	45.2	16.1
Malta	0.5	0.0	-	-	0.5	0.0
Netherlands	83.2	-1.2	5.3	5.9	136.7	-0.5
Austria	39.2	5.8	21.0	10.7	69.6	6.3
Poland	128.3	14.7	53.6	7.3	207.8	10.8
Portugal	45.0	5.7	2.4	0.3	47.5	5.4
Romania	57.1	10.9	15.8	-4.8	83.1	5.5
Slovenia	12.1	9.8	3.4	3.9	15.5	8.4
Slovakia	22.2	-1.6	10.0	5.5	37.9	1.3
Finland	29.7	-6.7	11.1	14.0	40.8	-1.9
Sweden	39.9	3.5	22.3	2.7	62.2	3.2
United Kingdom	172.2	2.8	23.1	3.7	206.3	2.7

Some data are estimated

- Not applicable

\* Total includes inland waterways and oil pipelines

## 2. LEVELS OF OPERATION

### 2.1. International Level

At international level, where the service require border-crossing, in terms of technically harmonized networks (i.e., infrastructure) the knack of the game is seen in delicate border-crossing negotiations and strict operations using “*one locomotive / one train brigade*”, to the extent possible. That means that one will need common/synchronized “European” scheduling systems for both rolling stock (i.e., locomotives and freight cars) and train crews, which would guide and monitor the operation over enlarged span, but over the territory of one country only.

Crossing borders is the biggest source of delays, because European railways involve different voltage systems, different signaling systems, and different rules on permissible loads, different safety

and working practices. Rail tracks in the Baltic States, Spain and Portugal are wider than those in the rest of Europe and locomotives have to be changed for different networks. Railways could be safer, less polluting and more suitable than trucks for transporting large quantities of goods over long distances, but Europe's problem is that its freight services were designed to serve domestic markets. "Authorities say: *The European dimension is missing*"

That is why the EC wants technical harmonization (to ensure no technical obstacles) and open market (to ensure competitive environment for efficient operation and development). Therefore, adopted is European standard for train signalling and speed control – the European Train Control System (ETCS), which is a one of components in the European Railway Traffic Management System (ERTMS) – and is intended to guarantee a common standard that enables trains to cross national borders and enhances safety. Thus, the deployment of ETCS across key freight and high speed corridors will greatly improve the operation with cross-border freight trains in Europe. Also, there is an agreement on a common certification system for train drivers, and there are some preparation works towards harmonizing safety rules over European Rail Network dedicated to freight transportation services.

Most of all, looking at the forthcoming future, The European Rail Freight Carrier must apply very well to the concept of "*Green*" transport corridors for freight, meaning: "*a concentration of freight traffic between major hubs and by relatively long distances of transport. Along these corridors industry will be encouraged to rely on co-modality and on advanced technology in order to accommodate rising traffic volumes while promoting environmental sustainability and energy efficiency. Green transport corridors will reflect an integrated transport concept where short sea shipping, rail, inland waterways and road complement each other to enable the choice of environmentally friendly transport*" [6]. In specifying these corridors, strategic locations must be identified and the links between these strategic locations must be ensured. The strategic locations are the "HUBs" in the network; the links are the corridors that connect these hubs. Consequently, one can say that focus is made on a Green Network for freight transportation services in Europe employing the concept of integrated transport. In terms of a Green Network for freight transportation services, there are many answers to questions to be found. Now focusing on the HUBs only, let us list some questions:

- What are the strategic locations (*those hubs*) and where should they be located?
- In detail, what type of service will be proved by the hubs, What is the role and the importance of each Hub in the Network, Who are the main actors/modes of freight transport to interact within a given hub (" therefore, "Hub By Hub" analysis should be conducted in order to identify the exact frame of service provided and the specificities of the operation – judging for the level of organization and management of the system in question)
- What is the equipment and human resources needed within these hubs? Some classification of HUBs might be of interest basing on their role and importance for the quality service level in terms of Network?
- How about the Theoretical and Actual Capacities and the Processing Capabilities of these facilities?
- What is the expected quality of service provided by these facilities seen in Appropriate Performance Measures?
- How about the Performance Measures? What is the freight transportation service exposure and how to measure it?
- Should the performance of HUBs be benchmarked or should Each Facility be examined in isolation, having in mind the difference in their characteristics at micro level of analysis?

The interested reader is encouraged to consult [7] on "The European freight railway system as a hub-and-spoke network", where a discussion of rail hub location problem in Europe is open. The authors employed the concept that "*A note that consolidates a high volume of freight is potentially a good site at which to install a hub.*"

As reported in [8], a document on "Towards a rail network giving priority to freight", a number of European Research Projects (such as: Eufanet, Trend, Reorient, NewOpera) has defined, to some

extent, a first-indication map of the possible EU corridors giving priority to freight. This map is given in Fig. 1. In the establishment of such a European Rail Network, a number of rational decisions over a long horizon must be made. Such decisions fall within “Strategic Management Level” and are dedicated to: overall goals and targets in long term, types of resources of big dimensions, acquisition of new resources of big dimensions, redesign and reconstruction of the physical network, relocation of facilities, building and demolishing infrastructure, etc. All these decisions are known as instalment decisions and go along with huge capital investment, i.e., they are capital intensive. Financial support has been granted to rail projects via the TEN-T funds and therefore infrastructure investments over some of the corridors depicted on Fig.1 are already being made but *in a very isolated way*, as reported in [9]. The particular example is the most advanced rail freight corridor in Europe, from Rotterdam to Genoa: *projects such as the Betuwe route and the Lötschberg tunnel have been realised but in the intermediate sections nothing happens.*

Therefore, a more detailed investment priority programme will be needed and explicitly developed at European level, but focussing on “*investments-with-aim-improvements*” at national and regional levels in order to identify and treat chocked places/bottlenecks (at any level of the freight transportation service) and supply/contribute the “*resources*” needed for ensuring the required *high* level of network processing capacity and seamless fluidity of the transporting freight.

In conclusion to clearly summarize required actions:

- Precise identification and analysis of the specific locations (i.e., *HUBs*) over European (either *green network* or *conventional*) network specified for freight. Evaluation of the performances of these hubs, important for providing the freight transportation service in terms of a network involving different transport modes, resources available, technologies and technical equipment needed;
- Railway Infrastructure Development for Transportation Services with Freight Trains and from Conventional to High-speed *freight train services*, identification of the critical points and analysis of the operating process (also involving resources and technology) with freight trains at the stations where the shift from Conventional to High-speed services and v.v. is fulfilled;
- Infrastructure Projects, Investment plans and Investment schemes, Risk Assessment, Portfolio of Projects involving International Freight Corridors in terms of a “Green” network in Europe.

## 2.2. National Level

At national level the freight transportation service provided by rail must be staunch and unflinching one. If at national level the service is of poor quality and the concept of delivery on time is merely a dream, it is somehow difficult to believe that at international level one may expect “better figures”. “*Delays are the major deterrent. According to EU data, in 2001 less than 48 percent of trains ran on time. That rose to 65 percent in 2004, but 7 percent of trains were delayed for as long as 24 hours. “When you compare this to the 95 percent-98 percent punctuality record of road transport, there is a lot of catching up to do”*”[1]. How about the number of trains that are daily cancelled and how about the number of extra trains that cannot be an object of any planning? How about cases in which the client is not reliable enough? Hence, the first steps towards service improvements are hidden within the fulfilment of the *strict fixed scheduled disciplined operations* with freight trains. This *process* must begin with rigorous remedy programmes at national levels that look at Tactical and Operational Management of the systems (i.e., both Infrastructure and Rail freight providers) and involves frequent performance evaluations followed by optimizations. Important issues to be considered in these remedy programmes are Co-, Inter- and Multi-modal freight transportation services and the explicit role of rail within such services to be rightly construed and understood.

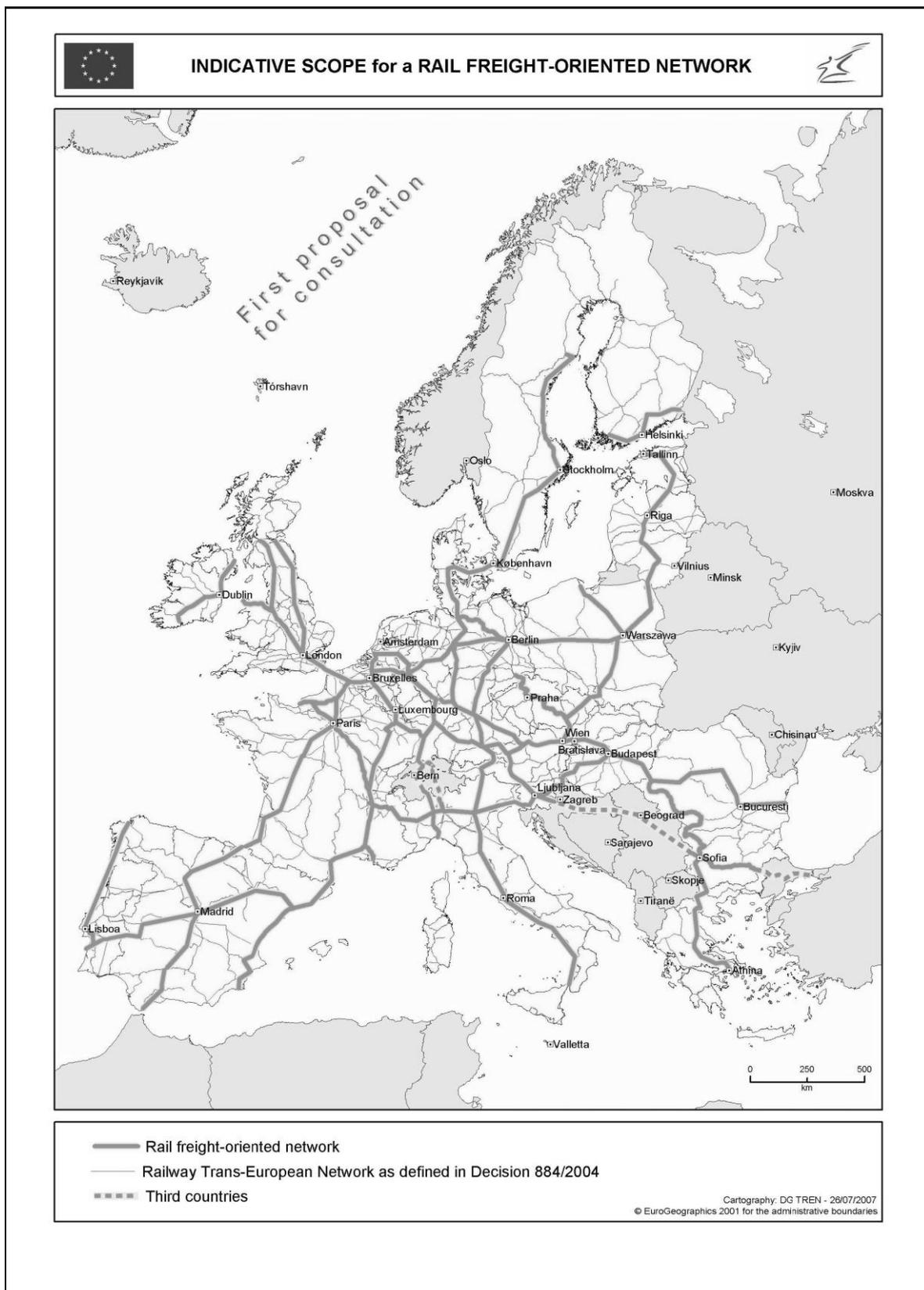


Fig. 1. A First-indication Map of the Possible EU Corridors giving Priority to Freight

Рис. 1. Первичная карта возможных транспортных коридоров ЕС, уделяющих первостепенное значение грузовым перевозкам

### 3. SYNTHESIS AND A FEW QUESTIONS FOR DISCUSSION

The recent data analysis shows that the performance figures of the most European rail freight operators are not promising, regardless of the geared EU policy on encouraging the competition in the railway market by implementing vertical disintegration in the sector. There have been studies demonstrating lack of operational efficiency characterized with long run deficits as well as no competitive environments at national markets seen in downright dominant rail freight operator. The question is: *what next and what is the future of the European Rail Freight Operators?*

The possible measures/avenues are seen threefold, as follows:

1. Imposing real pressure on the European rail freight operators (in the public sector) by solid and rigid political measures in order to increase their operational efficiency; to deliver values-for money to their customers and hence reduce long run deficits;
2. Encouraging intermodal, multimodal, and co-modal freight transportation services at international, national and even urban levels in which rail would play a significant role ... *Is this role understood, however?*;
3. Concentrating the freight flows in a number of freight transportation corridors ("*Green transport corridors for freight*"), where one day high-speed freight trains may be run ... (but for the time being it appears to be unthinkable, because of the need of new technologies, high-speed tracks, new rolling stock etc. all these require a huge investments, meaning they are capital intensive).

In terms of Level of Services at international level problems are encountered at border-crossings because of technically disharmonized rail networks. Hence, the road locomotives of the freight train compositions must be changed as well as their brigades/crews. In response to this situation is that Common/Synchronized European Rail Controlling and Scheduling Systems are needed allowing good level of tracking and monitoring the rail freight train movement all over Europe.

Today, the concept of "Green" (Railway) Network giving priority to freight in Europe is being introduced. The implementation of such a network is of by all means expected to improve and facilitate the movement of European freight trains having also positive environmental impacts at all. However, such an initiative (from design, organization and management perspectives) requires:

- Establishment of a number of corridors that will form this Green freight network followed by precise identification and analysis of the specific locations (i.e., *HUBs*) in which *reassembling/transforming* the freight flows over this European rail network will be fulfilled. Evaluation of the performances of these corridors and hubs, important for providing the freight transportation service in terms of a network involving different transport modes, resources available, technologies and technical equipment needed;
- Railway Infrastructure Development for Transportation Services with Freight Trains -... and *from Conventional to High-speed freight train services*, identification of the critical points and analysis of the operating process (also involving resources and technology) with freight trains at the stations where the shift from Conventional to High-speed services and v.v. will be fulfilled;
- Infrastructure Projects, Investment plans and Investment schemes, Risk Assessment of projects' implementations, Portfolio of Projects involving International Freight Corridors in terms of a "Green" network in Europe.

At national level rigorous remedy programmes that look at Tactical and Operational Management of the Rail Freight Systems (i.e., Customers, Infrastructure and Rail freight providers) involving frequent performance evaluations followed by optimizations of daily service must be launched. Important issues to be considered in these remedy programmes are Co-, Inter- and Multi-modal freight transportation services and the explicit Role of Rail in providing these services. The role of rail in freight transportation logistic chains must be very well construed and understood by each rail freight provider and infrastructure manager.

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