Study on Single Wagonload Traffic in Europe – challenges, prospects and policy options

Final report

July 2015

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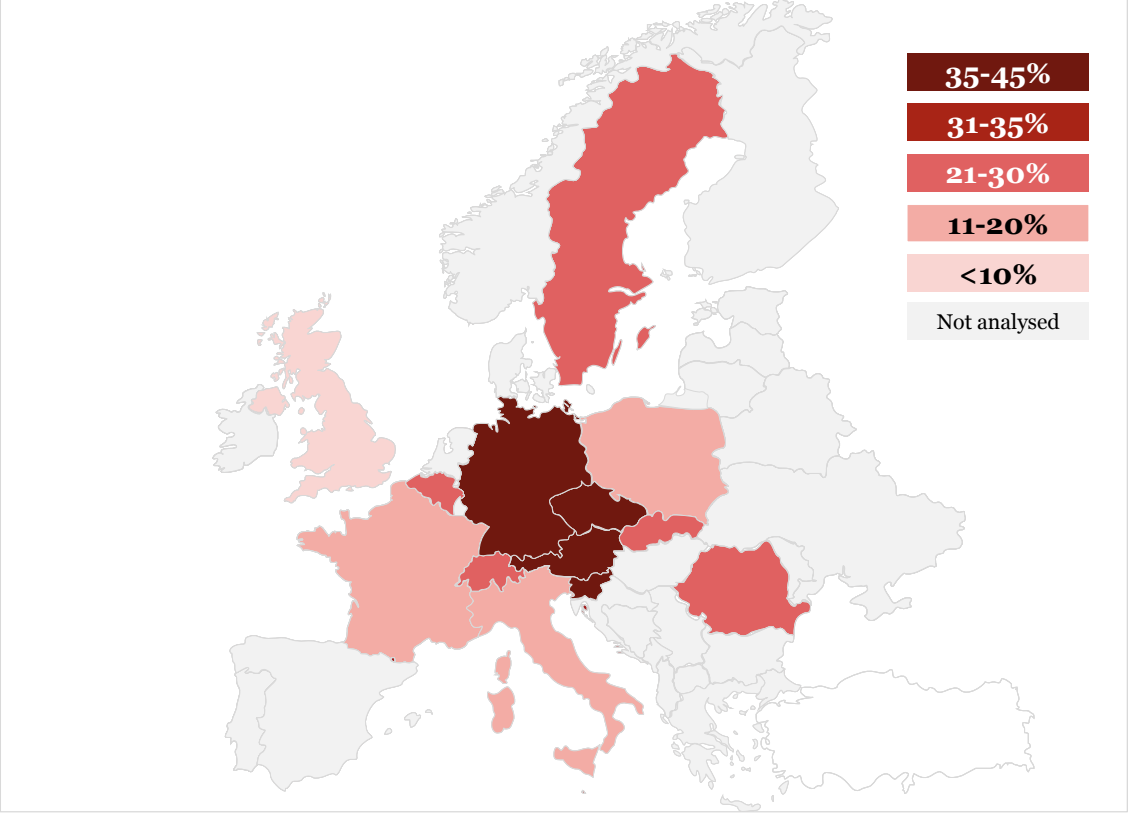
1. Executive Summary

The "Single Wagonload" railway services include – as far defined within this Study – all less-than-trainload rail freight flows, i.e. all shipments moved by rail with solutions different from full trains keeping the same composition from the origin to the destination.

The analysis undertaken within this Study of such services provides a relatively comprehensive picture of its importance in the European freight transport market:

- According to the available data from official statistics and gathered during this study, the SWL traffic represent about **75 billion tons*km** in the 13 analyzed countries[1], not considering the transit traffic (2012 data). By adding this latter component and the remaining EU member states, a reasonable estimate of the SWL traffic in EU+CH is about 80-85 billion tons*km, i.e. 15-20% less than the previous available estimates of Xrail of 2010, probably based on 2009 data.

Figure 1 - Share of total rail freight traffic (in tkm) moved by SWL services in the Key Countries (Data from Stakeholders consultation + Slovenia & Slovakia from Eurostat)



[1] 11 key countries for the Study: Austria, Belgium, Czech Republic, France, Germany, Italy, Poland, Romania, Sweden, Switzerland, UK; + Slovania and Slovakia.

- **SWL share on the total rail freight volume is about 27%** in the 13 key countries (Eurostat data on a sub-set of countries shows a reduction from 50% to 35-36% in the period 2004-2011).

- Significant differences among countries do exist, with SWL share on total rail freight of about 40% in Austria, Czech Republic and Germany, and lower than 15% in Italy and UK.

- **Almost 2/3 of SWL traffic is international**, showing the relevance of such supply for the international trade of goods.

- **SWL services are more extensively for the transport of specific type of goods** such as metals, chemicals, solid and liquid fuels, and transport equipment; in most cases, the SWL services are more suitable than other type of rail transport supply for such goods, due to the typical shipment size (preventing the utilization of full block train), as well specific transport requirement and constraints and a better use of the wagons and train transport capacity (these latter elements justifying the preference against combined transport solutions).

Thus, SWL is still an important transport solution, especially for international transport and in some market segments. However, what are the reason of the observed decline, both in volumes and in market share?

A number of reasons have been identified and analyzed, among which the most relevant one can be summarized as follows:

- a **general reduction of the flows of some commodities** that are "captive" for SWL services, such as metals and transport equipment, for which there is an observed reduction of the total land transport flows of 15-20% in 2008-2012, and an identical decrease of the rail volumes;

- the **low or no profitability of SWL** for the RU operating them, driving RUs towards the elimination or significant downsizing of the service (as experienced in UK, Italy, Spain, but to some extent also in France) due to the urgent needs to improve their financial situation. Due to market competition, precise figures are not available, however it has been reported that even in countries with RUs still supporting SWL such Austria and Switzerland, 15-50% of the SWL services do not cover their production costs), due also to the complexity of the transport chain making less easy to obtain economy of scale especially on last mile and marshaling operations (that represent a very important part of the costs: 22% for marshaling & shunting, + 25% for collection/distribution/shunting at nodes);
  On that respect, it shall be added that the large proportion of internal traffic in SWL means that the decision to eliminate such service by the dominant RU of a given country is very likely to affect the SWL in all other countries exchanging goods with

that country, since it will not be easy to find another RU interested and capable of replacing the incumbent;

- the **difficulty in coping market expectations in terms of quality of the service**, in particular for international transport that – as stated – is the largest part of SWL traffic: wagon tracking & tracking system already available to shippers in most cases for domestic SWL movements are not implemented yet at large scale for international flows, while that information is available when using other modes of transport; the reliability of the system is perceived as not sufficient (even if at least 75% of SWL trains are reported to arrive within 1h of the scheduled arrival time, because the complexity of the production model amplify the delay of a train e.g. whether other groups of wagons shall wait its arrival in order to reach an acceptable train capacity utilization);

- the direct **competition on small/medium shipments with road transport**, the latter being able to constantly improve its efficiency (e.g. diesel fuel prices variation did not generate a significant change in road transport prices in the last decade); besides, road transport is highly rated by shippers in terms of flexibility, and it is characterized by a large capacity of transport that make it very competitive in terms of prices;

- the **limited effect on SWL of the liberalization process** which affected the European railway freight market in the last decade: due to the complexity and lower profitability of SWL, new entrants focused on the intermodal and full train markets, so that the beneficial effects of the market opening have not been observed for SWL (by the way, during the Study's stakeholders consultation, only a couple of the new entrants contacted for the survey stated that they also supply SWL services);

- **large part of the SWL system are still operated according to traditional production and business models** although several RUs are already operating or developing new production models aiming at better use of available capacity and simplification of the transport chain (e.g. liner train supply); enhanced model aiming at combining typical conventional SWL flows with regular flows of intermodal or conventional transport are promising in terms of efficiency and profitability, but not planned & operated at large scale yet;

- a number of **technological innovations** aiming at enhancing SWL's productivity, flexibility and attractiveness for the shippers have been developed and in most cases, they are quite mature; large scale implementations are, however, quite significant in some cases, and the overall decline of the system does not encourage for such investments.

Under such general market conditions, a specific attention deserve the analysis of available **infrastructural facilities** that are essential to operate SWL services. The Study provided

evidence that the situation is quite heterogeneous among the countries, but with the following general characteristics:

- broadly speaking, the **tendency to reduce the available infrastructure for SWL appears to be more an effect than a cause of the reduction of SWL traffic**; IM would like to avoid unexploited capacities because of the tight budget constraints they have, so they react by reducing the available train formation facilities and freight station as soon as the relevant traffic streams are declining;

- thus, the number of marshalling yards in operation have been in several countries significantly reduced in the last 10 years (-30-40 % on average), and/or plans for further downsizing are existing;

- countries pursuing SWL are the ones more oriented to the preservation of the SWL related infrastructures, while other countries are developing "marshalling-free" SWL service (requiring only limited shunting operations on flat yards) to combine wagons from different clients;

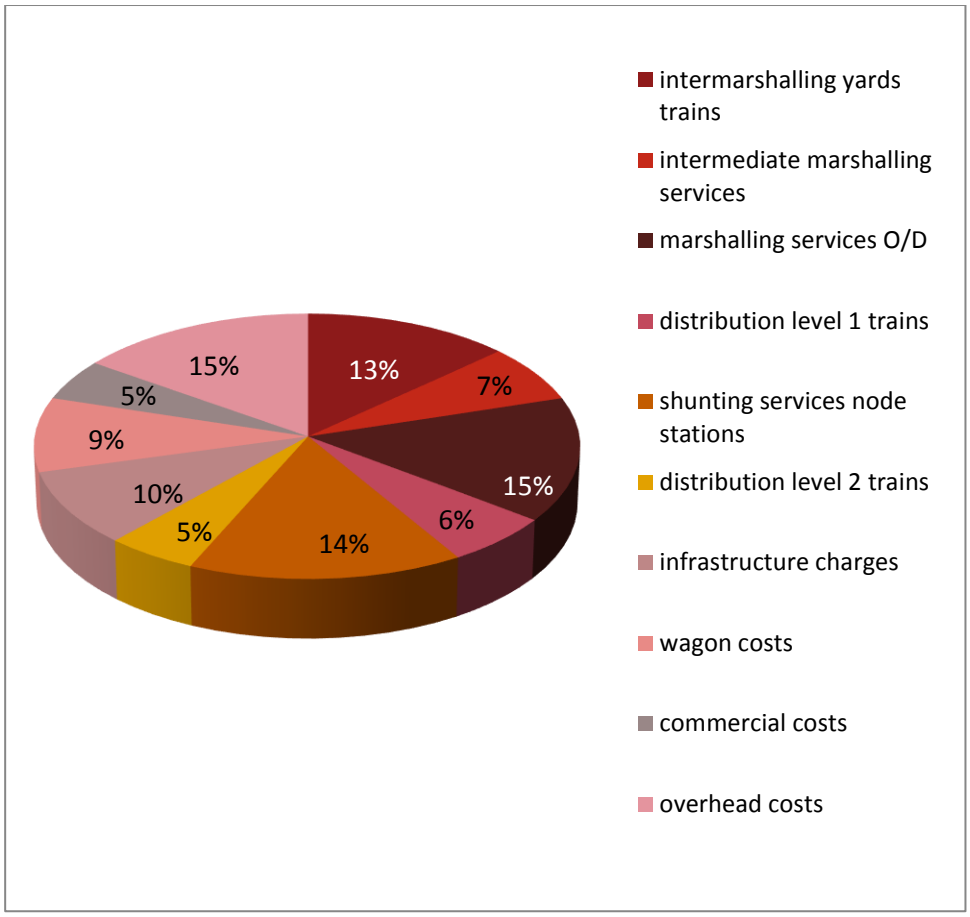
- in the medium term, however, **such decisions – although justified in the short term – might hinder future re-launch of traffic**, especially if the tracks in the yards or sidings or freight stations are removed, and the available land used for other purposes;

- the most critical issue is the **reduction of the private sidings**; rehabilitation or construction of sidings (and in some case their certification) is a significant expenditure and administrative burden for the companies owning the plants connected by the siding, and only some countries support with specific actions their survival and development. On the other hand, road connections to industrial plants are built and maintained at no cost for the companies.

Thus, infrastructure downsizing is a key aspect threatening the SWL re-launching. There is very likely risk of a "**vicious circle**" where traffic reduction is driving the closure of some key facility, and the latter will generate further traffic drop.

In terms of **cost structure**, the complexity of the SWL production chain imply that also the **cost structure is relatively complex**. For a typical shipment, the main leg (inter-marshalling yards trains) costs just 13% of the total, + 10% for charges for track access, in total 23%. Marshalling yards services in first and last marshalling yards are 15% of total costs. If we consider also the intermediate marshalling (7%), the total marshalling costs represent 22% of the total. Distribution costs (distribution trains + sorting at node stations) excluding marshalling yards services costs in first and last marshalling yards are 25 % of total costs, while commercial costs and overhead represent the remaining 20%.

Figure 2 – Typical cost structure of SWL services



Such complexity implies that the **cost efficiency is also a multidimensional problem**, and the search of production efficiency shall look for **optimising the utilisation of all involved resources** (wagons, shunting locomotives, marshalling yards, train capacity etc.) through **simplification of the production process** (e.g. avoiding two levels for distribution services and intermediate marshalling yard through flexibility in routing wagons), reduction of empty runnings, dynamic planning of train capacity utilisation, etc. Track access charges correctly set at the level that the SWL segment can sustain (as provided by EU directives) would probably also allow a further cost reduction.

Based on the analysis summarised above of SWL traffic, production and business models, a number of recommendations of possible actions for the elimination of relevant barriers & threats, and the exploitation of available opportunities, have been studied and filtered according to the evidence provided by the analysis, as well as the level of "relevance" indicated by relevant stakeholders and the likely feasibility given the current EU regulatory framework.

The following table summarises the proposed recommendations in terms of expected areas of impact, responsibilities for their implementation and level of priority.

Actions are classified as "high priority" ones when they have a general (Europe-wide) potential impact and are critical for the re-launch of SWL (since they are addressing the key issues synthesised in chapter 10).

Actions having a more limited scope of application and/or likely benefits (also in comparison with the related implementation costs and time) are instead classified as "low/medium" priority ones.

Impact area	Priority level	Recommended actions to be implemented by EC	Recommended actions to be implemented by MS	Recommended actions to be implemented by Stakeholders
Improving the efficiency and/or economic sustainability of SWL services	HIGH	• Supervise (also through appropriate guidelines) & monitor the implementation of proper TAC regimes respecting EU regulation principles in terms of charges set at "directly incurred costs" and mark-ups levied only at a sustainable level (if any) (*)	• Ensure the implementation of proper TAC regimes respecting EU regulation principles in terms of charges set at "directly incurred costs" and mark-ups levied only at a sustainable level (if any) (*) • Implementing conditions allowing workers polyvalence (as in other modes of transport)	• Implement capacity booking solutions • Plan and operate enhanced production models mixing SWL with other (regular) rail freight flows to increase capacity utilisation
	MEDIUM / LOW	• Support "short liner" (last mile) operation through specific funding (similar to Marco Polo)	• Support last mile operation as PSO in specific areas where no RU is interested to operate them at market conditions • Align reduction of TAC between intermodal and SWL trains (where provision in favour of the former exist) • Ensure the implementation of proper TAC regimes differentiating the levels by path quality / priority (***)	• Involve port authorities in the management of last mile services

Impact area	Priority level	Recommended actions to be implemented by EC	Recommended actions to be implemented by MS	Recommended actions to be implemented by Stakeholders
Ensuring the availability of essential infrastructure / facilities	HIGH	• Enhance the existing regulation on service facilities (art. 13 of the Recast) by imposing sufficient notice & market analysis (including consultation of RUs) before deciding the closure of service facilities under Annex II.2 of the Recast directive • Define guidelines (and possibly funding) for the incentives to construction & rehabilitation of private sidings (**) • Allow the simplification of safety and operational requirements for secondary lines where only freight trains circulate	• Implement funding programs (possibly with the support of EC) for the construction & rehabilitation of private sidings • Simplify certification procedure of private sidings (in countries where they are complex)	• Realise active interaction between IMs, RUs and also shippers and local authorities concerning the "rightsizing" of essential infrastructure for SWL
Effective regulation of the rail freight transport	HIGH	• Monitor the implementation of the relevant EU regulation such as the Recast • Foster the implementation of a "static platform" providing user-friendly access to information about last mile infrastructure (**)	• Transpose relevant EU regulation (such as the Recast directive) if not done yet	
	MEDIUM /LOW	• Pressing on nat. regulators for quick reaction in case of access discrimination (***)	• Pressing on nat. regulators for quick reaction in case of access discrimination (***) • Simplification of the requirements for the operators active only on secondary lines (****)	
Effective regulation of the competing modes	HIGH	• Ensure / verify the harmonisation of operating conditions with other modes, in particular concerning the infrastructure charging policies between rail and competing modes	• Align the conditions of road and rail transport concerning the provision of the "last mile" infrastructure connecting industrial plants and warehouses to the respective network	

Impact area	Priority level	Recommended actions to be implemented by EC	Recommended actions to be implemented by MS	Recommended actions to be implemented by Stakeholders
Improving the SWL quality to the customers	HIGH			• Implement enhanced wagons tracking & tracking solutions (also for international flows) available to customers (dynamic platforms) • Propose innovative business solutions tailored to market needs
Technological innovation	HIGH	• Support R&D on technology that are not fully mature yet (e.g. power source for "intelligent wagons")	• Ensure the applicability of innovative technologies such as remote controlled shunting locomotives (e.g. in terms of safety provisions)	• Go from research / pilot stage to full scale implementation for mature technologies allowing significant benefits at limited costs (e.g. ICT solutions for fleet management, capacity booking, tracking and tracing; hybrid & remote controlled locomotives, etc.)

(*) *This will also mean that basic TAC shall be more linked to the gross tonnage of the train as key driver of the "directly incurred costs" (typically the variable part of maintenance & renewal costs).*

(**) Actions already launched by EC in May 2014.

(***) Classified as medium/low priority for SWL, since they are general issues of EU or national regulation, not specifically linked to barriers for SWL development.

(****)The simplification of the requirements for the operators active only on secondary lines is already covered to a large extent by the Recast directive at art. 2 where the "undertakings which only operate regional rail freight services" and the "undertakings which only operate freight services on privately owned railway infrastructure that exists solely for use by the infrastructure owner for its own freight operations." may be excluded from the application of the Chapter III concerning the licensing of RUs. Thus, this remain an issue only at national level.

As far as the competition within the railway market, during the Study the issue of how to better regulate the management of relevant infrastructure, e.g. in terms of ensuring maintenance and open access to service facilities, was also discussed.

As far as SWL re-launch is concerned, the priority appears to be a **proper and full implementation of existing regulation** (e.g. Dir. 2012/34), as well as the monitoring if its actual application, as already stated in the above table.

Concerning the **full separation of IM and RU** to better ensure IM independence, available data show that – so far – the general performance of SWL and the presence of new

entrants in such market segment do not appear higher in the countries with an independent IM (e.g. Austria and Germany with IM integrated in a holding structure with the incumbent RU have high SWL %, while SWL is disappeared in Spain and UK where IMs are fully independent). This, it is not possible to conclude that fully separated IM would automatically generate a favourable environment for SWL.

Concerning the possibility to **assign specific "last mile" infrastructure such as the marshalling yards to an IM independent** from the national one is a possibility already existing especially for relatively isolated network (such as in port areas). A wider scale application of such policy shall consider, however, that the multiplication of the number of IMs might risk generating an additional complexity in the service planning (that is already a complex process for SWL, given the high percentage of international transport).

2. Introduction

2.1. Objectives and approach of the study

In many European countries, the Single Wagonload (SWL) traffic is facing profitability and quality problems and has difficulties to keep pace with changing market requirements. Nevertheless, in most European countries Wagonload still constitutes a significant part of rail freight.

Since there is not common understanding on the specific importance of SWL traffic to the total rail freight traffic, one of the main objective of this study is to scrutinise currently available SWL traffic figures and to collect missing traffic statistics directly from the rail operators.

Further objective of the study is the investigation on business models and production methods to be linked to current infrastructure endowment.

Previous studies on this matter provided only very aggregate estimate of the traffic volumes of SWL, and its composition. Thus, an important effort has been put on fact findings and information gathering in order to supply the Commission with reliable and updated figures.

Key drivers of the decline of SWL have been then identified, as basis for developing and analysing the possible actions and recommendation for the re-launch of this type of rail freight services

The consultation of relevant stakeholders (RUs, IMs, shippers etc.) and the associations thereof has been continuous all along the study. They provided updated traffic figures, as well as proposed and evaluated the possible actions to be implemented. Their cooperation has been extremely important for the successful completion of the Study.

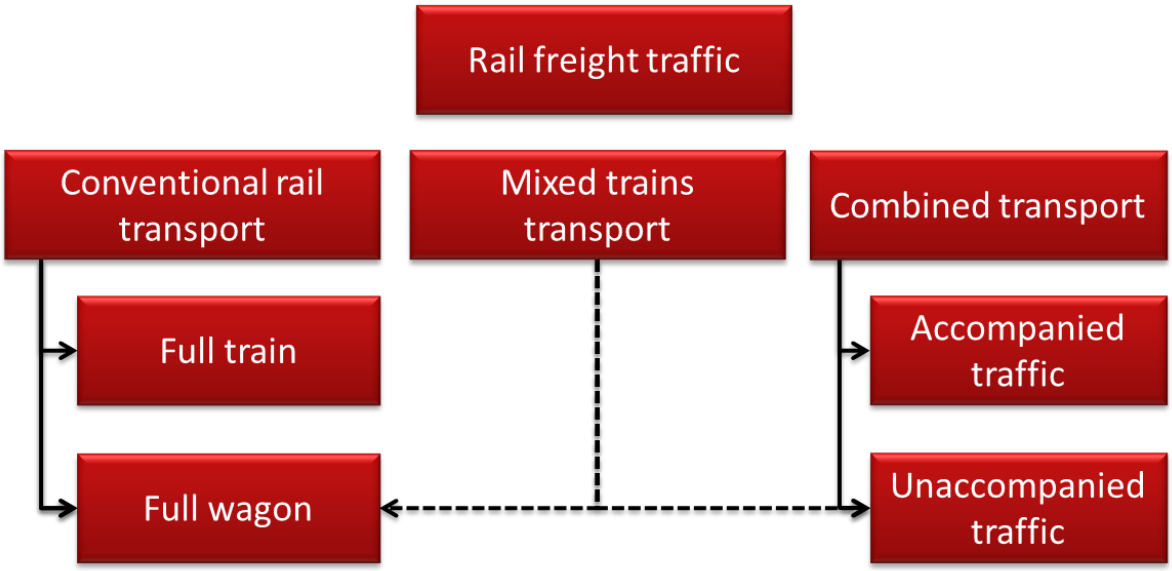
2.2. Definitions

Following the interviews carried out with the rail operators and the open discussion during the workshop, a strong need emerged for clear definitions of the terms in use in the SWL market.

2.2.1. Classification of rail freight services

As shown in Figure 3 below the Rail freight transport can be classified in three main categories which are further described hereafter.

Figure 3 - Rail freight transport: main type of services



According to the "Illustrated Glossary for Transport Statistics 4th Edition, Statistical Office of the European Communities" by OECD, conventional rail transport can be classified depending on the **types of consignment**:

Conventional rail transport

Full train load: any consignment comprising a train with several wagon loads transported together for one consignor with no change in train composition from single point of loading to single point of unloading.

Full wagon load (also often called **less-than-train load** or **single wagonload**): any consignment of goods requiring the exclusive use of a wagon throughout its journey whether the full wagon loading capacity is utilized or not; wagons move din a full train are excluded.

The term **block train** is generally used as synonym of **full train load** or just **trainload**.

In this study the term **single wagon load** (SWL) will be used to represent any shipment by rail with a size not allowing to assemble a full train from its origin to the final destination. This type of rail supply is operated when a single client does not have enough quantity to load a full train.

More specifically, the term '**single wagonload**' is used in this study to indicate a commercial offer of conveying individual wagons (or group of wagons), which are taken from the place they are loaded to a point of final destination.

Traditionally, this kind of rail transport is performed by conveying wagons to a point of assembly, called 'marshalling yard', where they are sorted by destination into trains towards other marshalling yards before being disassembled and dispatched to their final destination.

This study is also looking at all services moving groups of wagons of different origins and/or destinations, even if not using marshalling yards.

The term **multi client wagon load** is a commercial name introduced by several railway undertakings (among others: SNCF, Trenitalia) to indicate a development of the Single Wagon Load product where wagons from several shippers are collected in a full train travelling at fixed time and days of the week (scheduled). In this case, the assembling and disassembling of trains may not require the sorting of individual wagons in marshalling yards, since single shunting operations to add or remove batches of wagons from the train are sufficient.

Mixed train transport

The term[2] **mixed train** is used in this study to indicate a train composed of a block of wagons for a direct single-client origin-destination trainload service (full train load or even multimodal) and another part of wagons that are operated as single wagonload.

Multimodal and intermodal transport

Multimodal freight transport is the transport of goods with at least two different modes of transport.

Intermodal transport is a particular type of multimodal transport where freight is hauled in ITUs, Intermodal Transport Units (containers, swap bodies etc.), without any handling of the goods themselves when changing modes.

Combined transport is the intermodal transport of goods in which most of the journey is by rail, inland water or sea and any initial and/or final leg carried out by road is as short as possible (according to EU Directive 92/106/EC the road distance, measured as the crow flies, should be less than 100 km for road-rail transport and 150 for road-inland waterway or sea).

Intermodal transport can be **accompanied** (i.e. where trucks are carried by train on a "rolling motorway" or "rolling road") or **unaccompanied** (i.e. container and swap bodies transhipped from trucks to rail).It is worth noting that wagons with ITUs loaded will often be conveyed by full train between two intermodal terminals, but in some cases they also complete or start their journeys as part of single wagonload trains.

2.2.2. Infrastructure facilities

Marshalling yards: stations equipped with a number of tracks for railway vehicle marshalling operations based on a lead track on a hill (hump) where an engine pushes the wagons over. Then single wagons or some coupled wagons in a block, are uncoupled just before or at the crest of the hump, and roll by gravity onto their destination tracks in the

[2] . It is worth noticing that this term is sometimes also used to indicate a train composed by both of passenger railway vehicles and of freight wagons (this kind of supply is nowadays rarely operated in European countries).

classification bowl, formed by the tracks where the wagons are sorted. It is also referred to as classification yard.

Where the whole yard is set up on a continuous falling gradient it is called a gravity yard; such yards are operated similarly to hump yards.

Shunting yards: such yards are built on flat ground, or on a gentle slope. The operations within such yards are carried out by a locomotive pushing wagons and coasting them to the required location.

The term "**train formation facilities**" is used to define both marshalling and shunting yards.

Freight station: facility belonging to an Infrastructure Manager with several rail sidings in which freight is loaded/unloaded onto/from conventional wagons and/or connected to private sidings where the loading/unloading operation takes place. In general, a freight station is characterised by the possibility to be a start / end point of freight trains.

Intermodal transport terminal: terminal equipped with transloading devices and tracks dedicated to transhipment of intermodal transport units (ITUs) between modes and their storage.

Rail siding: track branching off running track equipped with platform suitable for loading goods onto conventional freight wagons[3].

Private siding (sometimes also named "industrial sidings"): track or set of tracks that are not managed by the infrastructure manager but are linked up with the track of an infrastructure manager, so that:

- railway transport operators or supportive functions can perform necessary activities;
- industrial, commercial or port establishment or group of establishments can be served by rail without transhipment.

Railport: the term Railport is a commercial name introduced by DB Schenker to identify a logistic terminal where goods can be transhipped between road and rail, either immediately or stored to be dealt with later by the rail service.

2.2.3. Network and production methods

Hub-and-spoke network: layout characterized by one main node (the hub) and minor nodes all connected via the former through direct links (spokes) but not directly among themselves.

Feeder service: feeder trains perform a short-haul transport service that consists of collecting or distributing freight demand gravitating around a terminal working as a hub.

[3] Glossary for Transport Statistics, Eurostat, ITF, UNECE Economic Commission for Europe, 2009

Long-haul service: long-distance rail transport.

Liner train: train service operating along a rail corridor with a scheduled service. It can change its composition during the journey with addition / removal of wagons at some stops.

Shuttle train: liner train operating a direct node-to-node service.

Short-liner (company): a short-liner (also referred as local freight railway undertaking in Germany or proximity operator in France) is a rail company serving a small number of points in the same region.

Demand-oriented service: a rail service designed to maximize fulfilment of customers' needs; for instance, increasing the flexibility and the accessibility to the service in time and space.

Supply-oriented service: a rail service designed to maximize the exploitation of human, energy and fleet resources by the operator.

Scheduled service: regular service operated according to a timetable.

2.3. Scope of the study

Following the glossary just defined, this will focus on the **single wagonload** traffic and services, also defined as **full wagonload** or **less-than-train load**.

The Study will then encompass all freight shipments moved by rail not using full train services, covering all the relevant production model used for such traffics as well the specific infrastructure required for its operations (marshalling and shunting yards, freight stations, private sidings etc.).

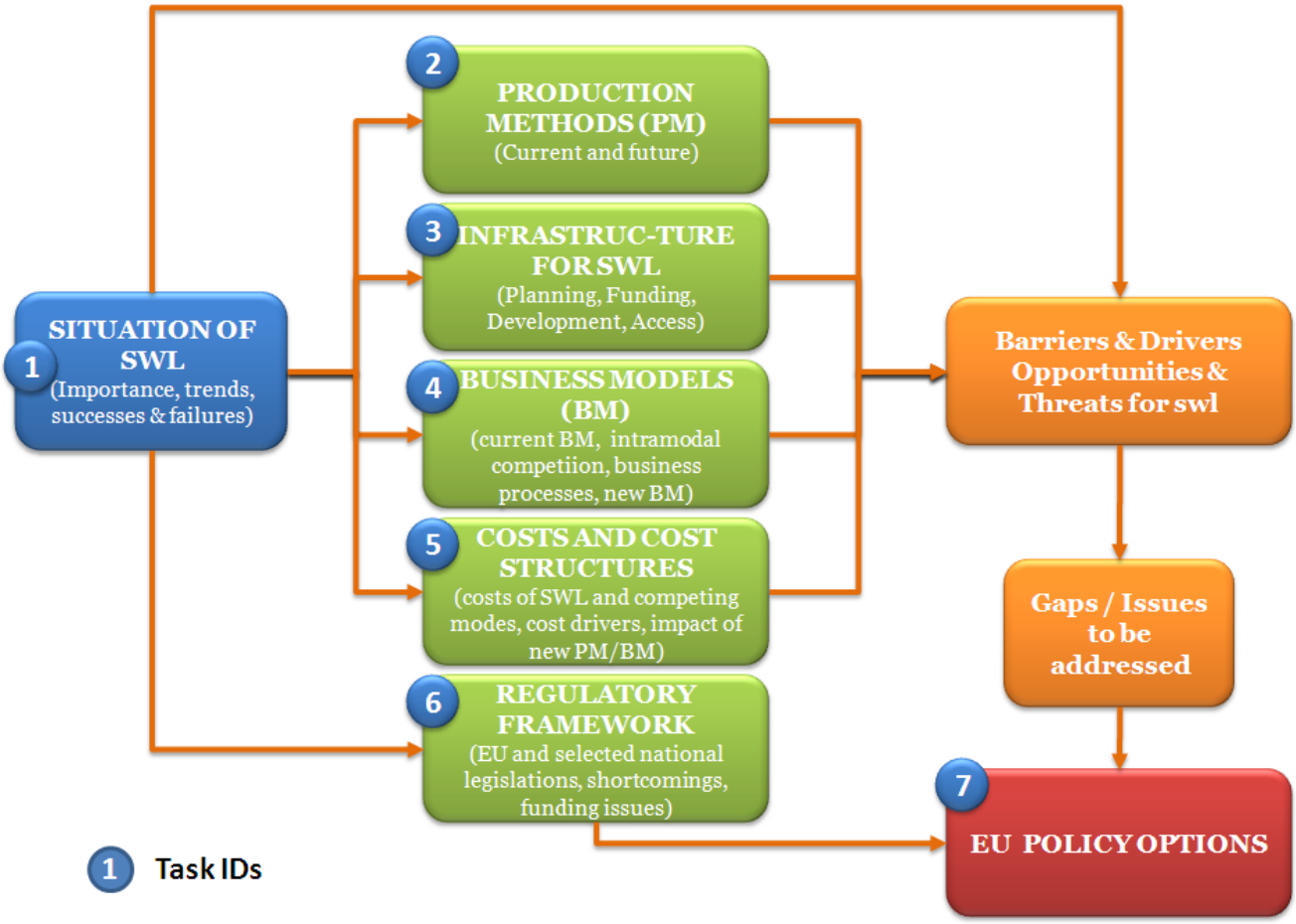
Since also wagons loaded transporting intermodal transport units are sometimes moved using the SWL system, it is important to highlight that SWL shall not be considered as completely alternative to combined transport. We will explore while analysing the evolution of the business model the possible (partial) integration of the two systems.

3. Methodology

3.1. Methodological approach

The project team carried out the Study according to the approach presented in Figure 4. A combination of desk research (based on the analysis of previous studies, relevant literature and our own expertise) and consultation of relevant stakeholders allowed us to identify the current market positioning of SWL (current volume and recent trend, main commodities, share of international traffic etc.) as well as to analyse the availability of the infrastructure required to this kind of rail freight transport, the production methods and their evolution, the cost structure and the business models.

Figure 4 – Methodology of the Study



Data collection and SWL supply analysis have been focused on 11 "key" countries, identified in agreement with the DG MOVE to represent a variety of situation in terms of geographical location and market positioning of SWL: Austria, Belgium, Czech Republic, France, Germany, Italy, Poland, Romania, Sweden, Switzerland, UK.

Such analysis of key elements of SWL allowed us to identify the drivers of its decline, and the threats for further reduction.

On this basis, considering also the opportunities provided by the innovation such as the one implemented by the RUs that still focus and invest on SWL, we identify the possible areas of interventions that have been again submitted to the consultation of stakeholders to understand the acceptability and suitability of them. Such areas of intervention encompassed a number of aspects (regulation, availability of infrastructure, technology etc.).

The evaluation of the stakeholders on the most relevant actions for the re-launch of SWL was then "filtered" with the outcome of our analysis.

Thus, **the final recommendations on each intervention area the actions that, while being confirmed as relevant/very relevant by stakeholders, do address the key barriers / gaps / threats emerged from our Study.**

3.2. Stakeholders consultation

The data gathering activity strongly relied on input from stakeholders. Three different approaches have been employed to engage stakeholders:

- Direct interviews with associations representing different interests groups of stakeholders.
- First survey to gather data about operations, infrastructure availability, cost structure and key drivers / barriers.
- Organisation of a workshop to discuss and validate the preliminary outcome of the data collection phase.
- Second survey to test stakeholders' acceptance and support on a number of possible action boosting SWL in Europe that emerged during the first phase of the study.
- Participation to official meeting of some stakeholders' associations (upon invitation) to present and discuss preliminary outcomes.

In the annex a detailed overview of the consultation process is presented.

4. Analysis of the SWL market in Europe

4.1. Overview of the total rail freight traffic

In 2012 about 420 billion of tonnes-kilometre of freight were hauled by rail in the 28 EU Countries[4] and Switzerland, according to Eurostat data.

Over a quarter of the total rail freight volume, in terms of tonnes-kilometre was carried in Germany and about 12% in Poland. France follows with about 8%. In Italy, Latvia, Austria, Sweden and United Kingdom about 20 billion of tonnes-kilometre were carried in each country (5% of the total each).

By focusing on the rail traffic share of the single countries, it is interesting to point out the key role played by their geographical position with respect to traffic typologies. Indeed, countries managing the main portion of **international rail transport** are located in key corridors running within the European core markets:

- Small countries in the Baltic Region as Latvia and Estonia, which are located at the border between Europe and Russia, show very high fraction of international traffic (respectively about 90% and 87% of the total);
- Luxembourg, the Netherlands and Belgium[5], all located within the main European industrial catchment areas, international traffic accounts for are respectively 87%, 85% and 70% of the total;
- Moreover, in the Eastern Europe, such percentages are between 65% (*Slovenia*) and 62% (*Hungary*);
- In *Austria* about the half of the rail volumes are of international origin or destination.

A peculiar case is that of *Greece*, where about 92% of the (remaining) rail traffic is international, also because the national traffic was reduced by about 75% over 10 years.

With reference also to the sea side traffic, it must be stressed that the Northern Range ports manage high combined sea-rail traffic volume destined to European and/or international trade, thus strongly influencing the above mentioned rail freight figures[6]. On the contrary, countries located in a peripheral position within the European Union, i.e. *Spain* (19%) and *Portugal* (12%), show a low share of rail-based international transport. Small values are also observed for the *United Kingdom* (2%) because of its insular position (source: Eurostat).

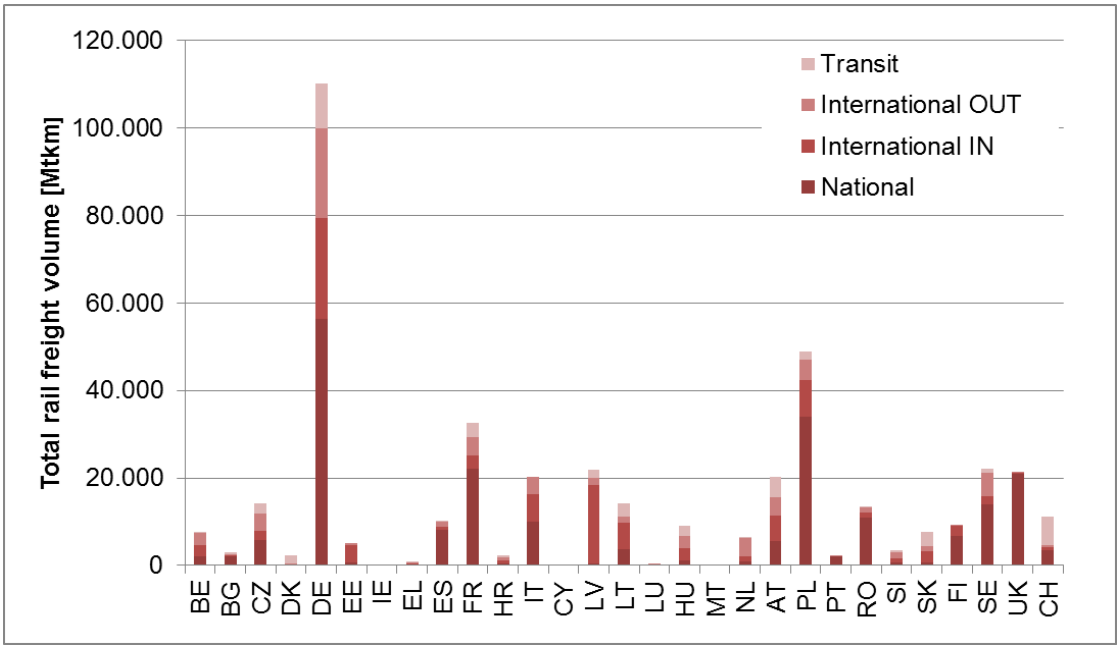
If we turn to the fraction of total traffic representing **national rail traffic**, the highest values are reported in *Ireland* (100% of the total rail volume) and in the *United Kingdom*

[4] It is worth of underlining that Republic of Cyprus and Malta cannot be included in this analysis since they are not equipped with railway network.
[5] Data referred to 2011
[6] Musso A., Piccioni C., Van de Voorde E. (2013) *Italian seaports' competition policies: Facts and figures*, Transport Policy, Vol. 25, pp. 198-209, Elsevier Ltd.

(98%), followed by *Portugal*[7] (87%) *Spain* (81%) and *Finland* (73%). Among the Eastern Europe countries, *Romania* (81%), *Poland* (70%) and *Bulgaria* (69%) recorded the highest percentages. In *France* and *Sweden* the national rail traffic percentages are comparable, being respectively 68% and 63%. In *Germany* and *Italy* the national rail market represents about 50% of the total rail traffic, followed by *Czech Republic* (41%). In the remaining European countries such national traffic is always below 30% of the total.

Rail transit traffic, as expected, is more intensive in countries characterized by a limited territorial extension. Indeed, the most relevant values are recorded by *Denmark*, *Switzerland* and *Slovakia* where traffic transit is, respectively, 83%, 61% and 41% of their total freight volumes moved by rail.

Figure 5 - Total rail freight volume [Mtkm], 2012 (Eurostat)



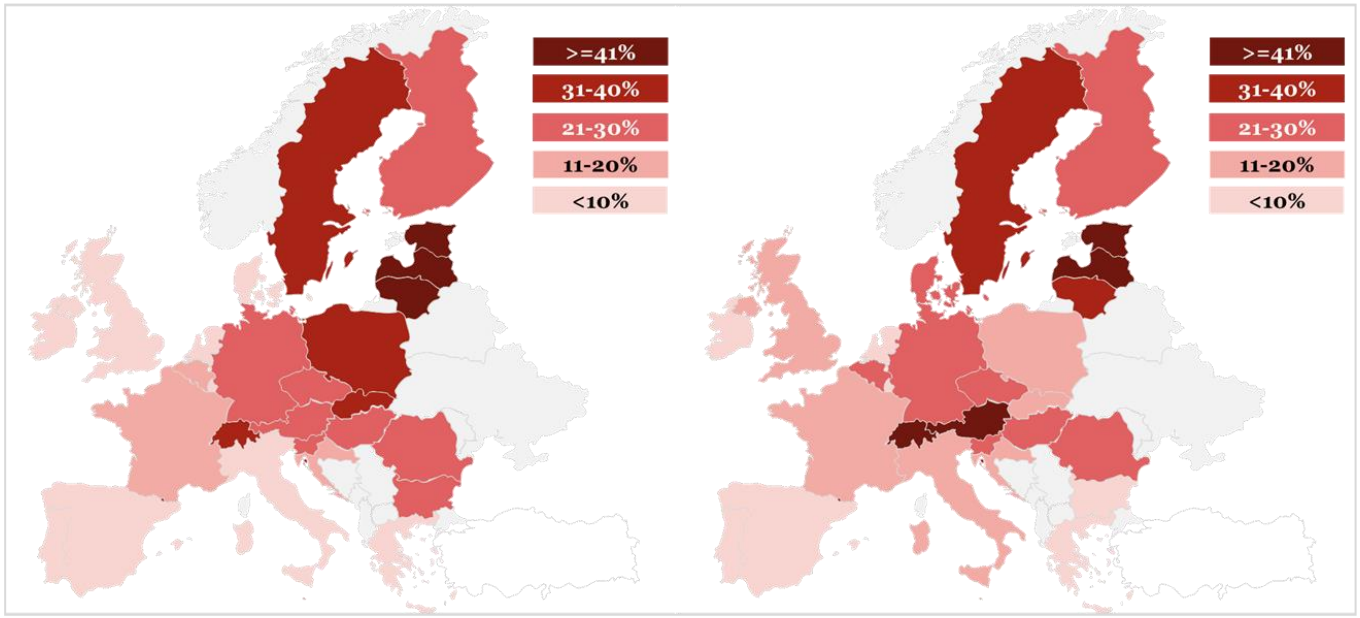
In this context, it seem also useful to provide some figures on the European intermodal freight transport market which represents about 22% of total rail traffic[8], with an annual volume traffic of about 92 billion of tonnes-kilometre. The highest percentages of intermodal transport are attained in countries where national traffic is predominant, likely due to a low level of interoperability (e.g. in *Ireland* this value is 47% of total) as well as in countries where rail–road and/or rail-sea combined transport is widespread. As an example in *Spain* the intermodal portion is about 41% but international traffic performed through intermodal transport units (ITU) is more that 65%. In *Portugal* such a percentage (intermodal international incoming traffic) rises to 90%.

7 Data referred to 2010

8 2011 data for Belgium, Czech Republic, Ireland, Italy, Slovakia, Switzerland; 2009 data for Denmark, Germany, Hungary and Netherlands; 2008 data for Greece, 2006 data for Luxembourg

At European scale, by considering the EU 28 plus Switzerland, the rail market share with respect to total land freight transport (rail + road) is currently 20% on average. Moreover, the comparison of 2003 percentage values with those of 2012 shows that in some countries the share of the railway segment has encountered a significant decline over time as seen in Figure 4, e.g. in the Baltic region and Poland. Vice versa, countries located in the Alpine region (Switzerland and Austria) recorded an important increase in the rail traffic share. Such a result can be likely traced to the freight transport policies, implemented at national level, aimed at encouraging modal split in favour of rail transport.

Figure 6 - Rail traffic share vs total land freight traffic (in tonnes*km): 2003 (left) and 2012 (right) comparison (Elaboration based on Eurostat data)



According to elaboration based on Eurostat data, the share of rail freight traffic is quite different among the selected 11 Key Countries. In some of them, the incumbent RUs is member of Xrail Alliance, which was launched in 2010 in order to increase quality and competitiveness of the SWL services. Therefore, a separate analysis was undertaken on the rail freight evolution in two cluster of Countries, defined as follows:

1) Countries where the incumbent RUs are members of theXrail network;

2) Countries where the incumbent RUs are not members of the Xrail network.

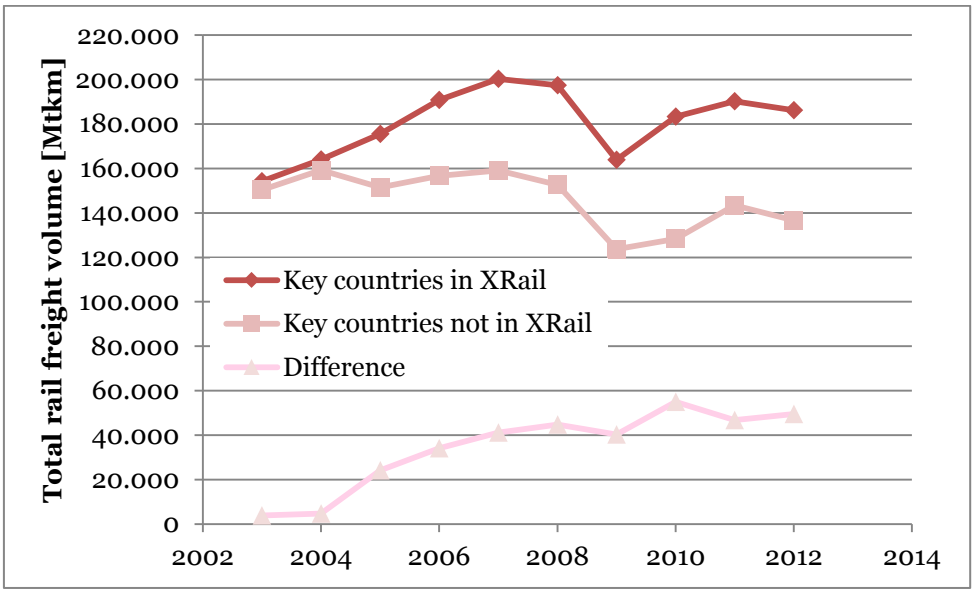
The group of countries with incumbent RUs belonging to **Xrail network presents an average rail share of 28% against 16% of other countries** as shown in the following figure.

Table 1 - Share of total land traffic moved bay rail [% t·km, 2012]. Elaboration based on Eurostat data

Country	X-Rail member	Total rail traffic [Mt·km 2012]	Total land freight traffic [Mt·km 2012]	Rail traffic share [%, 2012]

Austria	X	20.345[9]	48.887	41,6%
Belgium	X	7.593	40.700	18,7%
Czech Rep.	X	14.267	65.495	21,8%
France		32.552	204.612	15,9%
Germany	X	110.064	417.073	26,4%
Italy		20.244	144.259	14,0%
Poland		48.903	271.235	18,0%
Romania		13.472	43.134	31,2%
Sweden	X	22.043	55.524	39,7%
Switzerland	X	11.526	25.093	45,9%
UK		18.576[10]	165.261	11,2%
TOTAL		**319.585**	**1.481.272**	**21.6%**

Figure 7 - Comparison of rail traffic trends: countries with incumbent RUs that in 2013 are members/not members of Xrail (elaboration on Eurostat data)



With particular reference to Key Countries where the incumbent RUs are respectively members/not members of Xrail[11], by observing their **rail freight traffic trend** as a whole over the last decade, some preliminary comments can be outlined:

- in 2003, both groups of countries managed a comparable total rail freight volume, it about 150 bln t·km;
- the maximum difference over the time between the two groups has been > 50 bln t·km;

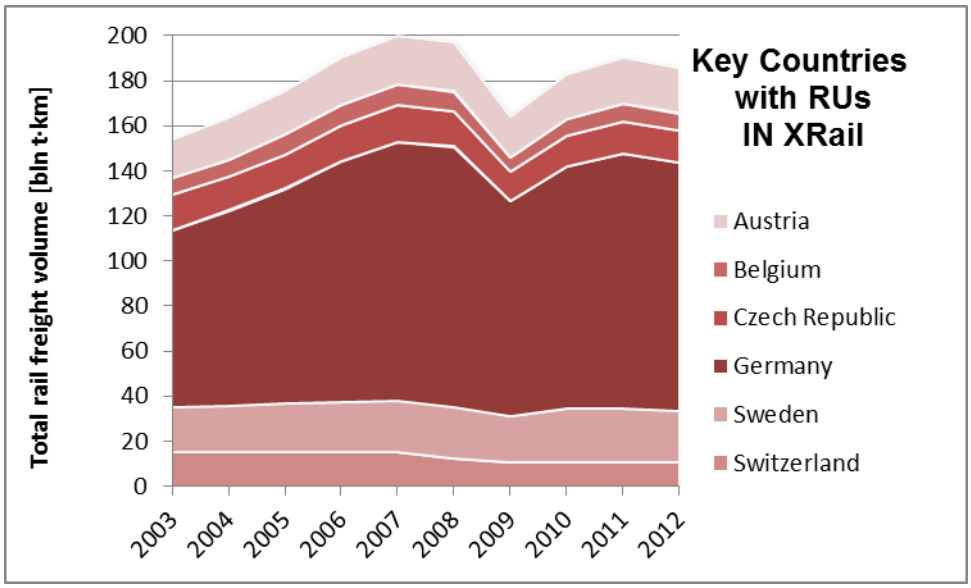
[9] 2011 data
[10] 2010 data
[11] Countries with RUs members in Xrail are: Austria, Belgium, Czech Republic, Germany, Luxemburg, Sweden and Switzerland. Key countries with RUs not members in Xrail are: France, Italy, Poland, Romania and United Kingdom.

- rail freight traffic (in tkm) in countries with incumbent RUs members of Xrail increased by about 21%;
- rail freight traffic (in tkm) in countries with incumbent RUs not Xrail's members decreased by about 9 %.

Moreover, by analysing the Countries with incumbent RUs belonging to the Xrail network , it can be observed that as the economic crisis impacted in the majority of them (with Sweden having the lowest volume decrease in that period). The dominant role of Germany appears clearly.

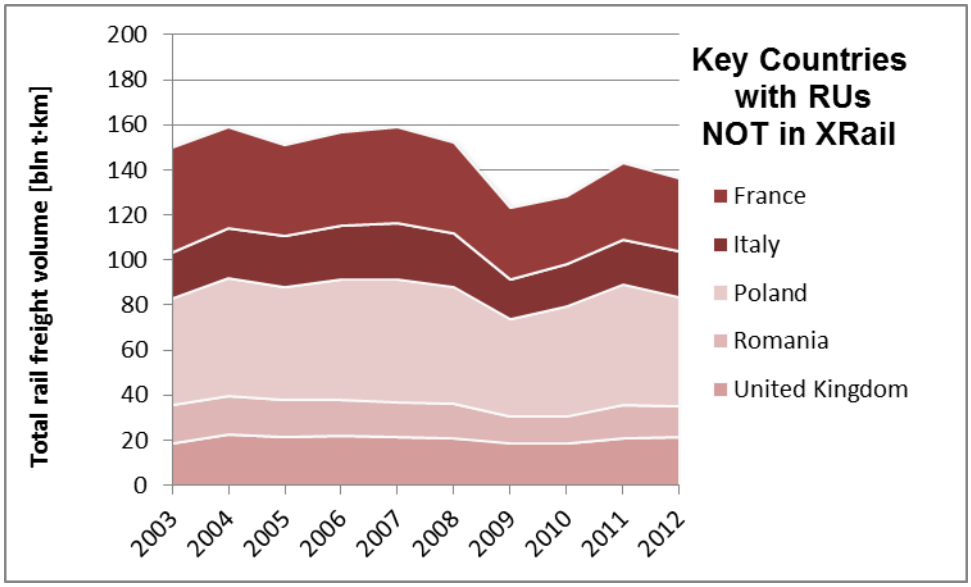
Needless to say, the differences observed cannot be directly attributed to the Xrail Alliance because, even if the idea was born in 2006, was signed just in 2010. Nevertheless, empirical evidence from traffic statistics in different Countries suggests that the introduction of coordination initiatives is correlated with a relevance of single wagonload traffic in these Countries and with an overall framework (at policy and operating level) oriented to the development of rail freight, independently of a cause-effect relationship.

Figure 8 – Key Countries' rail freight volume: countries with incumbent RUs belonging to the Xrail Network (elaboration on Eurostat data)



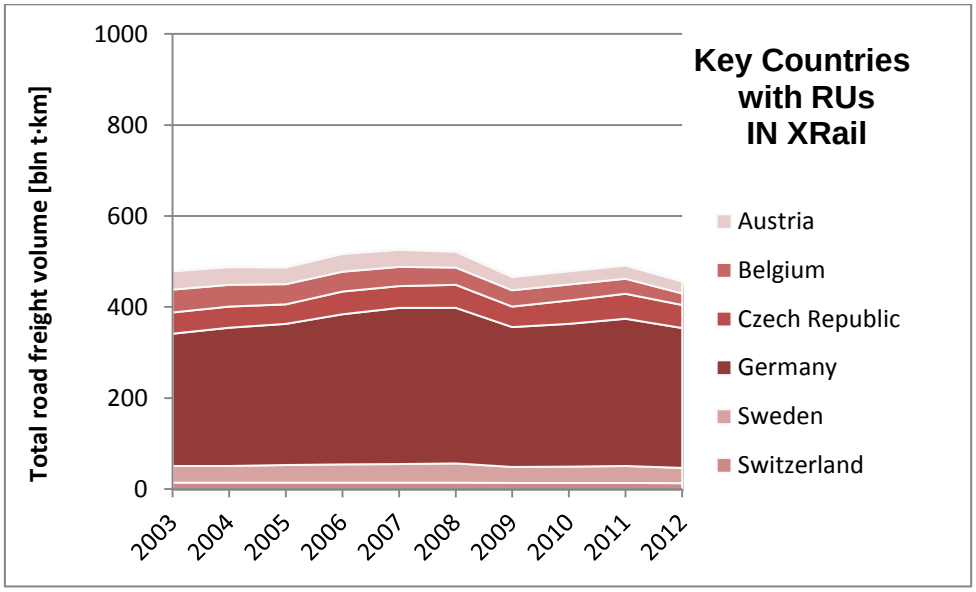
Regarding the countries with incumbent RUs have not joined the Xrail alliance , the total rail freight volume recorded an evident decrease (i.e. France and Italy above all), except for Poland which in 2012 handled the same tonne-kilometres as in 2003. Furthermore, it can be noticed how the United Kingdom, although it manages the smallest portion of rail traffic together with Romania, has kept its national value on a quite constant trend, throughout the entire observation period.

Figure 9 - Key Countries' rail freight volume: countries with incumbent RUs not belonging to the Xrail alliance (elaboration on Eurostat data)



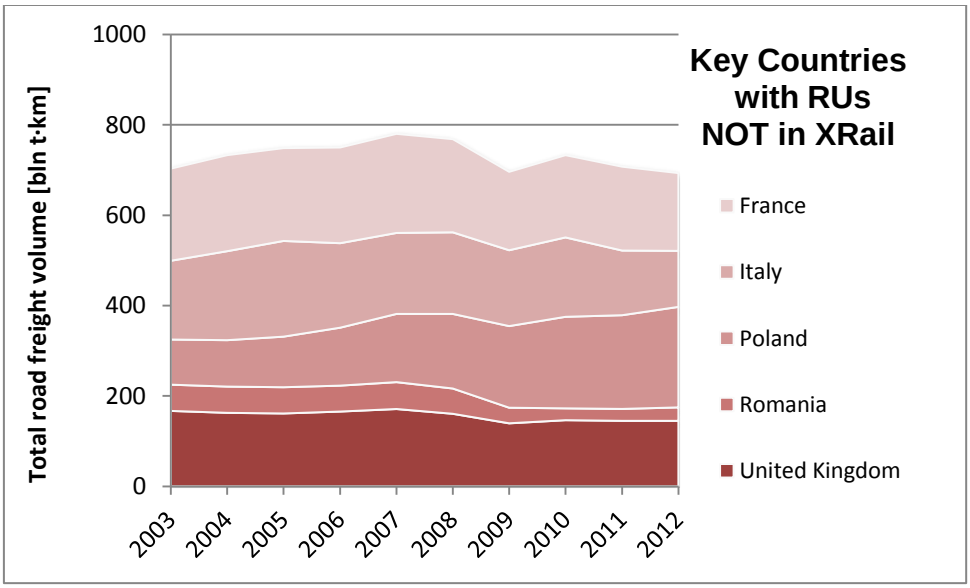
The evolution of rail traffic in the countries with incumbent RUs adhering to Xrail is certainly not explicable only by their attitude for the development of SWL services. The observed road freight traffic trends over the last decade shows that most of those countries, recorded a decreasing trend of road freight traffic, more or less significant, since there rail transport has been politically supported with specific regulatory measures and/or investment programs etc. However, we can state that – given the direct competition on small/medium shipment between SWL and road – the Countries where SWL is not abandoned appear to show a less fast increase of the road freight transport compare to the Countries where such system had to be downsized or stopped completely.

Figure 10 - Key Countries' road freight volume: countries with incumbent RUs belonging to the Xrail alliance (elaboration on Eurostat data)



The road freight traffic in the Key Countries where the incumbent RUs are not in Xrail outline are not homogeneous. With the significant exception of Poland showing a countertendency trend, all countries have marked a decrease of the road component of freight transport over time (certainly driven mainly by the effect of the economic crisis, since rail also declined as shown above). France and Romania recorded the highest reduction followed by United Kingdom.

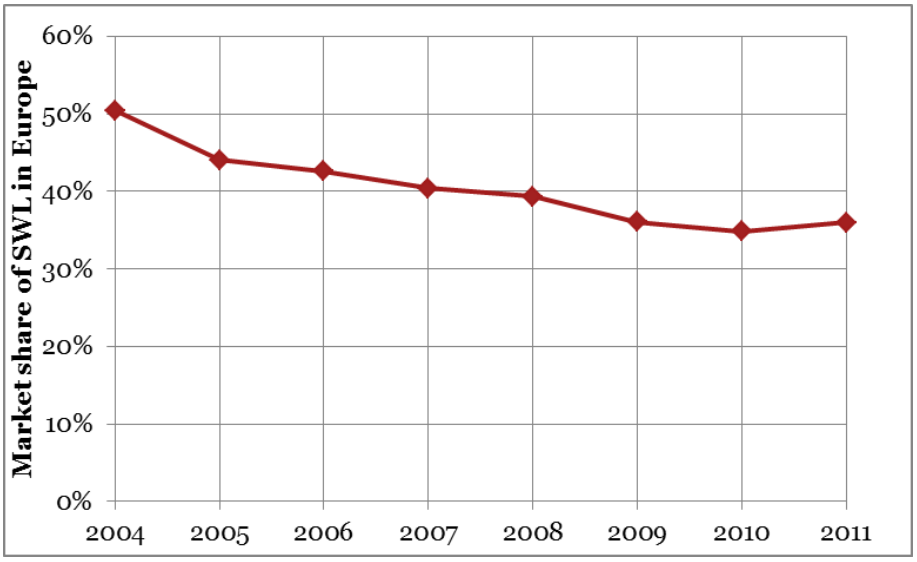
Figure 11 - Key Countries' road freight volume: countries with incumbent RUs not belonging to the Xrail alliance (elaboration on Eurostat data)



4.2. SWL rail traffic in Europe

Few years ago the volume of SWL traffic in Europe was estimated to be about 100 billion tonnes-km *(source: Xrail, 2010*). However, this order of magnitude probably needs to be slightly reconsidered because, according to Eurostat figures (2012) confirmed by the information gathered among the stakeholders, a general decreasing trend has taken place in the last years, as shown by Eurostat data (Figure 12).

Figure 12 - SWL market share in Europe on total rail freight traffic (Eurostat* data, 2004-2011)

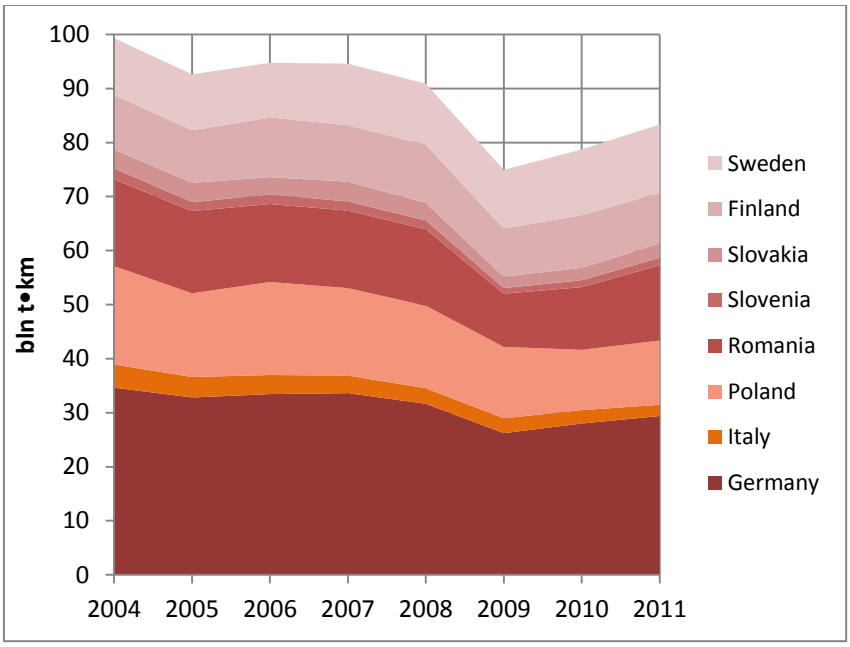


*Eurostat provides SWL data only for DE, IT, PL, SL, SK, FL, SE

According to the data available in Eurostat, Germany maintains primacy on SWL traffic followed by Sweden and Finland that, after the effects of the crisis involved all Europe, are experiencing a slight recovery of the reference market. Incumbent RUs of Slovakia and especially, Slovenia and Italy are downsizing their service. This occurs at a time of economic recession still affecting Europe as a whole and also of rationalization of terminals and marshalling yards dedicated to SWL service.

From a general point of view, taking also into consideration a previous analysis dealing with the SWL market throughout Europe (cf. CER, 2012), different national strategies have been already identified. In this sense there are some countries where SWL still covers an important segment of rail freight transport (e.g. Sweden, Austria, Germany) and other countries where such a service has been reduced (e.g. Slovakia, Slovenia, Poland, Italy) or, indeed, almost abandoned (e.g. UK).

Figure 13 - SWL traffic in European countries (Eurostat)[12]



4.2.1. SWL rail traffic in the selected Key Countries

Given the partial coverage in official statistics, the Study team surveyed the RUs of the 11 Key Countries (both incumbent and new entrants) to get recent data and update such evaluations.

Data collected for the Key Countries involved in the Study, provide the following evidence:

- in the geographical framework of reference, the total SWL traffic volume is about 75 billion tonnes-km (2012)
- such tonnage represents 27% of the total rail traffic in the selected countries
- as already highlighted, relevant differences at national level have been identified.

In particular, while some countries appear to have RUs (mainly the incumbent ones) still oriented to maintain and enhance their SWL supply, other countries have to face relevant economic and operational constraints related to the SWL service provision. Finally, in a third group of Countries RU appears to be interested in developing SWL supply any longer.

Such segmentation is clearly presented in the following map showing the share of SWL traffic with respect to total rail traffic. In Germany, Austria, Slovenia and Czech Republic, for instance, SWL is still a very important segment of the rail service supply, representing more than 35% of the total rail freight transport.

[12] The value of wagonload traffic in Germany on 2009 is missed in statistics and has been estimated by assuming the same yearly change as the whole rail traffic with respect to 2008.

Figure 14 - Share of total rail freight traffic (in tkm) moved by SWL services in the Key Countries (Data from Stakeholders consultation + Slovenia & Slovakia from Eurostat)

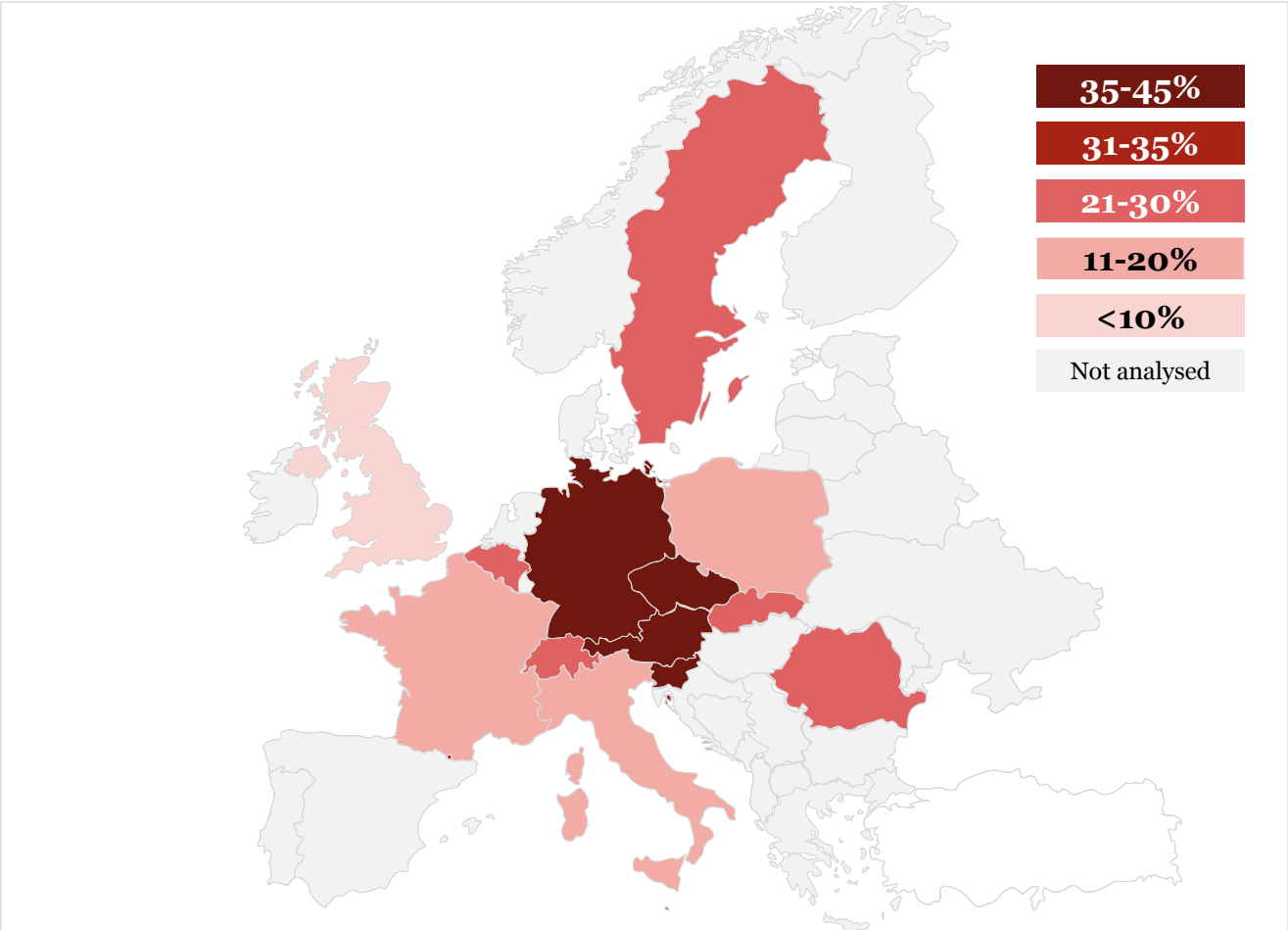


Table 2 - Share of SWL traffic with respect to total rail [% t·km, 2012]. Elaboration based on Stakeholders consultation (and Eurostat data for SI and SK)

Country	A	B	B/A
	Total traffic (bn tkm)	SWL Traffic (bn tkm)	% of SWL traffic
Austria	15,70	6,32	40%
Belgium	5,13	1,46	28%
Switzerland	12,39	2,84	23%
Czech Republic	11,42	4,68	41%
Germany	87,91	34,15	39%
France	24,34	4,87	20%
Italy	17,02	2,08	14%

Country	A	B	B/A
	Total traffic (bn tkm)	SWL Traffic (bn tkm)	% of SWL traffic
Poland	48,90	8,44	17%
Romania	8,19	1,64	20%
Sweden	21,24	5,43	26%
Slovakia	7,59	1,66	22%
Slovenia	3,23	1,16	36%
UK	18,58	0,28	2%
Total	**276,65**	**75,00**	**27%**

Source: Eurostat
Other countries: Stakeholders consultation
Data of incumbent RUs + other RUs when available
Data includes domestic and import / export traffic (transit SWL traffic is observed as a full train service by the transit Country); this explains the relatively low % of Switzerland.

Much lower share (20% or less) are recorded in France, Poland and Romania SWL traffic as well as in Italy. In the United Kingdom such a service covers only a small percentage, less than 10%, of the total freight rail traffic.

To this end, it is worth noting that RUs active in freight sector in the United Kingdom as well as the incumbent RU of Italy, in the recent years, oriented their business model exclusively on increasing full trains and/or intermodal transport that they consider more sustainable than SWL transport under the local market and operating conditions. This has also occasioned in a gradual closure of several marshalling yards and private sidings dedicated to SWL operation. Such SWL downsizing strategies were often driven by the need to improve the financial situation of RUs n a period of shrinking freight transport demand; SWL was assessed as the least profitable business, and therefore an obvious target for cost-reduction policies.

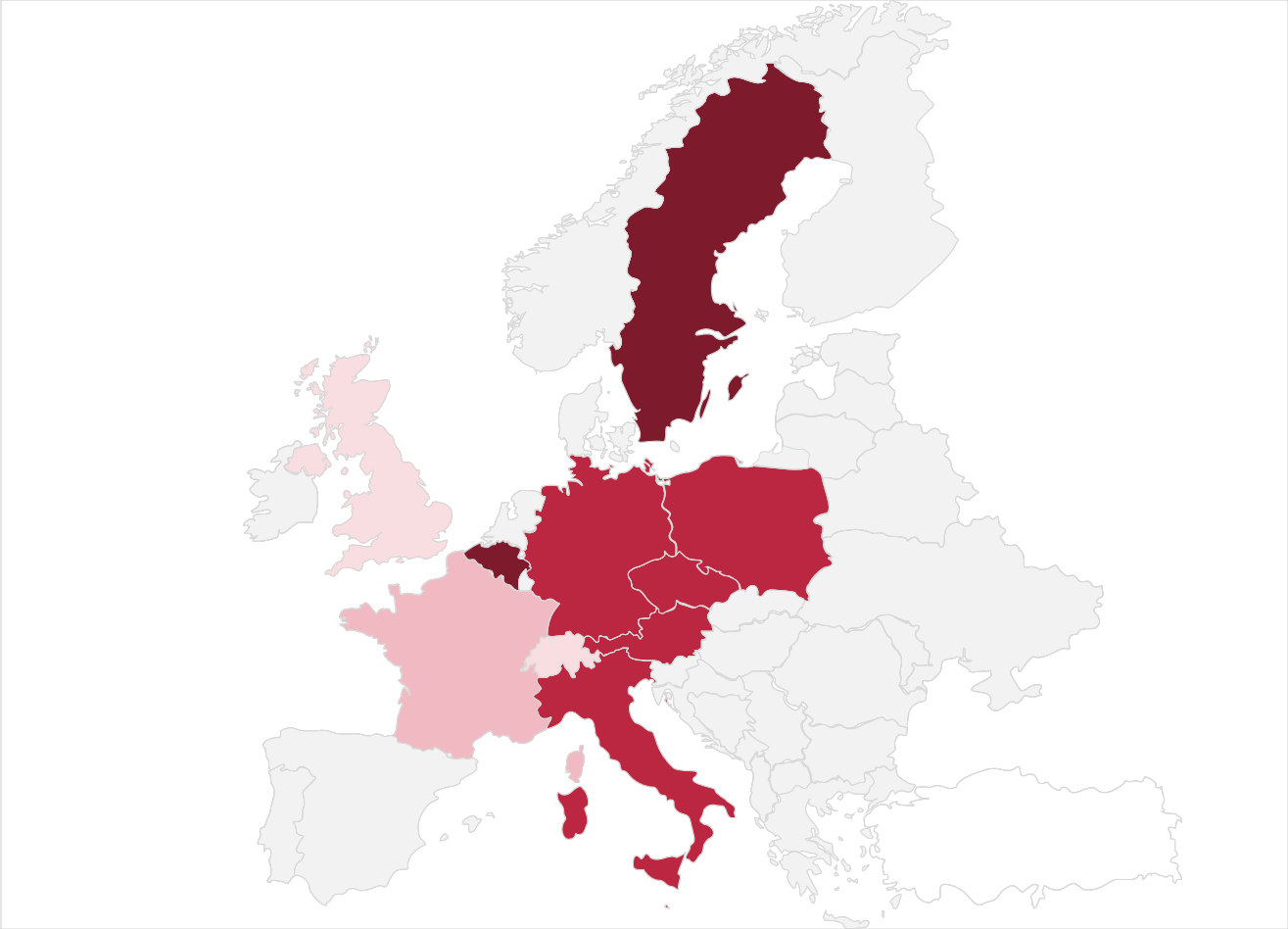
In order to provide a picture of the SWL market in terms of territorial coverage (i.e. international and national traffic), data coming from questionnaires outline that the **international traffic portion in the Key Countries as a whole is about 65%** versus a 35% of national traffic.

More than 80% of Belgian and Swedish SWL traffic is international while in other five countries - respectively Germany, Poland, Czech Republic, Italy and Austria - the international portion of SWL traffic is between 61% and 80%[13]. On the other hand, a prevalence of national traffic is observed in France and Switzerland, where SWL supply

[13] By considering data collected so far, there are not countries included in the 41-60% range.

appears to play a more important role for the internal movement of goods than for the exchanges for other countries. Transit traffic is not considered in this analysis.

Figure 15 -Key Countries: fraction of SWL traffic (bn tkm) that is international



Source: Elaboration based on the stakeholders consultation

4.2.2. Commodity types typically transported by SWL

With particular reference to the overall European market, according to data and previous evaluations from UIC[14] and McKinsey & Company[15] , the main SWL traffic market segments were assumed to be, in order of importance, chemical products[16], paper and pulp and automotive.

[14] UIC Web site – "Provisional traffic trends for 2000"
[15] McKinsey study on joint project of the Community of European Railways and Infrastructure Managers (CER) and their members
[16] In this context, it seems interesting to note that, according to CEFIC (European Chemical Industry Council), SWL transport is "*of key importance for the European chemical industry and a crucial element in the logistics chain of most chemical companies (>50% of total rail volume) because of the dispersed customer base often requiring only small shipments: volumes too low for full trains*".

By following our study's questionnaire and interviews findings, we are able to update the above evaluations in terms of main specific traffic segments transported by SWL in the Key Countries are, respectively:

1. Basic metals, fabricated metal product;
2. Chemical products;
3. Coal and lignite; oil and LNG;
4. Heavy Industry (incl. transport equipment);
5. Products of agriculture.

In the category "Other", depending on the country, refers to one of the following: *metal ores and other mining and quarrying products/ mail, parcels / other non-metallic mineral products / wood and products of wood and cork,* which is variable in each country.

Table 3 - Main traffic segments in the Key Countries

	Austria	Belgium	Czech Rep.	France	Germany	Italy	Sweden	Switzer-land	Poland	Romania	UK
Basic metals, fabricated metal products	I	I	III	I			I	I	I		III
Chemical products and Fertilizers		II		II	II		II		II	I	II
Coal and lignite; oil and LNG			I							III	I
Heavy Industry (incl. transport equipment)					I	I					
Secondary raw materials, etc.						II					
Products of agriculture	II									II	
Other	III		II	III		III	III	II	III		

Thus, the SWL services appear to be particularly used for the transportation of specific freight commodity types. This implies that SWL evolution is likely to be also related to the specific market dynamic of such categories.

In this context, it seems useful to provide an analysis concerning European[17] trends in land transport of these specific commodities – basic metals, chemicals, coal and lignite, transport equipment as well as agricultural products, in order to find a possible link with trends in

[17] EU 28 and Switzerland.

SWL traffic. Eurostat transport statistics for the last decade have been analysed in that respect

The relationship between SWL trend and overall land transport evolution of "captive" commodities appears to be true for basic metals, heavy industry (with particular reference to transport equipment) and agricultural products.

Nevertheless, it is worth noting that different trends can be observed between the two five-year periods, through which it is possible to perceive a kind of watershed[18] in terms of effects of pre-and post-economic crisis on freight traffic, also taking into consideration that a change in commodity classification occurred in the same period, changing from NST/R to NST 2007.

Table 19, summarizing the percentage variation of goods[19] moved by rail and road, allows us to outline the dramatic reduction of the flows of metals (-16% by rail) as well as transport-equipment (-18% by rail) in the last 5 years.

[18] Statistics on goods transported by rail, by group of goods and type of consignment (full wagon, full train) are not available. However Eurostat database provides statistics on goods transported by mode (rail and road) and group of goods according to NST/R until 2007 and NST/2007 since 2008.
[19] Traffic data were calculated leading back the commodity classes to a unique nomenclature.

Table 4 – Percentage variation in road and rail freight transport (EU 27)

Key Commodities for SWL	2003-2007		2008-2012	
	EU Countries *		EU Countries*	
	RAIL	ROAD	RAIL	ROAD
Basic Metals	12%	22%	-16%	-19%
Chemicals	9%	14%	9%	-22%
Coal and Lignite	8%	6%	1%	8%
Transport Equipment	5%	27%	-18%	-16%
Agricultural Products	-5%	3%	-5%	5%
*except BG – Source: Eurostat				

Since it is referred both to road and rail segment, these trends can be also directly attributed to recession impacts on industrial production of raw and/or semi-finished materials. However, it is also evident that rail sector has lost important units in a freight market clearly oriented to the road modality. Moreover, also agricultural products in each of the two 5-year periods lost a 5% of rail share versus a positive trend in road transport. In such a framework, chemicals represent an exception as rail transport recorded a constant growth (+9% in both 5-year periods) while road traffic volume sharply declined.

In order to better clarify traffic trends related to modal shift, Table 20 provides total variations in terms of quantities (tonnage) lost or gained respectively by rail and road occurred during the last decade.

Table 5 - Variation in road and rail freight transport (EU 27)

Key Commodities for SWL (1.000 tonnes)	2003-2007		2008-2012	
	EU Countries *		EU Countries*	
	RAIL	ROAD	RAIL	ROAD
Basic Metals	21.120	123.041	- 30.285	- 125.766
Chemicals	5.774	78.401	9.461	- 166.635
Coal and Lignite	25.960	9.109	1.582	11.968
Transport Equipment	2.034	122.631	- 6.857	- 41.713
Agricultural Products	- 1.459	20.056	- 4.077	60.323
*except BG – Source: Eurostat				

By moving the focus only on the Key Countries, it is also interesting to see the specific trends of the above key commodities.

By excluding from the analysis the period affected by the economic recession, it is still evident that – especially for some commodities – clear differences emerge among the observed evolution in different Countries. We again present separately the data for the

Countries where the incumbent RUs is member of Xrail (so showing clear interest in SWL) from the other ones.

Figure 16 – Key Countries' Basic metals trend (countries with incumbent RUs members/not members of Xrail)

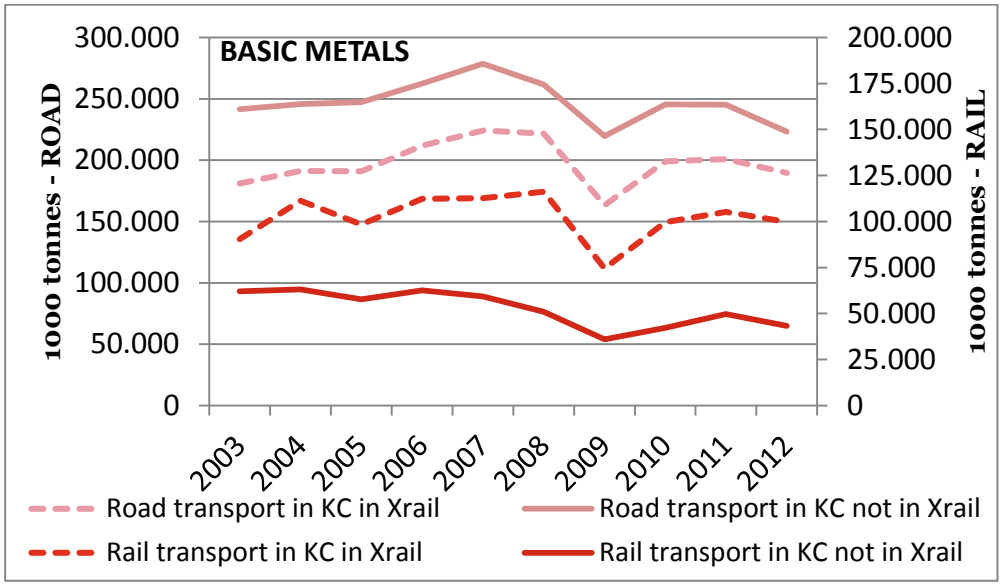
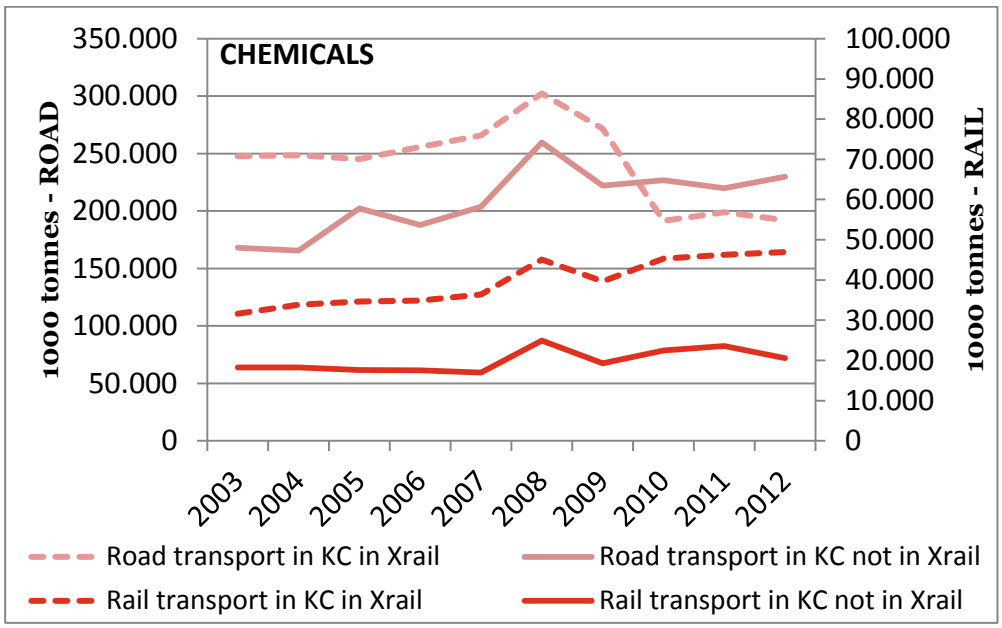


Figure 17 - Key Countries' chemicals trend (countries with incumbent RUs members/not members of Xrail)

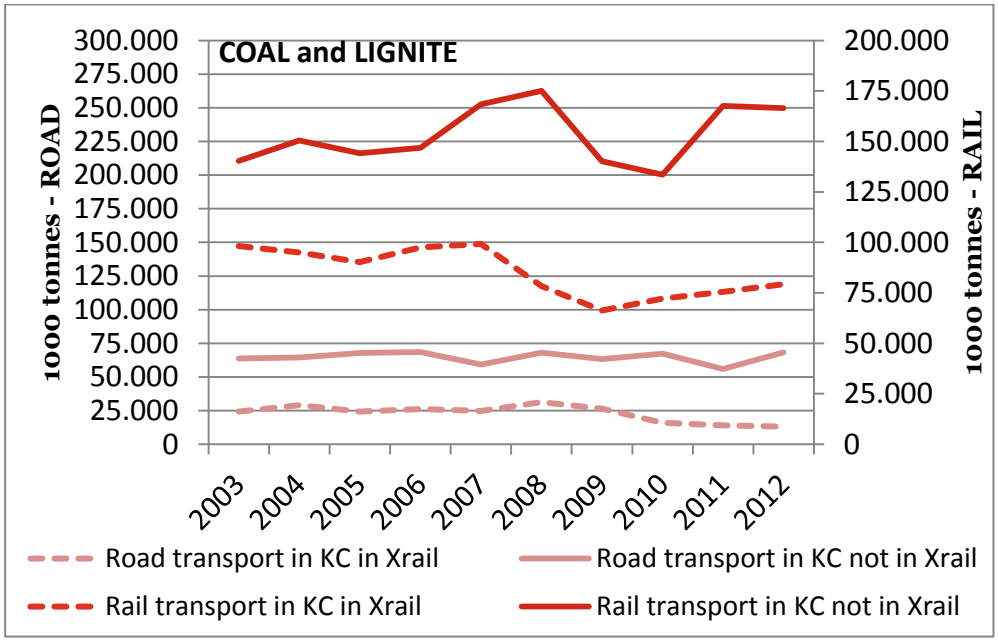


Such differentiation is scarcely visible for basic metals (Figure 16) but it becomes objectively noticeable for chemicals (Figure 17) which registered a steady increase over the 10-year span, it being also in countertendency if compared to trends of other commodities during the

global economic crisis. This means that rail is consistently increasing its market positioning within the chemicals trade.

Also with reference to the coal and lignite market (Figure 18) rail transport covers a prevailing position and this occurs regardless of the cluster to which Key Countries belong. Indeed, both for Countries with Xrail members and Countries with no Xrail members, a recovery trend of the rail market is confirmed, also after the past negative peaks recorded during the economic crisis.

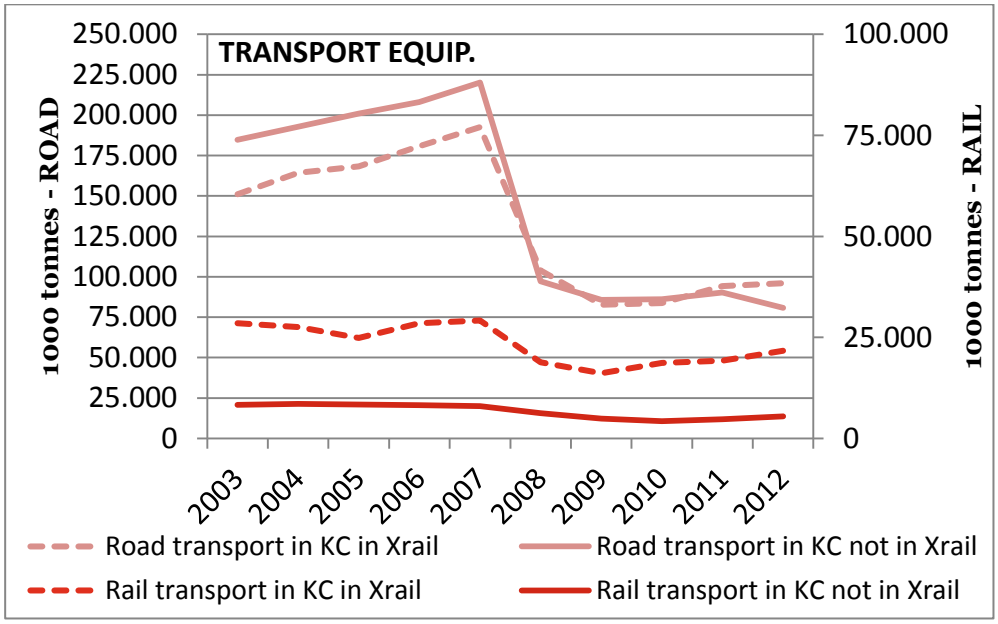
Figure 18 - Key Countries' coal and lignite trend (countries with incumbent RUs members/not members of Xrail)



With specific reference to transport equipment (Figure 19), rail market has preserved its traffic demand by limiting the negative impacts due to economic recession (its percentage decrease is quite low if compared to road transport).

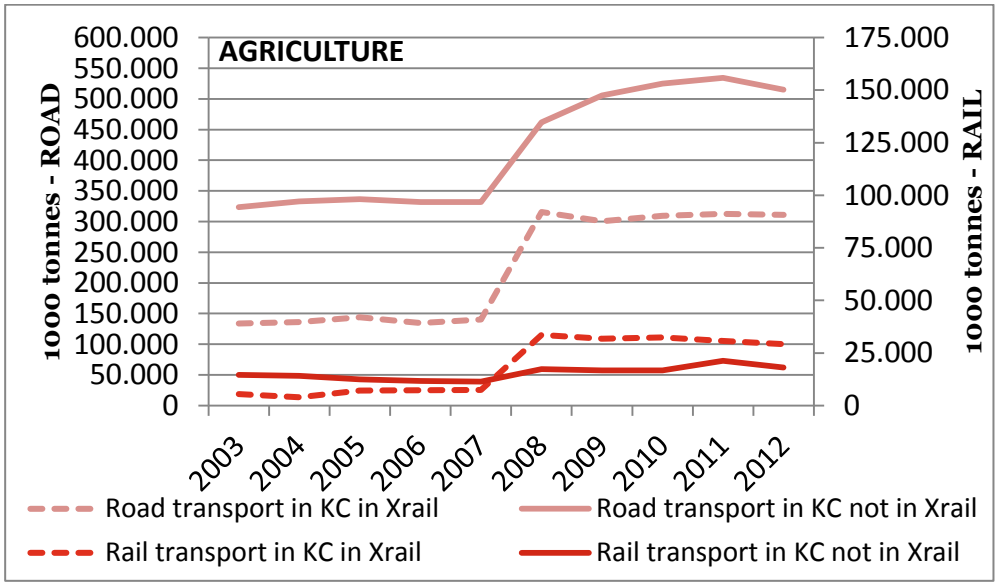
This likely suggests that, besides a drop in overall orders for such kind of products, some important changes are taking place within the related logistics chain.

Figure 19 - Key Countries' transport equipment trend (countries with incumbent RUs members/not members of Xrail)



Finally, although agricultural products (Figure 20) are widely moved by road, the overview over the last decade shows some interesting room for development of the rail market, especially starting from 2007. Indeed, this seems not to be affected by the crisis (similarly to chemicals, the rail market registered a countertendency trend), by showing also a quite stable trend in the 2008-2012 period.

Figure 20 - Key Countries' agricultural products trend (countries with incumbent RUs members/not members of Xrail)



Summarising the analysis of the evolution in the last 5 years of the key market segments for SWL, it appears that the overall evolution of the exchange of some of these commodities (as shown by the variation in total land transport volumes) has been one driver also of the evolution of the rail traffic, and therefore of SWL.

In particular, the significant decline of rail in **transport equipment** and **basic metals** has been clearly driven by the overall decrease in such traffic in Europe. Such commodities have been mentioned among the "captive" ones for SWL, so such general trend certainly also penalised SWL.

Table 6 – Summary of the analysis of main traffic segments evolution 2008-2012

Commodity	2008-2012 variation of total land transport	2008-2012 variation of rail transport
Basic metals	-18%	-16%
Chemical products	-18%	+9%
Coal and lignite	+3%	+1%
Transport equipment	-16%	-18%
Agricultural products	+4.5%	-5%

For agricultural products, the reduction of rail freight tonnage does not appear instead related to a general tendency, since total land transport of such goods increased in the last 5 years; modal competition seems in this case the elements of such evolution. On the other hand, rail transport seems to have improve its competitiveness in the case of chemical products, for which the rail freight volumes increased in the context of a reduction if considering all land traffic.

4.3. Key drivers and obstacles for the evolution of SWL

Concerning the main elements which, at different levels, can support the evolution of SWL services, and according to the interviews and questionnaires findings, the following key **drivers -** referred to **market demand and supply** as well as **infrastructure -** have been identified.

With particular reference to **market demand**, the following elements emerge from the analysis:

- the SWL transport is more relevant for some type of commodities that has shown significant decline in the last years also in terms of overall volumes (metals, chemicals, transport equipment); only in the case of chemicals rail transport competitiveness appear to have counteracted such trend, while for the other two segments the overall evolution penalised also rail;

- only solid fuels and agricultural products – among the SWL key segments – have been characterised by a modest overall growth, but rail did not benefit significantly of that;
- such trends in the transport demand were followed by significant reduction on SWL supply, in particular in **Italy** (where transport equipment was the most important segment for SWL) but also in other key countries where the declining market segments were more important, e.g. basic metals (stated as the 1st segment in terms of volume by RUs of **Austria**, **Belgium**, **France**, **Sweden**, **Switzerland** and **Poland**);
- some countries, such as **Belgium** and **Italy** as well as **Romania**[20]**,** have a freight market still heavily oriented to the all-road transport. This means that, in the absence of measures aimed at increasing the accessibility of the rail network together with proper policies also aimed at internalizing the negative externalities caused by transport activities, a better balance between rail-based and all-road transport is still far from being reached (and SWL, directly competing with road for small/medium size shipment, suffers more than the full train segment of such situation);
- finally, also difficulties in attracting new segment of the freight demand represent a main barrier to SWL enhancement. Such a condition was mentioned as relevant for **France, Sweden** and **Italy**. On the other hand, in Switzerland the peculiar conditions of the market – with heavy restriction on trucks (such as the night ban and the truck tax proportional to the vehicle's maximum weight and the travelled distance) – allowed to attract even domestic retail flows on the SWL.

In terms of **SWL supply**, due to the deregulation process occurred in the rail freight sector, a growing number of railway companies have entered the rail freight service market over time. The majority of "new entrants" are, quite often, major foreign rail companies (i.e. ex-monopolistic operators) which have the technical and financial capability to drive the development of the SWL market share even abroad, such as the German incumbent RU, now operating in many other markets outside Germany such as Poland and Italy.

In some countries, however, new entrants are testing different strategies to gain a competitive position even in the SWL by implementing simplified SWL network or liner train service, mainly for cross border services in order to access the main European Corridors.
A strong emphasis on the development of SWL service is expected to be given by the full implementation of the X-rail alliance. Such an alliance, currently involving the main RUs of

[20] In Romania, freight transport policies are still strongly "road oriented" and this is confirmed also by differences in transport charges. As an example, for heavy vehicles the road toll is about 0.01 euros/truck-km versus 3,2 to 4 euros / train-km. Moreover, the distance Arad – Bucarest (about 422 km) requires a road toll of 6 euros but if the same distance is covered by train (accompanied transport) costs respectively increase to 125 euros (in case of a 80% train filling rate) or 95 euros (for a 100% filling rate).

Central Europe (Austria, Belgium, Czech Republic, Germany, Sweden and Switzerland) aims at creating an integrated railway network capable of improving the quality of SWL service (mainly in terms of reliability, punctuality and customer-orientation) as well as at increasing the profitability through achievement of scale economies. It is expected to support the re-launch of SWL in such countries, particularly for international traffic, although the full-scale implementation has been so far relatively slow (only about 25% of international SWL of the involved RUs are reported so far to be managed within the Xrail production model).

Also in **France** the development of SWL market is targeted by the incumbent operator through a selection of specific O/D allowing to serve the most important clients who generate the largest part of the SWL transport demand.

The development of operator specialised in last mile operations such as shunting and feeder to private siding ("short liners" using the US name, or *operateurs de proximité* as defined in France) has been mentioned by stakeholders as a key elements to support a better organisation, efficiency and quality of SWL .

As far as the **infrastructure** aspects are concerned, in some Member States - such as **Austria**, **Germany**, **Switzerland** – funding dedicated to SWL infrastructure is allocated with the aim of facilitating the accessibility to rail nodes as well as of increasing their operational efficiency. In this context, particular attention is paid to private sidings.

For the other countries, the progressive reduction of available infrastructure for SWL has been mentioned by most stakeholders (RUs and shippers) as generating (existing or potential) regarding barriers limiting the SWL traffic development:

- a common barrier is related to IMs' strategies, implemented at national level, aimed at rationalizing the number of infrastructure dedicated to SWL (in the view of reducing the operation costs of the IMs that are facing reduction of the public budget allocated to the infrastructure maintenance and operations);
- in this context, for instance, the Infrastructure Manager of **Czech Republic** has no motivation to facilitate the SWL sector and, furthermore, the main national strategy announced by governmental authorities aims at closing up to 70% of private sidings;
- in **Belgium,** the stakeholders highlighted the lack of a clear willingness of the Infrastructure Manager to invest in infrastructure and/or funding for operation and maintenance of private sidings;
- in **Italy** the closure of the main hump marshalling yards was decided, due to the strong reduction of demand for specific freight categories that were the most important one for SWL (hump yards requiring high volumes to be economically sustainable);

- in the **United Kingdom** almost all infrastructures used for SWL traffic have been dismantled; moreover, there is a limited availability of wagon fleet as well as of infrastructure to all operators.

Even Countries with dominant RUs still supporting SWL, such Austria, Switzerland and Germany do suffer for important infrastructural constraints derived from the choices of neighbouring countries, concerning both

- the reduction of SWL specific infrastructure (as described above)
- the not harmonised conditions imposed to rail freight trains e.g. in terms of maximum train length, maximum axle load (influencing the wagon weight) and *gabarit* (loading gauge). Such conditions were mentioned as producing a lack of homogeneity in railway lines performances, with negative impacts also on total travel time and service quality.

The second constraint, however, is not applicable to SWL only. However, the rail supply segment that has typically a lower profitability, such as SWL, are particularly affected by any further restriction potentially producing additional costs

The issues related to infrastructure will be further explored in chapter 5.

5. Infrastructure for SWL: current situation and possible developments

As already mentioned, the Single Wagon Load service require the availability specific infrastructure to be operated:

- conventional wagons originates and terminates in **private sidings** connecting the main network with warehouses and plants ;
- **freight stations** are necessary as point of start/end of the private sidings where trains feeding the SWL system may stop before starting the journey on the main network (or before being moved to private siding at the end of the trip; besides, freight stations are also need to provide facilities to load/unload on SWL trains;
- **shunting and marshalling yards** are needed to assemble / disassemble the long distance SWL trains. SWL traffic generally passes through at least one train formation facility (i.e. marshalling yard, shunting yard) between origin and destination.

Many of the smaller sidings are usually owned by private companies, whereas freight stations and shunting & marshalling yards are usually owned by infrastructure managers. Port areas often comprise private sidings, freight stations and intermodal terminals.

The current situation of facilities for SWL and their trends and developments in the upcoming years have been analyzed through desk analysis, interviews and questionnaire submission to IMs.

5.1. Availability of infrastructure information

The information available through desk analysis was derived essentially from the Key Countries' Network Statements (NS) and from the DIUM (*Uniform distance table for international freight traffic, list of railways stations, list of the railways places of acceptance/delivery*).

RailNetEurope (RNE) has formulated NS guidelines that were useful to be able to classify the information in the NS according to the definitions used in this study.

Dir. 2001/14/EC lays down the obligation for every rail Infrastructure Manager to publish a Network Statement (NS). In particular, according to this directive, the NS is required to:

- set out the nature of the infrastructure which is available to RUs (art. 3 point 2);
- identify and describe the parts of the network dedicated to specified traffic types (art. 24 point 3);
- define the conditions of access to the infrastructure) (Annex I).

The Members of RailNetEurope (RNE) have agreed a common structure for Network Statement. Information on infrastructure for SWL traffic was derived from these chapters:

- **3. Infrastructure**
  - 3.7 Freight Terminals
  - 3.8.1 Service Facilities:Train formation yards
- **4. Capacity Allocation**
  - 4.9 Allocation of Capacity for Service Facilities
- **5. Services**
  - 5.3.4 Freight terminals
  - 5.3.5 Marshalling yards
  - 5.3.6 Train formation facilities
  - 5.4.4 Shunting and other services
- **6.Charges**
  - 6.1.3. Charging Principle referring to 5.3
  - 6.1.4. Charging Principle referring to 5.4
  - 6.3.3 Tariffs referred to services in 5.3
  - 6.3.4 Tariffs referred to additional services

The RNE Guidelines (26th March 2013 Edition) define the information that must be included in the NS, the information that is recommended for inclusion (this information "should" be presented) as well as the optional information (this information “may” be presented).

The following table illustrates the indication provided by the RNE Guidelines.

Table 7 - Indications of the RNE Guidelines

Chapter (ref. RNE Guidelines)		*Mandatory content*		
3. Infrastructure	***3.7 Freight Terminals***	List the **location of freight terminals**	List and description of purpose-built terminals	Special terminal equipment, such as side ramps and/or end ramps
		Describe **each terminal’s type** (intermodal or conventional, harbor etc	If the terminal is suitable for the interchange of goods between other (more) modes than rail-road and rail-rail this should be stated.	Contact point to which RUs or other interested parties shall turn in order to obtain further information on each terminal. Information concerning services provided in each terminal can also be
		State which **body is in charge of (track) capacity allocation** within the freight terminal. If the national IM is in charge, state if terminal capacity shall be requested as a part of the capacity allocation process or		

Chapter (ref. RNE Guidelines)		Mandatory content		
		separately		mentioned here
		Describe the **maximum train length** that can be accommodated in each terminal without splitting the train, and the **total track length**		
	3.8.1 Train Formation yards	List the **location of train-formation yards** and the **maximum length of trains** that can be formed in each yard		Contact point to which RUs or other interested parties shall turn in order to obtain further information concerning each yard.
4. Capacity	***4.9 Allocation of Capacity Facilities***		Allocation principles for the capacity of service facilities, in case these are managed by the IM.	
5. Services	***5.3.4 Freight Terminal***	**Product definition** – including track access conditions and usage conditions for each of the services listed, also stating whether services are delivered by the IM, or by other suppliers, who must be referred to For **information on location**, refer to Section 3 'Infrastructure'. For **information on charges**, refer to Section 6 'Charges'.	Where service facilities are owned and operated by the IM, supporting information for each facility and service should be outlined in more detail by use of text and maps placed in either annexes and/or online	
	5.3.5 Marshalling Yards			
	5.3.6 Train formation facilities			
	5.4.4 Shunting and other services			
	6.1.3 Charging Principle referring to 5.3	**Basis** for IM's charge State to what extent **Directive 2001/14/EC Articles** 7.4 (scarcity charges), 7.5 (environmental charges), 9 (discounts), 10 (compensation) and 12 (reservation charges) are **applicable.** If **discounts** are provided for, the NS shall clearly specify which lines are concerned, which type of trains are entitled to pay the discounted charges, what is the time period during which the discount will be applicable.		
	6.1.4. Charging Principle referring to 5.4			
5. Charges	***6.3.3 Tariffs referred to services in 5.3***	**Charging information** for train paths and any other services supplied by the IM **including discounts, compensation schemes and reservation charges**		
	6.3.4 Tariffs referred to additional services			

In order to check the types of information provided and their completeness, according to the RNE Guidelines, the following Network Statement have been analyzed:

- OBB (Austria) - Edition 2014;
- Infrabel (Belgium) - Edition 2014;
- SZDC (Czech Republic) - Edition 2014;
- RFF (France) – Edition 2014;
- RFI (Italy) – Edition 2012;
- DB Netze (Germany) - Edition 2014;
- Network Rail (UK) – Edition 2014;
- PKP (Poland) – Edition 2014;
- CFR (Romania) – Edition 2013;
- Trafikverket (Sweden) – Edition 2014;
- SBB (Switzerland) Edition 2014;

The findings of such an analysis are presented in the Annex I - Network Statement: Infrastructure Information.

Moreover, the DIUM *Uniform distance table for international freight traffic, list of railways stations, list of the railways places of acceptance/delivery* - contains relevant data, concerning railway transport of goods into international traffic, useful for RUs and customers. It also contains a list of stations equipped with UTI terminals.

The latest edition (1st July 2013) contains the following list code, valid for all countries, that gives information on stations:

1 *Frontier points other than frontier stations only used for calculating charges for international traffic. Not to be shown as a destination station on the consignment note CIM/ consignment note CUV*
2 *Frontier points point with restrictions*
3 *Internal Station with Customs Clearance facilities*
4 *Station with other special dispatch restrictions*
5 *Station only open for full trains load*
6 *Services discontinued until further notice, except for bilateral traffic*
7 *Station for which supplementary or ancillary charges are payable*
8 *Station opens only to or from private sidings*
9 *Loading yard = each loading yard is assigned to a freight depot. In the consignment note, a loading yard must not be given as the destination/delivery depot but may be given in the "acceptance/delivery location" box as the yard at which the consignment note CIM/ consignment note CUV is to be made available. In order to determine distances for loading yards, the distances of the freight depot responsible are used as a basis*
10 *Reconsigning station CIM- / SMGS Traffic*

The DIUM of each country contains also specific codes; to this end, a more detailed description has been provided in Annex II - DIUM: Infrastructure Information**.**

It is important to stress that, even if the IMs use a common structure for NS and DIUM, the level of detail of information provided is different in each document and in some cases they use different language and definitions so for the purpose of this study it is not easy to homogenise these data.

Where direct information from interviews and questionnaires submitted to IMs have been available, definitions have been clarified so it has been possible to provide data according to the definitions used in this study. Otherwise, data from documents are used so some inconsistencies between data may have occurred.

In particular regarding "train formation facilities" in some case documents provide information only on marshalling yards, or even shunting yards or refer generally to train formation facilities or to shunting stations including both.

5.2. Infrastructure facilities functional to the SWL operation

In this section, the main characteristics of the SWL facilities, in terms of marshalling and shunting yards, freight stations and private sidings, located within the selected Key Countries are analyzed.

4.2.1 Train formation facilities

The formation of SWL trains may take place in marshalling yards or shunting yards.

A **marshalling yard** is a facility for train composition/decomposition where wagons are sorted in several tracks, typically each one corresponding to a given destination. A marshalling yard can be flat, hump or gravity. The first type of facility is usually operated by shunting the wagon in the appropriate departure track by shunting locomotives, while the second and third type of facility exploit, respectively, an artificial or natural difference in the ground level between arrival and departure tracks (single or group of wagons to be included in the same departing trains are cut from the arrival train, and then go down by gravity to the defined sorting or departure track). Rail brakes in some cases equip the hump yard tracks, in order to properly regulate the approach speed (in order to avoid wagon damages resulting from excessive strikes from descending wagons approaching to the standing ones), in other cases manual means (stop blocks) are used.

These structural elements are very relevant, due the influence in the infrastructural investment and maintenance costs as well as in terms of operational costs. With regard to their function in the productive railway system, marshalling yards can be further classified into:

- *marshalling yard serving inland traffic*: mainly or exclusively dedicated to the SWL traffic between couples of inland origin-destination points;

- *marshalling yard serving ports:* usually dedicated to both conventional and combined rail traffic, they constitute a fundamental node in the transport chain due the very close link between their functionality and the operative performance of berths and port terminals;

As an example, the biggest marshalling yards in Europe, equipped with 88 tracks, is located in **Maschen** (Germany, where every day here about 4000 wagons arrive (2011). The process is electronically controlled and it has a five metres hump[21].

In a **shunting yard** the trains are usually composed/decomposed without sorting the wagons individually, by disassembling and shunting groups of trains using shunting locomotives.

The analysis hereafter focuses on marshalling yards, however some indications on shunting yards are provided.

Austria	There are 8 train shunting yards: Bruck an der Mur, Graz, Hall im Tirol, Linz, Salzburg, Villach, Wels and Wien (called "shunting nodes" in the NS). Annexes to NS provide specific information, in particular about the operation time.
Belgium	There are 5 marshalling yards: Zeebruges, Ghent Port Maritime, Monceau-Sur-Sambre, Antwerp-North, Kinkempois. The yards and stations with train formation facilities are mentioned in the Appendix D.9 of the NS, with the indication of the periods during which they can be accessed. The maximum length of the trains, which can access a yard, is indicated in the local agreements for the use of the infrastructure. These agreements can be requested from the area to which the facility belongs (see Appendix D.10). The IM does not provide shunting services, with the exception of the operations carried out from one of its centralized control posts
Czech Republic	The NS 2014, issued by Infrastructure Manager SZDC, provides a summary of data regarding some information about hump yards of 32 selected shunting stations (circuit) within the national railway as the number of relational tracks, the maximum length of relational tracks and the daily performance in shunted wagons. The main marshalling yards called "shunting stations" are 6. The IM stated that operational marshalling yards are 23. Possible usage of train formation facilities managed by IM, RUs have to negotiate with locally relevant Regional Directorate in advance (45 days before the timetable validity in case of regular use). The IM only organize the shunting but does not provide employers.
France	In France, there are 5 gravity marshalling yards (Le Bourget, Miramas, Sibelin, Woippy, Dunkerque). SNCF uses 3 marshalling yards with hump and 2 others (flat), Gefco uses 2 marshalling yards and Eurorail uses 1 marshalling yard.

[21] Source: http://www.mtu-online.com/fileadmin/fm-dam/mtu-global/pdf/mtureport/0311/10_King_of_the_hill.pdf.

Italy	In 2000 there were 7 marshalling yard with a hump: Torino Orbassano; Alessandria; Milano Smistamento; Venezia Mestre; Bologna San Donato; Roma Smistamento; Marcianise Without a hump: Domodossola Domo 2; Ventimiglia Parco Roja; Pontebba; Trieste C.M.; Bari Lamasinata; Villa S. Giovanni; Messina Contessa. According to questionnaire filled out by RFI, there are currently 6 marshalling yards in operation but none of these is still working by sorting wagons through humps.
Germany	In Germany there are 12 marshalling yards and about 50 switching yards, the majority of them equipped with humps (regardless of their size). Many have a track network that is kilometers long. Often situated in the outskirts of industrial cities, they make it possible for tens of thousands of freight cars to be sorted into the right trains on a daily basis. DB Schenker Rail rents the infrastructure. In the switching yards the work is done in the evenings and in the hours of the night. Gravity hump and hump locomotive are used and a computer controls the process setting the switches and activating retarders and accelerators built into the track so that the cars come to a standstill, safely and easily, at exactly the right point. The computer also controls the engine of the pushing locomotive, adjusting it on an ongoing basis, so that it always maintains the ideal speed. On average, it takes staff just 30 minutes to split up a train in this way from the time of its arrival at the switching yard[22].
Poland	According to interviews carried out in February 2014, 6 marshalling yards with hump were in operation in the early 2000s; however this number has decreased by 50% over time (currently only 3 marshalling yards are in operation). The biggest marshalling yards is at Poznan Franowo.

[22] Source: http://www.rail.dbschenker.de/rail-deutschland-en/start/company/interesting_facts/switching_yards.html

Romania

According to the NS the train formation yards are classified as marshalling yards (yards meant for processing the freight wagon flows and distributing them for various destinations) and technical yards (yards equipped with groups of specialized train formation line, some with fixed systems for testing the train break) and loading/unloading stations (public or private sidings)
The marshalling yards are mentioned in Annex 2 to the GD no. 581/1998 and are not necessarily equipped with freight loading/unloading facilities. The access to marshalling yards is allowed to the RUs, which have concluded an Access Contract with CFR. The marshalling yard must be on the route of the traffic sections indicated in the Safety Certificate. CFR does not supply shunting services but only the necessary logistical support for shunting operations to be performed by the RU.
According to the information provided, there are 8 marshalling yards with a hump. These are "public" and managed by CFR, which must ensure their opening to all Railway operators. 7 further major marshalling yards are again owned by CFR, but for these there is no opening obligation. Moreover, 50 yards without hump are still available in the country. In the main public yards, CFR Marfa does not use humps and all sorting operations are done on level ground. This resulted in a reduction of the staff members.

Sweden

According to the NS there are two types of railway yards: marshalling yards and other railway yards. Marshalling yards are characterized by turn-out track, automated switching, hump with approach and/or exit group and lining of the track.
Marshalling yards are divided into category 1 (with rail braking system) and 2 (without rail braking system). There are 9 marshalling yards belonging to the former category (Borlänge , Gävle , Hallsberg , Helsingborg , Malmö , Sundsvall , Sävenäs , Ånge) and 5 belonging to the second one (Jönköping , Nässjö , Tomteboda, Trelleborg, Västerås västra). In the main document of the NS information on tracks included are provided. According to this, there are 3 main marshalling yards (Hallsbergs, Nässjö, Sävenäs) equipped with more than 40 tracks.

Switzerland

There are six operational marshalling yards: Basel SBB RB, Buchs SG, Chiasso SM, Daniken RB, Lausanne Triage, RB Limmattal (incl. Zurich Mulligen). From 2016 on, there will remain only three operational hubs.

United Kingdom

According to the NS “freight services on the UK railway network generally run as block trains direct from origin to destination without the need for intermediate marshalling with other wagons. Some freight train operating companies operate a small number of yards where their pattern of trunk and feeder service requires trains to be remarshalled. Though some train formation yards are owned by Network Rail and leased to other railway undertakings, Network Rail does not control access to any train formation yards (with two exceptions at Carlisle Kingmoor and Ipswich Reception Sidings)”.
The IM stated that there are less than 5 operational marshalling yards.

Country	2000	2012	Location

Table 8 - Marshalling yards

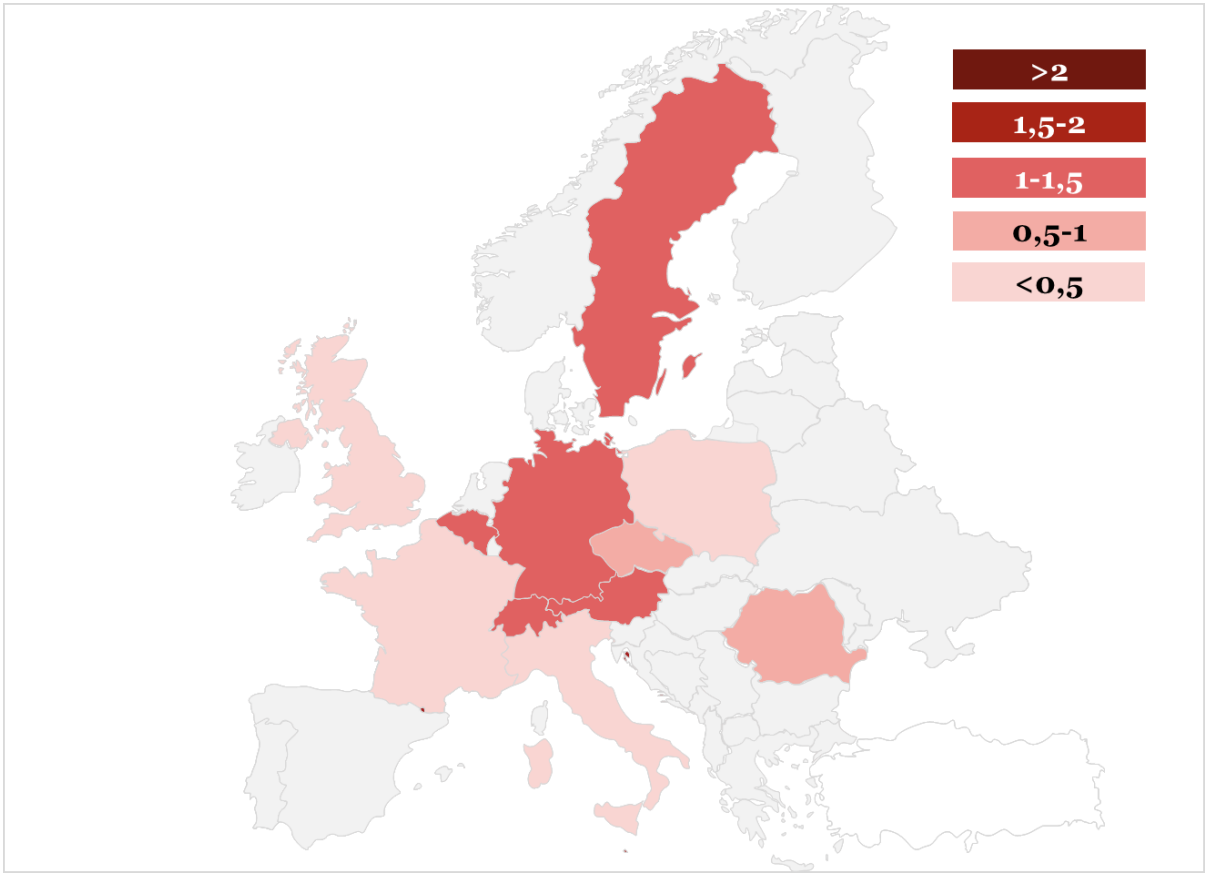
Country	2000	2012	Location
Austria	5 -10	8	Bruck an der Mur, Graz, Hall im Tirol, Linz, Salzburg, Villach, Wels and Wien
Belgium	4	5	Zeebruges, Ghent Port Maritime, Monceau-Sur-Sambre, Antwerp-North, Kinkempois
Czech Republic	5	5	Beroun, Č. Budějovice, Chomutov, Nymburk, Solokov
France	13	5	Le Bourget, Miramas, Sibelin, Woippy, Dunkerque
Germany	13	12	Maschen (near Hamburg), Rostock Seehafen, Seddin (near Berlin), Seelze (near Hanover), Hagen-Vorhalle, Engelsdorf (near Leipzig), Dresden-Friedrichstadt, Gremberg (near Cologne), Bebra, Nürnberg München Nord, Kornwestheim (near Stuttgart), Mannheim.
UK	<5	<5	Carlisle Kingmoor and Ipswich Reception Sidings
Italy	14	0	With a hump in a gravity yard (on 2010): Torino Orbassano; Alessandria; Milano Smistamento; Venezia Mestre; Bologna San Donato; Roma Smistamento; Marcianise Without a hump in a gravity yard (on 2010): Domodossola Domo 2; Ventimiglia Parco Roja; Pontebba; Trieste C.M.; Bari Lamasinata; Villa S. Giovanni; Messina Contessa According to the questionnaire filled out by RFI, there are currently 6 marshalling yards in operation but none of these is yet working by classifying wagons through humps.
Poland	6	3.	Szczecin Port Centralny; Wroclaw Brochów; Warszawa; Poznan Franowo; Tarnowskie Góry
Romania	5	6	Bucuresti, Curtici, Constanta, Craiova, Arad, Ronat (Timisoara)
Sweden	n.a.	12	Borlänge , Gävle , Hallsberg ,Helsingborg , Malmö , Sundsvall , Sävenäs , Ånge , Jönköping , Nässjö, Tomteboda, Trelleborg, Västerås västra
Switzerland	6	6	Basel SBB RB, Buchs SG, Chiasso SM, Daniken RB, Lausanne Triage, RB Limmattal (incl. Zurich Mulligen)

It is worth mentioning that data referred to 2000 result from "*Recommendation concerning the system of marshalling yards of major European importance*" issued by the Economic Commission for Europe Inland Transport. The criteria to define the system of marshalling yards of European major importance are, as follows:

- Minimum number of bays in one marshalling system:2;
- Minimum working length of track in the bays: 750 m
- Mechanization and automation equipment in the marshalling hump
- Mechanization and automation in marshalling-yard bays
- Automated control system for yard operations

Hereinafter is presented the current density of infrastructural facilities within the involved Key Countries related to the marshalling yards, with respect to the rail network extension.

Figure 21 - Operational marshalling yards/1000 km rail network



The geographical framework that resulted is extremely varied where a cluster of countries such as Sweden, Belgium, Germany, Switzerland and Austria possess between 1 and 1,5 marshalling yards per 1000 km of network length. They are followed by Czech Republic and Romania (between 0,5 and 1). A further cluster includes France, Poland Italy and UK which register the lowest value of marshalling yards density (< 0,5 per 1000 km of network length).

Needless to say, a low density shows the lack of capillarity of the system in comparison with the one of the network. The development of "marshalling-free" SWL service (requiring only shunting operation on flat yards) to combine wagons from different clients is among the causes of the observed situation. However, such supply trend is also due to the reduction of total SWL traffic (only high volumes make sustainable the management of large hump yards).

While the overall situation is characterized by the reduction of marshalling facilities, some development projects exist. The table below provides two example of ongoing projects to be implemented in Slovakia and Belgium.

Table 9 - Projects for marshalling yards siding

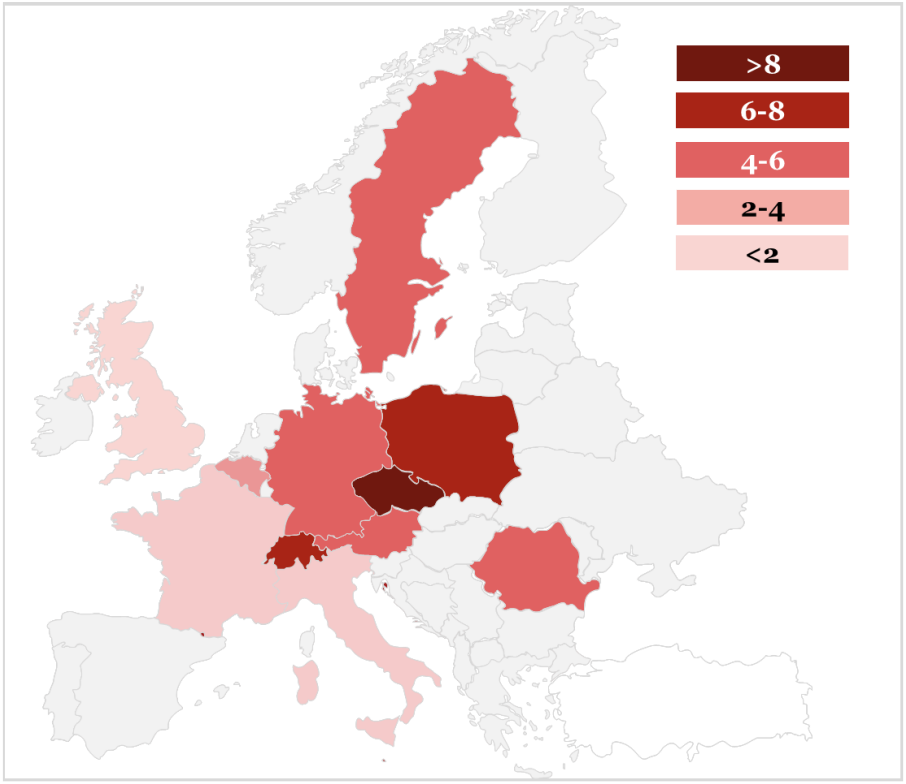
Country	Projects for marshalling yards siding
Slovakia	Project for Žilina-Teplička marshalling yard. It will gradually take over the train operations currently done at five separate yards. Characteristics: 36 km new rails, more than 100 switches (Total investment: about 125 million of euros; EU fundings: 87 million of euros for 2007-2013 programming period). *Source:ec.europa.eu/regional_policy/projects/stories/pdf.cfm%3Fsto%3D2385%26lan%3D7%26country%3DSK+&cd=15&hl=it&ct=clnk&gl=it*
Belgium	In order to facilitate the growth of the port of Zeebrugge, Infrabel is modernising and expanding the existing marshalling yard and is creating new arrival and departure yardsat Zwankendamme. Start of work: 2013- End of work: 2018 *Source: http://www.infrabel.be/en/residents/construction-sites/expansion-and-modernisation-existing-marshalling-yard-zwankendamme*

4.2.2 Freight stations for SWL

A freight station is a facility belonging to an Infrastructure Manager including typically rail sidings in which freight is loaded onto conventional wagons, and/or arrival/departure tracks from which private sidings are connected (so feeder train from private sidings stop in the freight station before having an available path on the main line, and vice-versa).

The following map provides the freight station density with respect to rail network extension.

Figure 22 - Freight stations /100 km rail network



In this case, the geographical framework is more varied if compared to the previous one and there is no any sort of territorial continuity among the Central European countries. Czech Republic, as for marshalling yard, registers the highest value (> 8 freight station per 100 km of network length) followed by Switzerland and Poland (between 6 and 8) Moreover, Sweden, Germany , Austria and Romania marks a freight station density between 4 and 6. Finally, for France and Italy such a value is between 2 and 4 freight station per 100 km of network length, it decreasing up to <2 for United Kingdom.

Undoubtedly, a low number of freight station implies low capillarity of the conventional rail freight system. Needless to say, the data presented in the map should be compared with the density of industrial sites generating the traffic in the different region of the countries, but less than 2 stations for 100 km of network (on average) – as observed in some countries - do represent in any case a sign of low accessibility to the rail transport mode

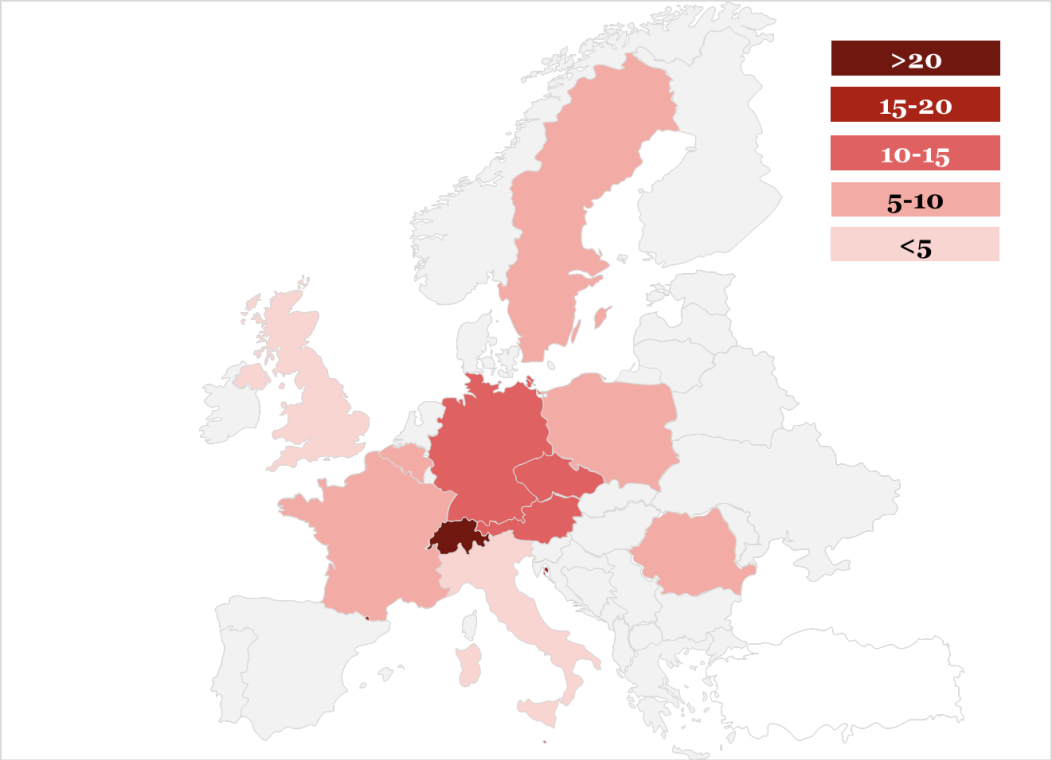
On the other hand, it should be highlighted that the IM need to operate efficiently (also considering the more and more stringent budget constraints), so that infrastructure "rightsizing" programs are unavoidable following the variation of freight traffic in terms of volume and spatial distribution. Thus, even if a reduction of capillarity is certainly a threat for the re-launch of the SWL system, it is clear that keeping a dense network of dedicated facilities in operation shall be carefully analysis in economic terms; where traffic volumes does not allow an appropriate cost coverage, other type of funding need to be considered.

4.2.3 Private sidings

Private sidings establish a link between an industrial plant or warehouse, and a rail station or a railway line. They are a very important element of SWL system, since they provide a direct access of SWL demand to the rail network.

In the following map is presented the private siding density calculated with respect to 100 km of network extension, Figure 21.

Figure 23 - Private sidings/100 km rail network



In this case Switzerland registers the main value (more than 20 private sidings per 100 km of rail network length) Followed by Germany, Austria and Czech Republic which provide a value between 10 and 15. In addition, Sweden, Poland, France, Romania and Belgium mark a private sidings density per 100 km of rail net between 5 and 10; for United Kingdom and Italy the indicator drops to less than 5 private sidings for 100 km of rail network.

In some countries, MSs and IMs support the use of private siding and encourage their development, even with funding (Switzerland, Austria, Germany).

In other countries MSs and IMs (with budget constraints) to pursue financial stability tend to close freight stations (and the last mile connection to sidings) reducing the appeal of SWL services. As an example, for what concerns private sidings, in Romania the price charged by the Railway Safety Authority for private siding certification is reported to be so high as to induce customers to forego this[23]. In Poland, on a total of 3.000 private sidings, only 1.500 are in operation. Also in this case, requirements to obtain the safety certificate are quite strict and expensive.

[23] There would be 800 particular rail branches owned by private Enterprises.

5.3. Drivers of the evolution and key issues

5.3.1. European policies for the development of railway infrastructure

In order to enhance the competitiveness of the freight railway sector and, consequently of the SWL system, with particular reference to infrastructure aspects, the **European Commission** has arranged some **measures** over time.

First of all, the concept of **Rail Freight Corridors**, according to Reg. 2010/913/EU concerning a European Rail Network for competitive freight, covers an essential role for developing an international-oriented rail market supply. Such a goal has to be achieved through a proactive co-operation between IMs as well as among these and RUs, in order:

- to optimize processes related to paths allocations for freight trains (currently there are not priority slot assignment procedures dedicated to freight train movements;
- to promote accessibility to the rail-road and rail sea interfaces, in order to improve the level of intermodality in freight sector;
- to increase interoperability through all the European rail network, by overcoming differences in track gauge, power traction, signaling, etc.

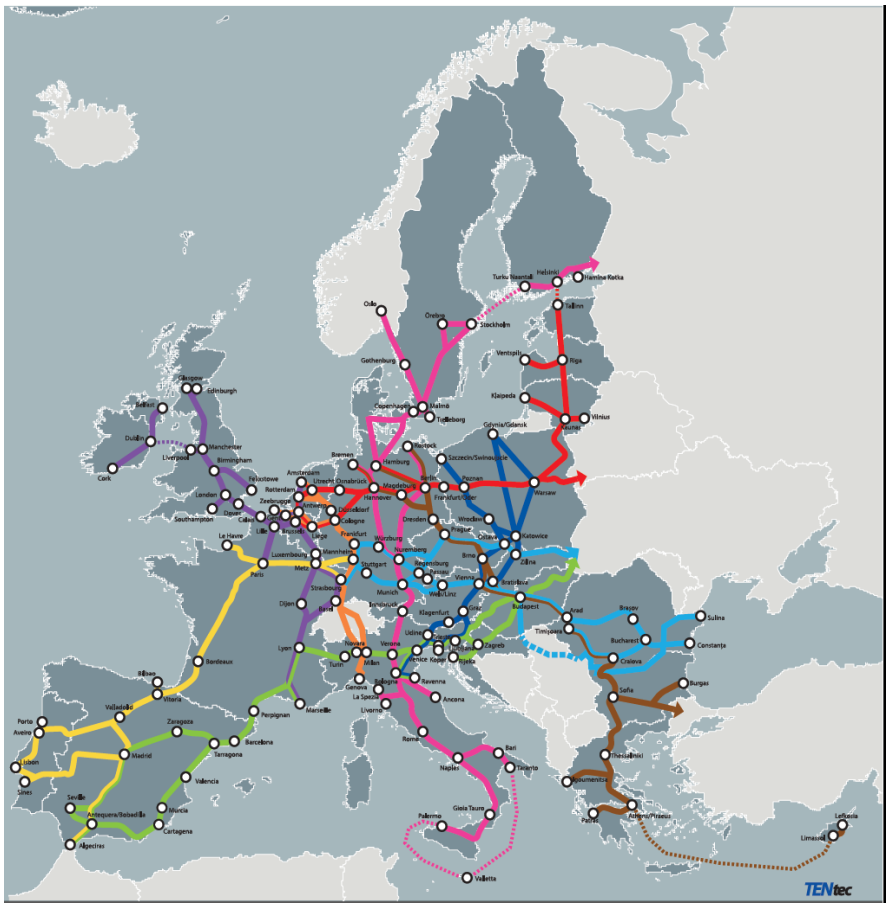
In the strategic view of the European Commission the full operation of each single national rail network as integral part of the European Freight corridors is a priority to increase the competitiveness of the rail freight services. Indeed "*In order to be competitive with other modes of transport, international and national rail freight services, which have been opened up to competition since 1 January 2007, must be able to benefit from a good quality and sufficiently financed railway infrastructure, namely, one which allows freight transport services to be provided under good conditions in terms of commercial speed and journey times and to be reliable, namely, that the service it provides actually corresponds to the contractual agreements entered into with the RUs*" (source EC, Reg. 2010/913/EU).

The regulation foresees that "to ensure that the railway infrastructure is better used, the operation of that infrastructure and the terminals along the freight corridor need to be coordinated". In the framework of RFC regulation, "terminals" mean "*installations provided along the freight corridor which has been specially arranged to allow either the loading and/or the unloading of goods onto/from freight trains, and the integration of rail freight services with road, maritime, river and air services, and either the forming or modification of the composition of freight trains; and, where necessary, performing border procedures at borders with European third countries*". Thus, train formation facilities used by SWL services are included.

An advisory group made up of managers and owners of the terminals of the freight corridor shall be created for each one of the corridors, in charge of issuing opinion on the proposals concerning investment and management of terminals. RFCs' implementation plans shall also

consider the development terminal. Capacity allocation also are expected to consider the access to terminals.

Figure 24 – The 9 Core Network Corridors defined in the new TEN-T Regulation



The Railway Corridors concept is strictly related to legislative proposal of the **TEN-T Guidelines** (Regulation 1315/2013) that, among the specific objectives, pursues to reduce and/or avoid network bottleneck by increasing the interoperability and interconnectivity of the European rail network not only for passengers but also paying particular attention to freight market. A common concern deals with the real disparity/discrepancy in availability, accessibility and performances of railway lines, not only between but also within the single European Countries as well as freight terminals. Among them, the main East-West connections have to be improved through new construction, maintenance program and rehabilitation or upgrading of existing infrastructure. To this end, the railway infrastructure are required to comply the TSI - *Technical Specification for Interoperability* referred to the requirements of 22,5 t axle load and 750 m train length and maximum gradients of 12,5 mm/m for new lines which have to be used by conventional freight trains (Art. 13 point 3.a). While in the Regulation the concept of terminal appear to focus on intermodal facilities allowing the transfer of goods from one mode to another, “sidings” are also mentioned, requiring their electrification in case this would be necessary for electric train operations.

As part of the new TEN-T regulation, a dedicated facilities for investment funding, named "Connecting Europe Facility" (CEF) will provide an increased budget for the TEN-T development in the programming period 2014-2020 (>26 bn Euro, vs 8bn Euro in 2007-2013). Specific co-financing rates are defined for railway projects as well as for inland transport connections to ports and airports (Table 10). While no specific indication of co-financing dedicated to facilities to be used by SWL is indicated, it is clear that the improvement of corridor lines at TEN-T standards, the removal of bottlenecks and the improvement of the connection to ports are all measured generating positive effects for SWL as well.

Table 10 – CEF co-financing rates

Types of Projects		All Member States	Member States eligible for Cohesion Fund
(a) Studies (all modes)		**50%**	85%
(b)Works on			
Rail	Cross border	**40%**	85%
	Bottleneck	**30%**	85%
	Other projects of common interest	**20%**	85%
Inland waterways	Cross border	**40%**	85%
	Bottleneck	**40%**	85%
	Other projects of common interest	**20%**	85%
Inland transport connections to ports and airports (rail and road)		**20%**	85%
Development of ports		**20%**	85%
Development of multi-modal platforms		**20%**	85%
Reduce rail freight noise by retrofitting of existing rolling stock		**20%**	20%
Freight transport services		**20%**	20%
Secure parkings on road core network		**20%**	20%
Motorways of the sea		**30%**	85%
Traffic management systems	SESAR, RIS, VTMIS (ground/onboard)	**50/20%**	85%
	ERTMS	**50%**	85%
	ITS for road	**20%**	85%
Cross border road sections		**10%**	85%
New technologies and innovation for all modes of transport		**20%**	85%

Thus, a set of measures have been launched by EU. Although not focused specifically on SWL, they are likely to create the conditions for a more efficient rail transport, especially on international corridors, and this will provide advantages also to SWL.

5.3.2. Evolution of the infrastructure facilities for SWL

As a result of the analysis carried out by the Study team and the information obtained from questionnaires and interviews with the involved experts, some important concepts linked to infrastructure issues and directly affecting the SWL operation can be identified, as follows:

- most of the analysed countries experienced a significant reduction of the infrastructure dedicated to SWL (e.g. private sidings, marshalling yards);
- due to the reduction of volumes, many hump yards have been closed and replaced by shunting in flat yards;

- such evolutions do not appear a “root cause” of the SWL traffic reduction, but instead an effect; IM needed to implement a "rightsizing" of the network to the actual level of SWL traffic, given also the lack of specific funding for maintenance and renewal of this kind of infrastructure in most Countries;
- the impact on international SWL traffic of the closure of such infrastructure is often not considered when decided at national level;
- only a couple of IMs declared an expected stability in the near future concerning the number of dedicated facilities.

This above underlines how the infrastructure issue strongly affects also production methods that, in case of strategies aimed at reducing fixed costs through the closure of specific rail facilities or development of few main hubs, have to be reconsidered with reduction in network density and capillarity of service. Moreover, local and regional rail lines (e.g. the adduction links used by SWL flows to reach the main national and/or EU freight corridors) are reported to suffer for a high rate of obsolescence (due to a lack of proper investments/maintenance in the rail sector) which hinder the service performances. Analysis carried out in recent years for some Countries (e.g. the “Rapport Rivier” about the French network) confirm this situation.

A number of potential actions emerged from the analysis of the above mentioned trends, aiming at keeping the accessibility to essential infrastructure for SWL in a non-discriminatory way (i.e. avoiding an immediate closure once the incumbent RU decides not use a given facility any more). Description, consensus and expected effectiveness of such actions will be examined in the section about the recommendations (chapter 11).

6. Technology

6.1. Overview of relevant technologies for SWL

There are many aspects of SWL transport that can benefit from technological innovations. Broadly speaking, we can categorise technology according to whether it addresses rail infrastructure, rolling stock, or information and communication (ICT, Information and Communication Technologies). We briefly examine the main potentially beneficial technological areas that were identified during the study, describing the state of the art and on-going innovations.

Infrastructure-related technology.

Infrastructure rail freight transport has not changed significantly over the last few decades. SWL operations are still done in marshalling or shunting yards, freight stations and sidings. We have shown in chapter 4 that the numbers of such facilities have been decreasing. Referring specifically to wagons or groups of wagons (SWL transport), these are loaded and unloaded in private sidings or sidings at freight stations and shunted so as to form trains.

The duration of loading and unloading operations is a significant contributing factor to the throughput of the whole process. For conventional wagons the equipment is very much linked to the type of goods (e.g. fork-lifts for palletised goods, hoses for liquids, chutes for grain-type commodities, etc.). For intermodal wagons reach stackers, portal cranes and similar devices are used. An important set of innovations in this area regards the possibility for transhipment of Intermodal Transport Units (ITU) without the use of such equipment, which requires generously sized infrastructure with plenty of room in the vertical direction for cranes and the like to access the ITU. They go under the name of *horizontal transhipment solutions*, since the displacement of ITU from road vehicle to rail vehicle, or between rail vehicles, occurs in a horizontal plane, reducing duration and infrastructure requirements. Since such equipment is ancillary to railway infrastructure, it is considered here as a part of the infrastructure. Such solutions range from relatively small devices allowing ITUs to be moved from a lorry to a wagon without the need of cranes, to relatively large innovative intermodal terminals specifically designed for the horizontal movement of ITUs between trains, thus requiring less space than traditional terminals.

Hump/gravity marshalling yards are high-capacity shunting yards, in which rakes of wagons are shunted over a hill, so that groups of wagons, previously detached, can roll to a designated track thanks to gravity. They require the speed of the groups of wagons to be controlled carefully, so that they can stop in the right spot. Recent years have seen the improvement of the *braking devices*, which allow increasingly higher speeds (greater throughput) with lower noise emissions (higher "environmental capacity").

Rolling-stock-related technology.

Rolling stock for freight operations comprises long-distance locomotives, shunting locomotives and 2-axle and 4-axle (bogie) wagons of several different types according to the goods transported.

The main existing wagon types have been the same for decades, the introduction of radically new types being infrequent. *Modified wagon-types* have appeared over time for faster loading (examples are those related to horizontal transhipment as described above), and for specific market segments. Innovations are expected to continue occurring in this sense.

Another innovative aspect regarding wagons is the increasing use of on-board devices allowing remote reporting of position (e.g. GPS), load status (temperature, shocks etc.), wagon status and any other physical quantity useful for the management of operations and maintenance ("*intelligent wagons*"). A crucial issue for such wagons is the availability of power sources for the on-board devices. Therefore, associated technological innovations that are also needed are long-life-cycle and reliable batteries, on-board generators, or solutions for drawing power from the overhead contact line (e.g. through the locomotive). The use of "intelligent wagons" is necessarily connected with the implementation of ICT solutions, as described below.

In the last decade or so several research projects have addressed *wagons for higher speed*, with lightweight design, particularly of bogies, but little practical application up till now. With such designs, lower wagon tares would also allow higher payloads for a given axle-load.

Research has also addressed radically new wagon designs for "self-marshalling". These highly innovative vehicles would be *self-propelled*, capable of low speed automated movements within a yard, thus strongly reducing the need for shunting locomotives.

In terms of locomotives, the traditional situation sees higher-powered higher-speed long-distance locomotives not usually being used for shunting, which is left to smaller locos. Diesel locos are usually required to access private sidings, and this requires additional uncoupling/coupling if the main line is electrified. Although the technology has been in

existence for a long time, innovations are occurring for *road-rail vehicles* (technology but also operation), *remote-controlled shunting locomotives*, *hybrid locomotives*. Such innovations allow the use during operations to be reconsidered.

Road-rail vehicles are capable of leaving the track and using road surfaces to reach other tracks, without necessarily having to use up track capacity. Innovation addresses the possibility for higher speeds and higher load being hauled. Remote controlled shunting locomotives allow improved operational schemes to be considered. Similarly, improved hybrid (both diesel and electric) locomotive technology could allow for operational benefits with shunting locomotives performing a part of mainline operations and vice-versa.

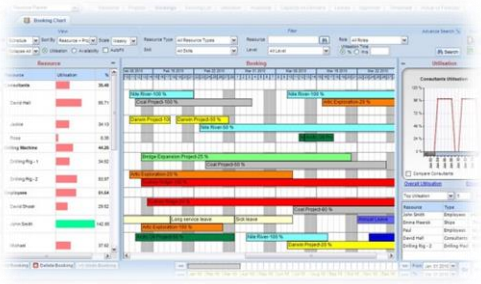
Automatic coupling of freight wagons was also identified as a technology with potential benefits for the sector. The technology has existed for a long time, and allows vehicles to be coupled just by slowly shunting one against the other. This eliminates the need for staff to work between the wagons and speeds up the single coupling operation significantly.

Information and communication technology (ICT)

While technological progress for rolling-stock and infrastructure has been relatively slow, ICT has seen major breakthroughs and has been increasing its presence in rail freight transport. This is also required by the European regulatory framework through the TAF TSI, the TSI on telematic applications for freight.

The most important solutions that were identified during the study address *wagon/locomotive fleet management, capacity booking, wagon/consignment tracking and tracing*.

Increasing computational power and the use of telematics allows ever-improving wagon and locomotive fleet management. Real-time information can be used to make predictions for maintenance interventions and availability of the rolling stock.



Similarly, a careful management of information on orders, rolling stock and infrastructure availability allows wagon capacity to be planned efficiently, and spare capacity to be known for "last-minute" needs. In this way, similarly to what happens for airline companies, vehicles run

as close as possible to their full capacity, and last-minute solutions can be found for customers willing to pay higher prices just as long as their consignment gets through.

Finally, wagon/consignment tracking&tracing uses available information to identify where exactly a wagon or consignment is at any given time (tracking), which waypoints were traversed in the past (tracing) and the expected times of arrival in future waypoints including the destination. Such functionalities are required by the TAF TSI, and thus will be a must for operators if the implementation plan of the TSI is to be respected.

The Table 11 lists the technologies identified, and summarises information derived during the study from the stakeholder consultation and desk research regarding expected benefits, maturity level and implementation issues.

Table 11 - Summary of the technology review - description, expected benefits, maturity and main implementation issues

Technology	Expected benefits	Maturity level	Implementation issues
INFRASTRUCTURE			
Horizontal transhipment solutions	- reduction of wagon loading times - improved efficiency in first/last mile shunting	further research needed	terminals require large investments
Improved automatic wayside brakes for marshalling yards	- improved efficiency in intermediate marshalling/shunting	mature	technology applicable to facilities whose use is decreasing over time
ROLLING STOCK			
Modified wagon concepts for faster loading, purpose built wagons for specific market segments	- reduction of wagon loading times - increased customer appeal	further research needed	implementation likely to be spontaneous
Road-rail engines for last mile services, remote controlled shunting locomotives	- improved efficiency in first/last mile shunting	mature	may require some modifications to existing last-mile infrastructure
Automatic coupling systems	- improved efficiency in first/last mile shunting - improved efficiency in intermediate marshalling/shunting	mature	requires widespread implementation
Hybrid-based traction schemes, rolling stock for higher speed	- improved efficiency in first/last mile shunting - improved efficiency in intermediate marshalling/shunting - improved efficiency during travel	mature	implementation likely to be spontaneous
"Intelligent wagon" communicating its physical status	- improved efficiency in first/last mile shunting - improved efficiency in intermediate marshalling/shunting - improved efficiency during travel	mature	implementation likely to be spontaneous

Technology	Expected benefits	Maturity level	Implementation issues
Self-propelled wagons / wagons with own driver cab	- improved efficiency in first/last mile shunting - improved efficiency in intermediate marshalling/shunting	further research needed	effectiveness still to be demonstrated
ICT			
Capacity booking schemes	- increased load/tare ratio - increased customer appeal	mature	requires strong collaboration among RUs
Wagon / consignment tracking and tracing, consignment condition monitoring	- improved efficiency during travel - increased customer appeal	mature	implementation likely to be spontaneous, required by TAF TSI
Wagon fleet and locomotive fleet management	- improved efficiency during travel	mature	implementation likely to be spontaneous

It can be seen from the above table that the technologies can also be categorised according to the impact (benefit) they are expected to bring. The following six categories have been formulated. The impacts are discussed on the basis of the technologies identified above.

Impact 1: to reduce wagon loading times. The reduction of the time taken to load or unload a wagon, either with goods or containers, usually has a direct effect on the turnaround time of wagons and on travel times. Innovations address wagon construction (e.g. modified container wagon with platform to allow driving onto the wagon with fork-lift trucks at the cargo station) and novel horizontal transhipment solutions (e.g. equipment that allows the horizontal transfer of containers or goods onto a wagon, even without a proper rail siding and in the presence of overhead contact line). In the latter area, innovations for container-transport include new types of terminals that can be built in relatively small spaces next to existing rail infrastructure and allow the removal of containers from trains under an electric contact line.

Impact 2: increase of load factors of wagons and trains. An increase the payload per wagon / per train has direct consequences on profitability of SWL transport in particular. This objective is addressed essentially in two ways: through rolling stock with lower tare weight/higher axle load/both and by managing wagons in a way as to minimise the number of wagons running empty. The former issue has benefited from a number of research projects in the last decade. However transfer of research results to manufacturers seems slow. This could mean that the research has not delivered practically applicable solutions yet. The latter has seen a number of applications which benefit from the use of ICT that allow a more effective management of train capacity (capacity booking), in a view to ensure increased reliability of customer services.

Impact 3: ***improved efficiency in first/last mile shunting.*** Shunting operations related to the first and last mile have a direct effect on overall transit times and reliability of service. The cost of such operations is affected significantly by the number of movements of shunting equipment when running without wagons and by the frequency of coupling/uncoupling. Road-rail engines can help reduce movements without payload, with the shunting equipment moving on road to the next shunting site, and reduce the number of tracks necessary. The number of wagons they can haul is an issue that can limit their use to specific situations. The use of hybrid locomotives (e.g. diesel-electric capable of drawing power from an overhead contact line) can allow a greater flexibility in coupling/uncoupling with the train/wagons. Automatic coupling has been discussed for decades and has been practically impossible up till now. It would of course reduce duration of shunting operations. Remote-controlled shunting locomotives are a reality that can contribute to reducing duration of operations, while reducing the number of staff required. Self-propelled wagons and wagons with their own driver cab have been a matter for research but have not yet seen practical application.

Impact 4: improved efficiency in intermediate marshalling/shunting. The marshalling and shunting operations that are usually required in SWL transport during the wagon's journey also directly affect transit times and reliability of service. Most of the technological solutions described for the previous objective are equally valid for such operations. Another technological proposal regards the introduction of ICT on wagons to monitor significant operational parameters, including position e.g. through GPS rather than with traditional means. This requires some form of power for the on-board equipment. The possibility to draw the power in a similar way as for passenger trains may have advantages but it entails a significant complication of the system. On-board long life-cycle or solar cells batteries are possible solutions. “Intelligent wagon” solution can also potentially contribute to a more efficient on-condition and preventive wagon maintenance, which can allow removal of a wagon for maintenance in a way that it does not impact too much on operations. Improved designs of wayside brakes for marshalling yards would have a direct effect on yard capacity and noise (which can also be a capacity constraint).

Impact 5: improved efficiency during travel. For the reasons given above, ICT for wagon monitoring (tracking & tracing including the monitoring of the status of consignments and wagon) is also considered a driver for the improvement of the efficiency of the system. Beside the use of wagons only when it is reasonable (for maintenance aspects) that they will be able to make the entire trip required. Such systems can usefully incorporate some form of decision support system. Another technological innovation that would contribute to lower travel times is the introduction of wagons capable of higher speeds. This issue is also connected with the possibility of higher axle loads.

Impact 6: increased customer appeal. Technologies allowing wagons & consignments tracking & tracing – to be available also on international movements – are a key element to increase the quality of SWL as perceived by customers. Such information shall be provided to the shippers, since such kind of data are already available when the transport is done using

other modes. Other relevant developments are wagon types for specific markets built by modifying existing types (modification of grain-transport wagons to allow the transport of calcium carbonate); however, increasing the number of wagons types (tailored to specific clients' needs) may help to attract customers but increases complexity in the system.

6.2. Drivers of the evolution and key issues

Evolution of technologies regarding infrastructure and rolling stock has been slow in the past. There are no signs of it speeding up. This is probably due to the fact that the sector is a particularly mature one with consolidated technologies. The novel solutions, taken individually, are not capable of providing breakthroughs in productivity. They have to be applied simultaneously, most of them requiring relatively large investments necessary to ensure widespread application. The entrepreneurial risk of developing solutions that are then not adopted by the market is quite large.

On the other hand, the relatively recent application of ICT looks to be quite promising. This is acknowledged by the European institutions through the TSI on Telematic Applications for Freight (TAF TSI), which requires several functions connected with rail freight transport to be performed by means of ICT. This technology is appearing in an area where it had not been used up till now. Therefore, the sector is open to new ideas and evolution has been rapid. The entrepreneurship of companies willing to enter the market, with risks that are less than those associated with infrastructure and rolling stock, is likely to be capable of sustaining this evolution in the future. The benefits of such technologies are potentially quite high. In fact, they are associated with parallel changes in management and mentality, which can boost their effect on productivity.

7. Production methods

The configuration of any transport system is the result of a spatio-temporal interaction between demand and supply. The physical structure of the rail network is the outcome of long-term development process and can be seen as fixed in the short and medium term, although even significant changes at nodes can occur in the medium term (that is, 3-5 years). The functional structure of the network, however, is composed of the supply of origin-destination services and can be adjusted in the short-term in order to conform to the spatial and typological configuration of the demand for freight transport.

Thus, the demand structure is one of the principal factors that affect the rail network configuration.

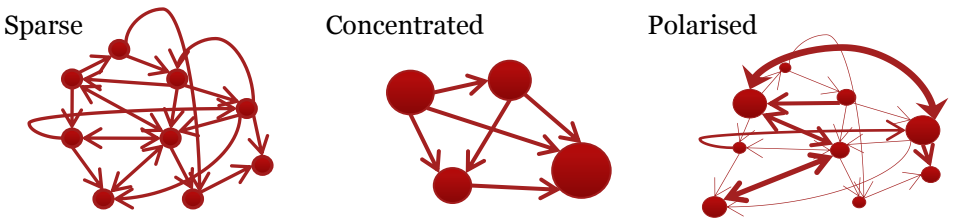
7.1. Demand spatial patterns

The actual configuration of freight transport demand is very complex and can be determined through extensive surveys on the field. However, because the efficiency of rail transport overall depends on the concentration of freight flows, the following characteristics can be identified as main requirements: space distribution, commodity composition, time distribution and flow directionality of demand.

An abstract model is useful to get a taxonomical representation of different actual conditions.

The space distribution has a direct effect on both the rail network topology and the quantity of rail services supplied. Three main space patterns of demand distribution can be identified:

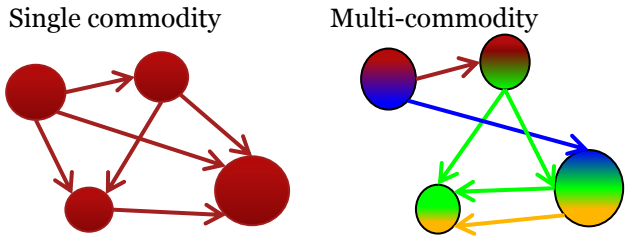
- *sparse demand*, with many small zones, distributed on the whole territory, where limited amounts of freight are generated and attracted, respectively toward and from many other zones;
- *concentrated demand*, with few zones on the whole territory, where large amounts of freight are generated and attracted, with limited origin-destination connections;
- *polarised demand*, characterised by a few large generation or attraction zones that exist together with some minor poles that generate or attract more limited but not negligible amounts of demand.



Demand space distribution

Rail service typology is also heavily influenced by the categories of commodities. Homogeneity of commodities between origin-destination zones is a relevant condition to achieve economy of scale in the transport. Thus, the following two conditions can be identified:

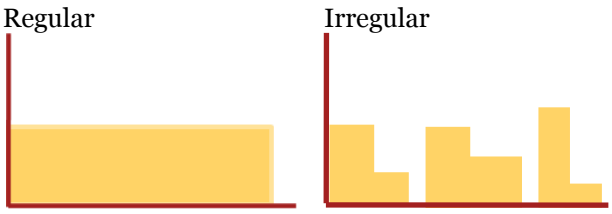
- *single-commodity*, characterised by large demand flows of homogenous commodities;
- *multi-commodity*, characterised by demand flows of several different freight commodities between the same origin-destination pairs.



Demand commodity composition

The effect of the time distribution of freight demand flow on the efficiency of the rail service is complementary to that of the space distribution in order to achieve load concentration.

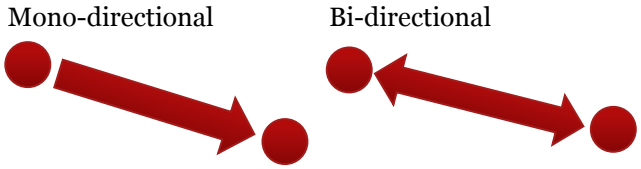
- Regular demand means a quite uniform time distribution of the freight flow;
- Irregular demand, however, means a concentration of large flows in short time intervals, alternated to intervals with small flows.



Demand time distribution

Finally, the space structure of freight transport demand between two zones has to be characterised by the direction.

- *Mono-directional* demand means that one zone is a generation pole (for instance, a production site), and the other is an attraction pole (for instance, an urban area);
- *Bi-directional* demand means that the demand flow is quite well balanced in the two directions, and both zones are mutually generation and attraction poles.



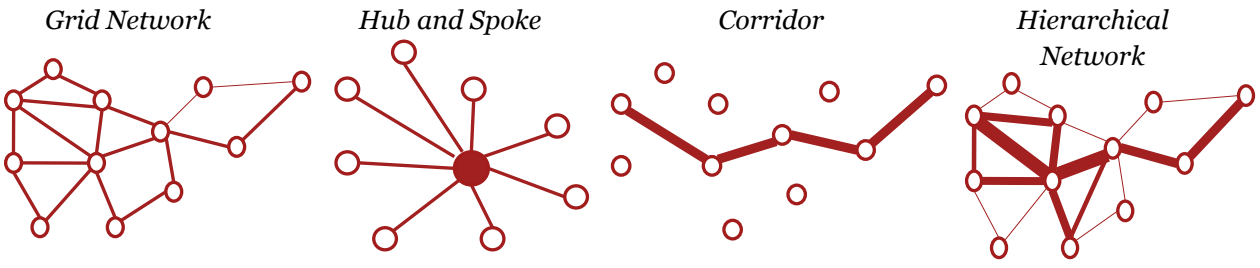
Demand flow direction

7.1.1. Network layouts and production approaches

The network layout arises from the superimposition of the connection service supply to the railway network topology. While the network topology is fixed in the short and medium term, service can be adjusted to fulfil demand even in the short term. The network layout always refers to a given time interval during which the rail transport service is supplied.

Several different network layouts can be identified for freight transport by rail.

- *Grid network* is a supply layout that allows many-to-many connections without any hierarchy among them;
- *Hub and Spoke* is a supply layout characterized by one principal node (the hub) and the remaining minor nodes all connected to the former through direct links (spokes) but not directly among each other;
- *Corridor* is a linear network layout where only nodes situated on a main railway line are connected directly through a high capacity rail service, while the remaining nodes are not connected directly to the railway network.
- *Hierarchical network* is a more complex layout, where both hub-and-spoke and corridors are combined on a grid network thus introducing so a hierarchy of rail transport supply in terms of frequency and capacity.



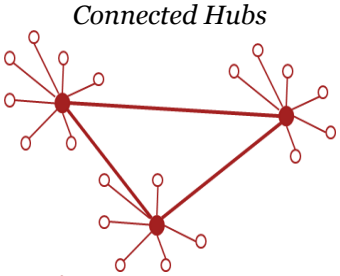
The Hub-and-Spoke is the prevailing current system for SWL traffic. The chief characteristic of the hub-and-spoke design is that all loading units pass through the hub terminal, and it must thus handle an extensive throughput. It is, therefore, of great importance that the hub terminal has a large capacity. It also has to be extremely reliable, since the whole system is

affected if the hub terminal breaks down. The design implies comparatively large detours, and for covering a large area overnight the hub terminal must allow short train stops. The load plan and exchange technology must offer accessibility to any loading unit, and if all trains combined at the hub are not accessible simultaneously, there is a great need for intermediate storage.

The production structure of the rail service represents the mode in which rail supply fulfils the demand for freight transport. The Figures below illustrate the combination of production methods that are currently implemented in the European network. The Table 12 shows how the demand structure shapes the network layout, the train functions, and the commercial approach to the production structure.

Point to Point

Connected Hubs



Two Level Connected Hubs

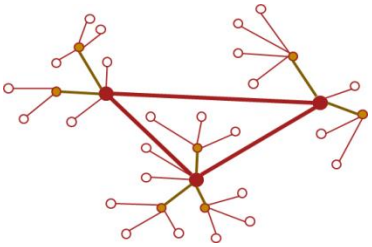


Table 12 - Network layout and production approach

Network Layout	Demand structure	Network Structure	Train Function	Commercial Approach	Production Structure
Grid	+O +D	*Sidings or Freight stations and Marshalling Yards*	*Feeder + Long-haul*	*Multi-client Unscheduled*	*Single Wagon Load*
Hub and Spoke	+O +D	*Sidings or Freight stations and Marshalling Yards*	*Feeder*	*Multi-client Unscheduled*	*Single Wagon Load*
Point to Point	*1O 1D*	*Two Terminals*	*Liner*	*Mono-client Scheduled*	*Full Train Load*
Corridor	*+O 1D*	*Nodes and Satellites*	*Liner*	*Multi-client Scheduled*	*Mixed Train*
Connected Hubs	+O +D	*Two or more Hubs and Spokes*	*Feeder + Long-haul*	*Multi-client Scheduled*	*Mixed Train*
Two Level Connected Hubs	+O +D	*First level hubs and second level hubs connected between them and their Spokes*	*Feeder + Long-haul*	*Multi-client Scheduled*	*Mixed Train*
Integrated Grid Network	+O +D	*Multi-function Nodes*	*All*	*Multi-client Dynamic Scheduled*	*Mixed Train*

The grid *network* complies with a many-to-many origin-destination distributed demand structure. The network structure is based on rail sidings or freight stations where freight

demand enters the network and marshalling (or even shunting) yards where freight wagons are recomposed to form trains toward their destination. The freight transportation service is typically based on both feeder and long-haul train functions. The service supplied is unscheduled and addressed to many possible clients. The typical production structure is single wagon load.

The *hub-and-spoke network* layout is typically shaped to comply with a many-to-many distributed demand structure in a spatially limited area. The network structure is again based on sidings and marshalling or shunting yards for the decomposition and the recomposition of trains. The service is composed of unscheduled, multi-client feeder trains. The typical production structure is again single wagon load.

The *point-to-point network* layout has opposite features with respect to both grid and hub-and-spoke networks. It is designed to supply a single client with a scheduled liner service that connects two terminals directly. The production structure is the full train load.

The *corridor layout* still implements a scheduled liner train service. It uses a high-density flow along an artery and short capillary services to nodes off the corridor. Unlike the point-to-point layout, it is based on a node and satellite structure that allows entering the corridor even at intermediate nodes (connected to the satellites external and close to the corridor), where blocks of wagons or even single wagons can be coupled (or decoupled) to the train travelling between the two terminals. The train can collect wagons of even different clients, if any. In such a case, the production structure is a mixed train.

A network layout formed by joining two or more hub-and-spoke networks (called *connected hubs*) exploits feeder trains to collect a distributed demand gravitating around the first terminal, hauls such a freight demand by means of a scheduled long-haul train, and finally distributes it toward the set of different final destinations by means of several feeder trains. The production structure is again single wagon load, or is a mixed train if blocks of wagons are joined to feed the long-haul train without decomposition. The feeder trains can be managed by local freight operators (short-liners). They can collect and deliver groups of wagons and the complete trains can be hauled by a national RU from one hub to another.

The *two-level connected-hub layout* is a more complex network layout than the traditional hub-and-spoke one. In this case, there are several hubs, which can be designated as first-level hubs or second-level hubs according to demand volume. Second-level hubs are generally connected to a first-level one and there are feeder services from second levels hubs to final destinations. The production structure is again single wagon load, or mixed train.

The *integrated grid network* is a more flexible layout, in which the nodes of the network are connected through different possible routes and can perform different functions; that is: intermodal terminal, marshalling yard, shunting yard. Different nodes of the network can be connected with different types of trains to comply with even diverse requirements of possible different clients. *Dynamic train scheduling* is the most advanced design strategy to adjust the service supplied according to the actual demand.

The Table below analyses the main features of network layouts that affect production methods, specifically: flexibility of either the network structure or the transport service; accessibility in time and space. Different methods are then clustered depending on their approach, either supply-driven or demand-driven. The former approach seeks to ensure efficiency of the rail transport. The latter is addressed to meet demand requirements.

Table 13 - Network layout and features affecting production methods

Network layout	Network Flexibility	Service Flexibility	Main Driver	Time Accessibility	Space Accessibility
Grid	*Rigid*	*Flexible*	*Supply-oriented*	*Unscheduled*	*Rail Sidings*
Hub and Spoke	*Rigid*	*Flexible*	*Supply-oriented*	*Unscheduled*	*Rail Sidings*
Point to Point	*Rigid*	*Rigid*	*Demand-oriented*	*Scheduled*	*Rail Terminal*
Corridor	*Flexible*	*Flexible*	*Demand-oriented*	*Scheduled*	*Intermodal Terminals*
Connected Hubs	*Rigid*	*Flexible*	*Hybrid*	*Scheduled*	*Rail sidings + Intermodal Terminals*
Two level connected hubs	*Rigid*	*Flexible*	*Hybrid*	*Scheduled*	*Rail sidings + Intermodal Terminals*
Integrated Grid Network	*Flexible*	*Dynamic*	*Demand-Oriented*	*Dynamic Schedule*	*Rail sidings + Intermodal Terminals*

Both grid network and hub-and-spoke network are traditional supply-oriented layouts. They have a rigid network structure (with access through rail sidings and shunting at marshalling yards), while the service is flexible both in terms of clients and in terms of transit time (even a single wagon is accepted, but the delivery time is not guaranteed).

With respect to the grid, the hub-and-spoke layout introduces a strong hierarchy in the grid network. It is usually the production method used to collect, haul and deliver freight in the traditional grid rail network.

Point-to-point connection is the typical layout of full train services. It aims at meeting demand requirements and introduces a more rigid scheduled service to increase the reliability in rail freight transport. Access to the network is allowed only at rail terminals (freight stations and/or intermodal terminals).

The *Corridor* layout also is a demand-oriented production method, which relaxes the strong rigidity of the point-to-point layout. It introduces more flexibility both in the service and in the network structure, whose space accessibility is improved through several intermediate terminals along the corridor. In a system based on the corridor design, each train passes several terminals en route, and the transfer times must be kept at a minimum in order not to

prolong the total transport time. On the other hand, only a limited number of loading units is transferred at each terminal, and, hence, these must be economically feasible to operate on a small scale. Reliability of an individual terminal is not crucial since it only affects the loading units to be transhipped at the terminal.

A particular case is represented by the mixed liner train, a type of production system that bundles the volumes of intermodal shipments originating in two or more terminals that are located along a line, and carries them to the destination terminal, and vice versa. In the "classical" meaning of liner train operations a full train set of wagons independent of their loading status is starting at the first terminal of departure, enters the second terminal where loading units are both loaded and – if requested – unloaded, and continues to its final destination provided that the train does not call at a third liner terminal. An example is provided by the liner trains starting from the Maasvlakte container terminal in Rotterdam.

The *connected hubs* layout and *two level connected hubs* layout are hybrid methods that allow entering the rail network both at rail sidings and intermodal terminals. Scheduled long-haul services between terminals ensure more reliable transit times. Specific local requirements at intermediate terminals can be complied with by allowing coupling or uncoupling blocks of wagons by means of limited shunting manoeuvres.

The *integrated grid network* is an enhanced production method, which provides higher service flexibility by means of adaptable routes design. Links are designated depending on the actual demand, and the network operator can choose many different routes between origin and destination. When using static routes design, the transport operator designates a number of links to use on a regular basis. In contrast to the hub-and-spoke layout, several nodes are used as transfer points along the route. Usually only part of the load is transferred, and the rest stays on the transport means to the next node. In an extreme form, routes can be changed during transportation thus providing so a dynamic routes design.

7.2. The production methods in the key countries

In order to increase quality and competitiveness of the Single Wagon System, RUs and Member States have been driven to find new solutions and new production methods.

In general, the network layouts had evolved from the grid structure to the hub and spoke system and to the hierarchical network.

The guideline is the optimisation of the resources and the "network footprint", closing down those service points with very low traffic and offering regular and scheduled services between hubs ("connected hubs") or service points with high demand and unscheduled service on service points with low traffic.

The feeder service to primary networks or services from ports to industrial spurs can be performed by local freight railway undertakings or short liners, companies serving a small

number of points. They exist in Europe in Germany, in Switzerland and recently in France, and they are widespread in USA and Canada.

The **conventional production system** is characterised by no capacity check and no booking on specific trains. The arrival time span and the maximum time are usually communicated to the clients. Priority is given to the first picked up (FIFO, First In, First Out rule), and normally there is no booking limit for the customer. This system is based on conveyor belt logic (wagons are directed towards the next train leaving for planned destination).

This system is overcome by the **capacity booking system**, which is characterized by an order confirmation after a capacity check and booking on concrete trains. The clients are informed of the Estimated Time of Arrival (ETA) based on the routes with free capacity. Priority is given to the first booked, the volume is limited by the available train capacity, and yield management (e.g., price differentiation) is allowed.

In order to develop *capacity-managed networks* and their connection in Europe, so as to increase the service quality and the efficiency the idea of an alliance between operators was initiated in 2006. One year later UIC started the "Xrail" project with DB Schenker Rail, Fret SNCF, Green Cargo, Rail Cargo Austria, SBB Cargo and SNCB Logistics. In 2008 CLF Cargo and CD Cargo became observing members and in 2009 Fret SNCF left the alliance.

In 2010, the official contract was signed between seven European rail freight operators: **CD Cargo** (Czech Republic), **CLF Cargo** (Luxembourg), **DB Schenker Rail** (Germany, Netherlands, Denmark), **Green Cargo** (Sweden, Norway), **Rail Cargo Austria** (Austria, Hungary), **SBB Cargo** (Switzerland) and **SNCB Logistics** (Belgium).

At May 2013 Xrail served 420 Origins/Destinations and the network is going to be also extended to Northern Italy.

Quality standards are set as for reliability and customer information: minimum reliability rate of 90% with respect to the given estimated time of arrival, transport information (track & trace, delay alert message, etc.) and transport quotes within a maximum of 3 working days.

Country cases are provided below.

Austria

Rail Cargo Group is working on the optimization of the network footprint in several phases. In 2010 there were 570 mileposts in the network. After a three-phase optimization plan, 434 mileposts have planned service. The closure of 25 % of mileposts since 2010 has caused a reduction of about 5% of the volume.

The optimization plan introduced a new SWL production system, production belts, with the consolidation of two parallel production systems into one system.

In the former vertical production, single wagon load and block train system were separated and the single wagon load was utilization driven.

	With the new production system the primary and the secondary networks have been identified. Within a cross-border primary network there is a demand driven hub-and-spoke system with regular and frequent connections with a resource reduction due to a reduction of traffic peak. The secondary network is for local and regional feeder traffic. Rail Cargo Group is in the Xrail Alliance.
Belgium	A Traditional SWL system based on a hub and spoke network is offered with ICT (track and tracing). About 5 % of SWL traffic is operated through Mixed trains. SNCB is in the Xrail Alliance.
Czech Republic	A *Traditional SWL System* Hub and Spoke network is implemented, and the services are mostly unscheduled, some scheduled services only inter – marshalling yards. Since October 2012 DB Schenker Rail Polska and CD Cargo have offered a *new liner train in Moravia* that runs 3 times a week. CD is in the Xrail Alliance, however only the 2% of SWL is carried with Xrail standard.
France	In France, Fret SNCF has recently reorganised the single wagonload network as *Multi Lots-Multi Clients* services. This system, operational since 2011, is based on a transport plan using a set of independent lines that provide regular links to the country's major economic regions. Each line is made up of a platform collection by a connecting train and a final distribution. Multi-Lots Multi-Clients is based on reciprocal agreements: the shippers commit to a minimum anticipated amount in the order process and Fret SNCF commits to the transport deadline. Since the end of 2012, the Multi-lots Multi-clients offer has been extended to Antwerp, Germany and Switzerland, providing an end-to-end service. From January 2013, Fret SNCF offer customers the possibility of ordering an unlimited volume over their initial pre-order, subject to available capacity. This new provision provides customers with real flexibility where their volume forecasts are difficult to predict. In France since 2010 there are also local railway undertakings (Operateurs Ferroviaires de Proximité) that collect groups of wagons and constitute complete trains, which can be hauled by national RU's from one hub to another, where the wagons can be delivered by another local operator. Four of them operate in the land (CFR Morvan, TPCF Régiorail, RDT 13, and Bourgogne Fret Service) and four more are expected in the next 6 months, and two are based in ports (OFP Atlantique and Normandie Rail Services). Three RUs covering the whole French territory have also created local organizations.

Italy	Trenitalia has concentrated Multiclient service to specific stations only for some routes (Torino-Fossacesia-Melfi, Dinazzano Po-Lamezia, Pescara-Catania, Milano Prato-Roma Marcianise, Rivalta-Roma/Pomezia, Piacenza-Roma-Marcianise, Bologna-Catania). In Northern Italy, Nord Cargo, a subsidiary of DB Schenker Rail, has started to offer the Xrail standards during 2013, and Rail Cargo Italia, part of Rail Cargo Group will follow on 2014. DB Schenker Rail closes the "last mile" gap with the Railport system, available at numerous locations in Italy and Europe. DB Schenker Rail currently operates nine Railports in Italy: Torino Orbassano, Desio, San Zeno, Castelguelfo, Dinazzano, Anagni, Verona, Grisignano, Lugo di Romagna.
Germany	The network layout may be assimilated to a hierarchical network that is more flexible if compared to the traditional one. Indeed, the hierarchy concept is based on commodity type and traffic volumes. In particular, chemicals and automotive have separate networks while coils do not have a dedicated network, even if in this case it is essential to ensure short travel times in order to counter the "white rust" problem. DB Schenker is in the Xrail Alliance, even if the current SWL market share (handled within Xrail Broker and Xrail standards) is about 1%. DB generally runs scheduled services only for very important O-D links. The company provides last mile service, both directly or in outsourcing, as such type of service is also considered as profitable. Mixed train services are also performed, aimed at maximizing the train capacity (i.e. a block train is made by adding SWL wagons or group of wagons until the maximum length train is reached). For specific commodities, such as coal and iron ore, this service is not available; indeed, they are loaded only on heavy block trains with a coupling system that does not allow further wagon additions. Generally speaking, the average dwell time of a wagon in a yard is between 2,30 and 6 hours (info provided by interview with Romanians).
Poland	A *Traditional SWL System* is implemented. There are many marshalling yards, but PKP uses only three of them. PKP requires their customers to ship a group of 5 wagons as a minimum. *A liner train for wagonload service* (regular 4 times a week) between *Silesia* and West Europe through Germany (Sedding marshalling yard near Berlin – 22 freight yards near four main Silesian stations) is offered by DB Schenker subsidiaries (DB Schenker Rail Polska, DB Schenker Rail Spedkol and DB Schenker Rail Deutschland). Since October 2012 DB Schenker Rail Polska and CD Cargo have offered a new *liner train in Moravia*, which runs 3 times a week.
Romania	The SWL wagon is performed only by CFR Marfa, no other private companies, as Traditional SWL System. The network is composed of about

600 freight stations (in the 1998-2000 period they were about 1.300). For the majority of these, after an authorization request, customers are required to fill a minimum of 5-6 wagons in order to finalize the shipment.
According to the most recent interviews CRF Marfa moves 150trains/day (full, intermodal and local) with 2-4 trains/day in intermodal between 2-8 main public marshalling yards. Main customers are large companies purchasing both trainloads and SWL service (no customers required only SWL service). The average train tonnage (intermodal) is 1300 gross t (or 700 t net).
Rail supply is completed by new operators: GFR provides SWL service through mixed trains while Rofersped (owned by CFR Marfa), Unicomtransit and Dacotrans provide shuttle trains.
Dwell time of a wagon in a yard is about 36-40 hours on average. At national level SWL is not competitive for links shorter than 200-250 km. On the contrary, it represents a convenient option for distances higher than 500 km.

Sweden

Green Cargo implements the Xrail Capacity Booking System.
In order to increase train fill rate Green Cargo operated also with mixed trains, and using capacitated booking classes performs the control of train contents.
According to the Green Cargo monitoring system, the train fill rate of different categories of rail transport are: about 75% (1600 tonnes -450 meters) for wagon load, 53% (1600 tonnes, 320 meters) for trainload, 50% (800 tonnes-600 meter) for intermodal train and 100% (700 tonnes – 200 m wagonload, 500 tonnes - 100 m trainload, 400 tonnes – 300 m intermodal) for mixed train. (Jeppson, 2010)

Switzerland

SBB Cargo operates Swiss single wagonload in a *hub and spoke system* and offered in *two* differentiated *production modes*:

- *Cargo Rail Net*: nationwide single wagon load transports between optionally selectable service points;
- *Express Net*: fast transport mode (mostly during the night) between a few selected service points.

The single wagonload services are currently operated through six hubs (three for each of the two different above mentioned nets). From 2016 on, there will remain only three hubs for both nets due to production and operational optimizations (Source: SBB Cargo, questionnaire).
In 2013 SBB Cargo has restructured 155 very poorly utilized service points. On average, less than one wagon a day was processed at these locations. SBB Cargo involved all affected customers and cantons in an extensive and broadly based process to discuss restructuring the poorly utilized service points and draw up solutions.
Of the 155 service points which were reviewed, 25 will continue to be operated on a regular basis. Two service points will now be operated seasonally. Eight service points are no longer included in the network, but block trains will now stop there at the request of customers. 128 of the very

poorly utilized points will no longer operate as of the new timetable. 98 percent of the current freight volume will continue to be carried by rail. (Rail Freight Portal-UIC, 2012).
SBB is in the Xrail Alliance.

UK SWL is dismissed and the freight traffic is mostly intermodal ("Domestic Intermodal"), the last mile services are offered by road.

The remarks above are summarized in Table 14, which reports the network layout and main production modes in each Key Country.

Table 14 - Country cases: Network layout and production modes

Countries	Network layout	Production modes
Austria	Hierarchical Network (Hub and spoke + feeder traffic)	Demand driven regular services on primary network Feeder services on secondary network Xrail broker – Capacity Booking System (not yet completely implemented)
Belgium	Hub and Spoke	Traditional SWL with ICT technologies Xrail broker – Capacity Booking System (not yet completely implemented)
Czech Republic	Hub and Spoke and corridors	Traditional SWL and a liner service Xrail broker – Capacity Booking System (only for 2% of SWL) (not yet completely implemented)
France	Point to Point	Multi-client SWL, liner services, short liners
Italy	Point to Point (FS) Hub and Spoke and Liner Train (NR, NC)	Multi-client SWL Xrail broker – Capacity Booking System in Northern Italy (not implemented)
Germany	Hub and Spoke – Hierarchical Network	Xrail broker – Capacity Booking System (not yet completely implemented) Mixed Train (Wagonload + Trainload + Intermodal)
Poland	Hub and Spoke	Traditional SWL + 2 liner services
Romania	Hub and Spoke	Traditional SWL
Sweden	Hub and Spoke – Hierarchical Network	Xrail broker - Capacity Booking System Mixed Train (Wagonload + Trainload + Intermodal)

Countries	Network layout	Production modes
Switzerland	Hub and Spoke	Cargo Rail Net: nationwide single wagon load transports between optionally choosable service points Express Net: fast transport mode (mostly during night) between a few selected service points Xrail broker – Capacity Booking System (not yet completely implemented)
UK	Grid	Domestic Intermodal

7.2.1. Service Performance

The following **Key Performance Indicators** have been surveyed through specific request to RUs as part of the first survey:

- *Average distance from production site,* including hub-to-hub distance (*marshalling yard - marshalling yard*), distance from consignment to hub *first mile*) and from hub to delivery l*ast mile*);
- *Average transit time,* including hub-to-hub transit times (*travel*) plus times from consignment to hub (*first mile*) and from hub to delivery (*last mile*);
- *Wagon filling rate*: ratio between the *total t·km SWL* and *the total capacity SWL* (calculated as *average wagon capacity·average number of wagons per train-km*). If this was not viable, *average loading factor of wagons + fraction of wagons running empty* or ratio between laden and empty wagons in trains;
- *Number of marshalling yards* or *shunting yards* encountered by a wagon during a trip (rangee of value);
- *Punctuality of service (trains within 1 hour)* and activity responsible for delays (reduced speed on the network, low priority level for freight service on the network, technical issues, rolling stock issues, delays created by the customer , third party intervention, force majeure, others).

These indicators refer to domestic services or to domestic segments of international services.

Only 8 RUs provided at least one of these indicators. It is important to highlight that the majority of them provided ranges, not precise values of the KPIs. The limited number of information available, as well as the obtainability only of “ranges”, are explained by the increasing completion in the sector, impying that service performance indicators are becoming sensitive data. Moreover, in some cases collection of such data at aggregate level resulted to be very difficult for the interviewed RUs.

The a*verage distance,* according to respondents (6 RUs), is from 100 to 500 km, with an average value of about 250 km. Some RUs (3) provided disaggregated data. The distance of first and last mile is less than 100 km and two respondents indicate less than 30 km.

The a*verage transit time,* according to respondents (7 RUs), is from 12 to 72 hours or more for longer distances. Some RUs (3) provided disaggregated data. The time in the marshalling yards is from 4 to 48 hours.

The *wagon filling rate*, according to respondents (5 RUs), is from 25% to 70%, with an average value of 50%. This is explained also by the demand characteristics, often mono-directional generating empty back running of wagons.

The *number of marshalling yards* or *shunting yards,* according to respondents (6 RUs) encountered by a wagon during a trip is from 1 to 4, with an average number of 2.

Regarding *punctuality of service,* respondents *(*4 RUs) stated that from 75 to 90 per cent of trains has less than 1h of delay. Only one RU provided the causes of the delays and stated that from 75% to 90% the cause of delay is low priority level for freight service on the network.

7.3. Prospects for future SWL system developments

In order to develop the SWL system, **cooperation between operators** seems to be a key issue for both operators (since, especially on international traffic, this will improve the overall efficiency of the system and the utilisation of available capacity) and shippers (stronger cooperation is expected to facilitate the avaialbility of a more comprehensive SWL supply as well as higher quality and a better information to customers[24]). Some exempla of cooperation are:

- **Xrail Alliance** between seven European rail freight operators: CD Cargo, CLF Cargo, DB Schenker Rail, Green Cargo, Rail Cargo Austria, SBB Cargo and SNCB Logistics. The network covered is that of Central European (Czech Republic, Luxembourg, Germany, Netherlands, Denmark, Sweden, Norway, Austria, Hungary, Switzerland, Belgium and Northern Italy). The main objective of this Alliance is the implementation of a central broker solution to connect RU **capacity booking**. Currently only Green Cargo has completed the implementation. The other RUs are expected to do by 2015. This system shall also provide shippers with "**Estimated Time of Arrival**" information for their consignment even in international traffic.

- **Mutual (bilateral) agreement** between RUs to provide international SWL services as DB Schenker Rail Polska and CD Cargo did in order to offer a new liner train in Moravia, or DB Schenker subsidiaries (DB Schenker Rail Polska, DB Schenker

[24]Wagons' tracking and tracing is already available in several RUs for domestic movements, but still not provided for international transport due to lack of interoperability and interconnection between the ITC systems of RUs of different Countries.

Rail Spedkol and DB Schenker Rail Deutschland) to offer a liner train for wagonload service between Silesia and West Europe through Germany, or even between forwarders and local railway undertakings, as it occurs in France.

Cooperation shall be implemented within a liberalised rail freight market, so that not to generate limitation to the competition among different operators.

The implementation of **innovative production methods** is a key point. The traditional Hub and Spoke network, with high fixed costs due to marshalling operations, is going to be overcome by networks characterised by **connected hubs** and **corridors** and flat shunting operations.

Liner train services, for instance, operate along rail corridors with scheduled services through fixed freight stations. Silesia liner service and its success (initially a train twice a week, currently four times a week due to a request of customers), demonstrates that this kind of services is very appreciated by customers. The service supply is "fixed" in the short term (scheduled, fixed service points) and this provides customers with higher service reliability, but it may be "flexible" to customers' needs and demand evolution with new timetable.

Mixed trains are also offered in Sweden, Germany and in others countries. Trains are composed with single wagon and block train and sometimes even with intermodal units. The **integration between single wagon and intermodal transport** is going to become more and more important.

In France, in the last years **Multi-Clients services** are offered by SNCF, based on a transport plan using a set of independent lines that provide regular links to the country's major economic regions. Each line is made up of a platform collection by a connecting train and a final distribution.

Table 15 - Development of Production methods

Adopted measures aiming to improve efficiency of SWL	Key Issues	Countries
Xrail Broker - Capacity Booking	Connected networks, ETA (Estimated Time of Arrival), high reliability ensured	Austria, Belgium, Czech Republic, Germany, Sweden, Switzerland,
Liner Train services	Scheduled service on corridors	Czech Republic, Poland
Mixed trains	Single Wagon + Block train (+ Intermodal)	Austria, Belgium, Germany, Sweden, Italy
Multi-client trains	Coordinated transport plan	France, Italy

The following conclusion can be drawn from the analysis of the SWL production methods:

- the **production system for SWL is progressively changing**, in order to be more adapted to the market situation;

- in particular, the "traditional" hierarchical network, where conventional wagons are marshalled several times during their trip before reaching the final destination, still exist in several countries, but it is now progressively transformed:
    - **mixed** with other type of services (e.g. including batches of wagons transporting intermodal units to/from the terminals where they are loaded / unloaded)
    - **simplified** by minimising the number of intrenediate marshalling, and with some services operated as linear or corridor trains, having a (limited) number of pre-defined stops where groups of wagons are cut or assembled to the train.
- production models are now focused on **increasing the service efficiency**, in particular by increasing the utilisation factor of the available capacity (especially on the medium/ long distance trains connecting marshalling yards), also through the implementation of integrated (i.e. involving several RUs) capacity booking solutions;
- the **high rate of international traffic** (representing 2/3 of SWL traffic, as presented in chapter 4.2) stimulate the need of enhanced cooperation among RUs providing services on international corridor.

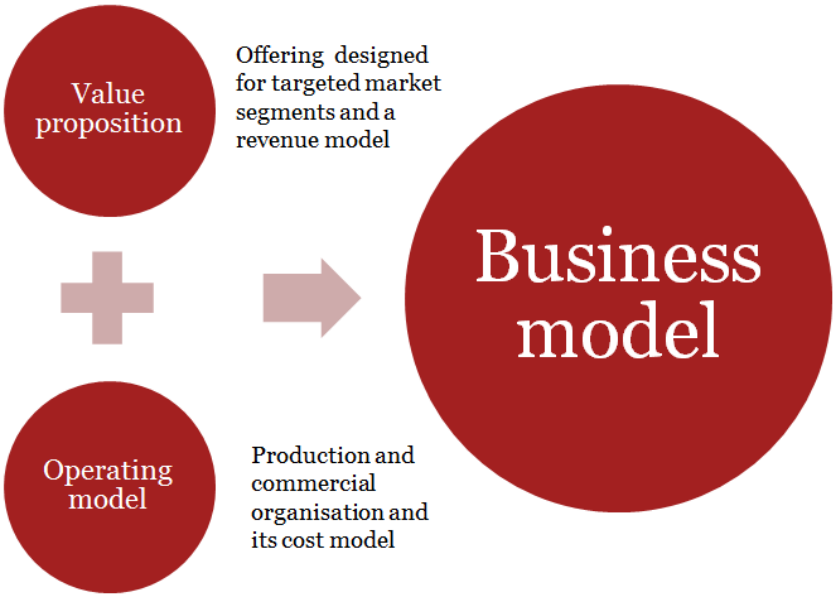
The setting-up of improved production models is entirely part of the corporate strategy of each RUs. Thus, limited intervention shall be expected by EU institutions on this aspect of SWL. However, the understanding of the above described evolution is essential to adopt appropriate infrastructure development strategies, in particular in the framework of the EU action on international rail corridors described in the chapter 5.3.1.

8. Business models for SWL

8.1. Situation

A business model describes how a company or a non-profit organization operates and delivers value to answer needs and help solving problems for its different market segments, customers or users.

Figure 25 - Business model components



The railway companies in the past served the transport market providing solutions to help mobility of persons and goods, this was their value propositions. They were able to answer the needs of a great diversity of market segments, offering adapted and affordable transport services. The principles on which their operations were based were rather simple (full train load and single wagon load systems), their organizational structures were pyramidal ones, but in practice the practical implementation of the operating principles was decentralized, leaving to the local level the space to adapt and satisfy the customers. Priority was given to passenger services in case of problem in operations. **Productivity of freight** assets and freight dedicated human resources **was not high**, and the **quality of freight services was not satisfactory** (especially in terms of reliability), even if they were charged high infrastructure costs in relation with the weight of trains. **Road competition was not present** as the road infrastructures in most western EU countries were not developed until the end of the 60s.

Road competition developed strongly in relation with the opening of highways in Europe. This lead to more reliable and competitive road transport services, the truck driver being responsible of the quality of the transport, while the trucking company was not paying full infrastructure costs. These developments introduced the perception of less quality and less efficiency for rail services, and volumes/market shares losses, especially

for Single Wagon Load services for which the competition with road services is very tough since they both compete for the transport of small/medium-size consignments.

For passenger services, the high speed revolution during the '80s, introduced new competitive and affordable rail passenger services, while during the same period, no similar revolution for rail freight services happened. Instead, a **lengthy deterioration of rail freight volumes, turnovers and profits in many EU countries was registered.**

Beginning of the 90s, the EU pushed towards rail market opening, to facilitate the development of new market players and innovative services in order to make a better use of rail systems and infrastructures and help creating the Single European transport area and the single European market area.

20 years later, the rail freight sector has been fully liberalised and new market players have now 15 to 30 % rail freight market share, but mainly focused on Full Train Load services for national and short distance cross border transports. These services are simpler to produce and the competition with road is not so tough for such massive transports.

The competition between these new market players and incumbent rail freight operators lead to:

- **Lower volumes and profits for Full Train Load services produced and commercialized by incumbent rail freight operators** as new market players won market shares and pushed towards price decrease;
- **Lower volumes and big losses for Single Wagon Load services produced only by incumbent rail freight operators**, as road competition won market shares with better quality services and better prices (reducing the economy of scale in SWL);
- **Lower margins available from Full Train Load to cross-subsidise Single Wagon Load still produced by incumbent railway undertakings** and uncertainties about the production of such rail freight services.

In some western EU countries, Single Wagon Load services are no longer offered by the incumbent rail freight operators : UK, Spain, Italy, partly France where SNCF reduced by 2/3 its Single Wagon Load business.

In central Europe, DB, SNCB, OBB, CFL made the choice to continue Single Wagon Load services, and propose new organization and operating processes.

In Eastern Europe, Single wagon Load is still at least 20% (or more) of the business of CD Cargo, PKP Cargo[25], CFR Marfa, but its future is uncertain, especially with State-owned rail freight companies offered for privatization as in Poland and Romania.

[25] PKP Cargo share of SWL is actually 17% according to the information collected in the Study.

8.2. The European freight transport market and its heterogeneity

8.2.1. The importance of the freight transport market in the EU

The freight transport market in the EU, including sea transports accounts for 3824 billion tonne km in 2011; therefore registering an increase by 25,9 % over the period 1995-2011 (i.e. +1,4% per year). On the contrary the rail market share is 11 % and is decreasing steadily since 2000.

While considering the inland freight transport in the EU it accounts for 2414 billion tonne km in 2011; thus increasing by 26,3 % over the period 1995-2011 (i.e. +1,5% per year) . Also in this case the rail market share is higher with 17,4 % but it shows always a decrease from 20,2% in 1995. More detailed analysis was provided in chapter 4.

The EU Commission plans for increase of the total EU freight transport market to 6943 billion tonne km by 2050. At this date, this means that rail market share should increase from 11% to 17,5 %, with three times more tonne km (source: *Trans Tools and Trans vision 2009*). In 2030, major urban centres should be free CO2 city logistics, with no longer conventionally fuelled cars in urban centres.

Contacts with market players in the EU (listed in Annex V – Stakeholders consultation) and Study's elaboration lead to the conclusion that there is a still a significant demand for rail freight in "Less than Full Train Load" services (the 2012 traffic in the 13 analysed countries was estimated at >75 bn tkm, see chapter 4.2.1). However, some shippers stated a SWL offer adapted to the market needs is not always available.

8.2.2. The heterogeneity of the freight transport market

Understanding better the characteristics of the freight transport market means to understand and to describe the characteristics that are important to shippers. This understanding should help the carriers to identify better their market segments, to differentiate their products and market them.

Main factors at the basis of freight transport market segmentation the following:

- Type of goods such as value per kg, density, perishability, ease of handling, importance of special services, fragility, susceptibility to theft
- Traffic patterns such as shipment size, type of shipment, diversity of routes, transport mode used, type of shipment
- Shippers' attitudes towards speed and reliability, loss and damage, inventories, freight rates, market competitiveness, company policy and customer influence, other external market influences

- Shippers competitive environment influencing predictability of goods demand, importance of customer service, competitiveness of the company on its markets,

Freight transport market segments are defined as grouping shippers having more in common regarding their transport choices and being significantly different from shippers from other groups.

Attitudinal factors may be considered as a basis for segmentation as they are key factors to explain freight transport choices, and define products to be offered. A segmentation may be proposed as in the following table.

Proposed Name of the Segment	***Main characteristics of the freight transport demand on the segment based on attitudinal factors***
Segment 1: Competitive shippers	Very sensitive to customer service, No loss no damage, No in excess inventories, Ease to manage inventories, Looking closely freight rates
Segment 2: Price oriented shippers	Freight rates are key choice factor for transport
Segment 3: Service oriented shippers	Speed and reliability are very important, No loss no damage, Ad equation between carrier and company policies
Segment 4: Large shippers	Competitiveness as well as speed and reliability are not so important These shippers know how to use rail
Segment 5: Loss and damage oriented shippers	No loss and no damage are key characteristics Speed and reliability, and freight rates are less important
Segment 6: Externally influenced shippers	Shippers less interested by competitiveness, Shippers generally not involved with perishable goods Shippers are not decision makers in many cases (less FoB for example in case of exports flows via the ports)
Segment 7: Inventories oriented shippers	Ease for Inventories management in relation with transport is very important, as well as reliability of the transports. Shippers may be very sensitive to inventories management in case of perishable goods

Source: Research by Michael Mc Ginnis in the US, Transportation Journal

Taking into account all the above factors, type of goods, traffic patterns, shippers perceptions and competitive environment will lead to precise the definition of market segments and will increase the vision of the heterogeneity of the freight transport market.

A large shipper may have big and smaller shipments, on long and short distances, domestic and international, he may be interested to deal with a big service provider able to offer different services at a reasonable price.

A competitive shipper under the pressure of its clients and competitors may have also different types of flow, and will be very sensitive to reliability, flexibility, price .

An inventory oriented shipper may be interested to the possibility to have stocks en route in wagons, providing the transport itself is reliable at a reasonable price.

Considering the shipments' sizes, all possibilities may be found from parcels to tonnages able to fill a barges or a ship.

This paragraph presented the description of the different types of demand of freight transport, in the following part of the document will be described and analysed the current supply of transport showing pros and cons.

8.3. Current situation of railway on the freight transport market in the EU

In the EU, more than 80% of freight transport flows is carried by road which is the dominant transport mode, because road transport services for freight are seen as available, flexible, adaptable, reliable, affordable. Road transport is dependent on quality of road infrastructures, imported fuel, gas emissions from trucks damage the environment, trucks contribute to road congestion and road accidents. **The EU policy states that 30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50 % by 2050, facilitated by efficient and green freight corridors.**

Which freight flows can switch to rail? Which freight flows can exploit core competencies of the railway system ? At which conditions ?

Looking at railway statistics, it is possible to calculate the rail market shares by type of goods, by type of flow (domestic, international). Interviewing shippers and intermediaries, it is possible to identify the attitudes towards rail and road offers and link them to type of goods, traffic patterns and competitive situation of the shippers.

8.3.1. Railway market shares

Rail market share in EU Inland transports is 17,4 % in 2011, it was 20,2% in 1995. The volumes carried by rail went from 386 billion tonne km in 1995 to 420 billion tonne km in 2011, or + 8,8% over the period. At the same time, the volumes carried by road exploded, going from 1289 billion tonne km in 1995 to 1734 billion tonne km in 2011, or +34,6% over the period.

Rail freight is more present to carry goods generally produced by large shippers, and transported in rather big shipments (from one full train load to at least one wagon) on rather long distances, such as:

- Non finished metal products
- Finished metal products
- Chemicals and dangerous goods
- Cereals
- Wood and wood products

In the EU, rail is used mainly for domestic transports and not for international ones except for Central Europe countries (Germany, Austria, Switzerland).

Rail transports to/from the main EU ports are also very important. Rail market share to/from Hamburg port is about 40%, and it is 30% to/from Anvers.

From interviews and statistics analysis, it appears shippers using rail are large companies organising themselves their transports and logistics, or subcontracting this organisation to one or several freight forwarders. They have a diversity of needs and requirements specially regarding shipments' size, origins and destinations, and would like to be able to consider road and rail options as often as possible, especially for dangerous goods' transports and heavy products' transports.

8.3.2. Railway core competencies

Considering the elements stated before, the following markets are recognized to be "captive" for the rail transport mode:

- Large volumes
- To/from important plants/ports
- Domestic flows
- Large shippers as clients
- Diversity of flows all over a territory where railway infrastructure is present

Railway "captive markets" does not include instead the carriage of freight on short distances and/or the movement of consumer goods, to/from distribution centres. Shippers and freight forwarders consider that rail transport mode has important fixed costs and heavy procedures to organise short distance transports needing transit via at least first and destination marshalling yards , so that using rail on short distance cannot in their views be competitive.

Importance of dense infrastructure network to offer services all over the domestic territory is recognised to rail freight undertakings. Nevertheless as since many years incumbent railway undertakings have closed down lines for freight transport, sghippers and freight forwarders are not confident in the sustainability of the network in the next years.

Possibility to offer large transport capacities is recognised to rail freight operators services, as well as the possibility to have access to a diversity of possibilities. Rail freight is well known and positively considered as a convenient and affordable transport mode to evacuate production from a factory, to empty and fill silos when necessary, as wagons can be timely available. Nevertheless with the separation between infrastructure management and operations, shippers and freight forwarders know that the two entities have different interests, and that capacity and paths may not be available when needed.

Shippers and freight forwarders appreciate also the possibility with rail transport to have at their disposal a large variety of possibilities , from one wagon load to a full train load, on many routes , domestic and international, in winter as well as all year round.

Expertise to make trains moving safely on the railway infrastructure is recognised to railway infrastructure managers and to railway undertakings.

8.3.3. Basic rail freight services offered to day by rail freight undertakings

Three main types of services are proposed based on recognised railway core competencies (mix of transport capacities especially important ones, access to a diversity of localisations on a territory)

- Full Train Load services
- Single Wagon Load services
- Unaccompanied and accompanied Combined transport services

These services are produced independently within the rail freight undertakings production's organisations, on the basis of trains operated for one client or several ones.

8.3.3.1. Full Train Load services

Full Train Load services carry groups of wagons going from one sender to one receiver running at the same time, from one place of origin to one place of destination, on one route.

Figure 26 - Full train load services

Full trains (also known as block trains) are freight trains operating as a single unit from a departure terminal to a destination terminal without intermediate pick up / drop off of wagons.

Full Train Load services may be used to evacuate a silo, to evacuate a production site, to load a ship in a port, to evacuate products unloaded in a port, to provide raw material or intermediate products necessary to a production site, to deliver consumer goods to a distribution centre.

Train concept is the basis for the proposition of Full Train Load services offering high capacity between origin and destination having direct access to rail, reasonable transit time and reliability, and acceptable price.

Procurement of train paths and organization of traction services are the basis for production of such services.

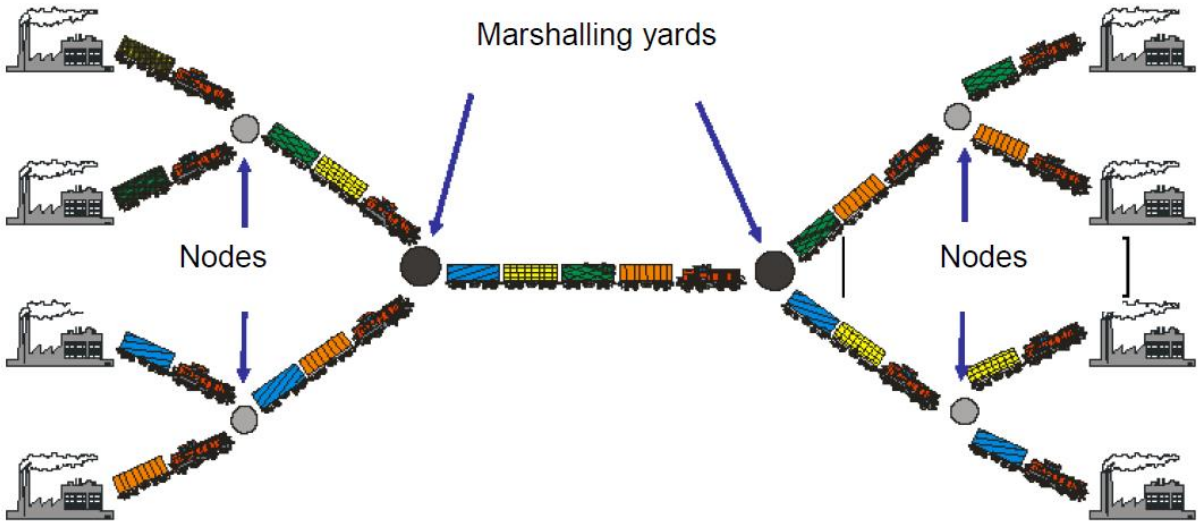
These services are rather simple to produce on the basis of shippers' demand specifying requirements such as route, weight, times for departure/arrival, necessity to provide empty wagons or not. The rail freight undertaking needs to get a path from the infrastructure manager and organise train traction; there is no necessity for en route handling /shunting of wagons.

The rail freight undertaking has no risk to bear in relation with the use of the train capacity, as train is operating when it is full.

8.3.3.2. Single Wagon Load services

Single Wagon Load services carry less than Full Train Load shipments and are more complex to produce. In chapter 7 the production methods of such system have been extensively described.

Figure 27 - Single Wagon Load conveyance and long distance activities



Source: Railistic brochure

Shipments' sizes on the freight transport market have wide variety, from parcel size to capacity of a ship. Truck capacity is the more common shipment size as road transport is the

dominant transport mode. Railway system is able to offer a range of services adapted to the shippers 'needs in terms of shipments' sizes, one or several wagons, small wagons equivalent more or less to a truck, or large wagons more or less equivalent to two trucks.

The **current SWL commercial proposition is to offer a range of services** from a shipment loaded in one small wagon to shipments loaded in groups of large wagons, to carry goods from one place to another on a network, for both domestic and international flows. The **transit time** may be reliable, or just defined in terms of maximum time of arrival**.**

As stated in the previous chapter, the production system underlying the SWL business model is based on the following principles:

- loaded single wagons or groups of wagons of are **collected from different shippers**;
- single wagons or groups of wagons are then moved to **marshalling yards** when wagons are sorted in order to build the trains for the next marshalling yard, typically located in the region of the final destination; they will be then sorted again and moved to recipient (in some cases more than one intermediate marshalling takes place);
- the **wagons are routed according to a transport programme**, allocating one pair origin /destination to one route, specific marshalling yards, specific inter-marshalling yards trains; production is then based on a fixed transport plan organising inter-marshalling trains in order to offer frequency, but also to fill them as much as possible;
- wagons are usually introduced into the production system according to their arrival time into the system (**first-in, first-out principle**);
- **priorities for specific wagons** may be managed, but are not easy to deal with, since prioritised wagons have to be considered differently from other wagons, which means to monitor them specially and in case of problems to deal with them; this needs special attention, special monitoring and often resources to solve problems, while traditional railfreight production organisation is not built to deal with special cases and special situations (it works well when used on a regular basis with no special, urgent, last minute needs).
- As stated, **collection and delivery train** services are necessary to collect the wagons and bring them to a marshalling yard, as well as to deliver them from the marshalling yard to their final destination. these services are generally small feedering trains organised and managed locally by personnel knowing the clients, their traffic and their facilities.
- **local teams** involved in SWL production could be more active as supporting commercial staff (even if in some countries a large part of SWL volumes is generated by large shippers, taking logistic decision at European or even global level

- the production organization requires – to be economically sustainable – the **maximization of the use of the available train capacity**. So far, SWL chain seldom comprises few mixed trains, including both conventional and intermodal wagons. Intermodal transports have their own trains organised and managed by intermodal operators distinct from shippers and traditional freight forwarders (intermodal operators bear the risk of filling the capacity of the trains operated on their behalf from RUs, while freight forwarders do not);

- **optimising the capacity utilisation** of the inter - marshalling trains and of the collection/delivery trains is generally borne by the incumbent railway undertaking offering Single Wagon load services.

8.3.3.3. Unaccompanied /accompanied intermodal transport services

Unaccompanied /accompanied intermodal transport services carry swap bodies, containers and trucks on rail on long distance. Most of combined transport services are block trains going between combined transports terminals. These block trains are managed by intermodal operators who bear the risk of filling the block train.

* * *

These three main types of services are operated independently, they have to cover their costs on their own and do not consolidate each other. However, wagons carrying intermodal units are sometimes routed also through the SWL network.

From an economic point of view, Full Train Load services are usually considered as being able to cover their costs, while Single Wagon Load services do not, mainly in relation with intense competition with road transports, higher production costs and reduction of volumes. The temptation is then to continue to cancel services and loose more volumes making the break even more and more difficult to reach.

For the intermodal services, the economic conditions are quite different, since railway undertakings are usually just traction services providers to intermodal operators. Rail part of the combined transport services should cover its costs, as it is mainly constituted by regular Full Train Load services connecting two intermodal terminals (land or port ones), and and taking into account that the intermodal operators pay for the Full Train Load whether the train is full or not.

8.3.4. Perception of rail freight services among market players

8.3.4.1. Full train Load services

They have a good image as for market players, and specially large shippers using them, they represent an efficient way to carry huge volumes. One train in Europe carries as much as 50 to 100 trucks at the same time.

The services are generally reliable except in case of incident. The major cause for un-satisfaction is related with the non-availability of train paths, whether because of structural lack of capacity or for temporary cancellation of paths for works or other reasons.

Uncertainty about availability of paths increase in case of Full Train Load international services. Shippers view is that for domestic trains, agreed paths reliability is not more than 2/3, 1/3 paths being cancelled or changed because of different reasons. As soon as you consider going out of your country of origin, the probability for incidents /changes/cancellations increase with the number of countries and the number of Infrastructure managers.RNE was created 15 years ago to solve this problem, but in fact RNE is only active for path design and has no influence on day to day operations.

Incumbent rail freight operators and new entrants compete on these services. New entrants operate 25 to 50% of Full Train Load services according to countries.

8.3.4.2. Single Wagon Load services

The perception is more differentiated.

The principles to produce Single Wagon Load services were defined in the 19th century. Marshalling yards were modernised after the second World War to cope with the transport needs for reconstruction and industrialisation.

Typically, incumbent RUs produce today these services, with limited exceptions in the largest Countries.

In the past, up to the end of the 80s, shippers using this type of service were very diversified. They are now mostly large shippers.

Single Wagon Load services are seen by shippers as necessary services to be offered, especially by important shippers for heavy products from the steel industry, for chemicals and dangerous goods, for wood and paper industry.

But the offer is not considered as fulfilling requirements for quality of service in terms of transit time, reliability, tracking and tracing. The production principles are considered as obsolete ones. Shippers are fully aware of the low or no profitability of SWL, so they are concerned about their survival in the future.

It is still very difficult for a wagon (even the one carrying dangerous goods) to get regular information on its position, the possible delay, its stop in case of problems, … the information is available in ISR data base developed and managed by Raildata, but this information is not considered as a key element to be provided to the shippers and thus in many cases is not provided.

Situation of Single Wagon Load in EU Member States

- In **Western Europ**e, Single Wagon Load services do not exist any longer except in France and Benelux. In France they have been streamlined and the result is seen as positive by the shippers such as representatives of the steel industry . The economic sustainability of the new system is not convincing other shippers who are still worried about financial sustainability of the offer, and of the railway undertaking . No longer Single Wagon Load services in UK, Spain and Italy. In France, SNCF launched Multilots /Multiclient which is a simplified network production organisation on a limited number of origins/destinations with 50% of wagons using only one route between two marshalling yards.

- In **Central Europe** (DB,RCA, SBB, CD, ZSSK..) and in Scandinavia, there is the perception from the shippers that DB, RCA, SBB have a vision and a strategy to continue to offer services for Single Wagon Load . The volumes are still important, and modernisation of the production organisation is going on in each country. For international transports, the modernisation was first based on the creation of a production alliance, X Rail, grouping 7 rail freight operators. In X Rail, new projects to improve quality of service and decrease costs are currently prepared, including booking system, systems to improve the capacity management of the inter-marshalling yards trains, and thoughts about introducing yield management system. Joint commercialisation of the services is not an objective of the alliance, services are still commercialised by each partner according to its own commercial policy.

- In **Eastern Europe**, Single wagon Load services were not modernised. They still use many marshalling yards, many inter-marshalling yards trains, costly delivery and collection trains. It is still about 20 to 40% of the total activity of the incumbent rail freight operators. Shippers recognise the services still exist, but for how long? There is uncertainty about the future, going from cancellation to transfer to other actors. The privatisation of incumbent rail freight operators is not an incentive to go on with Single Wagon Load operations, as these services are generally loss making. A possible transfer of Single Wagon Load services production and commercialisation from incumbent railways undertakings to their freight forwarders subsidiaries has been mentioned, incumbent rail freight undertakings being still traction providers.

8.3.5. Conclusion

According to the existing business models we have analysed, the incumbent RUs are almost the only one offering SWL services (with few exceptions). The SWL segment, by the way, is commonly seen by market players as poor quality and non-profitable, and based on an obsolete and inherently inefficient production organisation.

Except in Central Europe (Germany, Austria, Switzerland), in Scandinavia and to a less extent in France, vision for the future of this activity is focused on cancellation or transfer to other market players ready to take risks on parts of this business (combined transport, direct trains organised by Freight Forwarders or other entities between terminals).

Shippers appreciate the uncertainty on the SWL survival, and this does not help to make decision switching to rail.

8.4. Principles for new business models for less than Full Train Load shipments

A business model describes how a company or a non-profit organization operates and delivers value to answer needs and help solving problems for its different market segments, customers or users. As stated, business model is both a value proposition and an operating model, aiming at profit and /or benefits.

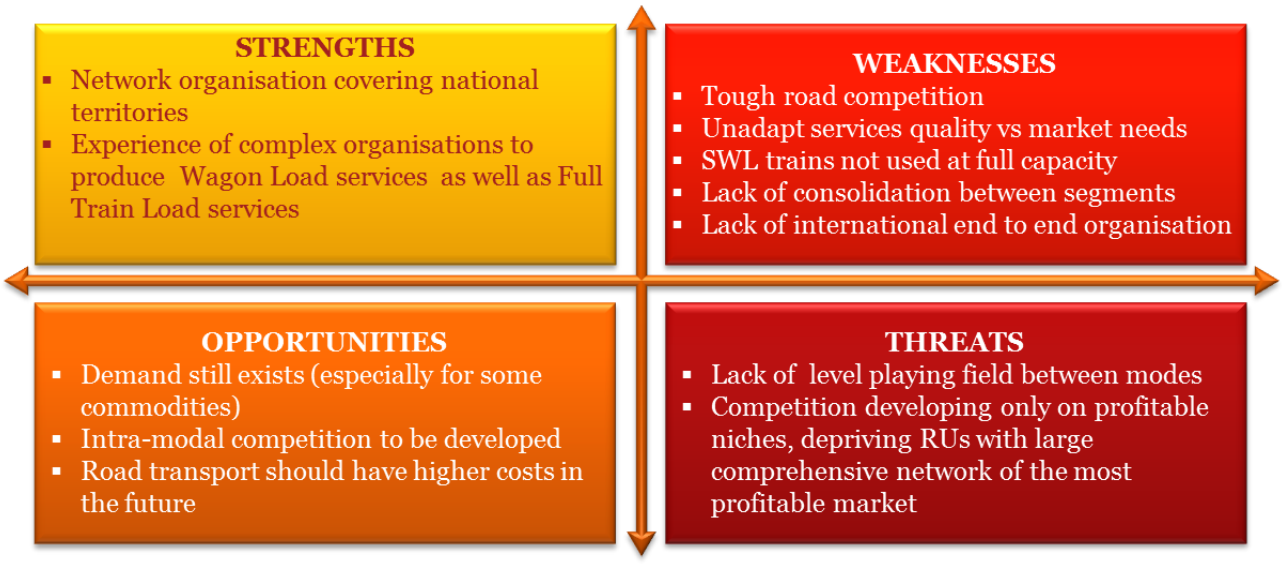
Considering the weakness of the current situation we deem as mandatory to start a reflection on how to innovate to attract new profitable flows to rail mode. Which opportunities shall be pursued and which new business models shall be invented and developed?

8.4.1. Basis for improvements

The demand for less than Full Train Load shipments by rail exists, and is rather heterogeneous in terms of shipment's size, transit time, frequency, key factors for transport and logistics choices, equipment for access to transport by rail.

A SWOT analysis of the transport market for SWL ("less than Full Train Load") services in Europe may be summarised as below:

Figure 28 - SWOT Analysis of the SWL transport market



How to design services for less than Full Train Load shipments, which should be adapted to market needs and viable economically, on the basis of opportunities and strengths of the rail transport ?

Business models should allow definition of a range of flexible, reliable, profitable services, to meet the variety of shippers expectations.

These services should be produced on the basis of trains with a little as possible wagons handling en route, and improved train capacity utilization, to reduce train numbers and to reduce wagon handlings.

8.5. Possible developments

Two main business models may be developed for Single Wagon Load services or Less than Full Train Load services :

- enhanced network-based service of mixed trains;
- enhanced route-based service.

8.5.1. Commercial proposition based on a network of mixed trains

The proposition aims at offering a mix of capacities (one or several wagons) from origin to destination located on a network, with mainly collection and delivery by rail, with indicative or fixed transit time and attractive pricing policy as the main objective should be to fill the system as much as possible.

Advantages

This commercial proposition is more convenient to flows with rail access to the railway infrastructure via private sidings, terminals, or parking tracks in stations.

The proposition is :

To offer a range of flexible, reliable, frequent Wagon Load services produced by consolidation of different types of flows into a network of mixed trains.

These mixed trains organized as a network should carry

- one or two important flows of wagons, regular, planned flows representing between ¼ to ½ of a train, which are today carried by Full Train Load services, but with constraints to build the necessary volumes to form the Full Train(time, parking tracks…);
- one or two regular combined transport flows between terminals for also between ¼ to ½ of a train;
- other regular and planned Wagon Load flows;
- possible non planned wagons if space to accommodate them exists.

These mixed trains would go through the minimum number of sorting/shunting stations, would use flat sorting rather than Hump sorting. For a same O/D, routes may change in relation with the content of the train, for example by passing a sorting/shunting station if no need for this specific train on that day.

Collection/delivery services could be by rail, or by road (cross dock or value added services). They should be efficient and quality services. They could be provided by low cost services providers.

Managing use of the trains' capacity to improve train capacity utilization should be based upon capacity booking systems, definition of priorities with the shippers, and production operational management .

Figure 29 - Improved SWL business model elements (network-based model)

IMPROVED TRADITIONAL SWL BM	
TARGET MARKET SEGMENTS	▪ Existing national & international demand for WL services ▪ Focus on O & D with limited pick-up / delivery points to be served
SUPPLY IMPRO-VEMENTS	▪ Reliable and frequent interhub direct trains carrying different segments* ▪ Increased capacity utilisation
SINERGIES	▪ Integration with road transport e.g. for last mile delivery of smaller flows ▪ Involvement of forwarders / logistic operators
MARKET APPROACH	▪ Provision of cross docking or value added services (not just transport) ▪ Improved tracking & tracing

* e.g. conventional wagons between private sidings or between one private siding and road transport at the other end; combined transports between terminals etc.

This type of service should be developed by a railway undertaking able to serve a network, and to consider partnerships to develop this network. The financial risk to be borne is high corresponding to operating trains with a fixed time table.

Issues and problems

Main problems with such proposal for services /production organization are

- high fixed costs of collection /delivery trains

- high fixed costs of a network of inter-marshalling trains
- High costs for handling wagons in shunting/sorting stations
- uncertainty on transit time reliability as trains may be fully used and wagons may be left without possibility to use other routing to deliver the wagons as agreed when order was confirmed ; necessity to negotiate with the shipper or the freight forwarder to propose solutions

Better coverage of fixed costs may be done by

- Volumes' increases as the fixed costs have to be allocated to every single transport, which leads to costs per unit highly sensitive to volumes. To reach this objective, railway undertakings may ask for a minimum number of wagons for collection /delivery trains . To fill intermarshalling trains, solution is promotion, and incentives through pricing policy
- Decreasing high fixed costs for collection/delivery trains may be possible with new rules for personnel and operations, and /or with inferior costs for components such as reduced infrastructure charges to access the terminal railway infrastructure. These collection/delivery services could be in the future subcontracted to local last mile railway undertakings
- Consolidating conventional wagons transports with combined transports in the same train, allowing fixed costs sharing and/or better frequency (it is easier to cover high fixed costs of a service with a regular important shipment while to base high fixed costs covering on random small shipment is a risky business; regular groups of wagons will help to make the system profitable).

Improvements' areas

Improving the perceived reliability of the transports may be done by:

- booking system and respect of announced transit time when shippers respect their booking.
- capacity management, priorities definition and transit time differentiation according to shippers day to day practical expectations, so that urgent transports are incorporated in trains as soon as possible while not so urgent transports are dealt with to fill the capacities. In some situations, a shipment may be urgent, but two weeks later, the same shipper and the same type of shipment may not be urgent and may be delayed to go via the next train while leaving space for an urgent shipment from another shipper in the first train to depart.

Differentiated transit time services should be also price differentiated. Shippers may need urgent transports in all circumstances (new car components transports going between

factories) or in only some circumstances (consumer goods being bought for sales promotion on precise dates). They may also accept normal reliable transports in other circumstances. Pricing could be differentiated, urgent transports paying a premium.

A key condition for such network based services develop is the existence of the railway infrastructure, its condition for use and the price to use it. If railway infrastructure disappears in a geographical area, clients are lost for long years. They will organise their transports by road. Shippers are unsure about the existence of the railway infrastructure, and about the sustainability of the rail freight services on this infrastructure. They know what happened in the last 20-30 years, they know the States have no money, and they are not confident for the rail freight future. Reversing this perception needs probably public commitment to support existing rail infrastructure, to help in developing new standards, operational rules, working conditions to operate local collection/delivery services by rail, to support development of new market players especially for local services.

There are plans and first steps for implementation by:

- new entrants developing such new systems on limited networks of origin/destination points, with only one shunting/sorting platform in transit (situation developped by one new entrant in France);

- incumbent railway undertakings designing services by route between an area and one of their domestic important marshalling yards to feed their domestic Wagon Load business with transports from abroad, by passing the partner incumbent railway undertaking in the neighbouring country (situation with DB in Poland with Wagon Load services offered between Silesia and Germany);

- X rail is a production venture between railways of Central Europe to offer reliable transport services for Single Wagon Loads on a large network of origin/destination points.X Rail is now developing booking system and capacity management.
- Multi Lot Multi client offer in France is a commercial offer based on a network of a limited number of origin /destination points in France and outside France. The shippers have to communicate forecasts for their transports several months in advance and have to confirm their orders to be granted priority and full transit itme reliability. Multi Lot Multi client already operates mixed trains (conventional and combined) when appropriate and profitable;
- There are new developments from important freight forwarders controlling freight from big shippers using several production facilities in Europe to build their own network systems and then to subcontract traction services (main leg, local) and shunting services in one or two platforms. This is the situation in France with Gefco building its own network to carry new cars produced by PSA, using two platforms Achères (near Paris) and Gevrey (near Dijon).

8.5.2. Commercial proposition based on enhanced route-based service

This proposition offers a mix of capacities (one or several wagons, large or smaller wagons) from origin to destination located in the area around a hub/terminal, with possible delivery by rail or by road, with possible value added services at the terminal or nearby, with reliable transit time and reasonable pricing policy.

Advantages

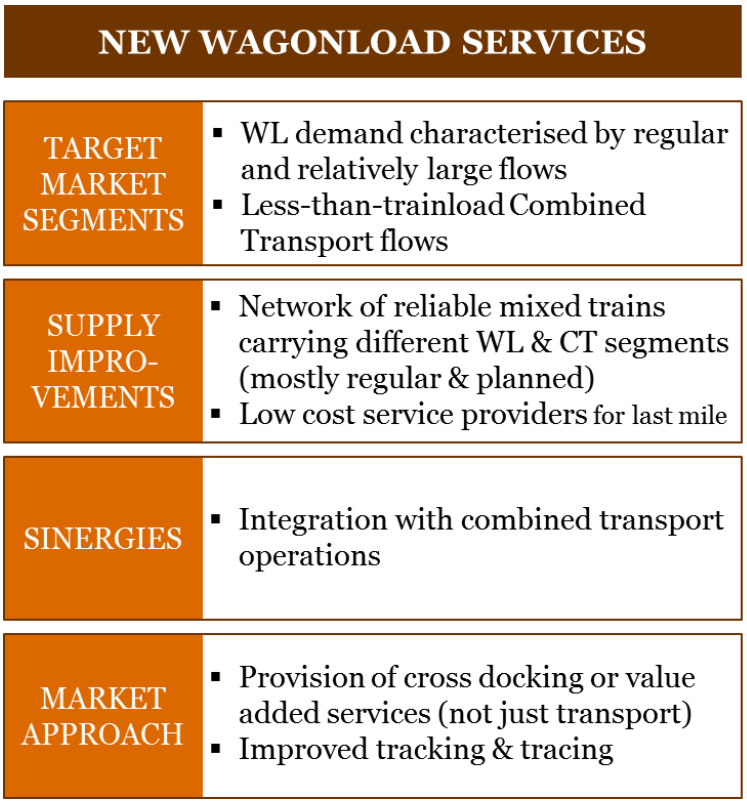
The proposition is

to offer a range of reliable, frequent, flexible Wagon Load services produced by interhubs/terminals direct trains

These direct trains should carry:

- traditional wagons between private sidings;
- traditional wagons between one private siding and road transport at the other end of the transport;
- combined transports between intermodal terminals.

Figure 30 - New (route-based) wagonload services business model elements



In case of road transport on one side of the transport, it could be simply cross dock or other additional value services could be provided to compensate for transshipment costs.

Issues and problems

An economic entity has to bear the costs of such an organization, as to offer an attractive service it is necessary to run at least 2 trains per week on the route.

These services could be offered by railway undertakings, or by freight forwarders/logistics companies or even ad hoc joint ventures, subcontracting traction on main leg, as well as subcontracting terminal services.

In case a freight forwarder bears the risk, this freight forwarder may be a subsidiary of the rail freight undertaking, when the rail freight undertaking sees itself as only a traction service provider and considers it is not its mission to develop such offers, as in Poland.

In case this proposal is developed, it will mean serving only part of the demand located in big centers. It would lead to a rail market share's loss. In the middle and long term it would mean also that railway undertakings would fail to capitalize on their expertise to produce efficient, safe and affordable trains and continue to offer rail freight services to the economy.

Improvements' areas

These new services by route should take into consideration conventional wagons transports based in the area. They should not be built only considering transports to/from terminals . There is a need for local collection /delivery services provided with the level of quality requested by the interested shippers and freight forwarders. How to support providers of such services ? First support should come from the infrastructure manager in charge of the capillary railway network . If no such support is provided, these new reliable and frequent services will be used only from / terminals, not answering the needs for dangerous goods transport and /or heavy products for the steel industry or the wood and paper industry. In Germany , IBS (*Interessegemeinschaft der Bahnspediteure*) is advocating to create such direct interhubs trains to provide wagon Load services, considering main part of the business should be direct between the terminals with road delivery after cross dock or value added services. Serving private sidings even near the terminals /hubs is not their first priority.

Such new services will be developed by freight forwarders /logistics service providers. The main problem is to bear the risk of the train or to share it with appropriate partners or to receive support to launch these services. The critical phase goes from just before the beginning of operations when the entity bearing the risk invests in IT management, has to provide guarantees to lease wagons and possibly locomotives for local services, has to hire facilities to organise value added services , has to pay for paths , wants to buy traction services and local delivery/collection services, begins to have to pay paths , tractions services, to provide guarantees to lease wagons.

To allow development of new innovative services , entities bearing financial risks should need financial support such as Marco Polo funds or other funds. These funds should not be to assist for development , but should also cover the very beginning of the business.

8.5.3. Conclusion

New business models whether based on a network approach or on a route approach should allow to provide more reliable and more efficient transport services for rail freight services. New initiatives coming from other than incumbent RUs are currently limited and mainly oriented towards reorganising existing businesses or recently lost services businesses by offering better quality and better competitiveness. Nevertheless, opportunities for new (profitable) service for the “less than full train load” segment can be defined.

Enhance network based services are likely to be developed by incumbent railway undertakings who are the ones having expertise of network management. One of the main risk for them is with conflict of interest with the infrastructure managers about line closures and pricing for access to tracks and necessary facilities to produce traditional Single wagon Load services. Public commitment to future rail freight development should be declared and explained to the market players.

There are new developments from important freight forwarders controlling freight from big shippers having several facilities in Europe to build their own network systems and then to subcontract traction services and shunting services in one or two platforms.

Freight forwarders and logistics services providers, however, are likely to be more attracted to develop **new services on a by route approach**, not focusing as a priority on conventional wagons and private sidings. Only the most important European companies are able to get the necessary financial guarantees and to bear the financial risk attached to such services . Smaller companies need financial support going from financial guarantees to subsidies.

9. Cost and cost structures of SWL

Single Wagon Load services are perceived as not meeting the market expectations in terms of quality (reliability, speed, possibility of tracking and tracing the goods during transport, …) and not profitable for the services providers.

It is commonly agreed that most of the losses of the incumbent railways are related to the production of these services as volumes decrease in a high fixed costs activity.

This statement is not really challenged even if when cutting more than half of the Single Wagon Load business does not reduce the losses by 2/3 or even by 1/3.

The project has to provide:

- information about costs for existing Single Wagon Load services and compare them for road, intermodal and full train load services;
- analysis of the collected information to present a costs structure for existing Single Wagon Load services and costs evaluation;
- identification of costs drivers for existing Single Wagon Load services and possibilities to improve economic performance with new Single wagon Load services.

9.1. Collection of information and presentation of observed costs

The Consultant made interviews with rail freight undertakings providing Single Wagon Load services and asked for costs, costs structure, costs levels, costs drivers.

The main results are the following ones:

- Total costs differ from one rail freight undertaking to another one.
- Costs structures also differ.

Contacts with market players in the EU (listed in Annex 1) lead to the conclusion that there is a strong demand for rail freight in Less than Full Train Load services, but that the adapted offers do not exist.

9.1.1. General perception of costs for Single Wagon Load services

When asked, representatives of rail freight undertakings might answer:

"Single Wagon Load business is 20% of our activity and 35% of our costs, while Full Train Load services are 80% of our activity and 65% of our costs".

More precision is not easy to obtain as costs data are still considered confidential in most rail freight undertakings !

9.1.2. Collection of information about Single Wagon Load services

Total costs of incumbent railway undertakings are published in their annual reports, covering Full Train Load services, Single Wagon Load services and Intermodal services.

A recent study published in France by the Commissariat Général au développement Durable compares results for rail freight in France and in Germany.

Fret SNCF

	2004	2005	2006	2007	2008	2009	2010	TCAM entre 2005 et 2010
Produits (Md€ courants)	1.7	1.7	1.7	1.7	1.6	1.2	1.1	
Charges[2] (Md€ courants)	2.0	1.9	1.9	1.9	1.9	1.7	1.5	
Produits (Md€2005 IPCH)	1.7	1.7	1.7	1.6	1.5	1.2	1.0	
Charges (Md€2005 IPCH)	2.1	1.9	1.8	1.8	1.7	1.6	1.4	
Volume transporté (Gtkm)	45.1	40.7	40.9	40.6	35.9	26	22.8	
Produit moyen (c€/tkm)	3.9	4.2	4.1	4.0	4.1	4.5	4.3	1.7 %
Coût moyen (c€/tkm)	4.6	4.6	4.5	4.6	5.0	6.1	6.0	6.5 %

DB

	2004	2005	2006	2007	2008	2009	2010	TCAM entre 2005 et 2010
Produits (Md€ courants)	3.5	3.5	3.8	3.9	4.7	4.1	4.6	
Charges[3] (Md€ courants)	3.5	3.5	3.6	3.7	4.1	3.9	4.6	
Produits (Md€2005 IPCH)	3 6	3.5	3.7	3.8	4.4	3.8	4.2	
Charges (Md€2005 IPCH)	3.6	3.5	3.5	3.5	3.8	3.7	4.2	
Volume transporté (Gtkm)	84.0	83.1	96.4	98.8	113.6	93.9	106.8	
Produit moyen (c€/tkm)	4.3	4.3	3.9	3.8	3.8	4.0	4.0	-1.4 %
Coût moyen (c€/tkm)	4.3	4.3	3.6	3.6	3.4	3.9	3.9	-1.3 %

Sources : SNCF, DB, rapport Grignon[4]

Official and public information about revenues and costs by type of service does not exist, except in cases when the railway undertaking is non-profitable and needs public money. Single Wagon Load services are provided only by incumbent railway undertakings not publishing any regular economic and financial information on their revenues and costs for this type of services .

Nevertheless, different documents were published such as :

- Rail freight : returning to profitability (ATKEARNEY)
- The mixed train concept : the best of both worlds for European rail freight (OLIVER WYMAN)
- Etude de capacité contributive Fret (Programme de développement des infrastructures ferroviaires en Languedoc Roussillon) (LOUIS BERGER)
- Schienenguterverkehr : markt- und wettbewerbsituation (ECONOMICA)

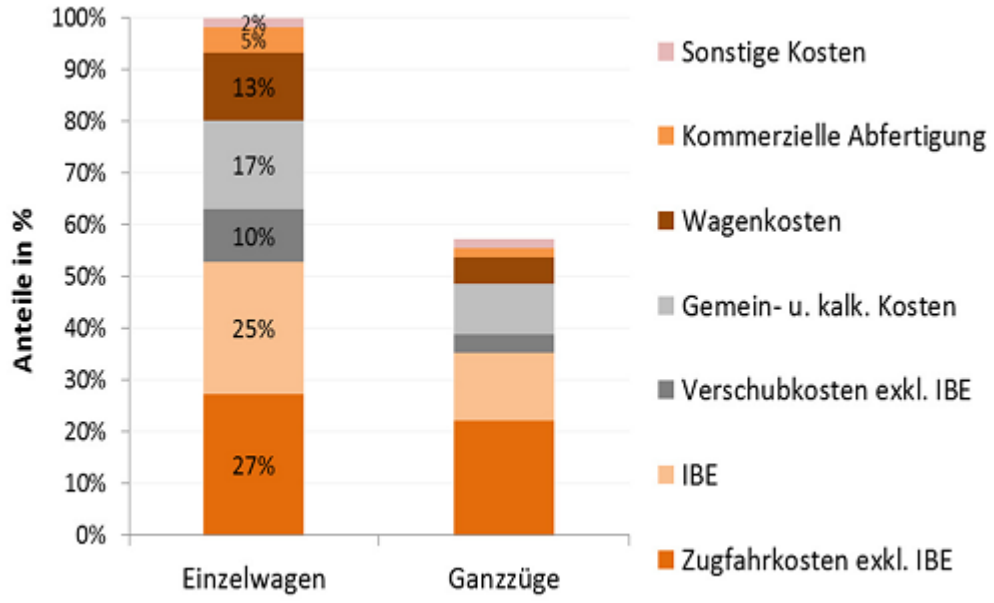
- Rail freight Operations-systems : Produktion management RAIL CARGO AUSTRIA
- Ableitung effizienter organisationsformen im Schweizer Schienenguterverkehr (HWH)

These documents provide information and analyse it.

Main findings regarding total Single Wagon Load services are as follows:

- costs for Single Wagon Load services are about twice the costs for Full Train Load services

Figure 31 - Costs comparison between Single Wagon Load and Full Train Load services



source : Economica study for the Austrian government

- Costs /tonkm for Single Wagon Load services are 3 to 8 times more than costs for rail part of intermodal services and Full Train Load services (heavy trains)

Year 2007	*Costs including access charges (cents euro /tonkm) 2007*
Rail part of intermodal services	1,98
Full Train Load services (heavy trains)	2,02
Full Train Load services (light trains)	6,91
Single Wagon Load	5,84 to 16,60
Average	4,37

source : Louis Berger France

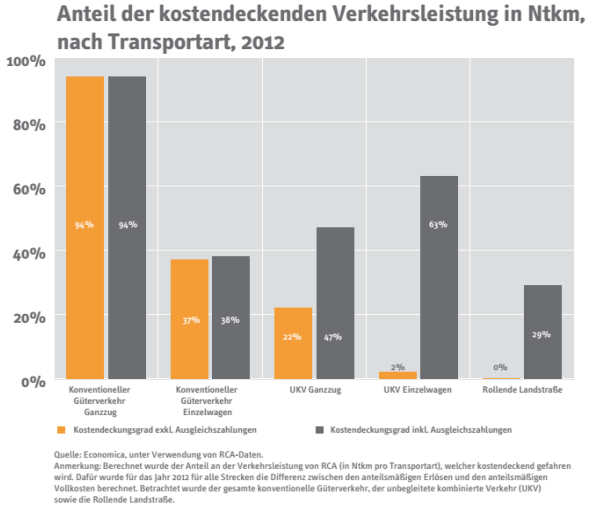
- Costs for Single Wagon Load services are higher than revenues

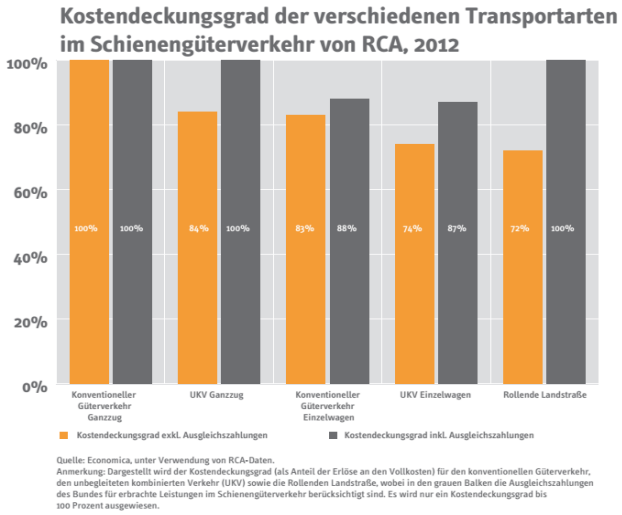
- A calculation made for France provides the following results

Year 2007	*Costs (cents euro per tkm)*	*Revenues (cents euro per tkm)*	*Margin in %*
Full Train Load	2,57	3,03	18%
Single wagon load	9,31	6,07	-35%
Rail part of Intermodal services	1,98	2,10	6%
Average	4,37	3, 68	-16%

source : Louis Berger France

- Another calculation made for Austria shows that subsidies are necessary to cover costs for Single Wagon Load services and intermodal services especially Rollende Strasse services.

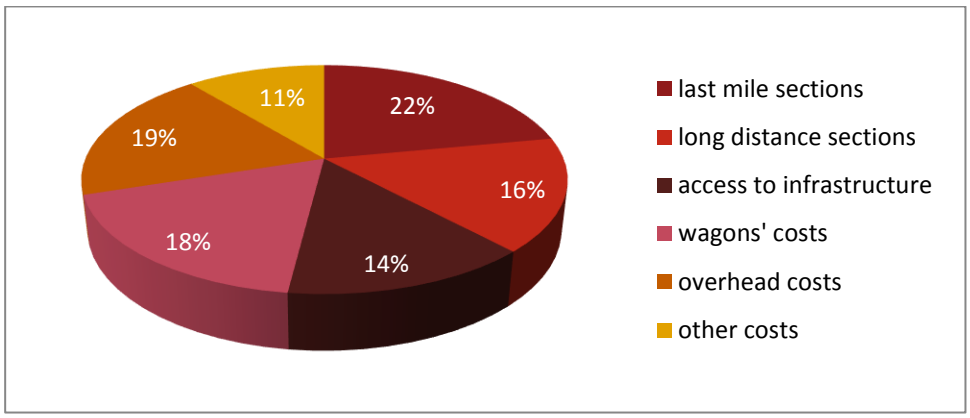




Source : Economica

Comments

- The reason for high costs for Single Wagon Load services is mainly related to collection/ delivery legs of the services representing 15 to 60% of total costs of Single wagon Load services according to interviews and questionnaires .
- Following graph from HWH study realized in Switzerland, shows that last mile services are estimated to 22% of total costs including access charges and overhead costs



- In Austria, the notification document prepared by the Austrian government for the EU of shows that for Single wagon Load services main leg transports count 60% of production costs while last mile services count for about 15% of total costs including access charges. Total costs for production of Single Wagon Load services being estimated to 131,6 euro per 1000 tkm of which 27,3 euro per 1000 tkm for the use of the infrastructure.

Figure 32 - Costs per Single Wagon Load services in Austria

	SINGLE WAGON LOAD	
in euro /1000 tkm	*domestic traffic*	
		Imp/exp traffic
production costs main leg without cost for infra use	60,5	38,8
costs for infra use	26,2	14,7
total production costs RCA	*86,7*	*53,5*
total costs private carriages	4,4	2,8
operational costs of the connecting railway	1	0,7
local shunting	1,2	0,9
total railway production costs	*93,3*	*57,9*
pre and post leg production costs	11,1	4,2
total costs of production	104,4	62,1
total costs for use of the infrastructure	***27,2***	***15,4***

source : notification document produced by the Austrian government for the EU

- SNCF considers that terminal services represent more than 50% of total costs of Single Wagon Load services as organized for Multi lot Multi client services.

9.1.3. Collection of information about cost structure

Costs are presented according to

- Main leg costs without infrastructure costs, including locomotives use costs , energy consumption costs , and train drivers costs;
- Terminal costs , local area services costs;
- Infrastructure costs (access to tracks, marshalling yards and stations);
- Other costs are mainly related to wagons, and other costs.

Data related to 4 examples were collected . % are calculated considering costs per loaded wagon.

Figure 33 - SWL costs description in 4 countries

In %	*Country A*	*Country B*	*Country C*	*Country D*

Main leg costs without infrastructure costs	25	59	52***	16
Infrastructure costs	7*	25	20	14
Possession locos and wagons excl maintenance	10	4**	na	18
Terminal costs, local costs including pre and post main leg costs	48	12	28	28
Overhead general costs and other costs	10	Na	na	19
Total	100	100	100	100

*main leg only **excl locos *** incl possession locos and wagons

Country B data are from Austria and are public data as they are part of a notification document presented by the government of Austria to the EU Commission in 2012.

Country D data are from Switzerland and were published in the press as results from a study commissioned by the Swiss transport ministry to Hwh , a consultancy firm.

Other data are confidential ones.

The following table provides a synthesis of various costs structures for Single Wagon Load services' production as described by railway undertakings and describes how the railway undertakings representatives describe the key costs factors for these services.

Figure 34 - Description of SWL costs structure and key costs factors

Section of the Single wagon Load transport	*% total costs for a loaded wagon*	*Reasons for costs variation*
Main leg traction services excl. infrastructure costs	16- 59	- Type of traction (electrical/diesel) - Distance of transport - Speed of the trains - Locomotives' km per year - Type of organisation and role of trains between marshalling yards and nodes organising collection/delivery trains - International /domestic services - Unit costs for a driver
Collection/delivery traction services	12 - 48	- Type of collection/delivery services to be produced and constraints (for example non automatic level crossings)
Marshalling /shunting services	6 – 10	- Nb of usage hours - Unit costs for employees in stations and marshalling yards
Infrastructure costs (access to tracks, to stations and marshalling yards)	7- 25	- Type and number of paths - Nb of tracks to be used in marshalling yards and stations
Wagon usage costs	10- 18 *	- Type of wagon - Nb of loaded trips per year - Loaded km per year
Commercial costs (customer	** included in	

Section of the Single wagon Load transport	*% total costs for a loaded wagon*	*Reasons for costs variation*
service and sales)	other costs below	
Overhead costs and others	10- 19	- Organisation and staff

* possession and maintenance costs for rolling stock (locomotives and wagons)

Comments

Data differ strongly from one country to another one. This might be explained by different meaning and understanding of the costs components. It might result also from types of services, geography of the country and of the railway network, different rules for personnel working conditions and social charges.

Infrastructure costs including marshalling yard costs are high representing between 5 and 30% of total costs . They represent costs on which a rail freight undertaking has no power to reduce them, except by maximising the capacity utilisation of a train path.

Terminal costs for local collection/delivery of wagons represent between 30 and 50% of total costs.

Infrastructure costs and terminal costs represent together about 40 to 60% of total costs.

Most costs other than infrastructure and terminal costs are fixed costs, related to possession and compulsory maintenance of rolling stock, staff presence. These costs are there even with small activity, and cannot be reduced easily when activity decreases .

Fixed costs for Single Wagon Load services are often said to be 60 and 90% of the total costs. Such a high % for fixed costs should be a strong incentive to maximise the use of the capacity of all planned trains whether intermarshalling yard trains or collection/delivery trains. Capacity management, yield management and adequate pricing policies should be driving the business.

9.1.4. Collection of information about unit costs' levels and operations conditions

New rail freight undertakings provide more easily information on costs, especially on unit costs. They do not operate traditional Single Wagon Load services, but they can provide part of services, for example main leg traction services or last mile services, or marshalling/shunting services.

For example, in France following information was provided :

- Cost for a locomotive for terminal and shunting services is 1000 euros/day, plus 200 l of fuel for 100 km

- Cost for a long distance locomotive is 2000 euro /day
- A train driver costs 500 euro /day or 100 000 euro per year
- An employee costs 250-400 euro/day or 50 000 euro/day
- A wagon costs 30 to 70 euro per calendar day
- A train km on main leg of a wagon transport costs 10 to 20 euro of which 1,5/1,9 euro is infrastructure access charge.

In Germany and Belgium, similar type of data are:

- Traction costs on main leg : 12 -15 euro /train km
- Infrastructure access costs: 3 euros /trainkm
- For local services, collection/delivery services, costs vary from 100 to 1000 euro per wagon depending on the type of area and service (slow speed for the train, frequent necessary stops en route, level crossings, necessity for a second employee for safety reasons,..). Costs per wagon for collection/delivery might not differ too much from costs per wagon for a full train on average medium distances !

An average train for Single Wagon Load services carries 500 – 600 net tons per train on main leg sections (intermarshalling yards trains) on 300 – 500 km.

Trains going from marshalling yard to node stations organising collection/delivery trains, when existing, carry in average 300 to 500 net tons per train on 50 to 200 km distance. When these trains exist, they will be considered by the Consultant as part of main leg sections.

A collection /delivery train carries from 100 to 300 net tons per train on 50 to 150 km.

9.1.5. Collected data about profit for Single Wagon Load services

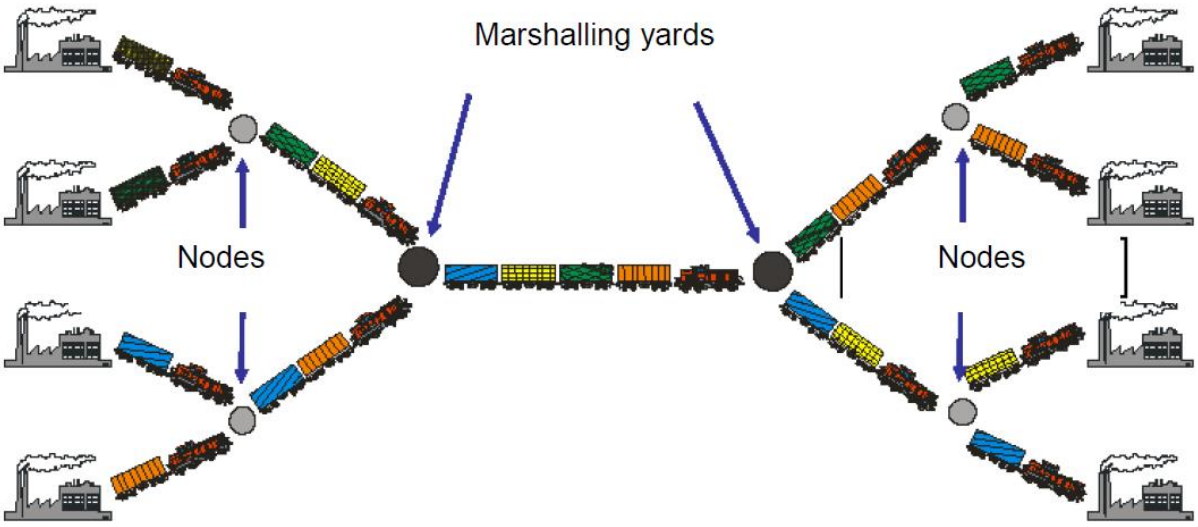
According to public studies realised in Switzerland and in Austria, 50 to 85% of Single Wagon Load services are said to be covered by revenues, while Full Train Load services are profitable and intermodal services cover their costs as they receive subsidies representing about 15% of their costs.

9.2. Building a costs structure model and evaluating costs

9.2.1. Proposition for a Costs structure

From the collected information, the Consultant proposes to define a costs structure and to evaluate costs for Single Wagon Load services.

The proposed costs structure is based on Single wagon Load production organisation .



Source: Railistics brochure

A Single Wagon Load transport is the addition of:

- intermarshalling yards train services, or main leg transport services
- distribution leg transport services including collection /delivery services,
- marshalling /shunting services

Intermarshalling yards trains are fed by trains coming from node stations, that organise collection of wagons from the shippers premises or from local stations /terminals. The same way, intermarshalling yards trains feed trains going to node stations, organising final delivery to the shippers premises or to local stations/terminals .

Traditionally, the trains between marshalling yards and node stations are considered as long distance main leg services.

In situations where the Single Wagon Load production process has been reviewed in order to improve quality and costs, there is a tendency to organise as often as possible, distribution of wagons directly from the marshalling yards to/from the shippers premises with no intermediate or light handling of wagons in node stations.

The Consultant proposes to consider these trains between intermarshalling yards and node stations as part of the distribution leg of a transport, and not as part of the long distance main leg of the transport. The Consultant proposes to consider the costs of these services as distribution costs, and not main leg costs.

9.2.2. Proposed Single Wagon Load structure

The Consultant proposes that costs structure for Single Wagon load services' production is defined as follows

- Intermarshalling yards services costs , excluding infrastructure costs
- Distribution services costs , including when they exist services between marshalling yards and node stations (distribution services level 1), and collection/delivery services (distribution services level 2)
- Marshalling /shunting services costs
- Infrastructure costs (access to tracks, to stations and marshalling yards)
- Wagon usage costs
- Commercial costs (customer service and sales)
- Other costs (overhead and others)

Main leg intermarshalling yards transports cost as well as distribution costs include costs for drivers, rolling stock and energy in order to provide traction services. They are fixed costs except costs for maintenance of the locomotives and energy.

Distribution transports costs are based on the same principles as the main leg transport ones.

Marshalling /shunting costs may be identified as separate or not, the Consultant proposes to clearly identify them. They consist of costs for access to marshalling yards or tracks in stations, and locomotives/ personnel to realise marshalling operations.

Marshalling /shunting services are time consuming as production organisation is not a continuous process, but is batch processed. it is a succession of trains and operations in marshalling yards/node stations; in between, wagons stay waiting; going through one marshalling yard is 2 to 6 hours average per marshalling yard. Marshalling/shunting operations may cause unreliability of the services, and their unit cost is said as high. As one wagon is going average through 2 marshalling yards, 2 node stations which means at least 4 marshalling /shunting operations it means much time, high costs and risks .

In EU member states, marshalling yards and tracks in stations are managed by the infrastructure managers, but operations are generally under the responsibility of railway undertakings using their personnel or sub-contracting. In Switzerland, the infrastructure manager was also in charge of operations in the marshalling yards , but this situation is changing as SBB, the incumbent railway undertaking is the only user of these marshalling yards as well as the only provider of Single Wagon Load services in Switzerland.

Wagons costs are both costs of possession the wagon either because it is owned or it is leased based on number of days necessary for a transport, and costs for maintenance of wagons based on distance and number of days.

Commercial costs are mainly costs of sales and marketing/ promotion, customer centre costs.

Overhead and other costs cover accounting/invoicing/finance/taxation, but also human resources management, safety and security, IT and telecoms.

9.3. Costs evaluation

The Study team prepared an evaluation of costs for Single Wagon Load services.

The evaluation has been made considering the production of a transport by rail organised to carry goods loaded in a conventional wagon from A to B, with 50 t net per wagon, on a total distance of 800 km with transport within 5 calendar days from end to end.

9.3.1. Product organisation

Production organisation for the transport of the above shipment is :

- At origin of the transport, the wagon once loaded is collected by a train to go to the first node station. The Consultant defines this train as part of the distribution system , distribution train level 2. The wagon is coupled to other wagons and the transport process begins.
- In the node station, the wagon is incorporated into a train to go to the first marshalling yard (marshalling yard 1) . The Consultant defines this train as part of the distribution system, distribution train level 1. . In the node station, wagons are sorted on station's tracks.
- At arrival in the first marshalling yard, the wagon is uncoupled to be incorporated into a train going to the intermediate marshalling yard (marshalling yard 2). The Consultant defines this train as part of the main leg production system train. The wagon is marshalled using a hump or shunted in a flat yard.
- From this intermediate marshalling yard (marshalling yard 2) , the wagon is incorporated into a second main leg train, part of the main leg production system, to go to the destination marshalling yard (marshalling yard 3)
- On arrival in marshalling yard 3, the wagon is marshalled to be incorporated into a train going from this marshalling yard to the node station in charge of preparing delivery trains, which is a distribution train level 1.
- On arrival to this second node station, the wagon is sorted and incorporated into the final delivery train, distribution train level 2.

- At destination, the wagon is uncoupled, and officially delivered.

For the costing exercise, we propose the following assumptions regarding the different types of trains

- Main leg production system, intermarshalling yards trains: trains with 24 wagons of which 12 are loaded, or 600 t net/ 900 t brut. 100% of wagons go via 3 marshalling yards, one at origin, one at destination and one intermediate. These trains run on 500 km in total
- Distribution production system , level 1 trains : trains with 20 wagons of which 10 are loaded,, or 500 t net/ 750 t brut . These trains run on twice 100 km or in total for one loaded wagon on 200 km, twice 100 km both ends of the transport .
- Distribution production system, level 2 trains : trains with 8 wagons of which 4 are loaded , or 200t net/ 300t brut. These trains run 50 km each end of the transport.

9.3.2. Assumptions regarding unit costs

Operations and working conditions

The Consultant proposes to consider the following assumptions for the costing exercise :

- Number of days of operations : 220 /year
- Speed for main leg intermarshalling yards trains and distribution trains level 1 between marshalling yards and node stations : 70 km/h with electrical locomotives, one driver per train
- Speed for distribution trains level 2 or final collection /delivery trains : 40 km/h with diesel locomotives , one driver plus one assistant
- Drivers working conditions for main leg intermarshalling trains and distribution trains level 1 between marshalling yards and node stations : 5,0 h per day effective driving time or 50 000 km per year for a freight train
- Effective use of an electrical locomotive for main leg intermarshalling yards trains and distribution trains level 1 between marshalling yards and node stations : 2000 hours per year or 140 000 km per year.
- Drivers working conditions for distribution trains level 2 or final collection /delivery trains : 5h per day effective driving time on average effective distances of 100 km with stops , or 25 000 km/ year.
- Effective use of a diesel locomotive for distribution trains level 2 or final collection/delivery trains : 1000 hours of traction and 1000 hours waiting, meaning 40 000 km /year.

- Drivers costs, all included 100 000 euro per year for drivers for main leg intermarshalling yards trains and distribution trains level 1 between marshalling yards and node stations , and 70 000 euro per year for a distribution train level 2 or final collection /delivery train's driver.

- Other staff cost in stations or for marshalling/shunting services is 50 000 euro per year per employee.

Driving costs

Under the above assumptions, costs of drivers for main leg intermarshalling yards trains and distribution level 1 trains are 2,5 euro per train km . This cost takes into consideration the fact that freight trains often stop to allow passenger trains to pass.

These costs are more or less fixed costs. Drivers need long training, have specific working conditions. Up to now, they stay all their professional life with the same company

Rolling stock possession and maintenance costs

The Consultant proposes the following assumptions for the costing exercise :

- An electrical locomotive costs 3 million euro and is amortized on 25 years to run 140 000 km /year. Fixed cost of possessing the locomotive is thus 0,9 euro per trainkm. The cost of maintenance of an electrical locomotive may be estimated as 4% of the acquisition value or 1,2 euro per trainkm. Total locomotive cost in case of an electrical locomotive is 2,1 euro/trainkm .

- A diesel locomotive for collection /delivery services costs 1,5 million euro and is amortized on 25 years to run 40 000 km/year. Fixed cost of possessing such a locomotive is thus 2 euro per trainkm. The cost of maintenance is 7% of the acquisition cost or 2,1 euro/km which may be considered as a variable cost. Total locomotive cost in case of a diesel locomotive is 4,1 euro /trainkm.

- A wagon costs 80 000 euro (from 70 000 to 120 000 euro) , and is amortised on 25 years. The necessary investment for 20 wagons is 1 600 000 euro. This investment is amortized on 25 years which means 64 000 euro per year. An average distance covered by one wagon is 40 000 km/year which means a cost of possession of wagon of 1,6 euro per wagon km. Maintenance costs are estimated as 3% of value, which means 2400 euro per year or 1,2 euro per wagon km . Total cost per wagon are 2,8 euro per wagon km.

Energy consumption

Electricity cost for an electrical locomotive pulling a 900 brutto tons train on a line with no specific difficulty may be evaluated to 1,8 euro per trainkm.

For a diesel locomotive pulling a 300 t train for collection/delivery services the diesel cost may be evaluated to 2,5 euro per train km .

These costs are variable costs.

Marshalling and shunting costs

The Consultant was told that marshalling and shunting costs may be evaluated to 300 euro per wagon in case a wagon is going through 2 marshalling yards. Shunting in flat yards may cost less but the Consultant proposes to consider the same unit cost applies.

The Consultant proposes to consider that handling the wagons in node stations costs the same or 150 euro per wagon.

Handling to couple /uncouple the wagons at collection /delivery points cost is including in the cost of the distribution level 2 train grouping with one driver plus one two assistants.

This includes the infrastructure charges for access to marshalling yards and tracks in stations.

Infrastructure costs

Infrastructure costs are track access charges paid to the infrastructure manager plus access charges to parking tracks in stations, and access to marshalling /shunting yards. The infrastructure manager may also charge for electrical energy, but this cost has been considered above as an operating cost for the railway undertakings.

Tariff for access charges varies in Europe from 3 to 8 euro per train km . For the costing exercise the Consultant proposes to consider 3 euro per train km.

In some countries such as France, there were public subsidies reducing the freight charges paid by the RUs up to 50% , but they are likely to disappear due to State budget constraints.

There might be commercial discounts according to types of trains (heavy trains, combined transport trains) but up to now, there are no commercial discounts for trains producing Single Wagon Load services , whether main leg inter-marshalling yards trains, or distribution trains levels 1 and 2.

Access to marshalling yards is generally charged. It might be an important annual fixed charge whether all tracks are used or not, or it may be charged as a cost per wagon goin in/going out. Use of marshalling yards may also not be charged, it is the case in the Czech Republic up to now .

Access to tracks in stations to build trains and/or park wagons are generally charged.

Tariff for access/use of marshalling yards and tracks into stations are published every year by every infrastructure manager in the Network Statement.

We propose the access charges to marshalling yards and tracks in stations are part of the costs for marshalling/shunting operations.

Commercial costs

We propose to consider they are 5% of the total costs. They represent costs for sales, marketing, promotion, customer centre.

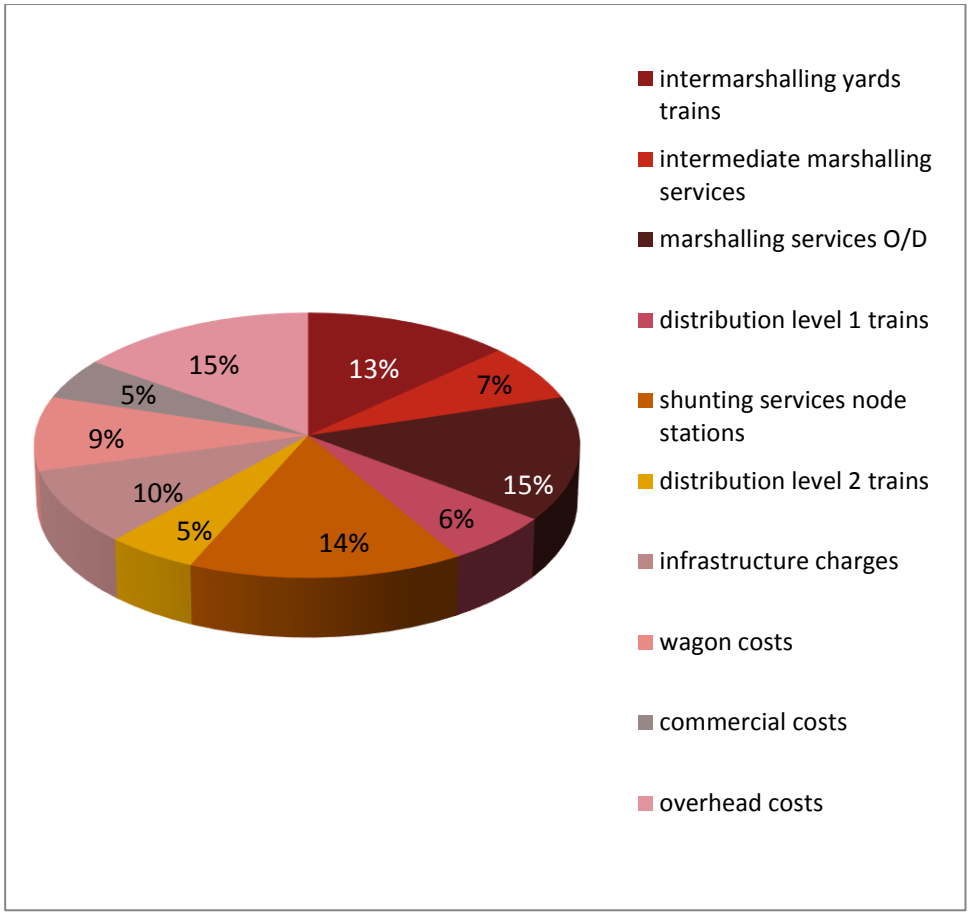
Overhead costs

A reasonable estimate is 15% of the total costs. They represent costs for accounting/invoicing, finance, human resources, legal services, safety and security, technical visit, IT management . They are at different level in companies, both regional and national levels.

Costs evaluation

Table 16 - Costs evaluation for Single Wagon Load services (without financial costs)

Component for SWL costs	*Estimation of unit costs(in euro/trainkm)*	*Estimation for a loaded wagon on 800 km for 50t load (in euro)*	*%*
Main leg intermarshalling yards trains excl infrastructure costs, including locomotives and drivers costs	6,4	267	13
Distribution trains			
- level 1: trains between marshalling yard and node stations	6,4	128	6
• level 2: trains for collection and delivery	10,5	119	5
Marshalling /shunting – Costs per wagon			
• Main leg: marshalling at marshalling yards	450*	450	22
• Distribution: Sorting at node stations	300*	300	14
Infrastructure costs (without access to marshalling yards and tracks in stations)	3	200	10
Wagon costs	2,9	200	10
Commercial costs	5%	100	5
Overheads and other costs	15%	300	15
Total costs		**2064**	**100**



Comments

Total cost is 2064 euro per wagon for a transport in a bogie wagon loaded with 50 t on a total distance of 800 km with 3 marshalling yards en route , two node stations fed by trains coming from marshalling yards and final locla collection/delivery trains.

Intermarshalling yards trains costs 13% of total cost, plus 10% for charges for track access, in total 22% of total costs

Marshalling yards services in first and last marshalling yards are 15% of total costs. If we consider also the intermediate marshalling (7%), the total marshalling costs represent 22% of the total.

Distribution costs (distribution trains + sorting at node stations) excluding marshalling yards services costs in first and last marshalling yards are 25 % of total costs.

Commercial costs and overhead costs represent 20% of total costs .

Several possibilities to reduce costs , as

- Simplify the production process and reorganise naise it using as few as possible two levels for distribution services. Savings would be about 15% representing at least the costs for shunting in node stations.

- Avoid using an intermediate marshalling yard as much as possible introducing flexibility in routing wagons to produce main leg transport services only going through first and last marshalling yard . Savings would be represent 7% of total costs
- Better use the capacity of trains with more than 24 wagons per train
- Reduce empty runnings , which in our example, are represent in our example 50% of the wagons carried in trains
- Reduce the access charges specially for access to marshalling yards and first/last mile infrastructure which may represent 50% of all marshalling/shunting services costs. These facilities are often old and not well maintained. Pricing access to them should be reviewed in order not to jeopardise the traffic which can use them.
- Load more that 50t in a wagon , using more efficient wagons
- Reduce overhead costs using more Information Management tools, as ERP software

When railway undertakings decide to redesign their Single Wagon Load services to provide more reliable and less costly services, they try to simplify their production organisation basing it on regular predictable flows.

For example, SNCF builds flexible and reliable Single Wagon Load services with 50% of wagons going through only first and last marshalling yards using only one intermarshalling yard axe and almost 50% of wagons using only one intermediate marshalling yard. The system is also based on capacity booking and procedure for order's confirmation.

Another example is with new railway undertakings developing new services for groups of wagons going from origin by trains converging towards a platform where groups of wagons are exchanged from their arrival train to their new departure train up to destination with no intermediate marshalling /shunting operations. These wagons are only sorted once !

9.4. Single Wagon Load costs comparison with road costs and intermodal costs

In all EU member states, road costs are monitored on a regular basis. studies are done on a regular basis in all EU member states.

Studies are realised about road and rail costs, specially to compare road costs and intermodal costs, but also Single Wagon Load costs. Recent studies were published in 2010 and 2012 in Austria and Switzerland.

9.4.1.1. The main results of these studies have been reviewed by the Consultant and are presented in this paragraph. Comparison with road costs

Costs calculations for road transport have been developed and published since many years in most EU member states.

As an example, the following table provide road costs estimation for a transport done in 2011 between to facilities located in France with a transport distance of 743 km, a transit time of 13,32 hours for 27 t of goods in the truck.

Table 17 - Road transport costs estimation in France 2011

2011	*Indicator*	*Estimation*
Outputs	Km of the transport	743 +50 (approach distance)
	Transit time in hour	Loading time :1h Driving time :793/70 km/h Unloading time:1h Total : 13,32 h
	Transit time in days	13,32h/10h= 1,32 day
Costs	Variable costs	793*0,44 euro/km=349 euro
	Hourly costs	13,32*21,74 euro/h=290 euro
	Fixed costs	1,32*166,64 euro /day =220 euro
	Total costs per truck	859 euro
	Total costs per 000 tkm	42,95 euro

source : Comité National Routier / Consultant

Comments

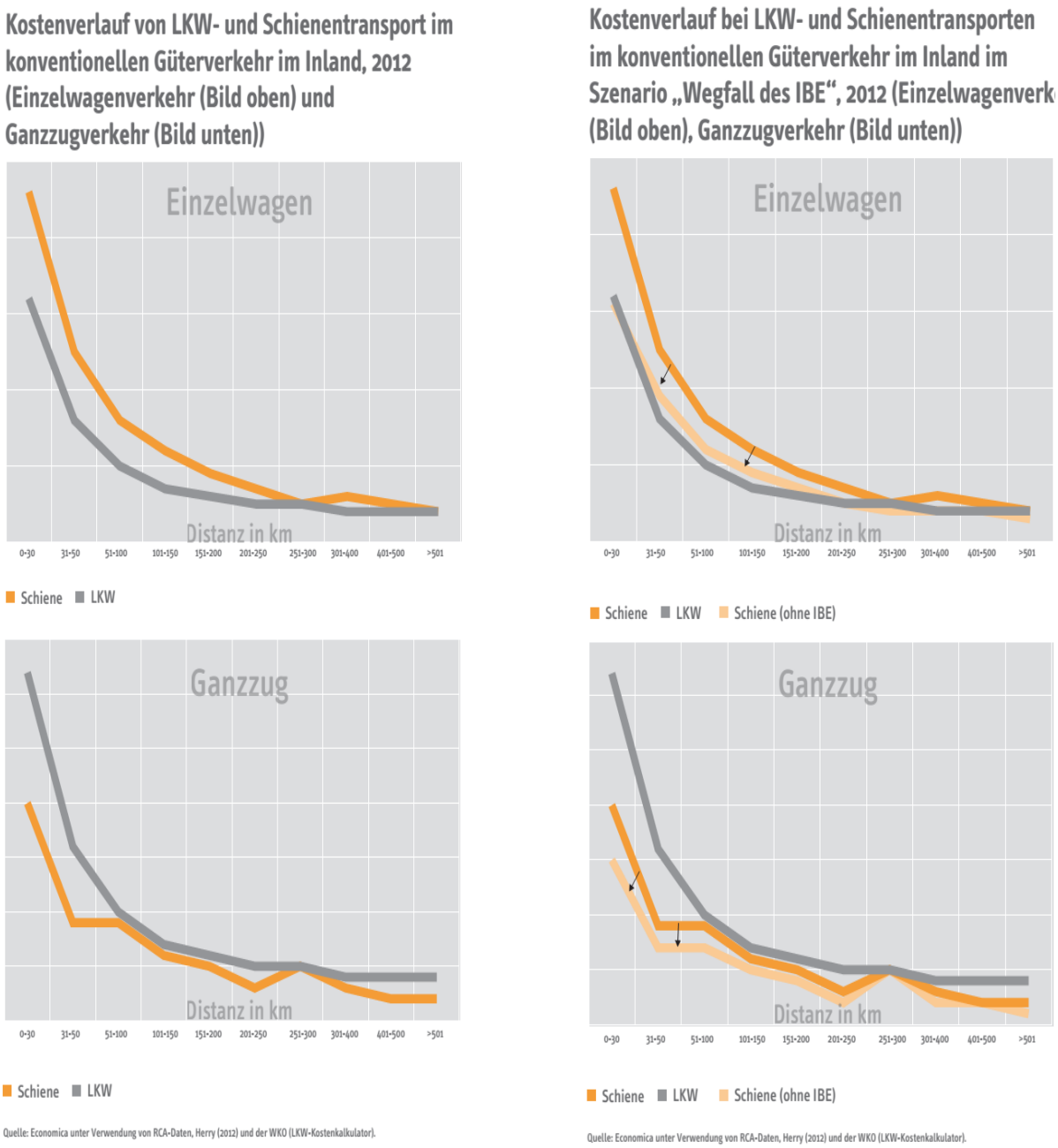
Estimation for road transport costs is about 50% of estimation for rail Single Wagon Load transports costs.

One reason is the necessary time for the transport, which makes necessary expensive but not used enough assets, and expensive labour costs for intermediate marshalling/shunting operations of wagons

Another reason is the labour costs difference due to level of wages and effective working times.

Costs calculations for road transport and comparison with rail transports were also part of the work prepared by the Austrian Government to get clearance for State Aid for rail intermodal transports.

The following graphs show how road and rail compete in relation with the distance of the transport.



Source : Economica

Comments

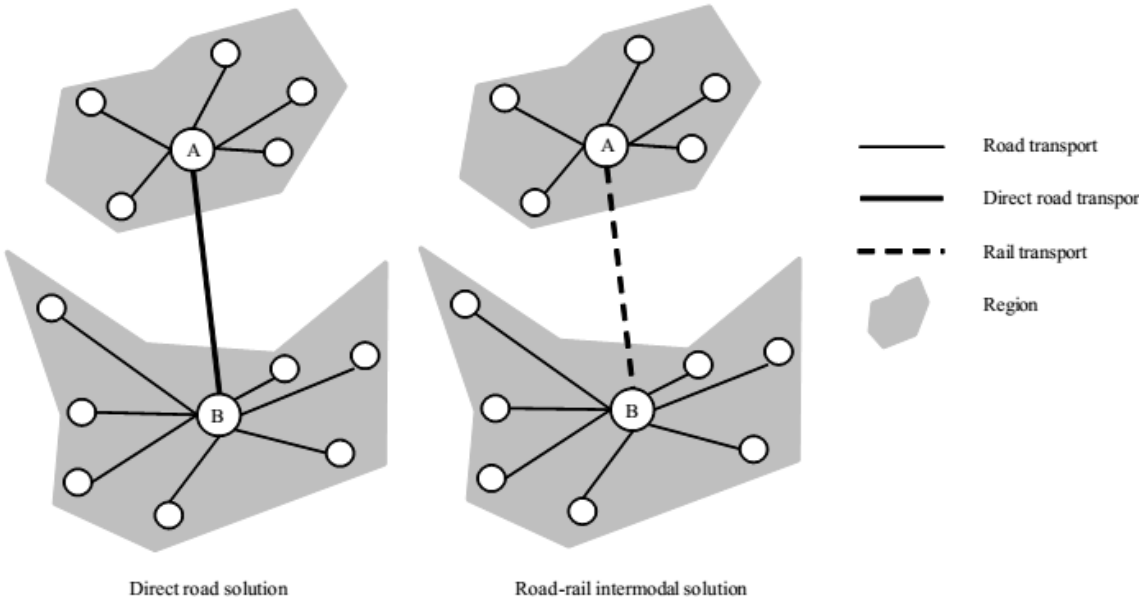
Single wagon load services are almost always more expensive to produce than road transports. They are really competitive in Austria for distances more than 300 km

Full Train Load services are almost always less expensive than road transports at any distance

Infrastructure cost is a major factor to be taken into consideration to improve the competitiveness of rail versus road and thus allow modal shift. In case infrastructure charges would not be paid , Single wagon Load services would be competitive with road at almost any distance

9.4.1.2. Comparison with intermodal costs

In case of intermodal services, a container, a swap body , a trailer or a truck is loaded on a wagon for the main leg of the transport between specialised intermodal terminals , while terminal sections (between terminals and shippers facilities) are road transports. Inter terminal trains are often dedicated to intermodal transports. Distribution from /to the terminal is made by road, distances may be 150 km to/from the terminal. Collection/delivery trains used to collect/deliver conventional wagons do not carry intermodal wagons.



Source: Finnish study on combined transport

Main difference between intermodal transport and unimodal road transport is that unimodal road transport uses road transport for the whole transportation chain, whereas intermodal transport uses at least two different transport modes.

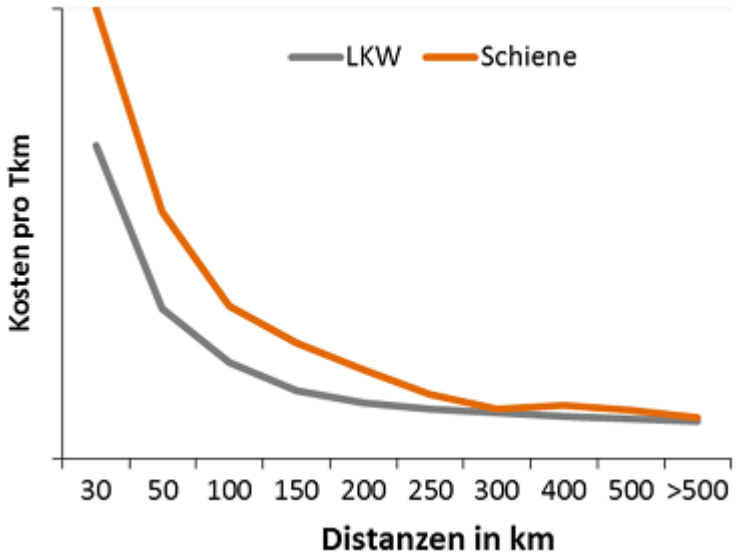
Price of intermodal transport consists of four main elements:

- Price of pre-haulage by road
- Price of terminal handlings in intermodal terminals
- Price of main haulage by rail

- Price of post-haulage by road

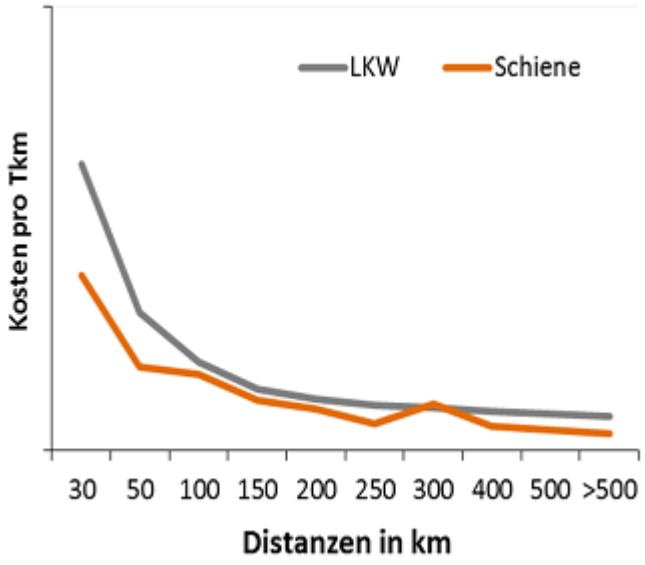
In the notification prepared by the Austrian government for the EU Commission to get an exemption for subsidies for Single wagon Load, Intermodal and RoLa services, a comparison of the profitability of the 3 systems (Single Wagon Load, intermodal and RoLa) is shown .

Figure 35 - Costs comparison between road transport and Single Wagon Load services



source : Economica study for the Austrian government

Figure 36 - Costs comparison between road transport and Full train Load services



source : Economica study for the Austrian government

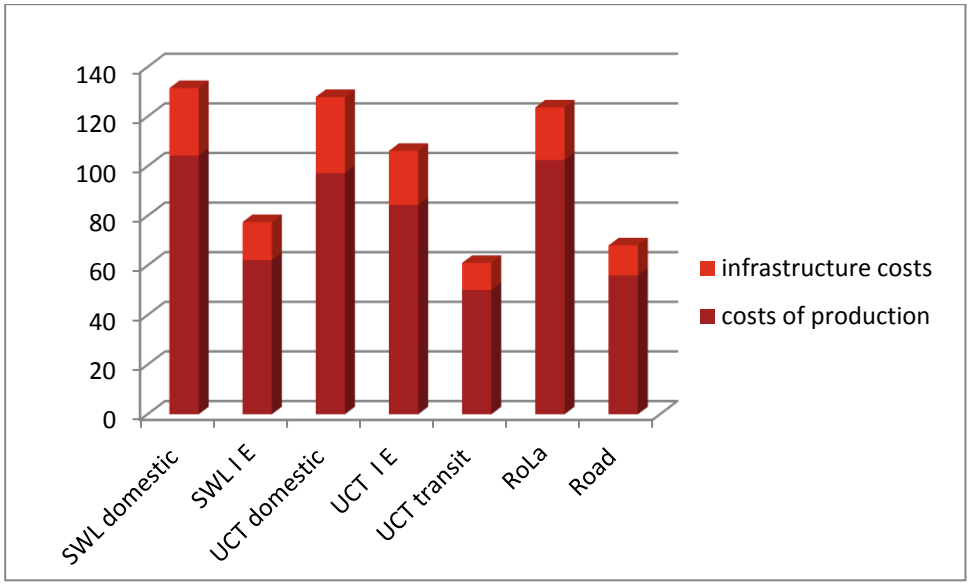
The comparison of costs for the 3 types of services is detailed in the following table, prepared by the Austrian government and part of the notification document for aid for the provision of certain combined transport services by rail in Austria .

Table 18 - Costs comparison between Single Wagon Load services (SWT), intermodal services (Unaccompanied Combined Transport) , for RoLa services (Rollande Strasse) and Road transports

		SWT		UCT			RoLa	Road
		Domestic Transport	*Import/Export*	*Domestic Transport*	*Import/Export*	*Transit*	*Total traffic*	
1	Production costs main leg without costs for the use of infrastructure	60.5	38.8	49.7	32.7	21.2	36.7	*44.0*
2	Costs for the use of infrastructure (IBE + shunting / toll)	26.2	14.7	20.8	13.1	7.4	16.7	*12.1*
3 = 1+2	*Total production costs RCA*	*86.74*	*53.5*	*70.4*	*45.8*	*28.6*	*53.4*	
4	Total costs private carriages	4.4	2.8	0.2	0.8	0.8	0	
5	Production costs Terminal*	0	0	9.9	8	3.5	4.5	
6	Additional costs RoLa carriage	0	0	0	0	0	18.9	
7	Operational costs of the connecting railway*	1	0.7	0	0	0	0	
8	Local Shunting*	1.2	0.9	0	0	0	0	
9 = 3+4+5 +6+7+	*Total railway production costs*	*93.2*	*57.9*	*80.6*	*54.6*	*32.9*	*76.8*	
10	Pre- and Post leg Production costs	11.1	4.2	16.6	29.8	17.2	0	
11	Fixed and personnel costs lorry on RoLa	0	0		0	0	25.7	
12 = 9+10+ 11	***Total costs of production***	***104.3***	***62.1***	***97.2***	***84.4***	***50.1***	***102.5***	***56.0***
13 = 2+5+7	**Total costs for use of infrastructure**	**27.2**	**15.4**	**30.7**	**21.0**	**10.9**	**21.2**	***12.1***
	* costs in EUR/tkm of main leg							

source : document State Aid SA.33993(2011/N)- Austria- Aid for the provision of certain combined transport services by rail in Austria.

Figure 37 - Costs comparison of SWL, UCT , RoLa and Road transport services in euro/1000 tkm



Comments

Single wagon Load services are the most expensive rail services to be produced especially for domestic services when collection /delivery services are needed both ends of the transport

UCT services in transit costs 50% of domestic SWL services

Infrastructure costs are 22 % of total costs for domestic SWL services and 18% for Import/Export SWL services , while they are only 18% for road transports.

9.5. Main costs drivers and possible actions for a better economic performance of new improved Single Wagon Load services

To produce transport services on the basis of Single Wagon Load production principles, main operations are the following ones :

- collection of wagons,
- incorporation of wagons into trains going to the 1st marshalling yard,
- intermarshalling yard train to a second marshalling yard,
- incorporation of wagons in smaller trains for final delivery

For most of railway undertakings, there are still additional operations with trains going from the last marshalling yard to a node station, where wagons are sorted to constitute final delivery trains. The same for collection trains arriving in a node stations where they are manipulated to build a train going from this node station to the first marshalling yard.

Wagon Load costs are mainly

- Intermarshalling yards costs including staff costs (drivers)
- Collection and delivery costs ,including staff costs (drivers)
- Marshalling /shunting services
- Rolling stock costs both locomotives and wagons
- Infrastructure access costs
- Other costs(overhead and financial costs)

The Study team has identified the main cost drivers for each cost category as follows :

	Costs drivers	*indicators (average figures)*
Main leg Intermarshalling yards costs including staff costs (drivers)	- Productivity of locomotives - Drivers' working conditions - Productivity of drivers - Energy consumption and costs - Costs of locomotives - Costs of drivers - Infrastructure charges - Paths quality and reliability - Use of capacity of the train	*- Number of days /hours for use of a locomotive* *- Number of km made by a locomotive in a year -* *- Driver 's number of hours at work* *- Drivers' costs* *- Number of hours during which a driver is effectively driving a train (train moving at design speed)* *- Number of wagons in the train /%of use of train capacity* *- electricity consumption in kwh/train km and cost* *- Track access charge /trainkm* *- Speed of the train path in km/h* *- % of paths cancellations* *- Minutes of delay*
Distribution collection and delivery costs ,including staff costs (drivers)	- Drivers' working conditions - Productivity of locomotives - Productivity of drivers - Energy consumption and costs - Costs of locomotives - Costs of drivers - Infrastructure charges - Paths quality and reliability - Use of capacity of the train	*- Number of days /hours for use of a locomotive* *- Driver's number of hours at work* *- Drivers' costs* *- Speed of the last mile train and number of speed limits* *- Number of non automatic level crossings /km* *- Number of wagons to be collected /delivered with one train* *- number of litres fuel /train km and cost* *- Track access charges to the capillary network* -
Distribution trains between marshalling yards and node stations including staff costs drivers	- Drivers' working conditions - Productivity of locomotives - Productivity of drivers - Energy consumption and costs - Costs of locomotives - Costs of drivers - Infrastructure charges - Paths quality and reliability - Use of capacity of the train	*- Number of days /hours for use of a locomotive* *- Driver's number of hours at work* *- Drivers' costs* *- Number of km made by a locomotive per year* *- Number of wagons in the train* *- Electricity consumption kwh /trainkm* *- Track access charge*

	Costs drivers	*indicators (average figures)*
Marshalling /shunting services	- Staff working conditions - Productivity of staff marshalling wagons - Work organisation - Staff costs - Infrastructure charges	*- Number of wagons to be sorted in marshalling yards /day* *- Number of wagons to be handled in node stations /day* *- Access costs to marshalling yards and tracks in stations* *- Staff costs in stations and marshalling yards*
Rolling stock cost for locomotives	- Adequation type of locomotive/operational needs - Productivity of the locomotives - Efficiency of maintenance	*- Investment cost for a locomotive* *- Maintenance costs for a locomotive* *- Number of km of a locomotive in a year* *- Number of hours when a locomotive is available*
Rolling stock costs for wagons	- Productivity of the wagons - Efficiency of maintenance	*- Investment cost for wagons* *- Maintenance costs for wagons* *- Number of loaded trips per year made by a wagon* *- % of empty trips /loaded trips* *-Number of days /year when the wagon is available for transport*
Infrastructure access costs	Type of paths and their adequation to needs	*- Cost for track access on main line for light trains* *- Costs for track access in case of not regular trains* *- Costs for cancelling a train on main network* *- Cost for access to marshalling yards* *- Cost for access and use of station tracks* *- costs for access to secondary lines to serve private sidings*
Other costs	- Organisation's efficiency - Staff productivity	*- Number of employees* *- Production organisation*

Main cost drivers may be classified in 5 categories

A. Single Wagon Load services 'production organisation leading to necessity to handle wagons several times during one transport

B. Not optimal use of trains' capacities

C. Working conditions and drivers' /other staff's productivity

D. Not optimal use of locomotives and wagons capacities

E. Infrastructure costs / quality of paths for freight trains / conditions and costs for access to capillary lines and private sidings

4 costs drivers are under the responsibility of the railway undertaking, while the last one regarding infrastructure costs/quality/availability is not.

A. Single Wagon Load services' production organisation leading to necessity to handle wagons several times during one transport

Handling wagons in marshalling yards, in node stations and on shipper's premises is a high part of total Single Wagon Load services' costs.

Organising production of services so that one or two handlings could be cancelled would lead to inferior costs.

This could be done as a result of negotiations with clients and better flexibility of production for Single Wagon Load services.

As an example, the Consultant would like to present the following case : in the USA, raw plastics were carried by rail to be delivered to companies using these plastics to produce various products such as bags, technical components . Companies producing raw plastics had relatively low capacity for storage, and directly from production, loaded special wagons carrying the products as bulk products. The wagons were parked on producers' own tracks in their premises and grouped by main destination areas. Real time information on the number of wagons ready to depart and their destination area was exchanged between the plastics producers and the railway undertakings in charge of transport. When a railway company considered it was possible to group these wagons for one destination area with other wagons from other shippers for the same destination area, the railway company was designing the train and its routing, and was sending a locomotive to collect the wagons. During the production process of the transport, wagons were handled as little as possible and the distance on which the train was operated as a Full Train Load was as long as possible. As the train was specifically designed, it provided reliable transit times except in case of technical incidents/accidents.

Production planning in real time should be used as a powerful tool to decrease the number of stops and handlings for wagons to produce Single Wagon Load services, and so increase reliability and decrease costs. It would mean network services based on fixed timetables used with flexibility (flexible routings, flexible but reliable transit times, optimal use of trains' capacities..) in order to offer best quality at low costs. It would be based on real time exchange of information between shippers and railway undertakings about orders for transport from shippers with needed transit time, proposed dates for transport and commitment on transit times by the railway undertaking after production planning, acceptation by the shipper and implementation by the railway undertaking. Production could be realised by the railway undertaking alone or by the railway undertaking together with its sub-contractors but under the railway undertaking s responsibility.

B. Not optimal use of trains capacities

The production's organisation of Single Wagon Load services is based on a non-flexible time table mobilising important resources and thus having high fixed costs : network of intermarshalling yards trains, network of collection /delivery trains, with corresponding paths, locomotives and staff , numerous marshalling/sorting/handling operations for wagons and locomotives .

When the system is used at full capacity, breakeven is possible. As soon as volumes decrease, costs increase much. The temptation is high to reduce the services by cancelling trains, and then quality is poor and does not meet the market needs.

Trains should be used at full capacity as much as possible !

The objective should be to manage the use of capacity in order to optimise /maximise the use of the trains capacities. This should be obtained through introduction of booking system, day to day monitoring, and introduction of yield management in order to provide to clients planned transit times and to respect them, or in case of problem to be able to inform the client and eventually to negotiate a solution. .

Another objective should be to increase the timetable efficiency by practical optimisation of paths, trains and services in order to adapt the capacity of the whole system to the market volumes which have ups and downs by day, by month, ….

C. Drivers' and staff' productivity

A locomotive driver in most railway undertakings work 6 h per day. It means working less than 1500 h per year. If during this time, the driver is effectively driving, he would run over 100 000 km per year, which is not the case.

Other staff have different working conditions than drivers, which limit the variety of tasks an employee might provide, limiting their adaptability to different missions and functions during the working hours.

This is related to general working conditions and labour rules which are specific to the railway sector.

Changing these working conditions will be a great challenge!

For example, changes were introduced in the UK when privatisation occurred in 1997, it was done against high increases for salaries. This was possible as franchisees operating passenger services had to hire drivers and were competing with each other on this market where the offer was limited !

This low productivity is also related to the production's organisation in the railway companies, and priorities given in most European countries to passenger trains, and not to freight trains .

Freight drivers run only 50 000 km per year because freight trains often stop and wait, which jeopardize drivers', locomotives' and wagons' productivity and efficiency. In the past, with integrated incumbent railways, freight trains got the worst paths, in case of incidents they were parked to use their locomotives and drivers, but they were charged high infrastructure costs according to brutto ton km which were much higher than passenger trains' ones. Such a policy was possible until competition with road transport was not developed. But when road transports developed better services in relation with opening of highways and other road infrastructure improvements such as ring roads to avoid congestion in cities' centres, railways lost market share because of poor relative quality and high relative prices for their freight services compared to road transports !

When a freight train is stopped on a track, its locomotive's and driver's productivities decrease and costs per trainkm and per wagon increase.

D. Not optimal use of locomotives and wagons

Having trains with sub optimal use of their capacities leads to sub optimal use of locomotives.

Having paths for freight trains which include stops en route and waiting times to allow passenger trains to run leads to sub optimal use of locomotives and wagons. Transports are too slow and need more rolling stock to produce them.

Locomotive's energy consumption is higher for trains with many stops en route, as well as wear of locomotive's and wagons' brakes; their maintenance costs increase.

Priorities given tot Passenger trains is also a cause of bad productivity of locomotives as in case of incidents with the locomotive of a passenger train the rule was to look where was the nearest freight train to take its locomotive and its driver …

Cancelling Single Wagon Load services to/from wagons maintenance workshops jeopardise the productivity of wagons, as transit time to go to/from a workshop are longer as it is necessary to build full train load trains to carry the wagons.

Days spent by a wagon in a work shop for its maintenance are not used for transport and increase the costs of wagons for loaded transports. This number of days is related to efficiency of workshops, but also upon availability of spare parts .

Not recent locomotives are not so reliable as new ones and their maintenance costs are higher. The same with old wagons.

E. Conditions for use of the railway infrastructure

These conditions whether quality of paths, level of track access charges, level of access charges to use marshalling yards and tracks in stations, are key elements for the productivity and the efficiency of staff and rolling stock for freight services.

Considering quality of paths, it is difficult to negotiate and be informed properly with the national railway infrastructure manager, but the situation becomes almost unpredictable for use of paths in other countries.

A railway undertaking stated than at some periods, 1/3 of planned paths were changed or cancelled !

Providing reliable transport services in such situations is not possible as well as optimising use of capacities. Productivity and efficiency are not possible.

The problem is that infrastructure managers are publicly owned monopolists service providers, and that railway regulatory bodies created to regulate them do not have yet the expertise for an incentive regulation towards more quality and less costs.

Considering level of infrastructure charges, several ideas to improve the situation for Single Wagon Load services.

- To consider train paths used to produce Single Wagon Load services as a basis fixed network which might be used with flexibility and special pricing policy: for example, possibility to confirm effective use of a path the day before with no penalty but with a possible differentiated price (i.e. hotel rooms reservations with blocked dates at a certain price and with possibility to change reservation at another price),
- To impose penalties in case the infrastructure manager does not provide the quality as planned
- To differentiate paths prices according to train weight and so provide discounts for light trains
- To look for solutions to decrease infrastructure charges for access to capillary network and tracks in stations on the basis of their conditions and equipment in order to reduce them as much as possible. Possible negotiations with local authorities and local industries to define the necessary conditions of the local railway infrastructure , the necessary resources and the sharing of costs between local partners. Local railway infrastructure should be decided at local level and no longer at national level.

10. Lessons learned about the past and likely future evolution of SWL

The analysis of SWL flows allows the Study team to obtain a relatively comprehensive picture of importance of such kind of supply in the European freight transport market:

- According to the available data from official statistics and gathered during this study, the SWL traffic represent about 75 billion tons*km in the 13 analyzed countries[26], not considering the transit traffic (2012 data). By adding this latter component and the remaining EU member states, a reasonable estimate of the SWL traffic in EU+CH is about 80-85 billion tons*km, i.e. 15-20% less than the previous available estimates of Xrail of 2010, probably based on 2009 data.
- SWL share on the total rail freight volume is about 27% in the 13 key countries (Eurostat data on a sub-set of countries shows a reduction from 50% to 35-36% in the period 2004-2011).
- Significant differences among countries do exist, with SWL share on total rail freight of about 40% in Austria, Czech Republic and Germany, and lower than 15% in Italy and UK.
- Almost 2/3 of SWL traffic is international, showing the relevance of such supply for the international trade of goods.
- SWL services are more extensively for the transport of specific type of goods such as metals, chemicals, solid and liquid fuels, and transport equipment; in most cases, the SWL services are more suitable than other type of rail transport supply for such goods, due to the typical shipment size (preventing the utilization of full block train), as well specific transport requirement and constraints and a better use of the wagons and train transport capacity (these latter elements justifying the preference against combined transport solutions).

Thus, SWL is still an important transport solution, especially for international transport and in some market segments. But what are the reason of the observed decline, both in volumes and in market share?

A number of reasons have been identified and analyzed, among which the most relevant one can be summarized as follows:

- a **general reduction of the flows of some commodities** that are “captive” for SWL services, such as metals and transport equipment, for which there is an observed

[26] 11 key countries for the Study: Austria, Belgium, Czech Republic, France, Germany, Italy, Poland, Romania, Sweden, Switzerland, UK; + Slovania and Slovakia.

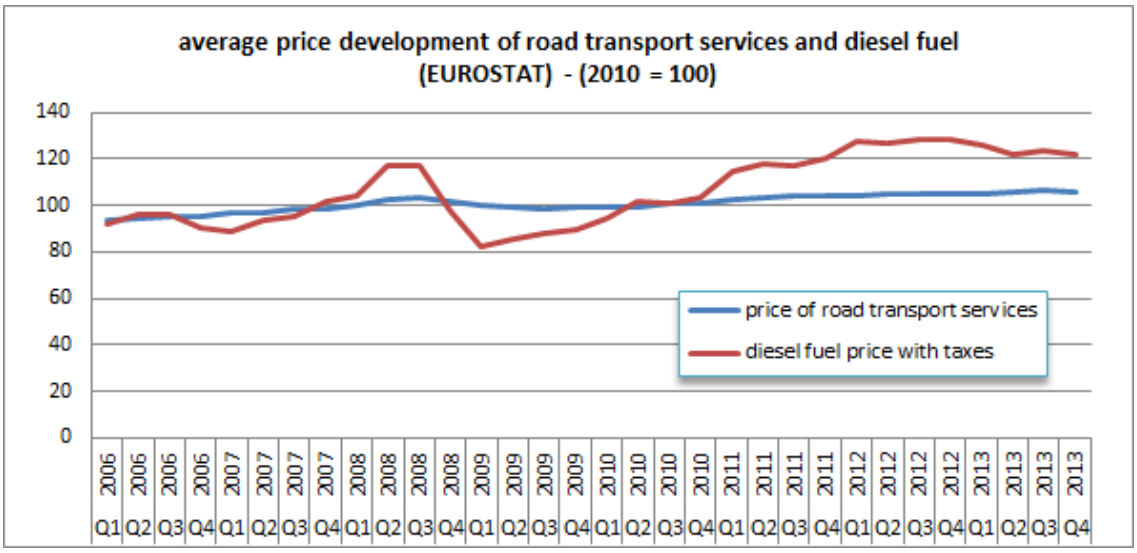
reduction of the total land transport flows of 15-20% in 2008-2012, and an identical decrease of the rail volumes;

- the **low or no profitability of SWL** for the RU operating them, driving RUs towards the elimination or significant downsizing of the service (as experienced in UK, Italy, Spain, but to some extent also in France) due to the urgent needs to improve their financial situation. Due to market competition, precise figures are not available, however it has been reported that even in countries with RUs still supporting SWL such Austria and Switzerland, 15-50% of the SWL services do not cover their production costs), due also to the complexity of the transport chain making less easy to obtain economy of scale especially on last mile and marshaling operations (that represent a very important part of the costs: 22% for marshaling & shunting, + 25% for collection/distribution/shunting at nodes);
  On that respect, it shall be added that the large proportion of internal traffic in SWL means that the decision to eliminate such service by the dominant RU of a given country is very likely to affect the SWL in all other countries exchanging goods with that country, since it will not be easy to find another RU interested and capable of replacing the incumbent;

- the **difficulty in coping market expectations in terms of quality of the service**, in particular for international transport that – as stated – is the largest part of SWL traffic: wagon tracking & tracking system already available to shippers in most cases for domestic SWL movements are not implemented yet at large scale for international flows, while that information is available when using other modes of transport; the reliability of the system is perceived as not sufficient (even if at least 75% of SWL trains are reported to arrive within 1h of the scheduled arrival time, because the complexity of the production model amplify the delay of a train e.g. whether other groups of wagons shall wait its arrival in order to reach an acceptable train capacity utilization);

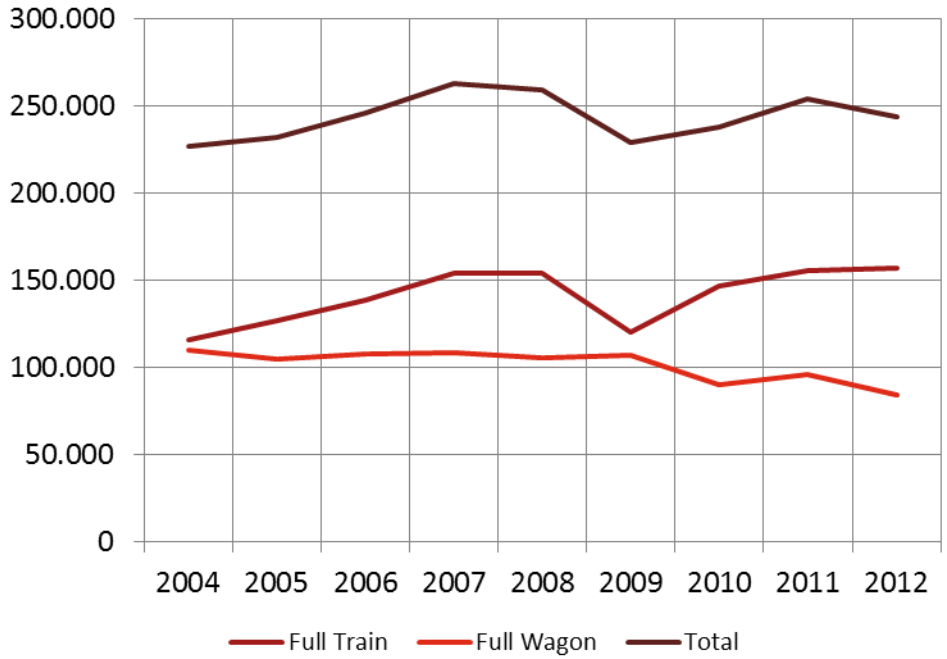
- the direct **competition on small/medium shipments with road transport**, the latter being able to constantly improve its efficiency, as shown in the Figure 38 that illustrate how diesel fuel prices variation did not generate a significant change in road transport prices; besides, road transport is highly rated by shippers in terms of flexibility, and it is characterized by a large capacity of transport that make it very competitive in terms of prices

Figure 38 – Evolution of road transport prices & fuel prices in Europe



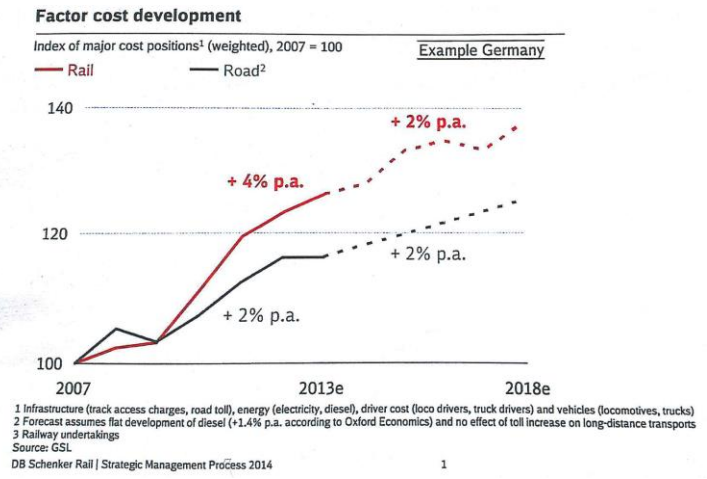
The peculiar market situation of SWL is evident by comparing the trend of SWL and Full Train services on total rail freight, that clearly shows the declining trend of SWL, while Full Train remained stable or increased in the period 2004-2012.

Figure 39 - Market share of SWL traffic over time (source: Eurostat)



By the way, specific analysis carried out by one of the key stakeholders in the rail freight sector highlighted an increasing gaps in the cost of rail and road freight transport.

Figure 40 - Road and rail costs trend comparison (source DB Schenker)



- the **limited effect on SWL of the liberalization process** which affected the European railway freight market in the last decade: due to the complexity and lower profitability of SWL, new entrants focused on the intermodal and full train markets, so that the beneficial effects of the market opening have not been observed for SWL (by the way, during the Study's stakeholders consultation, only a couple of the new entrants contacted for the survey stated that they also supply SWL services);

- **large part of the SWL system are still operated according to traditional production and business models** although several RUs are already operating or developing new production models aiming at better use of available capacity and simplification of the transport chain (e.g. liner train supply); enhanced model aiming at combining typical conventional SWL flows with regular flows of intermodal or conventional transport are promising in terms of efficiency and profitability, but not planned & operated at large scale yet;

- a number of **technological innovations** aiming at enhancing SWL's productivity, flexibility and attractiveness for the shippers have been developed and in most cases they are quite mature; large scale implementations are, however, quite significant in some cases, and the overall decline of the system does not encourage for such investments.

Under such general market conditions, a specific attention deserve the analysis of available **infrastructural facilities** that are essential to operate SWL services. The Study provided evidence that the situation is quite heterogeneous among the countries, but with the following general characteristics:

- broadly speaking, the **tendency to reduce the available infrastructure for SWL appears to be more an effect than a cause of the reduction of SWL traffic**; IM would like to avoid unexploited capacities because of the tight budget

constraints they have, so they react by reducing the available train formation facilities and freight station as soon as the relevant traffic streams are declining;

- thus, the number of marshalling yards in operation have been in several countries significantly reduced in the last 10 years (-30-40 % on average), and/or plans for further downsizing are existing;
- countries pursuing SWL are the ones more oriented to the preservation of the SWL related infrastructures, while other countries are developing "marshalling-free" SWL service (requiring only limited shunting operations on flat yards) to combine wagons from different clients;
- in the medium term, however, **such decisions – although justified in the short term – might hinder future re-launch of traffic**, especially if the tracks in the yards or sidings or freight stations are removed, and the available land used for other purposes;
- the most critical issue is the **reduction of the private sidings**; rehabilitation or construction of sidings (and in some case their certification) is a significant expenditure and administrative burden for the companies owning the plants connected by the siding, and only some countries support with specific actions their survival and development. On the other hand, road connections to industrial plants are built and maintained at no cost for the companies.

Thus, infrastructure downsizing is a key aspect threatening the SWL re-launching. There is very likely risk of a "**vicious circle**" where traffic reduction is driving the closure of some key facility, and the latter will generate further traffic drop.

11. Identified policies and best practices to revitalise SWL

11.1. Improving the availability of the information about SWL facilities and services

11.1.1. Background

The international carriage of goods by rail has always required exchanges of information between railway administrations in order to organise and operate the transport for each single wagons. The need of reliable and comprehensive information is, needless to say, particularly relevant in the case of SWL movements.

The basic information that needs to be exchanged today is not different from the data exchanged, for instance, between RUs of different countries in the past. However, thanks to ICT, it can now be shared among actors through information platforms with numerous advantages with respect to the past. Information can be communicated more rapidly and analysed in a more refined way so as to understand in real time the exact location of a consignment and make much more reliable predictions of Expected Time of Arrival (at least to the last railway delivery point for the consignment). This impacts favourably both the efficiency of the transport and the attractiveness of the service to customers.

Two different types of information platforms can be identified:

- **platform(s) delivering "static" information** (e.g. providing information on last-mile infrastructure and available "short liner" operators);
- **platform(s) delivering dynamic information** on the SWL service, i.e. giving to operators & shippers access to the information about the actual position of wagons and estimated time of arrival along the entire planned trip.

The platforms rely each on one or more databases of which many examples exist (see *EU Rail Vehicle & Infrastructure Databases Study, Final report, version 1j, 7/2/2012*). There is a considerable degree of fragmentation, apart from a few cases.

Dynamic information platform are already provided by several RUs, but they usually do not cover the international movement that are, as stated in the previous section, a very important share of the SWL traffic.

Examples of existing static information platforms are the DIUM (*Distancier International Uniforme Marchandises*, uniform distance table for international freight traffic) for railway infrastructure, describing not only tariff distances but also infrastructure characteristics in terms of suitability to receive specific types of trains/consignments. Regarding rolling stock, an existing static platform is the RSRD Rolling Stock Reference Database, required by the

TAF TSI and expected to be near completion in 2016 (see *TAF TSI Masterplan 2013*). The existing vehicle and infrastructure registers (e.g. the Virtual Vehicle Register) may be also be considered as static information platforms.

Dynamic information platforms are required by the TSI on the telematic applications subsystem for freight services. They have to be based on specific databases such as the RSRD and the WIMO (Wagon and InterModal unit Operational database). The TAF TSI defines the required information which has to be exchanged between the different partners involved in a rail transport chain, and permits a standard mandatory data exchange process to be installed. It shows also the architecture strategy for such a communication platform.

The TAF subsystem is characterised by many functions, related to consignment notes, path requests/cancellations/on short notice, train preparation, service disruption and electronic transmission of information. The functional and technical specifications that are most relevant for the revitalisation of SWL transport are those on train location, wagon/intermodal unit ETI/ETA, wagon movement, interchange reporting, networking and communication. The most important information for attractiveness and efficiency of SWL transport is the ETA (Expected Time of Arrival), for which the target implementation milestone set in the TAF TSI Masterplan is 2018.

In terms of networking and communication it is envisaged for the subsystem to see, over time, the growth and interaction of a large and complex telematics rail interoperability community with hundreds of participating actors (RUs, IMs, etc.), which competing and/or cooperating in serving the market's needs.

The network and communication infrastructure supporting such rail interoperability community is to be based on a common 'Information Exchange Architecture', known and adopted by all participating actors.

Given the international nature of freight transport, the TSI is *de facto* mandatory in all EU member states. Therefore, any future information platform is required to comply with the functional and technical requirements set forth in the TSI.

Large dynamic platforms allowing tracking of trains/wagons and consignments and calculation of ETA already exist and are under development:

- the ISR wagon movement and status reporting platform, which is a common tool of RAILDATA railway undertakings, founded by former "national railways" of 20 member states within UIC;
- the UseIT Uniform System for European Intermodal Tracking and tracing (intermodal train status reporting), again established among RAILDATA members;
- the Xrail platform, specifically conceived for SWL and allowing additionally functions for capacity booking.

Such platforms are based on the right premises to become fully TAF-TSI compliant.

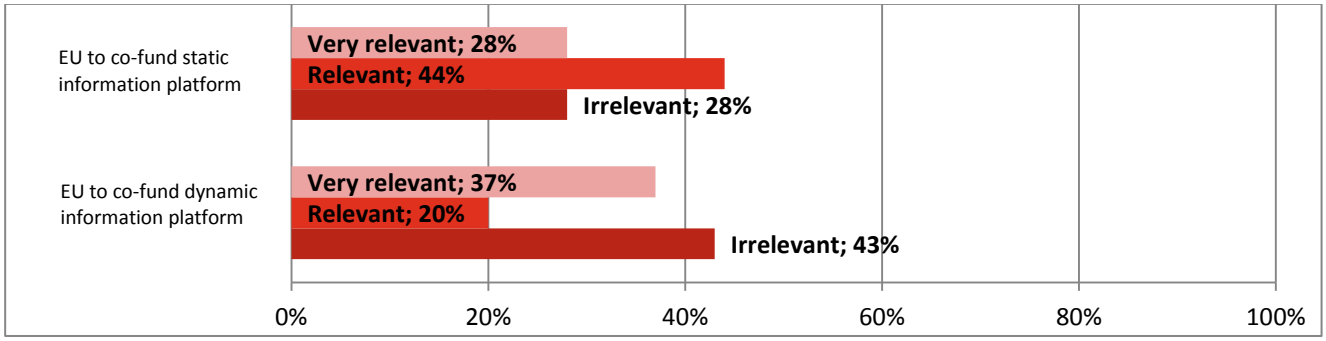
11.1.2. Stakeholder outcomes and analysis undertaken

The appropriateness of the use of EU funding to contribute to the development of static and dynamic information platforms was surveyed in the second Stakeholders' consultation

The chart in Figure 41 shows the overall distribution of the answers (fraction of respondents answering "very relevant", "relevant" or "irrelevant", and composition of the respondent group). There appears to be majority in favour of EU funding for this aspect, particularly for static information platforms.

However there is an important part of respondents against EU funding, the **dynamic platforms** already exist (at national level), so that their development does not seem to require specific significant research or development.

Figure 41 - SWL information platform(s), overall survey results



If we look deeper into the questionnaire results we realise that "customers" such as shippers / forwarders and infrastructure managers are more in favour of EU funding for dynamic platforms than RUs. Customers (shippers') position is due to their need of having for rail shipments the same level of information as they have when using other modes of transport, as emerged also in the meetings the Study team had with their associations. Because of the relevance / urgency of such necessity, they are more or less in favour of any action that could accelerate the implementation of such kind of platform. On the other hand, RUs are more wary of possible increases in administrative burden in the case of EU-wide EU-funded solutions. Besides, RUs consider that such systems shall be developed as part of the commercial strategies of the RUs, while a single common platform would be a threat to competition (the level of information provided being part of the offer proposed to the customers by each RUs).

In terms of **static information**, most stakeholders both on the public infrastructure side and the rolling stock side (keepers) seem interested in developing an EU-wide database from the fragmented existing ones (e.g. information on access to relevant facilities and related services presented in the Network Statements of each IM). Such kind of information does not seem to present constraints to become public, as commercial/competition issues are less relevant than for the dynamic information. On the other hand, a EU-wide platform on available facilities and services for SWL will allowing the users (RUs, logistic operators) to

plan their activities with greater ease and less cost even when assessing the feasibility of new services in Countries/regions for which they do not have a direct knowledge.

In this picture, we see an important role for the **harmonisation** provided by the TAF TSI. This is quite suited to respond to the efficiency and attractiveness challenges for the rail freight market, although few years are required before the TAF subsystem reaches a good degree of maturity.

11.1.3. Policies and recommendations

The strategic direction of EC rail policy is clearly to leave as much freedom as possible to all actors on the market, with impositions only where strictly necessary for the achievement of societal objectives. In this sense, an important activity at the EC level is to study which **static information** on relevant last-mile facilities is crucial for any (potential) rail customer (particularly shippers/forwarders) to plan their activities efficiently, and consider the opportunity of requiring such information to be publicly available and easy to access on EU-wide platforms, and identifying the manager of such platforms. An example of this type of action is DG-MOVE's **Study on user-friendly access to information about last-mile infrastructure for rail freight** for which a call for tender has been recently launched.

For such activity the use of EU funding appears to be fully justified by the fact that, with no action, other mechanisms would not drive this issue forward and customers could be driven to other transport modes. The funding could address any potential gaps discovered in the above study, and the full integration of existing platforms and databases, overcoming the current fragmentation.

For **dynamic information**, the competition mechanism should be sufficient to progressively drive the implementation of wagons' tracking & tracing platforms. The availability of more or less detailed information on the wagons' position is part of the commercial offer of the rail transport, as it is in other modes of transport. Thus, the development of such platform and its accessibility to shippers – already provided in several countries at national level – shall remain under the responsibility of each RU. However, such kind of information is extremely relevant for the shippers, and therefore it is essential to increase the attractiveness if rail transport by aligning it to the competing modes. EU action may be oriented to disseminate best practices in that respect, and/or to develop the concept of "intelligent wagon" that can improve significantly the quality and comprehensiveness of the dynamic information provided.

Finally, **the implementation of the TAF TSI** should continue in order to facilitate the exchange of information in the freight sector.

11.2. Effective regulation of the rail freight transport and of competing modes

11.2.1. Background

EU regulation of the railway sector

The European Commission started, beginning with the EEC regulation 91/440, a process to make more competitive and open the rail transport market; in this process was included, also the rail freight transport sector. The underlying principle was that in rail transport the monopoly elements of the industry were associated with the provision of infrastructure while not with services. Therefore the best way to increase competition was to divide ownership of infrastructure from service provision. But to make effective the possibility of competition among different actors emerged the need to introduce the open access to the rail network so that the railway undertakers can enter the markets and provide their innovative services.

So, European efforts have concentrated on three areas crucial for developing a strong and competitive rail transport industry: opening of the rail transport market to competition, improving the interoperability and safety of national networks and developing rail transport infrastructure.

The first Railway Package (2001) contained three directives (2001/12; 13 and 14) that divided the railway activities between railway undertaking (i.e. the train operator) and infrastructure manager (i.e. the network operator) and regulated the network and licensing of train operators.

Such directives was re-formed and updated by the Directive 2012/34 (the so-called **"Recast" directive**), that simplified and consolidate them in a single act, and modernised their provisions by tackling key problems areas which have been identified on the market after the implementation of the 1st package.

Among the contents of such Directive, the most relevant for SWL are the ones concerning the improvement of the transparency of the rail market access conditions (e.g. by providing for more detailed network statements), as well the articles establishing improved (and in certain cases guaranteed) access to rail-related services (subject for instance to management independence requirements). Explicit rules on conflicts of interest and discriminatory practices in rail related services are also provided for.

The second Railway Package (2004) aimed to create a legally and technically integrated European railway. The following four proposals are of utmost importance: developing a common approach to rail safety (Directive 2004/49); strengthening the fundamental principles of interoperability (Directive 2004/50); setting up an effective steering body: the European Railway Agency (Regulation 881/2004) and completing the internal market in rail

freight services (Directive 2004/51). This package accelerated[27] the liberalisation of rail freight services anticipating (by two years) the date from which international freight service providers must be granted access to the entire EU rail network to 01/01/2006.

The third Railway Package (2007) introduced open access rights for international rail passenger services including "cabotage" by 2010. Furthermore, the third railway package introduced a European driver licence allowing train drivers to circulate on the entire European network (the certification of cross-border drivers is foreseen as from 2009 and of all other drivers as from 2011). Last but not least, the third railway package strengthened the rail passengers' rights.

The fourth Railway Package is under the European Parliament approval phase to take the process to its logical final conclusion. The Commission proposes that, by December 2019, railway undertakings must be granted access to provide all services - including, for the first time, domestic passenger services - in all EU Member States. In addition, it will be mandatory to keep separate the function of owning/operating the track from that of providing the train service to customers.

Thanks to the different four Railway Packages the liberalization process in the rail transport system was progressively implemented; nevertheless today the **full implementation among the different Member States of the European legislation shall be fostered** (inter alia the 2012 Recast of the first Railway Package) to ensure the future development and efficient operation of the railway system.

Also according to the survey responses the implementation of the Railway Packages by all member states is deemed as mandatory also for the SWL market[28]. Thanks to **their implementations** it would be **possible to ensure the full liberalization of rail services** in practice **removing remaining obstacles** (e.g. free access to marshalling yards and associated services) and **creating opportunities for private operators**. It has been highlighted that the **integral implementation of the existing regulation is necessary before considering to establish new regulations**.

To ensure the above mentioned objectives the **EU Member States must also have regulatory bodies well in place to monitor railway markets and to** act as an appeal body for rail companies if they believe they have been unfairly treated. It is mandatory to achieve that regulators would **quickly react in all cases of access discrimination** (e.g. denied free access to marshalling yards and associated services) since this behaviours will hamper the opportunities for private operators to offer services within the rail sector.

Fair competition with other transport modes

[27] In any case the second Railway Package provides that access must be granted to the entire EU rail network by 1 January 2007 at the latest for all types of rail freight services.
[28] The implementation of all the provisions within the Railway Packages will ensure open, equal and fair access to rail terminals, marshalling yards, sidings and the rail network, and any required handling equipment necessary for the efficient and reliable provision of single wagon-load services

As previously stated, the SWL services are in direct competition with road transport for shipments of small/medium size. Thus a **fair level of competition with other transport modes** (and in particular with trucks) is particularly important for this kind of supply.

The policy instruments usually considered to ensure such a fair level of competition are usually the harmonisation of the infrastructure charging principles, the internalization of external costs, and the respect of the social rules in road transport.

Concerning the **infrastructure pricing** and **external cost internalisation**, the Directive 2011/76 gives Member States the option to charge heavy lorries to cover the costs of air and noise pollution from traffic emissions, and not only charges to cover the cost of the infrastructure. Besides, MS may also charge higher tariffs during peak periods and lower tariffs during off-peak periods in order to better manage traffic and reduce congestion (higher tariffs in congested areas may be up to 175% above the average tariff, with top tariffs collected during a maximum of five peak hours per day). However, the non-binding nature of such provisions is considered as a weak aspect of the regulation according to the railway operators.

Evidence (chapter 10) suggests, however, that road transport appears to be able to offset the increase in some costs (such as the infrastructure charge or the fuel price) by improving its efficiency, and also due to the high competition in the sector that is lowering the margins practically to zero. Nevertheless, fully harmonised conditions of infrastructure charging on all relevant modes (e.g. under the “polluter pays principle”) are actually not implemented yet.

The new **regulation about mega trucks** (currently under evaluation with an impact assessment of the European Community after the negative vote by the European Parliament), is another concern of the railway sector. Such policy is expected to increase the weight and dimension of trucks travelling by road, making freight transport by lorry 20% cheaper (as reported by a report for Transport and Environment by CE Delft, 2010).

According to the outcomes presented in the study undertaken by CER (i.e. Mega Trucks vs. Rail freight, 2008), the following elements have been highlighted:

- the likely consequence of allowing mega trucks would be a process leading to shift freight from rail to road again, with a likely increase of CO2 emissions (thus contradicting the EU objectives of reduction of greenhouse-gas emissions);
- to upgrade the existing infrastructure of road system would require an heavy additional expenditure on public authorities;
- the impact of Mega Trucks on the existing congested road network would likely increase risks in terms of road safety;
- the total cost of transport borne by the community would increase even more, if considering the increase in external costs caused by the Mega Trucks. On the contrary,

it shall be enforced sustainable transport modes having low impact on the environment;

- the efforts undertaken by the rail stakeholder ensured an increase of rail modal share; the introduction of Mega Trucks would send an opposite message to the market.

Not all the surveyed stakeholders, however, are opposing Mega Trucks. Shippers, in particular, stressed that all transport modes are more than needed in the future to cope with the expected rising volumes by improving efficiency and productivity, and Mega Trucks could even help to reduce the negative effect of the road mode (allowing less truck movements to move the same tonnage).

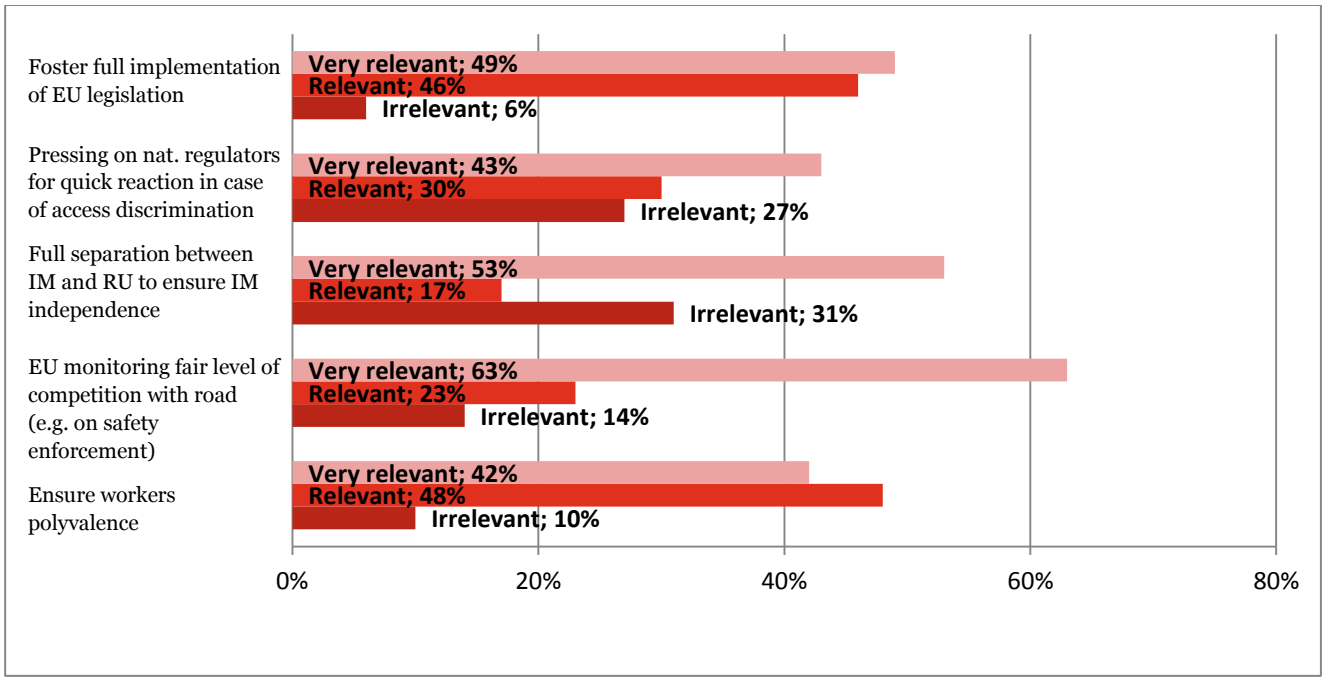
11.2.2. Stakeholder outcomes and analysis undertaken

The following picture (Figure 42) indicates the response provided during the consultation by the interested stakeholders.

As can be noted **all the proposed actions have been appreciated** by the stakeholders participating to the survey **and deemed as relevant or very relevant by the most part of respondents**. Among the most popular actions can be mentioned the full implementation of the current EU legislation (wished by nine out ten respondents), the monitoring of the fair level of competition with road (wished by four out five respondents). Respondents showed interest also in the other proposed actions (i.e. pressing national regulators to quick react in case of access discrimination and ensure full separation between IM and RU) even if three respondents out of ten deemed such actions as irrelevant (probably countries where the IM / RU separation is achieved).

In this section has been examined also the responses provided about the action aiming to encourage the polyvalence and flexibility of workers in the rail transport sector to enhance their productivity and increasing the competition of rail freight transport. 90 % of the respondents are favorable indicated as very relevant and relevant during the survey phase.

Figure 42 - Effective regulation and increasing competition from road



The cluster showing more interest in this area of actions has been the one composed by Shippers, Wagon Keepers and Freight forwarders. They highlight as most important the following actions: monitoring the fair level of competition between road and rail, achieve the full separation between IM and RU and the full implementation of EU legislation. Less interest is showed in ensuring workers polyvalence and on having the national regulators ready to intervene in case of discriminations.

Railway undertakings, on the other hand, support in particular the following actions: fully implement the EU legislation, pressing on national regulators to quick react and avoid possible discrimination and finally the action aiming to increase the workers polyvalence; a slight less interest is showed for the other proposed two actions: full separation between IM and RU and monitoring of competition between modes. A similar trend is showed also by the infrastructure managers even if with a lower percentage.

Short liners and terminal managers are generally in favour of all the proposed action but they show less interest in comparison with the others stakeholders.

11.2.2.1. Foster full implementation of EU legislation

The long process initiated in 1991 for the liberalization of the rail transport is gradually achieving the expected benefits and effects; to this extent (deploy a fully integrated and liberalized single European Railway Area) today it is necessary to fully implement all the requirements arising from the existing legislation.

Rail freight transport (including SWL) has been liberalised in the EU since the start of 2007; to ensure the market opening would be mandatory to guarantee open access to the market.

Therefore open access / non-discriminatory access to facilities such as shunting yards, fuelling stations is of key importance in the development of SWL transport. This should ensure a fair competition between incumbent and new operators.

Rail freight companies need full geographic availability and open access to infrastructures and services to satisfy their customers. So, availability of open access to infrastructures and services have a great impact on performance and competitiveness of rail freight.

The survey confirms that this issue is already tackled by existing EU legislation, so that the key recommendation is to monitor the market conditions in order to ensure its full implementation, before that additional regulatory measures are considered.

Finally, the survey highlighted that the open access to facilities is more a "local" than an European issue, since there are countries for which no problems of access to relevant facilities are reported.

11.2.2.2. Pressing on national regulators for quick reaction in case of access discrimination

An efficient national regulator is necessary to ensure the open access to rail network and essential facilities and the full implementation of policies.

A possible solution to overcome discrimination (also considering that respondents states that the existing EU rules are sufficient and should simply be fully implemented) is the possibility to further empower and implement the network of regulatory bodies as defined in Article 57 of the Recast of the First Railway Package (Directive 2012/34/EU). The Regulatory Body is a body independent from any infrastructure manager, charging body, allocation body or applicant. It is independent in its organisation, legal structure, funding and in its decision making. The Regulatory Body shall monitor the competition in the rail services market. In its monitoring function it shall decide on complaints or on its own initiative on appropriate measures to correct undesirable developments.

Strong cooperation is expected at European level and with the help of the European Commission, the Regulatory Bodies to exchange information about their work and decision-making principles and practices with the aim to develop a common approach in order to avoid conflicting decisions.

11.2.2.3. Full separation between IM and RU to ensure IM independence

Among the policies individuated by the European regulation crucial for developing a strong and competitive rail transport industry can be mentioned the separation between infrastructure manager and railway undertaking allowing to open the rail transport market to competition.

As stated in the survey phase by the respondents the separation between IM and RU it is the most important evolution of rail transport sector. The infrastructure manager must follow

the global interests of the Country and not the interest of the incumbents. Moreover the transparency on state railways financial performance can be only obtained by achieving a total separation between the IMs and the RUs.

The European Commission is proposing in the Fourth Package greater separation[29] between infrastructure management and railway undertaking businesses, as well IM's governance structure ensuring that all railway undertakings are treated on an equal base.

Some stakeholders suggest, on the other hand, that there is no 'one-size-fits-all' solution, and that vertical separation can lead to higher costs for the rail system (CER, Eves-Rail Study, 2012).

Finally, countries with full separation between IM and RUs does not show – in general – an higher share of SWL (large % are reported – for instance - in Countries such as Germany and Austria where the IM is integrated in an holding structure with the incumbent RU, while in countries with fully independent IM such as UK and Spain SWL is almost disappear). The presence of IM not fully separated from RUs is certainly relevant for the railway market in general, but it does not appear to have been so far a specific barrier for the development of the SWL.

11.2.2.4. EU monitoring fair level of competition with road (e.g. on safety enforcement)

On this point the great part of respondents welcomed and ensured a fair competition between all mode of transport achieved through the important monitoring of social conditions and external costs. The violation of social and safety standards[30] in road transport leads to a substantial distortion of intermodal competition. The control of social rules in road transport should therefore be reinforced. In addition the full internalization of external costs (increasing the road transport costs currently very cheap) in the road transport will permit to create a better competition framework leading the possible increase of the rail freight market share.

Several RUs expressed their concern about the introduction of mega trucks as a threat against the fair level of competition between modes. Among the underlying reasons given by respondents, it can be mentioned the likely shift freight from rail to road; the upgrade of the existing infrastructure of road system requiring significant additional expenditure also for the not-tolled network (expenditure that will be then paid with the general State budget), as well as increase the risks in terms of road safety.

To ensure the fair competiveness between modes the respondents stated that each transport mode should aim to operate as efficient as possible; therefore a possible suggestion is also to

[29] This objective can be attained either through complete institutional separation (wholly independent corporate groups, as in Britain) or, at least, through strong "Chinese walls" to achieve full functional separation within a single corporate group.
[30] The share of trucks violating the rules reaches e.g. in Germany about 25%. The resulting cost advantage amounts to 5 – 8% (Source: PROGNOS AG: Quantifizierung der Nichteinhaltung von Sozial- und Sicherheitsvorschriften auf der Straße, Basel, 2003).

ameliorate the rail sector's productivity considering smarter trains and more innovative wagons that can carry more weight and run at faster speed; in parallel it has to be ensured that the infrastructure is developed in such a way that it is able to handle such new rolling stock. When in the future this is achieved then rail will be more competitive to road's mega trucks for example acting as an alternative thus avoiding congestion on the roads.

Another key issue for modal competition is that industrial sites and warehouses are in the large majority of cases connected to the road network without that the related costs will be charged on the companies owning the sites (both initial investment and maintenance), while private sidings providing similar connections to the railway network shall be developed and maintained at the expenses of the such companies, so creating a clear inconsistency between the two modes of transport.

11.2.2.5. Worker's polyvalence

The proposed actions about the possibility to increase the worker's polyvalence has been welcomed in the survey phase since this has been already done at most alternative operators offering less costs and more flexibility.

Introducing polyvalence and flexibility of workers in the rail transport sector, in particular at incumbent companies, would indeed enhance the productivity of SWL operations, making it more competitive to other transport modes. In particular combined driving and shunting competencies are important to deal with the higher number of shunting operations in SWL transport.

While this could be an important measure to help operators to increase their operational efficiency and make efficiency gains, the potential role of the EU seems unclear since this topic is subject to agreements between the representatives of the respective employers and employees and thus cannot be determined on a European level.

11.2.2.6. Additional solutions proposed during the survey

Among the proposed actions coming by survey shall be mention the one regarding the **possible development of an annual survey about the market development in rail business managed by the MS / national regulators according European guidelines**.

As an example can be mentioned the report from the *German Bundesnetzagentur*.

Figure 43 - German rail business /market development survey

A lots of interventions proposed the **increase transparency of the social costs** (pollution, noise, congestion and alike) **of each transport mode thus fostering a level playing field for all transport modes**:

- to avoid that the lack of transparency of societal costs of each transport mode distorts fair competition;
- to create a system to shift traffic on rail over the 200 Km based on measurement of external costs;
- keep developing / promoting / incentivising rail (the European market share of rail is significantly lower than that of other transport modes);
- revenues generated by the application of the "polluter pays principle" could be used in order to finance infrastructure for sustainable modes of transport (i.e. look at the "Swiss model").

Among the additional proposed actions shall be highlighted the **incentives to the shippers using SWL for the cost difference** (transport cost difference, stock increase)

versus cheaper and faster (transit time) **road transport** to increase industries interest of SWL[31].

The **utilisation of mega-trucks is suggested to be limited to the national level and maintain their ban on cross-border traffic** since they have a negative effect on single wagonload (as well as intermodal) traffic[32].

11.2.3. Policies and recommendations

By combining the evidence provided by the analyses carried out in this Study with the opinions provided by the stakeholders, the following conclusion can be drawn:

- at the regulatory level for the rail sector, most key barriers for the entrance in the SWL market of new operators are already addressed by existing EU regulations (such as the Recast Directive rules on the access to rail-related services); thus, the key recommendation is the continuous **monitoring of the implementation and respect of relevant EU railway directives at national level**;
- the reduction in **railway competitiveness against road transport** cannot be linked only to the lack of harmonisation in the respective regulations and market conditions, since the improvement in road transport efficiency and productivity also matters; however, some discrepancies exist (e.g. in terms of infrastructure charging but also in financing of construction and maintenance of "last mile" connections) as well as some potential threats (mega-trucks);
- the **lack of full separation of the IM from the RUs** does not appear to be a key barrier for SWL, since countries with independent IM do not always show better market position of SWL;
- **workers polyvalence** as part of productivity improvement of rail freight will provide advantages also to SWL service (that are more dependent on human resources utilisation, due to the additional intermediate operations that are required).

[31] Today rail transit time takes at least 2 extra days longer versus road transport (door-2-door concept) and especially the small (2 axle wagon shipments) as an equivalent to FTL is always more expensive.
[32] Megatrucks have a negative impact on sustainable transport: according to a 2011 Fraunhofer ISI/K&P study, the 44t/25.25m vehicles cause the highest back shift for Combined Transport, with as much as 13% losses for combined transport on Corridor 2. The same study also showed that more than 35% of the single wagonload traffic could be back-shifted to road due to the greater use of megatrucks on certain corridors

11.3. Availability of "last mile" services

11.3.1. Background

Competitive SWL services heavily depend from efficient first/last miles connections. As highlighted in previous chapters, such services represent a relatively small share of the SWL production in terms of train*km, but do generate significant part of the costs, since last mile operations require specific equipment (e.g. shunting locomotives) and availability of staff that are not easy to be efficiently employed. Besides, "last mile" operations have high impact in the overall reliability and efficiency of the system, so the lack of them or a reduction in their efficiency may result in further contraction of the market volume for SWL.

A number of aspects emerged as deserving investigation to preserve or re-launch "last mile" services (also considering the specific nature of last mile operations, and the potential lower interest of larger RUs to operate and expand them):

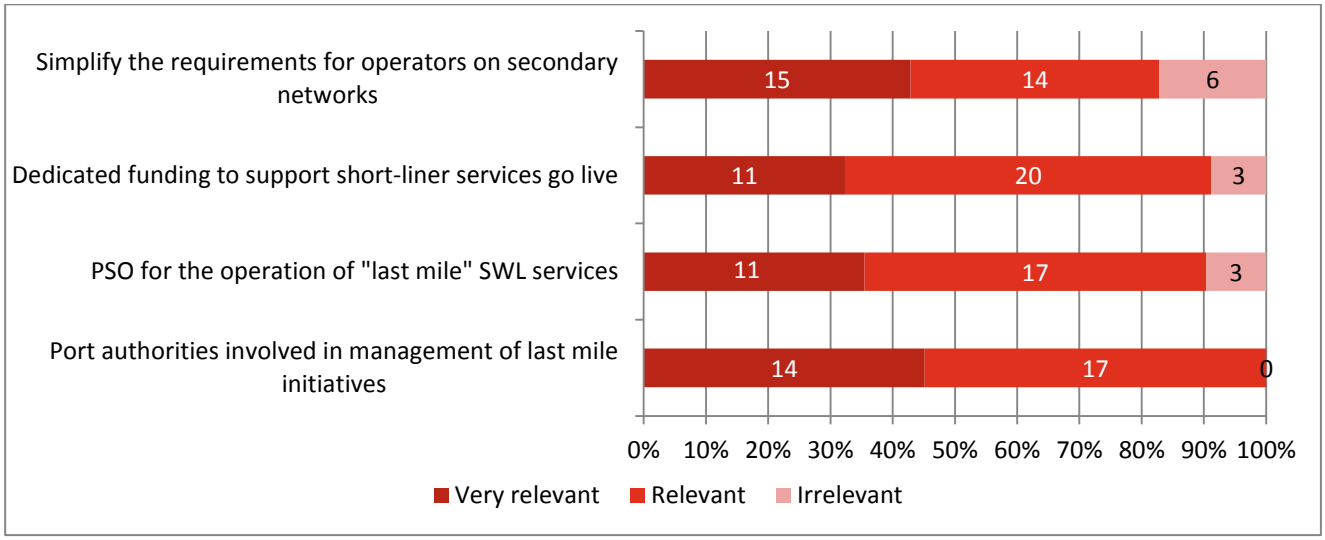
- enhancing the conditions for **economic sustainability of "last mile" operations**, such as through support to new "short liner" undertakings (i.e. operators focusing on the last mile: shunting wagons to final destination or from the initial origin) or the public funding of "last mile" services defined as public service obligations;
- **reducing the administrative and safety-related burdens** for undertakings that are operating only on secondary lines (not opened to passenger traffic) and private sidings;
- ensuring availability of effective "last mile" operation in ports by **involving the relevant port authorities**.

In case of development of short liner, a more complex organisational and business model is likely to be implemented, where the large RUs are responsible for the traction on the main lines, whereas the short liners (also defined *opérateurs ferroviaires de proximité* – OFP – in French) are in charge of the activities within the last mile sections (collection/distribution of wagons from/to private sidings). Significant experiences of OFP exist in France, where at least two short liners are focusing on such last miles services (working in cooperation with RUs operating over the long distance), and two additional short liners expected to become active in the near future.

11.3.2. Stakeholder outcomes and analysis undertaken

Figure 44 summarises the view of stakeholders concerning the measure for ensuring the availability of "last mile" services.

Figure 44- Stakeholders' position on the proposed actions to ensure the availability of "last mile" services for SWL operations



Most respondents claimed that **simplifying the requirements and obligations for operators which operate only on secondary freight specialised network** would help to reduce the productions costs of SWL. Operations on secondary freight specialised networks are often operating at lower speed and with trains running at much lower frequencies, so that the risk of accidents is inherently reduced.

Simplification of requirements and obligations would help to reduce the production costs of SWL and make it more attractive without sacrificing the relevant safety related issues. Within this context, in 2013, Belgium has adopted new legislation[33] concerning rolling stocks and personnel allowing non-railway operators to operate locally with their own equipment and their own staff. The aim is to create conditions to reduce the requirements in terms of personnel and rolling stock for enterprises having the status of transport auxiliaries, allowing them to perform "first / last mile" operations at a lower cost. However, a large amount of stakeholders pointed out that such measures on operational rules are very difficult to be implemented since pure freight-lines are very rare while most wagons often run on both secondary dedicated freight-lines and main lines with mixed services. Thus, the practical implementation of such provision is not that easy, however, because of the necessity to provide a clear "boundary" between main line RUs and operators on secondary network (now possible according to EU regulations only for isolated networks).

Dedicate funding for the launch of short liner service is considered as relevant or very relevant by more than 90% of respondents. The help shall allow the new operators to be economically sustainable in the first year of operation (similarly to the provisions of the Marco Polo program for the intermodal services). Some stakeholders, however, believe that the program should focus on "last mile" infrastructure, essential for single wagonload, instead of supporting operations of new short-liner services. Other stakeholders believe that

[33] Arrêté Royal du 23/05/2013 (Rolling stock) + Arrêté Royal du 09/07/2013 (Personnel de sécurité)

a temporary financial support to short-liners shall be granted mainly to cover the costs for getting licences and certification.

Among the other measures proposed, it has been also suggested

- to support the acquisition by local communities of pools of "short line locomotives" to be rented to local operators.
- existing RUs should be allowed to accede to the funding instruments for short-liners if willing to operate new short line services.
- to finance low interest loans for the purchase of shunting /last mile locomotives or funding of radio-controlled shunting locomotives.

By the way, the 2013 Annual work programme under the second "Marco Polo" programme already included among the political priorities the "Single Wagon Load Traffic (SWL)" with the following description

In view of the emerging problem of decreasing support for SWL traffic in the market, a political priority is established for projects that use Single Wagon Load Traffic only, defined as "less-than-trainload rail traffic including intermodal loading units" For Modal shift actions, the minimum modal shift from road to Single Wagon Load traffic only is lowered to an average of 30 million tonne-kilometres, or its volumetric equivalent, per year.

The implementation of the Marco Polo support for SWL services appear however quoite limited: e.g. according to the official results of the 2013 selection, only 1 project out of 27 deemed eligible for EU support was clearly labelled as related to a SWL service, while most of the projects concerned rail-based intermodal transport or motorways of the sea.

MPII-2013/032	MOD	**CONTRAST** Implementing a single wagon load (SWL) service along the international route from the Port of Rostock (DE) to Sopron (HU), via Wustermark/Berlinn (DE), Dresden (DE), Breclav (CZ) and Vienna (AT), including the combination of rail and IWW transport solutions.	- **VTG Rail Logistics Deutschland GmbH (DE)**	€ 27,811,223	€ 1,945,150

In 2011 & 2012 calls, no SWL-labelled project was deemed eligible for support (it is not known whether any project of this kind was proposed).

The **provision of Public Obligation Services (PSOs) for the operation of last mile SWL services** is also considered by stakeholders as a relevant option to take into account. Nevertheless, most respondents required that a framework and minimum rules establishing how such PSOs should be applied at a European level should be set, in order to avoid discrepancies between Member States.

Several business models existing where port authorities are involved in the management of last mile to connect ports to the rail network (e.g. port is only IM, port tenders last mile

services, and/or port owns a RU). In any case, 100% of stakeholders agree on judging as important the **involvement of port authorities in the management of port-related last mile initiatives**. Shippers need to secure investments and since many manufacturing companies and storage terminals are located in port areas, ports involvement in setting up last mile services is largely considered as advisable. This is already in place in the most significant French ports that are connected to the rail network. Other stakeholders reported that this is the case also for some German ports and Antwerp in Belgium.

However, some stakeholders suggests that the EU does not need to become involved to boost such action. Market opportunities will ensure this development.

11.3.3. Policies and recommendations

By combining the evidence provided by the analyses carried out in this Study with the opinions provided by the stakeholders, the following conclusion can be drawn:

- **the "last mile" operations** (marshalling, shunting and wagons collection/distribution) **do represent a significant part of total SWL costs** (> 1/3 of the total production costs), and, at the same time, are not easy to be optimised requiring specific equipment and dedicated staff relatively scattered on the territory in order to serve all relevant origin/destination points;

- the "survival" of SWL service depend upon the **availability of "last mile" operations** that are economic sustainable, reliable, and able to cope with the challenge of spatial and seasonal variation of the traffic flows (so with less possibility to consolidate flows);

- specific actions on this area may involve the **support of the unprofitable last-mile services**, through PSO contracts or support for the launch of "short-liner" services; however, such actions shall either respond to actual situation of "market failure" where no undertaking can operate the service with a reasonable margin, in order not to distort the market functioning (possible actions at EU level could be then to provide more detailed guidelines on the application of PSO on such kind of services, and/or the activation of a more tailored support for the launching of "short liner" services until they reach the break-even);

- any support shall in any case be granted to eligible "short liner" services to be provided in regions where the market conditions do not ensure a profitable operation thereof, regardless whether they are provided by RUs focusing on such kind of business, or by RUs that are active also on long distance transport;

- the **involvement of the port authorities (PA)** in the management of last mile services obtain large consensus among the stakeholders, but it shall be activated according to the market conditions (i.e. in a port of the PA provides for "last mile"

operations, directly or as shareholder of a specialised operator, this shall not prevent other RUs to operate similar services on their own).

11.4. Rightsizing of "essential infrastructure" for SWL operations

11.4.1. Background

Fair and open access to infrastructure as well as maintenance and rehabilitation of last-miles and train formation facilities is a priority to allow the survival of the system.

Train formation facilities and rail freight network

As already presented in chapter 5, the network density of infrastructural facilities within selected key European countries is quite heterogeneous. Besides, although it is difficult to gather "historic" data, the number of marshalling yards in operation have been in several countries (such as Austria, France, Italy, Poland) significantly reduced in the last 10 years, and/or plans for further downsizing are existing (such as in Czech Republic).

Generally, it can be noted that countries pursuing SWL are the ones more oriented to the preservation of the SWL related infrastructures. On the contrary countries like France, Italy and UK developing "marshalling-free" SWL service (requiring only shunting operation on flat yards) to combine wagons from different clients show a tendency in down - sizing the SWL related infrastructures, due to the strong reduction or even elimination of the traffic using them. Indeed, large hump yards are sustainable only in presence of high volumes of traffic to be managed.

In general, such tendency to reduce the available infrastructure for SWL appears to be more an effect than a cause of the reduction of SWL traffic. Most operators pointed out that, in order to be competitive with road transport, a strict cost management is needed in all parts of the transport chain, especially in the costly business of marshalling and/or shunting. This requires above all avoiding unexploited capacities. To this aim a good coordination and efficient use of personnel in shunting areas would be beneficial, as well as a continuous updating of the network structure aiming at achieving economies of scale by consolidating the operation in a relatively limited number of train formation facilities.

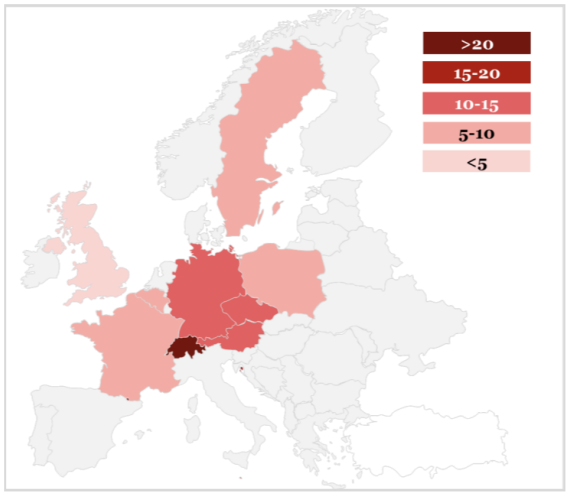
Needless to say, such decisions would hinder future re-launch of traffic, especially if the tracks in the yards or sidings or freight stations are removed, and the available land used for other purposes.

The SWL rail freight transport is highly dependent by the availability of the infrastructures used for the "last – mile" operations (i.e. arrival and departure tracks, marshalling and shunting yards, freight stations etc.). As requested by the EU regulations, the infrastructure manager should be encouraged to ensure open access under fair conditions to all relevant facilities including train formation facilities and freight stations.

Private sidings

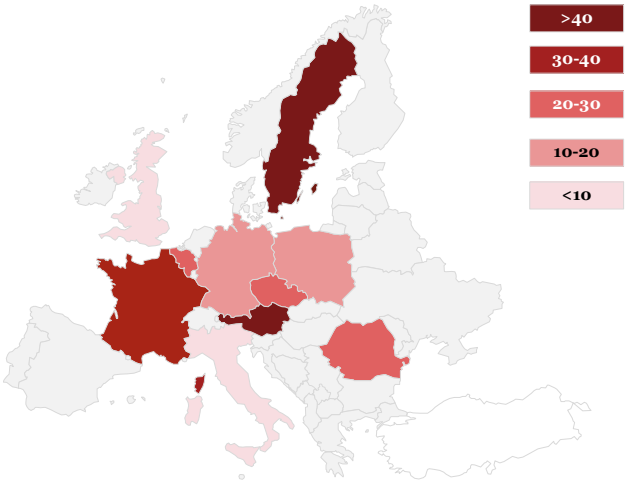
Private sidings – linking the industrial plants or warehouses with the main rail network, represent a crucial element for the functioning of the SWL system, since they provide a direct access of SWL demand to the rail system. Hence their availability and timely maintenance is essential. Many stakeholders, especially on the shippers side, expressed their concern on the progressive dismantle of the private sidings or on the difficulties to develop new ones.

Data collected during the Study (chapter 5) allowed for the calculation of the density of sidings for the key European countries (number of private sidings per 100 km of network).



Private sidings / 100 km of rail network

If the number of sidings is compared to manufacturing industrial concentration[34], figures do change a little.



Private sidings / 100 medium-big manufacturing companies
(Data for Switzerland on manufacturing companies not available)

[34] For the purpose of this document, mining and quarrying, manufacturing and electricity, gas, etc. are considered.

Germany has by far the highest concentration of medium and big manufacturing companies, but comparatively less private sidings, compared to other countries – apart from UK, Italy and Poland – where the number of private sidings per manufacturing company is higher.

Differently, Austria has one of the best private sidings / manufacturing companies ratio in Europe, with over 40 private sidings per 100 manufacturing companies. Sweden and France also present comparatively high density.

A lower density if compared with the number of manufacturing companies may be interpretd in two ways: for countries with a relatively large SWL volume handled, such as Germany, it is likely to indicate that the traffic is more concentrated in terms of final origin / destination. For countries with low SWL volume (Italy, UK), it is more likely a sign of the decline of the SWL service both in terms of available supply and served demand.

As it can be noted, some countries support with specific actions the use of private siding and encourage their survival and development. In this context, it is interesting to note that Germany, Austria and Switzerland established dedicated grant programs for supporting private sidings, starting from, respectively, 1986, 1995 and 2004. A peculiarity of the Austrian scheme is that it funds sidings also in other countries, if the traffic originates or is destined to Austria.

Table 19 - Example of funding schemes in the past years

		Austria	Germany	Switzerland
Maximum subsidy	**% eligible costs**	40% for new or reopened sidings; 30% for upgrading existing facility	50%	40% to 60%
	For new construction	€2.9m per project	€8 per ton per year; or €32 per 1000 ton-km/year	No limits, but grants are only available for sidings connected to stations or lines with at least 12,000 tons or 720 wagons per year
	For reactivation/ extension	€2.2m per project	€4 per additional ton/year; or €16 per additional 1000 ton-km/year	
	For refurbishing	€1.45m per project		
Threshold		€15,500	€15,000	€30,000
Guaranteed volumes		Negotiated contract volumes for at least 5 years	Additional volumes reached within 5 years, measured in yearly average	-

Synthesis elaborated on various sources

All the three systems fund the construction, extension and reactivation of private sidings, with the aim to transfer traffic from road to rail. Different subsidies are envisaged, with a minimum duration of 5 years in which specific volumes are required to be reached. The Swiss scheme, on the opposite, appear less structured and requires a minimum investment threshold of €30,000 (twice that of Austria and Germany) but does not have limits for the maximum subsidy if not in terms of percentage of eligible costs (between 40% and 60%, in line with the other two countries).In Germany the program for the funding of private sidings was developed in 2004 and revised twice to be into force until 2016. From 2005 to 2010 a total of 82 private sidings was funded - with €48.2 million, for a total investment of €129.4 million[35] – under the basis of the *Guidelines on Funding the Construction, Upgrading and Reactivation of Private Sidings*. Overall, as of December 2012, 120 projects have been funded. It is claimed that with more realistic economic appraisals and easier bureaucracy higher results could have been achieved.

These are the most important and general support program for private sidings that exist across Europe. In Sweden, there is not fixed criteria to support such kind of facilities, but the IM can use a certain percentage of its annual investment budget for private sidings.

Another issue emerged for some countries in the Central and Eastern Europe is the excessive burdensome and costly certification process of private (industrial) sidings. In such countries in the past all industrial sidings were state owned and managed by the railway monopoly. Today their status is still unclear and often this "grey area" implies that the same regulations in force for the main line tracks are applied, making difficult and costly to get the proper "certification". Needless to say, for a private company this might appears as a non - priority investment that might even cause the decision of closing down the siding in order to save on costs.

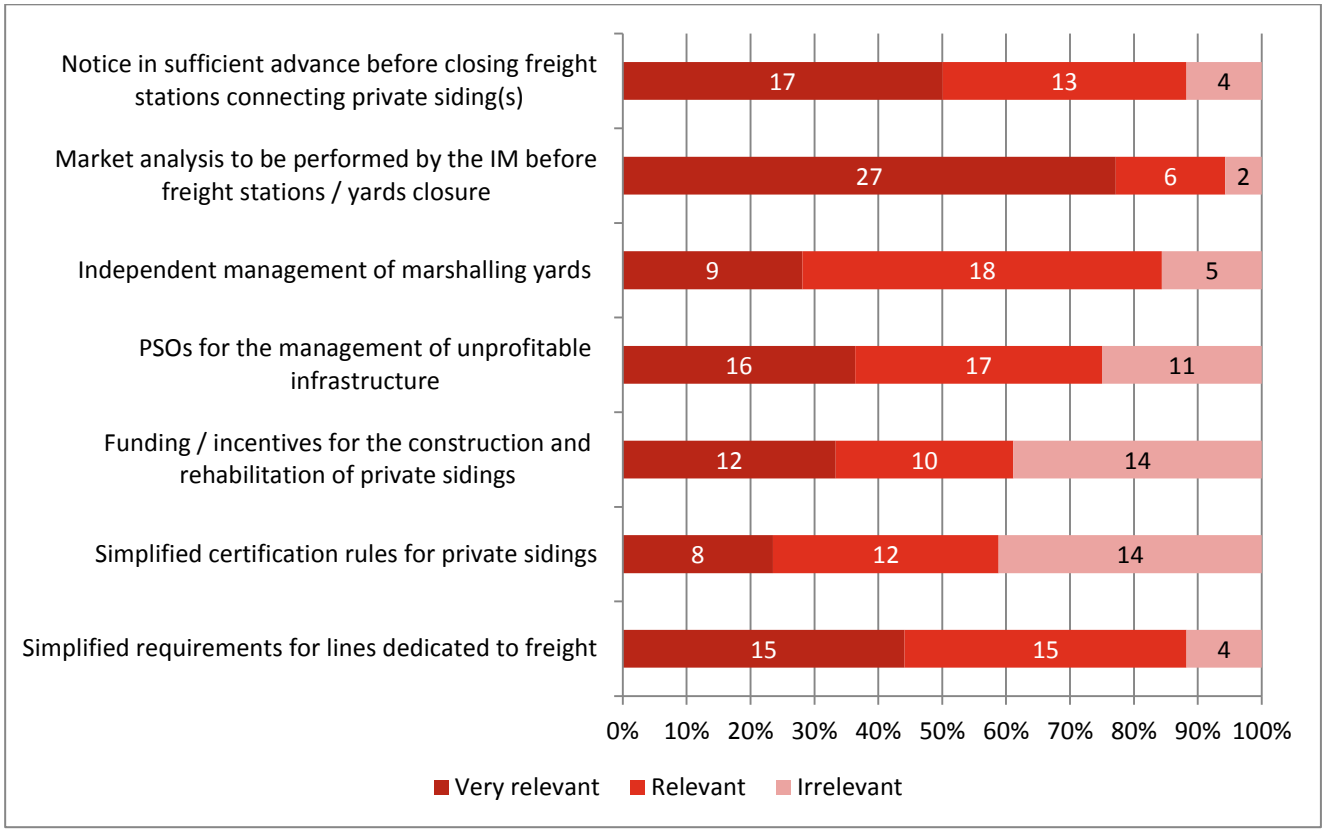
Also, the requirements in terms of safety (incl. signaling equipment) for lines that are used only by freight trains have mentioned as to some extent not proportionate. The obligations to be fulfilled are often the same whether for the national network where both freight and passenger trains run, and on secondary freight specialised lines (i.e. rules for operations, equipment needed to operate, etc.).

11.4.2. Stakeholder outcomes and analysis undertaken

Figure 45 summarises the view of stakeholders with regards to a number of actions meant to rightsizing of the essential facilities that are required to operate SWL services.

[35] http://www.internationaltransportforum.org/statistics/investment/Country-responses/Germany.pdf

Figure 45- Stakeholders' position on the proposed actions towards rightsizing of available essential infrastructure



When the incumbent RUs decide to abandon a given facility (a station, a marshalling yard or a train formation facility), the infrastructure manager is likely to face operating & maintenance costs not justified by the existing traffic. This might urge them to close the facility with low or no traffic. As a consequence, the network is losing capillarity and this is likely to hamper the launch of new services from other RUs. In these cases, the **timing of the notice given for dismantling freight station** is perceived as important by the industry. Article 13 of the Recast of the First Railway Package (Directive 2012/34/EU) imposes the infrastructure manager to provide this mentioned notice. Nevertheless it appears that the industry does not perceive this to be sufficient: a number of stakeholders lamented that twelve months are not sufficient and at least 24 months' notice should be provided in order to allow for proper planning of investments.

Besides, a large majority of the respondents suggest that the in case the IM intends to dismantle a station, a **market analysis** should be performed before taking the final decision on the closure (so that eventual future market needs are taken into account in the decision). The market consultation aiming at defining alternative solutions should involve operators and shippers. Some respondents claimed that local authorities should also be included in the consultations as well, as these may be related to a public interest it is their interest to keep taking over the station.

With respect to the consultation of the market, some good practice can be taken from the regulations concerning the airport sector, concerning the obligation to carry out consultation when taking decision on charges. This procedure has increased the transparency: as recently reported by a Commission study[36] following the implementation of Directive 2009/12/EC[37] starting from 2011, consultations between airports and airlines are now being carried out and Member States' independent supervisory authorities have been set up.

Directive 2009/12/EC on airport charges

This directive meets the need to harmonise the system for setting airport charges and increasing transparency by imposing on airport managing bodies the requirement to consult all stakeholders when taking decision on charges.

Consultation and remedy

Airport users or the representatives of associations of users shall be consulted regularly with respect to:

- the operation of the system of airport charges;
- the level of airport charges and, as appropriate;
- the quality of service provided.

Transparency requirements

Airport users or representatives of airport users shall be informed about the components serving as a basis for determining the level of charges. The information shall include:

- the various services and infrastructure provided in return for the airport charge levied;
- the methodology used for setting airport charges;
- the revenue of the different charges;
- any financing from public authorities of the facilities and services which airport charges relate to;
- forecasts of the situation at the airport as regards charges.

Airport users shall be required to submit the following information to the airport managing body before every consultation:

- forecasts as regards traffic and use of their fleet;
- their development projects and their requirements at the airport concerned.

New infrastructure

Airport managing bodies shall consult with airport users before plans for new infrastructure projects are finalised.

Independent supervisory authority

EU countries shall be required to establish an independent supervisory authority. It shall ensure the correct application of the measures taken to comply with this directive. The authority may delegate tasks to other independent supervisory authorities.

[36] Report from the Commission to the European Parliament and the Council on the application of the Airport Charges Directive [com(2014)278]
[37] Directive 2009/12/EC of the European Parliament and of the Council of 11 March 2009 on airport charges.

Over 90% of respondents find it would be relevant or even very relevant initiative to require independent management of marshalling yards or terminals hubs based on periodically renewed contracts. The renewals should be granted by transparent call for tenders procedures. However, a proper definition of rules will not be easy since in many cases the incumbent operators still hold larger part of the traffic. Whatever rules are defined, these should not prevent the incumbent rail freight undertaking from managing marshalling yards. They are the most competent and have a self interest in effective management. Therefore, they should be allowed to bid for the management/operation of marshalling yards.

The implementation of **PSO for the management of unprofitable infrastructure** finds large consensus among survey respondents. According to this action MSs would be required for explicitly providing Public Service Obligations for the management of unprofitable infrastructure which are key for the functioning of SWL services. Such solution is welcome from some stakeholders because often the secondary network dedicated to rail freight, needs important investments. The availability of PSO would put the infrastructure manager in the condition of defining long term investments. It is also important to note that if in one hand many stakeholders support this action, on the other hand many of them are sceptical that proper rules can be defined to implement this action.

Many survey respondents claim that **private sidings are suffering from the lack of public funding/ incentives**, which prevent their development as well as their maintaining. All stakeholders, being short liners or bigger players, share the same view on the matter: without a proper public support, private sidings hardly have a future, with all repercussions related to increased road transport (i.e. environmental issues, road traffic saturation, etc. It clearly appears that stakeholders are strongly supporting an intervention of the public through funding/ incentives for the private sidings construction, modernisation and rehabilitation. If responses are broken down per stakeholder category, all short liner and terminal managers responding to the survey entirely support this action.

An important point raised during the consultation is that, comparing rail and road, the latter benefits from different investment and financing procedures, since the “last mile” connection between the industrial plants and the public road system are usually built by the public authorities with no cost for the company owning the plants. This is not the case for rail, with the exception of the few countries (Germany, Austria and Switzerland) that are presented as best practice due to incentives granted for private sidings.

Some stakeholders suggested the **grouping of plants in industrial sites** well connected to the rail network should be encouraged and made a pre-condition of access to EU grants, if applicable. European spatial development policy and national planning should assure that new industrial areas are connected or are developed in areas which can be connected to the existing rail network. In line with such proposed action, areas where sidings do exist already because of the existence of (discontinued) industrial activities linked to the rail network shall be selected in priority as the location of new industrial sites.

The principle that **simplified certification rules for private sidings** should apply is widely accepted by stakeholders. Indeed, private sidings or local tracks often present only one train in operation; rigorous safety systems and standards as for intensively used tracks would be excessive.

The majority of stakeholders express appreciation also with regards to initiatives to simplify requirements in terms of technical characteristics and of signalling equipment for railway lines which are exclusively used by freight trains. Operations on secondary freight specialised networks are often operating at lower speed and with trains running at much lower frequencies, reducing the risk of accidents. Simplification of requirements and obligations would help to reduce the production costs of SWL and make it more attractive without reducing the safety standards. These which are against this initiative are concerned that simplification of requirements and obligations might result in reduced safety of operations.

Specific experience of safety rules tailored to local network when only freight trains operate do exist, for instance, in Germany, as developed by the association of operators VDV and accepted by relevant safety authorities.

Four different stakeholders suggested that IMs should be required to plan construction works and to provide information at an early stage on construction plan and progress. In order to provide timely and quality services, RUs need reliable information about changes in train paths (departure & arrival time, train parameters) caused by construction works in advance.

11.4.3. Policies and recommendations

By combining the evidence provided by the analyses carried out in this Study with the opinions provided by the stakeholders, the following conclusion can be drawn:

- the **availability of "last mile" infrastructure** is essential for the existence of the SWL system as well as for its re-launch; however, the reduction of volumes and the stringent budget constraints forced the downsizing of the available ones, due also to the lack of specific funding policies in most countries;
- the **downsizing of the number of facilities used by SWL services** was mainly driven by the traffic decline**.** It is widely recognised that the IM cannot keep open facilities where no traffic takes place or is likely to be developed in the near future. However, in line with Recast directive provisions, the **IM shall inform the operators with sufficient advance** about any decision of closure for train formation facilities and freight stations (in order to allow them to re-organise their logistic chain). Besides, the decision of closure shall be supported by an adequate **market analysis including the consultation of operators and local authorities** in order to verify whether the traffic can be re-launched in the near future; in some peculiar and limited situations (such as peripheral areas, facilities serving market segments that shall not be transferred to other modes such as

dangerous goods) specific funding policies can be foreseen to ensure the opening of the relevant facilities e.g. in the form of **public service obligations**;

- the **condition for the construction, rehabilitation and maintenance of "last mile" infrastructure are not harmonised between road and rail transport**, since for the latter "private sidings" related costs shall be covered by the companies owning the connected plants (while road connections are developed at no cost for the industries); specific **funding & incentives actions for private sidings construction and rehabilitation**– such as the ones already existing in some countries – can help to eliminate this gap ensuring more fair condition of competition between modes;

- other most relevant actions to be implemented for the improvement of the capillarity of the SWL supply are:

    - the **elimination of complex certification procedures for private sidings** in the Countries where they exist

    - the development of **land planning policies** ensuring that any new industrial plants shall be developed in areas already connected to the rail network (such as discontinued industrial sites already equipped with their sidings) or that will be connected as part of the development project.

11.5. More favourable track access charging regime

11.5.1. Background

11.5.1.1. Track access regime

In some countries SWL services tend to pay higher track access charges in comparison with block train services due to fixed costs (i.e. a fixed charge per train) that is distributed on smaller amount of tonnes (SWL have usually lower payload).

A study conducted by OECD in 2008 reviewed the charges applied to passenger and freight trains in 25 different European countries: nine out of 25 countries have adopted a charging system including a fixed charge per train or train*km (i.e. same fee independently from the train weight). Among such countries the most important are: Italy, France, Germany, Belgium, Hungary and Spain.

In general, this implies that SWL services "suffer" more than other types of rail freight services in case of increase of the track access charges. In fact, SWL trains are generally light trains composed by few wagons otherwise waiting times in marshalling yards would be too long: in Romania most of inter-marshalling yards trains have only few wagons (10-15).

On this point the following remarks arising by the survey might be highlighted.

A market segmentation could be useful to take into account the types of SWL trains and understand the category who will have benefit by the track access regime distributed on tonnes. The following categories might be individuated:

1. the long haul trains, which connect the main marshalling-yards and hubs with each other. These trains are often long, heavy and can reach almost 80% of their maximum capacity (in terms of weight or length)

2. the last mile trains or local trains, which are indeed lighter and shorter. They represent the majority of the costs related to SWL.

A dedicated pricing[38] is likely to be important for feeder trains having a lower capacity utilization rate (in terms of tonnage per train) in order to avoid penalisation for such kind of services that are part of the SWL transport chain. An appropriate action to take this into account could be the creation of a dedicated freight feeder train path (as better detailed hereinafter).

[38] As an example the Swiss system is based on several, variable factors (train kilometres, gross tons, peak vs off-peak, train path quality, wear and tear, etc.). On the basis of this system, SWL trains are not discriminated against block trains.

Freight feeder train path

Some Infrastructure Managers started to offer dedicated products for SWL operations. In particular to take into account the important phase of conveyance of wagons to main marshalling and shunting yards where then they are composed into full train load for the main line journey have been created paths especially dedicated to this activity. They are generally offered at discounted prices in comparison to standard freight paths in order to offer a solutions to cope with the specific type of activities performed in the SWL transport.

Germany

The freight feeder train path have been created by DB Netz and they are used for the conveyance of loaded and empty wagons in single-wagon operations between freight transport centres and DB Netz AG's train formation facilities.

The freight feeder train path must be used in direct conjunction with the use of a standard or express freight train path and must not be longer than 75 km.

	Last mile	Long distance	Last mile
Type of path	Freight feeder train path	Standard or express freight path	Freight feeder train path
Max length	< 75 km	No limits	< 75 km
Notes	To be used in in direct conjunction with l/d train path		To be used in in direct conjunction with l/d train path
Price factor	0.50	1.00 (std) / 1.65 (exp)	0.50
Priority	Low	Medium (std) / High (exp)	Low

Belgium

In Belgium Infrabel (the local Infrastructure Manager) within the Network Statement offers, a shunting line charge (RR-L) applicable for a limited number of sections (which may be isolated from the rest of the railway network).

Once an RU has begun a movement on a line with 'shunting line charge (RR-L)' status, that RU shall pay the RL unit price multiplied by the number of km of the line in question.

The amount payable for the use of the line is thus totally independent of the number of km travelled by the RU on the line in question and the tonnage carried. An RU may thus make as many return journeys on the RR-L line as it wishes without this influencing the price.

On the other hand, if the RU leaves the RR-L line and comes back to it later, it must once again pay the shunting line charge for the line in question.

Austria

According to a recent changes in the track access charging regime, the train*km charge will not be levied on short distance SWL trains (only the fees proportional to gross tkm

11.5.1.2. Extension of the existing discounts for CT services also to SWL

Another interesting remark issued during the survey phase was relative to the possibility to apply **reduced rates / discounts currently entitled to other rail freight segments** (typically combined transport) also to single wagonload services. In this case, it is important to ensure that such reductions are compensated by Member States, rather than by other types of rail services, and do not come at the expense of proper maintenance and upgrades of the rail line network.

The analysis carried out in the Study and that will be presented in the next chapter will show, however, that the discount on track access charges for combined transport are applied by very few countries nowadays.

11.5.1.3. Train paths quality

The **quality of the train path** is not always considered in the definition of the infrastructure charges. The traditional vision is that – at least in some cases – SWL trains (typically for last mile collection/distribution) might not require paths with the same level of speed and priority of intermodal shuttle trains or passenger trains, so they could benefit of a differentiation of charges depending upon the quality of the path.

However, given the development in the freight market, speed and priority becomes more and more important even for SWL. To ensure the competitiveness against other modes such as road transport, the quality of railway services shall be similar to the one provided by road transports in terms of speed, and especially reliability. Customers have the same punctuality and reliability expectations from rail freight in general, and SWL in particular, as for other types of freight transportation.

On the other hand, in the case of paths having a reduced priority and/or lower reliability, SWL trains are disadvantaged in operations (their more complex transport chain implies that delay in some leg of the chain might affect quality and productivity of a large part of the traffic handled).

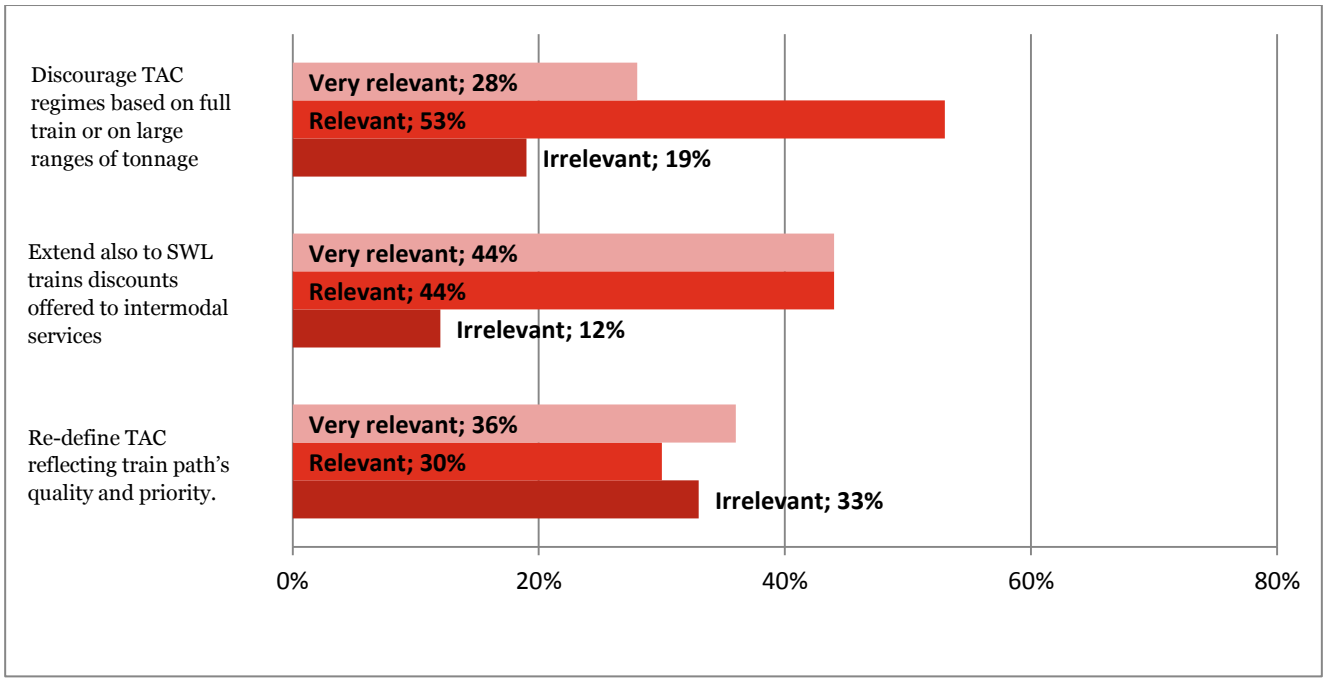
Thus, a performing SWL system shall be based on reliable train paths, since both quality to customers and production efficiency will strongly be deteriorated in case of train delays.

11.5.2. Stakeholder outcomes and analysis undertaken

The following picture indicates the response provided during the consultation by the interested stakeholders.

As can be noted all the three proposed actions have been appreciated and deemed as relevant or very relevant by the most part of respondents. The most popular actions have been welcomed by more the four respondents out of five, while the action aiming to re-define the Track Access Charges tacking into account train path's quality and priority has been been considered as not relevant by 1/3 of the respondents.

Figure 46 - More favourable track access charging regime survey results



The most favourable stakeholder supporting the re design of the track access charge regime are the Railway Undertakings / Short liners; it is remarkable also the support showed by the IMs while less interest is showed by the Terminal Managers (since they are not really involved in this topic).

As can be noted the most favourable stakeholder supporting the re - design of the track access charge regime are the Railway Undertakings / Short liners; it is interesting also the support showed by the IMs while less interest is showed by the Terminal Managers (since they are not really involved in this topic).

11.5.2.1. Track access regime overview by country

The following table sums up the main elements of the track access charge for each of the identified key countries. An overview about the TAC regimes do distinguish the ones based on train*km and/or ranges of tonnage (or gross tonnage) was undertaken. The presence of incentives to combined transport trains and the differentiation of TAC according to the level of priority of paths are also examined.

Table 20 - Track access charge regime by country

Member States	Track Access Charging regime				TAC regime likely impact on SWL conveyance traffic	TAC reduction for combined transport trains	TAC differentiation according to paths priority for freight trains
	train km (or train path km)		(gross) tkm				
	Y	N	Y	N			
Austria	√	on short-distance SWL traffic no trainkm fee is applied	√ (1)		Positive	n.a.	√ Freight. & l/d WL path
Belgium	√		√ by range of 400 t		Neutral or Positive	n.a.	√ Rapid / slow freight
Czech Rep.	√		√ (1)		Neutral or Positive	n.a.	n.a.
France	√		n.a.		Potentially Penalising	n.a.	n.a.
Germany	√		√ (surcharge if >3.000 t)		Potentially Penalising	n.a.	√ Standard & Express freight path
Italy	√		√ (a "wear and tear" parameter increase the charge for heavier trains)		Potentially Penalising	n.a.	n.a.
Poland	√		√ Interval of 60 t		Neutral or Positive	√ (*)	n.a.
Romania	√		√ (1)		Neutral or Positive	√ (**)	n.a.
Sweden	√		√ (1)		Neutral or Positive	n.a.	n.a.
Switzerland	√		√ (1)		Neutral or Positive	n.a.	n.a.
UK	√		√ (***)		Neutral or Positive	n.a.	n.a.

Note

n.a. : not applicable

(1) Full proportional by gross tonnage * km

(2) Pricing by type of rail category

(*) During the period from 15 December 2013 to 13 December 2014, PLK awards 25% discount of basic charge for minimum access to railway infrastructure, referred to in § 25 rec. 3, for a journey of block train composed exclusively with wagons carrying intermodal units

and/or with empty wagons designed for carriage of intermodal units. This discount will not be awarded by PLK in case when at least 1 wagon not designed for intermodal units or at least 1 wagon carrying non-intermodal load is hauled in a train.

(**) As far as the Romanian railway system is concerned, the IAC discounts shall apply to the international freight traffic of complete trains in transit on the Romanian territory

(***) For freight wagons, adjustments are made to variable usage charges also to reflect the relative 'track friendliness' of the suspension/bogie type to incentivise the use of 'track friendly' suspension/bogie types which will result in lower infrastructure costs. In addition, freight variable usage charges vary depending on the commodity type being transported. The reason for this is that the operating speed and operating weight of a freight vehicle can vary materially depending on the commodity type being transported and this is reflected in the Variable Usage Charge.

Weight-dependent TAC charges

As can be seen in the table all countries except France have foreseen a TAC system including not only on distance but also including a weight-dependent component. Nevertheless some differences might be noted:

- Austria, Czech Republic, Romania, Sweden and Switzerland adopt a full proportional system where each additional ton is charged to the RU according to a specific fees. In this cases SWL feeder trains are not be penalised by their lower capacity thus finally avoiding penalisation for SWL feeder lines and last mile services.

- Belgium, Poland and also adopt a pricing based also on weight but in these cases the system is not fully proportional but it is based on intervals of weight corresponding to specifics fees. The intervals identified in Belgium are quite large (400 tonnes for each class) thus reducing the proportionality of pricing system based on tonnes potentially impacting SWL feeder trains having lower capacity.

- Germany adopts a pricing system based on weight with the only difference applied to trains having a weight over 3.000 tonnes. Nevertheless shall be mentioned that in Germany discounts to SWL feeder trains are offered with the previously mentioned freight feeder paths.

- Similarly Italy included in the TAC formula a parameter based on the gross train tonnage that increase the charge essentially for the heavier trains.

A possible good practice to be mentioned is the Polish experience of TAC system based on relatively small ranges of train gross weight. Since large ton ranges make big difference in a train path price in case of modification of train composition (adding or removing wagons) last year PKP PLK increased number of gross weight ranges in his Price List from 10 (large) to 37 (narrow). PKP PLK hopes that this change will have positive influence also on SWL business. Also the recent decision of Austria to ley only the weight-dependent fee on SWL short distance trains is a good example of TAC regime in favour of SWL.

In general, it is important to highlight that European directives (2001/14 as updated now by the 2012/34) clearly stipulates that:

- basic TAC shall be set at the level of "directly incurred costs" generated by the circulation of the train;

- mark-ups to cover IM's full costs can be levied, but they cannot "exclude the use of infrastructure by market segments which can pay at least the cost that is directly incurred as a result of operating the railway service".

Therefore, weight-dependent charges are well in line with such principles (a significant portion of marginal infrastructure maintenance / renewal costs are typically dependent on the train weight). Higher charges (as it is typical the train-related component) would have to be levied only following the principle not to exclude services with lower profitability. Thus, in case SWL services have low profitable, a TAC system imposing to them only the weight-dependent component appears to be fully in line with the above regulation.

Reduction of on TAC charges for combined transport

Regarding the incentives to combined transport trains the analysis undertaken shows in the latest available Network Statements that such reduction is available only in Poland; it shall be mentioned that Romania has a similar regime but for the full train load international traffic (i.e. not specifically for SWL). Such regimes existed in the past also in other countries, but they have been discontinued since.

As highlighted during the survey extend the existing (and foreseen) incentives also to SWL avoid to create cannibalism between different rail freight modes. It is very important that the level playing field between different railway modes is ensured fair. In the past the combined traffic was funded very generously. European Commission and Member States should act towards the SWL traffic in the same way, avoiding that one rail transport mode would be cannibalized by the other. Extend this incentives (where still applied or foreseen) would be very relevant for single wagonload, considering that

- the TAC may represent a significant part of the cost structure of SWL (up to 25%, see chapter 9);
- the economic sustainability of some SWL services is low;
- price being an important factor of modal choice for shippers, SWL rates charges to shippers cannot be raised, so economic sustainability would be ensured only by reducing its costs

It is however important to ensure that such reductions would be compensated by Member States, rather than by other types of rail services, and do not come at the expense of proper maintenance and upgrades of the lines.

As possible best practice can be mentioned always the Polish experience where the IM receive a percentage discount applied for intermodal (combined) rail transport. Discount level depends on state subsidy addressed to IM for this purpose. It works from several years and RUs appreciate this solution. Therefore it is possible foresee to extend this model on SWL trains on condition that the Government compensates the full loss of revenues due to applied discount to IM.

Priority paths

As highlighted during the survey SWL trains require the same paths quality as other trains. Customers have the same punctuality and reliability expectations than for other types of freight transportation. Today also a great part of freight moved by SWL are just-in-time transport requiring high quality of paths. On the contrary freight trains traditionally have a lower priority than passenger trains. This becomes critical in case of track closures, works etc. where just limited capacity is available on a line. Freight trains have to wait and sometimes can go just rather late, during nights. Also the main line is sometimes crowded with number of competing passenger RUs so there is no spare capacity for freight trains.

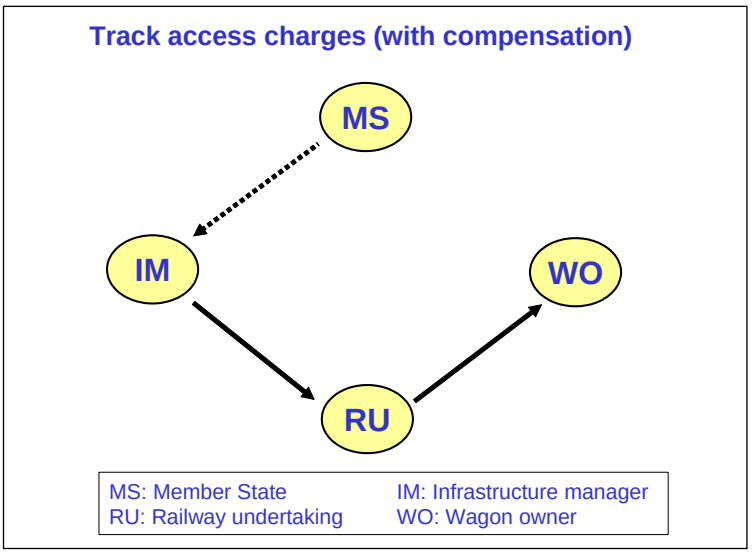
According the desk research only two Member States (Austria and Germany) have already implemented in their network statement priority paths for freight traffic, even if with an higher price. In Germany for example the express freight paths would cost 65% more than the standard one but it would ensure facilitate the fastest and most direct freight service links, operated on a high standard of reliability. In the management of running operations, the express freight train path is given highest priority over all trains apart from urgent rescue and emergency trains and trains running on express passenger service train paths. Thus this kind of paths seems to be the reply to the request of punctuality and reliability expectations than for other types of freight transportation (especially by road).

Noise Differentiated Track Access Charges

In the green transport package, published in 2008, the European Commission has published a communication “Rail noise abatement measures addressing the existing fleet”. An impact assessment study conducted by PwC has identified as the more appropriate incentive solution to support freight wagon retrofitting, a combination of noise-differentiated track access charges, noise emission ceilings and voluntary commitments.

The rationale behind the implementation of differentiated track access charges is that the railway undertakings would receive a discount on this charge if using low-noise rolling stock. This would give them a financial incentive to retrofit if the savings from the discount were higher than the cost of retrofitting.

Figure 47 - Financial flows of track access charges (bonus system)



The main risk arising by the noise-differentiated track access charge for all types of railway companies is the possibility of decreasing margins in the case the costs for rail transport would increase. The cost of transport is likely to increase due to the need of retrofitting / purchasing the new wagons that might be very expensive and could be not levelled by the reduction of access charges.; in addition the reduction of track access charges might impact negatively the IMs accounts.

In such case, there is a potential risk for modal shift to road if railway companies are forced to raise their prices due to higher costs while other modes of transport are not treated in the same way.

The principle of noise-differentiated TAC is already provided for by the art 31.5 of European directive 2012/34:

The infrastructure charges […] may be modified to take account of the cost of environmental effects caused by the operation of the train. Any such modification shall be differentiated according to the magnitude of the effect caused.

Based on the experience gained by infrastructure managers, railway undertakings, regulatory bodies and competent authorities, and recognising existing schemes on noise differentiation, **the Commission shall adopt implementing measures setting out the modalities to be followed for the application of the charging for the cost of noise** effects including its duration of application and enabling the differentiation of infrastructure charges to take into account, where appropriate, the sensitivity of the area affected, in particular in terms of the size of population affected and the train composition with an impact on the level of noise emissions. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 62(3). They shall not result in the undue distortion of competition between railway undertakings or affect the overall competitiveness of the rail sector.

Any such modification of infrastructure charges to take account of the cost of noise effects shall support the retrofitting of wagons with the most economically viable low-noise braking technology available.

11.5.2.2. Additional solutions proposed during the survey

Further proposals have been indicated by some stakeholder during the survey process.

- the possibility to **include in the TAC system a portion linked to the train performance** known in order to provide incentive to railway undertakings and the infrastructure manager to minimise disruption and improve the performance of the railway network (as stipulated by art. 35 of the Dir. 2012/34). This point is highly dependent with the one examined before about the train paths priority.

- **implement consistent system of road charging and rail TAC** capable to ensure level playing field between truck and train. This element is widely examined and analysed in the chapter 11.2 about the increasing competition from road freight transport and effective railway sector regulation

- **review the charges to allow a better use of the secondary network**; this could be achieved with a "network solidarity" in terms of charges level between the core network and the secondary network. Such proposal would also direct to reduce track access charges for short first/last mile to /from bundling point for SWL-trains therefore ameliorating the competition of the SWL system. The feasibility of such provision with respect to 2012/34/EU principles on TAC set at directly incurred costs shall however be examined;

11.5.3. Policies and recommendations

By combining the evidence provided by the analyses carried out in this Study with the opinions provided by the stakeholders, the following conclusion can be drawn:

- the TAC representing a significant part of the cost structure of SWL (typically 10%, but up to 25% in some cases), the **definition of an appropriate TAC regime is critical for the economic sustainability of SWL** (and – on the other hand – large fluctuations can threat they already low profitability of the system);

- appropriate TAC regime, well in line with principles of 2012/34, shall allow to levy relatively **low charges on SWL trains, essential based on their gross tonnage and the travelled distance** (in line with the "directly incurred costs" principle), while mark-ups – if levied shall not exclude from the market any service (including SWL ones) that can pay only TAC set at directly incurred costs;

- in case **specific reduction of TAC levels** are defined for segments of the freight transport, such as combined transport train, their suitability also for SWL shall be analysed, and if confirmed such reductions shall be extended to SWL trains also;

- **noise-differentiated TAC**, if implemented, shall provide clear incentives for the wagons retrofitting, and not just add an additional cost burden on the service;
- **differentiation of TAC by train path quality** is still limited for freight trains, but it can be suitable since SWL could in some cases accept to use paths with lower commercial speed provided that they are highly reliable;
- **any TAC regime shall be developed also considering the infrastructure charging level on competing modes** (bearing in mind that tolls are levied only in a fraction of the road network and in some countries), in order to ensure a level playing field for the transport market competition.

11.6. Technology innovations

11.6.1. Background

Technology applied to SWL rail freight transport will permit to increase the overall productivity thanks to its impacts on the different sub systems such as infrastructure and wagons.

Hereinafter are listed and briefly commented the technologies having a potentially positive impact on the development of SWL transport.

They are broadly categorised in three categories:

1. infrastructure-related
2. vehicle-related
3. ICT solutions.

The proposed technologies aim to increase the effectiveness and efficiency of the SWL services thanks to:

- better use of the available capacity (infrastructure and rolling stock);
- more effective and efficient operations.

Implementation of new technologies is not a goal in itself, but it shall be strictly driven by the key objectives already presented in chapter 6:

1. reducing wagon loading times;
2. increasing load factor of wagons and trains;
3. improving the efficiency in first/last mile shunting.
4. improving the efficiency in intermediate marshalling/shunting.
5. improving the efficiency during travelling on the main network.
6. Increasing the quality delivered to the customers.

11.6.2. Stakeholder outcomes and analysis undertaken

An analysis of the Stakeholder questionnaires allows us to examine the degree of relevance for the revitalisation of SWL transport ("very relevant" and "relevant" actions). Some technologies emerge as clearly relevant for all Stakeholders, a few as irrelevant and many with no clear indication.

ICT Technologies are considered by most as relevant or very relevant. Even those who responded "irrelevant" back up their response by stating that they are a must, or that they are

already under development, thus confirming implicitly their importance for revitalising SWL.

Figure 48 – Technology innovation survey results

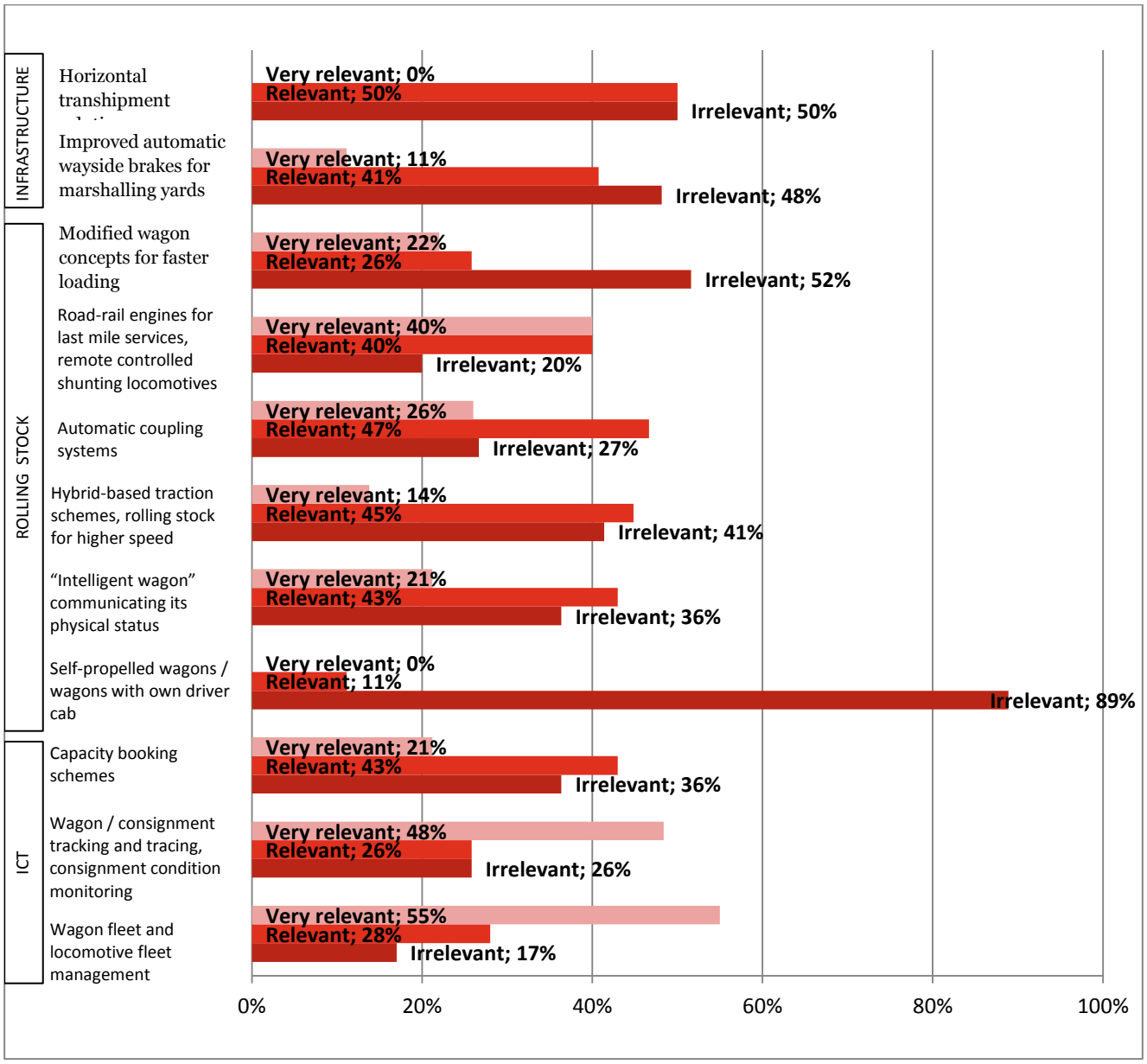
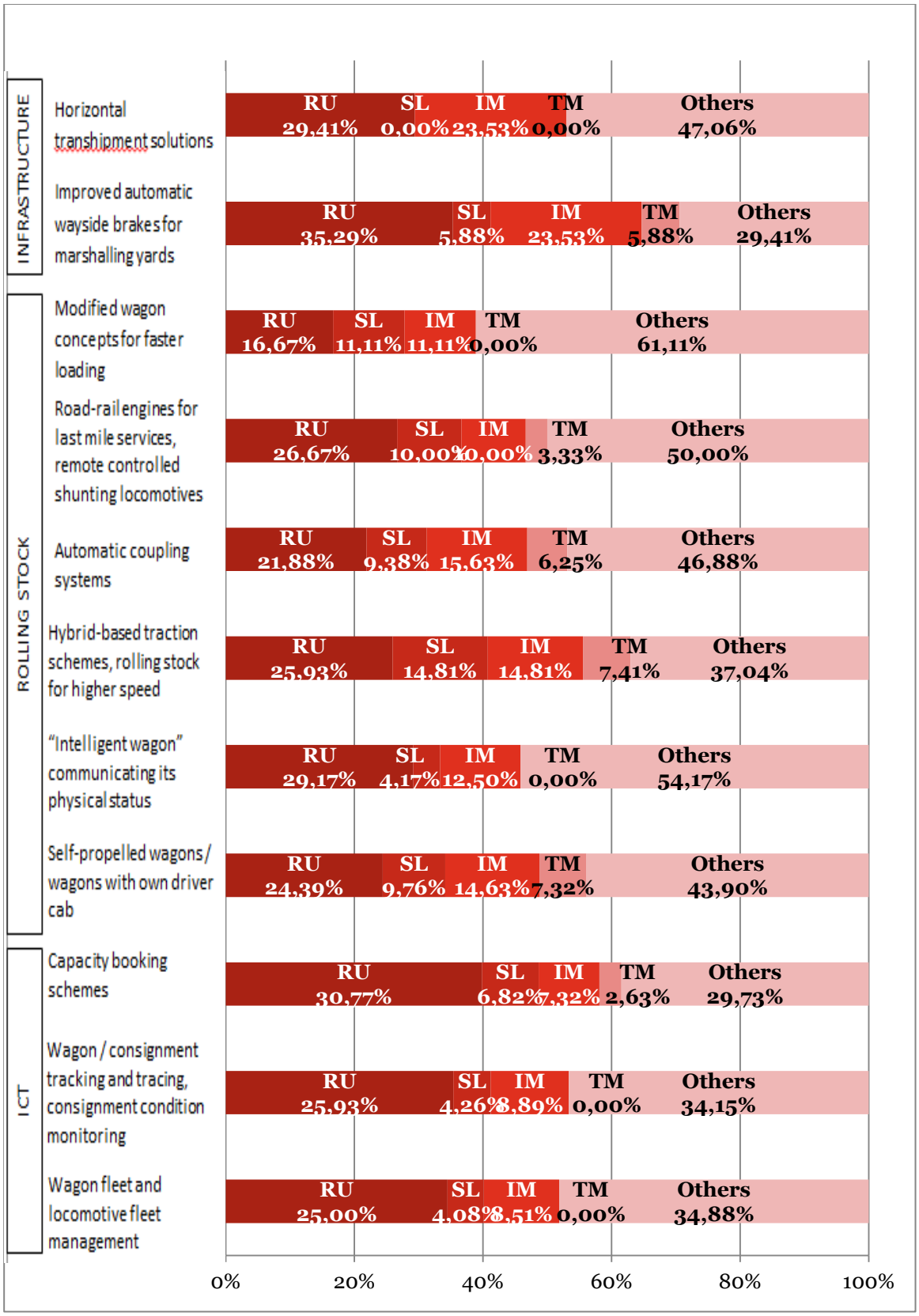


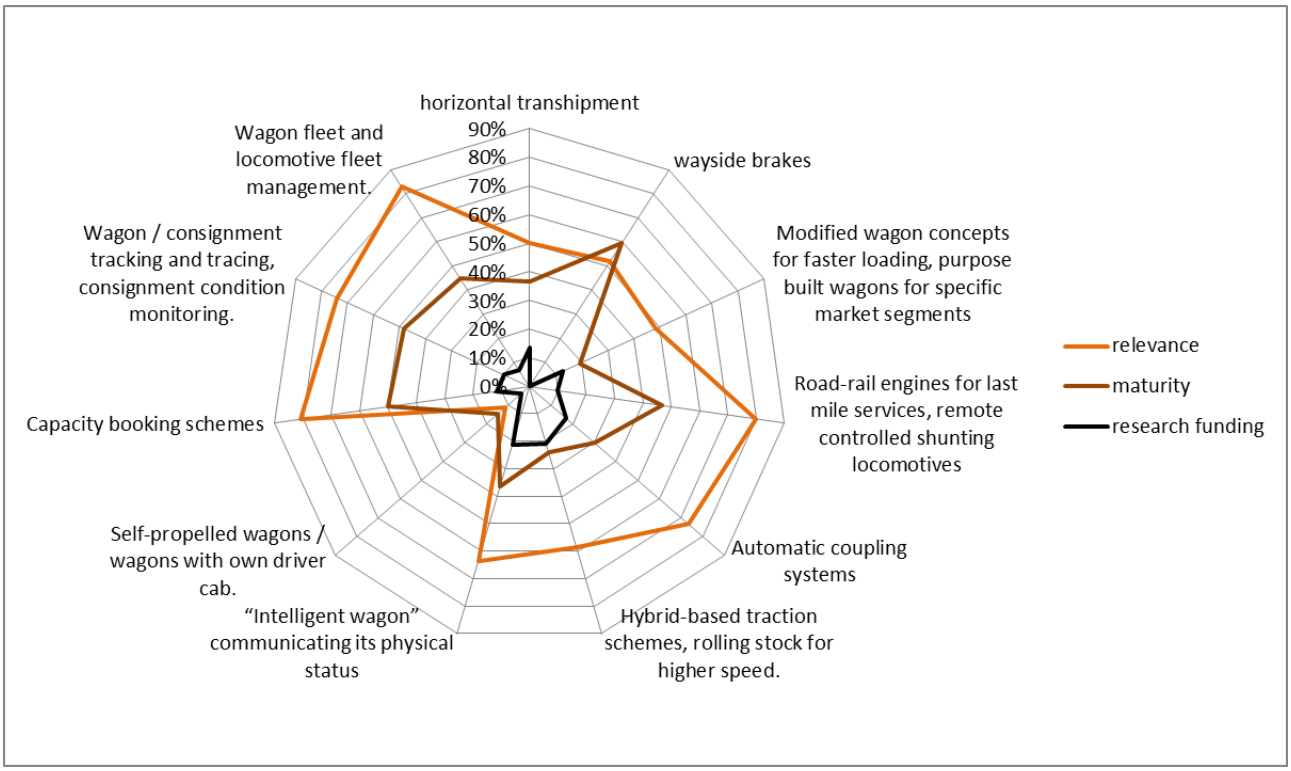
Figure 49 - Respondents' clusters breakdown



Legenda: RU: Railway Undertakings, SL: Short Liners, IM: Infrastructure Managers, TM: Terminal Managers.

The radar diagram of Figure 50 allows us to examine together degree of relevance, maturity of the technologies and research funding needs as proposed by the respondents.

Figure 50 - Relevance, maturity and research needs for the identified technologies



We see that ICT solutions are considered as both relevant and mature - although the number of respondents on the maturity level was less than for relevance, hence the smaller polygon in the diagram for maturity. There were even less responses expressing a requirement for research funding on these topics, but a comparison with the same data regarding the rolling stock technologies listed may indicate a general feel that further research is less important and that probably the urge is to move on implementing practical solutions.

The infrastructure-related technologies (horizontal transhipment, wayside brakes for marshalling yards) divide the respondents into two groups, one favouring the technologies and the other not considering them relevant. Wayside brakes are considered to be quite mature and not require much further research.

Of the rolling-stock-related technologies, in order of relevance road-rail engines and remote controlled shunting locomotives, automatic coupling systems, hybrid-based traction schemes and "intelligent wagons" all rated high or very high degrees of favour by the respondents. All these technologies do not appear to be considered as mature as ICT, and in particular automatic coupling, hybrid-based traction schemes the use of intelligent wagons are indicated as requiring further research in comparison with other already mature technologies. Modified wagon concepts and, particularly, self-propelled wagons / wagons with own driver cab, do not encounter much favour.

In addition to the above analysis, it is important to add a preliminary analysis of potential impacts of the listed technologies. In fact, there is a wide variety of impact on easiness of application, cost, productivity and quality of service of such technologies. The following table summarises a high level qualitative evaluation of these aspects.

Table 21 – Application and impacts for the identified technologies

Technology	*Easiness of application*	*Costs to implement*	*Impact on productivity*	*Impact on the quality of service*
INFRASTRUCTURE				
Horizontal transhipment solutions	Low (infrastructure) Medium (ancillary equipment, new wagon/ITU designs)	Medium (infrastructure) Medium (ancillary equipment)	Medium	None
Improved automatic wayside brakes for marshalling yards	High	Medium	Low	None
ROLLING STOCK				
Modified wagon concepts for faster loading, purpose built wagons for specific market segments	Medium	Low	Low	Low
Road-rail engines for last mile services, remote controlled shunting locomotives	Medium (road-rail engines may require some infrastructure modification)	Medium	Medium	None
Automatic coupling systems	- (requires widespread implementation)	High (requires widespread implementation)	High	None
Hybrid-based traction schemes, rolling stock for higher speed	Medium	Medium	Medium	None
"Intelligent wagon" communicating its physical status	Medium	Medium	Medium	Medium (facilitates consignment t&t)
Self-propelled wagons / wagons with own driver cab	Lo	Medium	Low	None
ICT				
Capacity booking schemes	Medium (for international traffic systems and databases shall be / become interoperable)	Low	Low	High
Wagon / consignment tracking and tracing, consignment condition monitoring	High	Low	Low	High

Technology	*Easiness of application*	*Costs to implement*	*Impact on productivity*	*Impact on the quality of service*
Wagon fleet and locomotive fleet management	High	Low	High	None

In a broader perspective, according to our analysis we may conclude that:

- in terms of benefits, the solutions affecting directly **attractiveness of SWL services** are mainly ICT solutions aiming at enhanced **tracking and tracing** of wagons, also in international transport, with the support of "**intelligent wagons**" communicating information of interest also to the customer such as consignment status, temperature etc.

- all other solutions are mainly providing potential improvements in the **SWL service productivity**, and thus have an indirect effect on attractiveness (positive influence on system capacity and potentially punctuality) and a direct effect on competitiveness (reduction of operational costs and thus potentially more competitive prices);

- **automatic coupling of wagons** has been historically largely studied as the key technology to speed up SWL operations and improve the productivity (reducing also the need of shunting locos and staff on the tracks); however only an implementation on the large majority of the wagon fleet would produce significant benefits; application needs to be EU wide with consequent huge investment costs;

ICT solutions stand out as relatively low/medium cost but they are expected to prvide high-benefit. Some rolling stock solutions also appear to be favourable in terms of benefits/investment ratio (road-rail engines and remote controlled shunting locomotives, hybrid-based traction schemes).

11.6.3. Policies and recommendations

Technological solutions appear in general difficult to address as part of integrated policies at the EU level. As a matter of fact, they depend essentially on the choices of the market actors and any imposition in this sense appears in contrast with the spirit of EU rail legislation. EU may contribute to the technology upgrade of SWL system by supporting the research (for the technologies that are not mature yet) and disseminating the best solutions.

The only solution which would require strong EU action is the implementation of **automatic coupling systems**. This implementation needs to be EU-wide, involving the large majority of wagons used in the SWL system, and entailing therefore significant costs and long implementation time. Although the technology regarding the mechanical and operational aspects is fairly mature since research has been taking place for a long time, the feasibility of a large scale implementation is quite doubtful.

For the other technologies, strong action from EU is not required. It is important to continue **fostering research** on innovative operational schemes based on the use of road-rail engines and hybrid locomotives, and on what to measure and how to use the data from "intelligent wagons" to improve operations, as well on the appropriate autonomous energy production sources to supply “intelligent wagon” systems.

The highest benefits for the revitalisation of SWL transport are likely to derive from the increased use of **ICT**, as foreseen in the TAF TSI (see also §10.1). Although less important than for the rolling-stock related technologies, research on these topics should not diminish.

Development of large scale **ICT solution for international SWL transport (capacity booking, tracking & tracing, fleet management)** are mainly hindered by the need to harmonise and make interoperable different IT systems and databases used by the IMs and RUs. This is not likely to require very innovative solutions, but a huge implementation effort to ensure such integration. TAF TSI certainly help in that respect.

The remaining solutions examined all have the potential to offer some benefit (apart, perhaps, from self-propelled wagons / wagons with own cab). However the potential probably depends on the specific situation (market, operator etc.) as indicated also by the mixed nature of the questionnaire responses. For **improved rail (wayside) brakes**, as often is the case for noise-related aspects, the solution could be local - public co-funding for their installation if the continued operation of the marshalling yard is problematic for residents. **Horizontal transhipment** solutions could be a good choice in specific situations and could deserve further public research. **Modified wagon concepts** are up to manufacturers, in their quest to differentiate their products and meet customer needs.

12. Conclusions

A number of recommendations of possible actions for the elimination of relevant barriers & threats, and the exploitation of available opportunities, have been studied and filtered according to the evidence provided by our analysis, as well as the level of "relevance" indicated by relevant stakeholders and the likely feasibility given the current EU regulatory framework.

The following table summarises the proposed recommendations in terms of expected areas of impact, responsibilities for their implementation and level of priority.

Actions are classified as "high priority" ones when they have a general (Europe-wide) potential impact and are critical for the re-launch of SWL (since they are addressing the key issues synthesised in chapter 10).

Actions having a more limited scope of application and/or likely benefits (also in comparison with the related implementation costs and time) are instead classified as "low/medium" priority ones.

Impact area	Priority level	Recommended actions to be implemented by EC	Recommended actions to be implemented by MS	Recommended actions to be implemented by Stakeholders
Improving the efficiency and/or economic sustainability of SWL services	HIGH	• Supervise (also through appropriate guidelines) & monitor the implementation of proper TAC regimes respecting EU regulation principles in terms of charges set at "directly incurred costs" and mark-ups levied only at a sustainable level (if any) (*)	• Ensure the implementation of proper TAC regimes respecting EU regulation principles in terms of charges set at "directly incurred costs" and mark-ups levied only at a sustainable level (if any) (*) • Implementing conditions allowing workers polyvalence (as in other modes of transport)	• Implement capacity booking solutions • Plan and operate enhanced production models mixing SWL with other (regular) rail freight flows to increase capacity utilisation

Impact area	Priority level	Recommended actions to be implemented by EC	Recommended actions to be implemented by MS	Recommended actions to be implemented by Stakeholders
	MEDIUM / LOW	• Support "short liner" (last mile) operation through specific funding (similar to Marco Polo)	• Support last mile operation as PSO in specific areas where no RU is interested to operate them at market conditions • Align reduction of TAC between intermodal and SWL trains (where provision in favour of the former exist) • Ensure the implementation of proper TAC regimes differentiating the levels by path quality / priority (***)	• Involve port authorities in the management of last mile services
Ensuring the availability of essential infrastructure / facilities	HIGH	• Enhance the existing regulation on service facilities (art. 13 of the Recast) by imposing sufficient notice & market analysis (including consultation of RUs) before deciding the closure of service facilities under Annex II.2 of the Recast directive • Define guidelines (and possibly funding) for the incentives to construction & rehabilitation of private sidings (**) • Allow the simplification of safety and operational requirements for secondary lines where only freight trains circulate	• Implement funding programs (possibly with the support of EC) for the construction & rehabilitation of private sidings • Simplify certification procedure of private sidings (in countries where they are complex)	• Realise active interaction between IMs, RUs and also shippers and local authorities concerning the "rightsizing" of essential infrastructure for SWL

Impact area	Priority level	Recommended actions to be implemented by EC	Recommended actions to be implemented by MS	Recommended actions to be implemented by Stakeholders
Effective regulation of the rail freight transport	HIGH	• Monitor the implementation of the relevant EU regulation such as the Recast • Foster the implementation of a "static platform" providing user-friendly access to information about last mile infrastructure (**)	• Transpose relevant EU regulation (such as the Recast directive) if not done yet	
	MEDIUM /LOW	• Pressing on nat. regulators for quick reaction in case of access discrimination (***)	• Pressing on nat. regulators for quick reaction in case of access discrimination (***) • Simplification of the requirements for the operators active only on secondary lines (****)	
Effective regulation of the competing modes	HIGH	• Ensure / verify the harmonisation of operating conditions with other modes, in particular concerning the infrastructure charging policies between rail and competing modes	• Align the conditions of road and rail transport concerning the provision of the "last mile" infrastructure connecting industrial plants and warehouses to the respective network	
Improving the SWL quality to the customers	HIGH			• Implement enhanced wagons tracking & tracking solutions (also for international flows) available to customers (dynamic platforms) • Propose innovative business solutions tailored to market needs

Impact area	Priority level	Recommended actions to be implemented by EC	Recommended actions to be implemented by MS	Recommended actions to be implemented by Stakeholders
Technological innovation	HIGH	• Support R&D on technology that are not fully mature yet (e.g. power source for "intelligent wagons")	• Ensure the applicability of innovative technologies such as remote controlled shunting locomotives (e.g. in terms of safety provisions)	• Go from research / pilot stage to full scale implementation for mature technologies allowing significant benefits at limited costs (e.g. ICT solutions for fleet management, capacity booking, tracking and tracing; hybrid & remote controlled locomotives, etc.)

(*) *This will also mean that basic TAC shall be more linked to the gross tonnage of the train as key driver of the "directly incurred costs" (typically the variable part of maintenance & renewal costs).*

(**) Actions already launched by EC in May 2014.

(***) Classified as medium/low priority for SWL, since they are general issues of EU or national regulation, not specifically linked to barriers for SWL development.

(****)The simplification of the requirements for the operators active only on secondary lines is already covered to a large extent by the Recast directive at art. 2 where the "undertakings which only operate regional rail freight services" and the "undertakings which only operate freight services on privately owned railway infrastructure that exists solely for use by the infrastructure owner for its own freight operations." may be excluded from the application of the Chapter III concerning the licensing of RUs. Thus, this remain an issue only at national level.

As far as the competition within the railway market, during the Study the issue of how to better regulate the management of relevant infrastructure, e.g. in terms of ensuring maintenance and open access to service facilities, was also discussed.

As far as SWL re-launch is concerned, the priority appears to be a **proper and full implementation of existing regulation** (e.g. Dir. 2012/34), as well as the monitoring if its actual application, as already stated in the above table.

Concerning the **full separation of IM and RU** to better ensure IM independence, available data show that – so far – the general performance of SWL and the presence of new entrants in such market segment do not appear higher in the countries with an independent IM (e.g. Austria and Germany with IM integrated in a holding structure with the incumbent RU have high SWL %, while SWL is disappeared in Spain and UK where IMs are fully independent). This, it is not possible to conclude that fully separated IM would automatically generate a favourable environment for SWL.

Concerning the possibility to **assign specific "last mile" infrastructure such as the marshalling yards to an IM independent** from the national one is a possibility already existing especially for relatively isolated network (such as in port areas). A wider scale application of such policy shall consider, however, that the multiplication of the number of IMs might risk to generate an additional complexity in the service planning (that is already a complex process for SWL, given the high percentage of international transport).

Annex I - Network Statement: Infrastructure Information

Information about "Infrastructure: Freight Terminals" on Network Statement

Information	*Availability*	*Presentation as a table/list*	*Presentation as a map*	*To be asked*
List the location of freight terminals	***Yes:*** OBB (AT) SZDC (CZ) RFF (FR) RFI (IT) SBB (CH) NR (UK) Trafikverket (SE) CFR (RO) ***No:*** Infrabel (BE)[39] DB Netze(DE) PKP (PL)[40]	***On the main document:*** - ***On annex:*** RFI (IT) CFR (RO) RFF (FR) ***On website:*** RFI (IT)	***On the main document:*** - ***On annex:*** RFI (IT) ***On website:*** OBB (AT) SZDC (CZ) NR (UK) Trafikverket (SE)	SBB (CH) RFF (FR)
Description each terminal's type (intermodal or conventional, harbour etc.).	***Yes:*** RFF (FR) CFR (RO) NR (UK) OBB (AT) Trafikverket (SE) SZDC (CZ) ***No:*** Infrabel (BE); DB Netze(DE) SBB (CH) PKP (PL) RFI (IT)	***On the main document:*** ***On annex:*** RFF (FR) CFR (RO) SZDC (CZ) ***On website:*** NR (UK)	***On the main document:*** ***On annex:*** ***On website:*** NR (UK) OBB (AT) Trafikverket (SE)	SBB (CH)
List and description of purpose-	**Yes:** RFI (IT)- dangerous	***On the main document:***	***On the main document:***	SBB (CH)

[39] The IM does not manage freight terminals

[40] PKP NS is compliant with the RNE structure

Information	*Availability*	*Presentation as a table/list*	*Presentation as a map*	*To be asked*
built terminals	goods NR (UK)- cement, aggregate,minerals,bulk,metal ***No:*** Infrabel (BE); DB Netze(DE) SBB (CH) CFR (RO) OBB (AT) PKP (PL) Trafikverket (SE) SZDC (CZ) RFF (FR)	***On annex:*** RFI (IT) ***On website:*** NR (UK)	***On annex:*** ***On website:*** NR (UK)	
Body in charge of (track) capacity allocation within the freight terminal	***Yes:*** CFR (RO) NR (UK) OBB (AT) ***No:*** Infrabel (BE); DB Netze(DE) SBB (CH) PKP (PL) Trafikverket (SE)	***On the main document:*** ***On annex:*** CFR (RO) ***On website:*** NR (UK) OBB (AT)	***On the main document:*** ***On annex:*** ***On website:*** NR (UK)	SBB (CH)
Terminal suitability for the interchange of goods between other (more) modes than rail-road and rail-rail	***Yes:*** OBB (AT) ***No:*** Infrabel (BE); DB Netze(DE) SBB (CH) CFR (RO) NR (UK) PKP (PL)	***On main document:*** ***On annex:*** ***On website:*** OBB (AT)	***On main document:*** ***On annex:*** ***On website:***	SBB (CH)

Information	*Availability*	*Presentation as a table/list*	*Presentation as a map*	*To be asked*
Maximum train length without splitting the train, and the total track length	***Yes:*** OBB (AT) ***No:*** Infrabel (BE); DB Netze(DE) SBB (CH) CFR (RO) NR (UK) PKP (PL) Trafikverket (SE)	***On the main document:*** ***On annex:*** ***On website:*** OBB (AT)	***On annex:*** ***On website:***	SBB (CH) CFR (RO)
Special terminal equipment	***Yes:*** OBB (AT) CFR (RO) ***No:*** Infrabel (BE); DB Netze(DE) SBB (CH) NR (UK) PKP (PL) Trafikverket (SE)	***On the main document:*** ***On annex:*** CFR (RO) (trancontainer terminal or loading/unloading) ***On website:*** OBB (AT)	***On the main document:*** ***On annex:*** ***On website:***	SBB (CH)
Contact point	***Yes:*** CFR (RO) NR (UK) OBB (AT) ***No:*** Infrabel (BE) DB Netze(DE) SBB (CH) PKP (PL) Trafikverket (SE)	***On the main document:*** ***On annex:*** CFR (RO) NR (UK) ***On website:*** OBB (AT)	***On the main document:*** ***On annex:*** ***On website:***	SBB (CH)

Information about "Train formation yards" on Network Statement

Information	*Availability*	*Presentation as a Table/List*	*Presentation as a maps*	*To be asked*
Location of train-formation yards	***Yes:*** OBB (AT) Infrabel (BE) CFR (RO) Trafikverket (SE) SZDC (CZ) RFF(FR) ***No:*** SBB (CH) NR (UK) RFI(IT) DB Netze(DE) PKP (PL)	***On main document:*** Trafikverket (SE) SZDC (CZ) ***On annex:*** OBB (AT) Infrabel (BE) CFR (RO) RFF(FR) ***On website:***	***On main document:*** ***On annex:*** OBB (AT) ***On website:*** Infrabel (BE) Trafikverket (SE)	SBB (CH)
Maximum train length	***Yes:*** SZDC (CZ) RFF(FR) ***No:*** Infrabel (BE) CFR (RO) Trafikverket (SE) SBB (CH) NR (UK) RFI(IT) DB Netze(DE) PKP (PL)	***On main document:*** SZDC (CZ) ***On annex:*** ***On website:*** RFF (FR) only for customers	***On main document:*** ***On annex:*** ***On website:***	Infrabel (BE) CFR (RO) Trafikverket (SE) SBB (CH) NR (UK)
Contact point	***Yes:*** OBB (AT) Infrabel (BE) CFR (RO) SBB (CH) SZDC (CZ) ***No:***	***On main document:*** CFR (RO) SBB (CH) SZDC (CZ) ***On annex:*** OBB (AT)	***On main document:*** ***On annex:*** ***On website:***	NR (UK)

Trafikverket (SE) RFI(IT) DB Netze(DE) NR (UK) PKP (PL) RFF (FR)	Infrabel (BE) SZDC (CZ) ***On website:***

Information about "Capacity Allocation" on Network Statement

Information	*Availability*
Allocation principles for the capacity of service facilities, in case these are managed by the IM.	***Yes:*** Trafikverket (SE) NR (UK) ***No[41]:*** OBB (AT) Infrabel (BE) CFR (RO) SBB (CH) RFF (FR) DB Netze (DE) PKP (PL) RFI (IT) SZDC (CZ)

Information about "Services:Freight Service" on Network Statement

Information	*Availability*
Track access	***Yes:*** OBB (AT) (on annex) NR (UK) Trafikverket (SE) RFI (IT) CFR (RO) SZDC (CZ)

[41] It does not means "no information at all on capacity allocation", in some case capacity allocation of service facilities is not a separated process.

Information	*Availability*
	No: SBB (CH) RFF (FR) - to be asked DB (DE) PKP (PL) Infrabel (BE)
Usage Conditions	***Yes:*** OBB (AT) on annex RFI (IT) NR (UK) Trafikverket (SE) CFR (RO) SZDC (CZ) ***No:*** SBB (CH) RFF (FR) to be asked DB Netze (DE) PKP (PL) Infrabel (BE)
Indication of who delivers services	***Yes:*** OBB (AT) on annex NR (UK) Trafikverket (SE) RFI (IT) CFR (RO) SZDC (CZ) ***No:*** SBB (CH) RFF (FR) to be asked DB Netze (DE) PKP (PL) Infrabel (BE)

Information about “Services: Marshalling Yards” on Network Statement

Information	*Availability*
Track access	***Yes:*** CFR (RO) NR (UK) Trafikverket (SE) OBB (AT) Infrabel (BE) SZDC (CZ***)*** RFI (IT) ***No:*** SBB (CH) RFF (FR) to be asked DB Netze (DE) PKP (PL)
Usage Conditions	***Yes:*** CFR (RO) Infrabel (BE) NR (UK) to be asked SZDC (CZ) Trafikverket (SE) RFI (IT) OBB (AT) –on annex ***No:*** SBB (CH) RFF (FR) to be asked DB Netze (DE) PKP (PL)
Indication of who delivers services	***Yes:*** CFR (RO) Infrabel (BE) SZDC (CZ) NR (UK) Trafikverket (SE) RFI (IT) ***No:*** SBB (CH) RFF (FR) to be asked DB Netze (DE) PKP (PL)

Information about "Services: Train formation facilities" on Network Statement

Information	*Availability*
Track access	***Yes:*** CFR (RO) SZDC (CZ) NR (UK) Trafikverket (SE) OBB (AT) RFI (IT) ***No:*** Infrabel (BE) SBB (CH) RFF (FR) to be asked DB Netze (DE) PKP (PL)
Usage Conditions	***Yes:*** CFR (RO) SZDC (CZ) NR (UK) to be asked Trafikverket (SE) RFI (IT) OBB (AT) –on annex ***No:*** Infrabel (BE) SBB (CH) RFF (FR) to be asked DB Netze (DE) PKP (PL)
Indication of who delivers services	***Yes:*** CFR (RO) SZDC (CZ) Trafikverket (SE) RFI (IT) OBB (AT) –on annex ***No:*** Infrabel (BE) SBB (CH) RFF (FR) to be asked NR (UK) to be asked DB Netze (DE)

Information	*Availability*
	PKP (PL)

Information about "Services: Shunting" on Network Statement

Information	*Availability*
Track access	***Yes:*** CFR (RO) OBB (AT) –on annex SZDC (CZ)) Trafikverket (SE) RFI (IT) ***No:*** Infrabel (BE) NR (UK) to be asked SBB (CH) RFF (FR) to be asked DB Netze (DE) PKP (PL)
Usage Conditions	***Yes:*** CFR (RO) OBB (AT) –on annex SZDC (CZ) RFI (IT) Trafikverket (SE) ***No:*** Infrabel (BE) NR (UK) SBB (CH) RFF (FR) to be asked DB Netze (DE) PKP (PL)
Indication of who delivers services	***Yes:*** CFR (RO) OBB (AT)-on annex SZDC (CZ) NR (UK)

Trafikverket (SE)
RFI (IT)
No:
Infrabel (BE)
SBB (CH)
RFF (FR) to be asked
DB Netze (DE)
PKP (PL)
DB Netze (DE)

Annex II - DIUM: Infrastructure Information

Countries		Specific Reference codes
Austria	*n*	*Only for certain customers*
	o	*Only for certain customers. Dispatch only with CIM freight paper*
	d	*End platform*
	e	*Side platform*
	m	*Rolling Road (RoLA)*
	g	*Station closed, used nevertheless as tariff boundary point for the calculation of international freight charges*
	a	*Station situated on a narrow-gauge line*
	i	*Station is situated in Germany*
	j	*Station is situated in Switzerland*
	k	*Station is situated in Hungary*
	l	*Station is situated in Liechtenstein*
	h	*Station served only by road services*
	p	*Only for transports by separate contract*
Belgium	a	*Open only for internal consignments and for the consignments of scrap iron from the local workshop of the belgian national railway company*
	b	*Open only for internal consignment.*
	c	***Open only for consignments in complete trainload***
	d	*Traffic temporarily suspended*
	e	*Station open only for the completion of customs formalities without break of load.*
	f	*Consignments from or to this station must be previously authorized by SA INFRABEL, rue Bara 110 1070 Brussels*
	g	*Open only for beetrots traffic*
	h	*Open only for military consignments*
	l	***Single wagon load only possible by mutual agreement***
Czech Republic	a	*CD Cargo: Services discontinued until further notice*
	b	*Desinfection station*
	c	*Stations which do not belong to the infrastructure Czech Railways Cargo*
	d	*Station where it is possible to water live animals*
	g	*Wagon destinated to this station must be equiped with both hand brake and continuous air brake*
	j	*Allowed only for sendings of exceeding size (overload)*
France	GB	*Station opened for gauge GB*
	GA	*Station closed for gauge GA*
	a	***Stations where some installations for clients are used for individual freight cars by Fret SNCF under previous commercial agreement***
	b	*Railways Station closed for steel products traffic*
	c	*Station of the "Chemin de fer d'intérêt local du département des Ardennes" (secondary railway)*
	h	*Station of the "Voies ferrées du Port fluvial de Mâcon" (secondary railway)*
	k	*Station of the "Chemin de fer industriel de rouen à Déville-lès-Rouen"*

Countries	Specific Reference codes
	(secondary railway)
	m *Station of the "Société des Voies Ferrées-Transports (V.F.T)" (secondary railway)*
	n *Station of the "Société anonyme des voies ferrées des Landes" (secondary railway)*
	o *Station of the "Régie départementale des transports des Bouches-du-Rhône" (secondary railway)*
	s *Station of the "Réseau d'intérêt local de l'Hérault" (secondary railway)*
Germany	a *Stations which do not belong to the infrastructure of Deutsche Bahn AG*
	b *Only for KV*
	c *This station has a wagon weightbridge*
	d *Only open for piggyback traffic*
	e ***Only for single cars***
	g *Station closed, used nevertheless as a tariff boundary point for the calculation of international freight charges*
	j *Station is situated in Switzerland*
	m *Exchange and additional freight charges (Zu-Frachten) for specific German station*
Great Britain	a *Traffic conveyed under conditions of the Community of Interest Automobiles may be only be conveyed to or from stations marked with this code*
	C ***Traffic in conventional wagon loads may only be conveyed to or from stations marked with this code***
	I *Intermodal traffic may only be conveyed to or from stations marked with this code*
	M *This location is only open for traffic consigned on behalf of the Ministry of Defence*
	X *Station subjected to special traffic conditions. In all cases a prior request is required to be made to E W S International Ltd*
	Z *Station only open for Customs Clearance formalities. The station may not be indicated as forwarding or destination station on consignment note*
Italy	a *Station open also to the transports of some dangerous goods under the RID conditions*
	b ***Not admitted single wagon transports of dangerous goods on the basis of conditions definedin RID***
	d *Calculated chilometres for the shortest way.*
	f1 ***International SWL traffic admitted only via Gorizia.***
	f2 ***International SWL traffic admitted only via Chiasso.***
	f3 ***International SWL traffic admitted only via Gorizia and Tarvisio.***
	f4 ***International SWL traffic admitted only via Iselle and Chiasso.***
	f5 ***International SWL traffic admitted only via Iselle.***
	f6 ***International SWL traffic admitted only via Chiasso, Tarvisio, Gorizia, Villa Opicina.***
	f7 ***International SWL traffic admitted only via Tarvisio, Gorizia, Villa Opicina.***
	g ***For single wagons, pay service from nearby station.***

Countries	Specific Reference codes	
	h	*Station closed to carriage of vehicles.*
	q	*Connecting Station belonging to a Regional Railway (formerly Secondary Railways), directly linked to FS national network.*
	q1	*Ferrovie Nord Milano (Connecting stations: Brescia, Camnago Lentate, Merone, Laveno Mombello, Rovato, Seregno). For the connecting stations of Camnago Lentate, Merone,Laveno Mombello, Rovato, Seregno* ***only full trains are allowed****.*
	q2	*Sistemi Territoriali S.p.A. (Connecting stations : Venezia Mestre, Adria). For the connecting stations of Udine* ***only full trains allowed****.*
	q3	*Ferrovie Emilia - Romagna:* *- Linea Suzzara - Ferrara (Link stations networks : Ferrara, Suzzara,Poggio Rusco). For theconnecting stations of Ferrara, Suzzara, Poggio Rusco* ***only full trains allowed*** *- Linea Codigoro - Ferrara(Connecting stations: Ferrara). For the connecting stations of Ferrara* ***only full trains allowed****.* *- Linea Parma - Suzzara (Connecting stations: Parma, Suzzara). For the connecting stations of Parma, Suzzara* ***only full trains allowed****.* *- Linea Reggio Emilia - Sassuolo - Reggio Emilia - Guastalla (Connecting stations: Reggio Emilia). For the connecting stations of Parma, Suzzara* ***only full trains allowed.***
	q4	*Ferrovie del Sud-Est e Servizi Automobilistici S.r.l. (Connecting stations: Bari Lamasinata,Surbo F.Merci, Francavilla, Taranto). For the connecting stations of Francavilla, Surbo F.Merci and Taranto* ***only full trains are admitted****.*
	q5	*La Ferroviaria Italiana S.p.A. (Connecting stations: Arezzo, Sinalunga). For the connectingstations of Arezzo, Sinalunga* ***only full trains allowed****.*
	q6	*Ferrovie Udine Cividale (Connecting stations: Udine). For the connecting stations of Udine* ***only full trains allowed****.*
	r	*In this station an additional tax is imposed for transports destinated for sidetracks or fixedpoints.*
	s	*Connecting stations belonging to Regional Railways directly linked to FS national network. Not to be shown as a delivering station on the CIM consignment note / CUV wagons consigment note*
	u	*Station connected to a port*
	v	*Station of technical support, only serving rail links located in other stations*
	z	*Only for fixed goods*
Poland	a	***Station open for wagon-load traffic***
	b	***Station open for wagon-load traffic on the base of contract with a customer***
	f	*Station open for traffic in large containers, for consignments in direct railway communication by ferry line Świnoujście - Ystad,*
	l	*a border pass with a track of a gauge of 1520 mm. The distance quoted is measured from a forwarding (destination) station to the Hrubieszów / Izow border pass through the Sławków Południowy junction station.*
	p	*Loading can be done at the following junction stations:Sędziszów (change of bogies), Gołuchów, Wola Baranowska, Szczebrzeszyn, Hrubieszów Miasto. To calculate carriage charges throgh the junction stations mentioned above, the Distance should be determined according to national PKP regulations.*
	z	*Only for transports by separate contract.*

Countries	Specific Reference codes	
Romania	g	***station open only for block trains and wagongroups with minimum 5 wagons***
	i	***for isolated wagons which are sent/received from/in these***
	m	***stations a preliminary approval from CFR Marfa is necessary***
		border point that services the ferry-boat lines Constanta Ferry-boat – Derince (Turkey)and Batumi (Georgia)
	s	*Station located on an non-interoperable infrastructure*
Sweden	**a**	*Only for transit consignments through Denmark in traffic with Germany and beyond. Not for container or combined traffic. Distances indicated may not be used for allocation of compensations according to AIM*
	c	*Only on agreement with Green Cargo AB*
	d	*Only for certain customers*
	e	***Only for combined traffic***
	f	***Only for container traffic***
	g	*Only for consignments in connection with ferry traffic to Finland*
	h	*Only for specialised transports by separate contract*
	i	*Station is situated in Norway*
Switzerland	**a**	***Open for full wagonloads not requiring a fixed platform for loading or unloading***
	b	*Station with transhipment installation for combined traffic (Terminal)*
	c	*Station situated on a narrow-gauge line*
	d	*Closed for traffic to and from France and beyond via Basel*
	e	*Station is situated in Germany*
	f	*Station managed by German Railway (DB)*
	g	***Only open for complete train loads***
	h	***An agreement can be reached for individual freight cars***
	i	*The train station is not part of SBB AG's infrastructure*

Annex III - List of companies contacted for the project (Task 4)

List of companies contacted for the project (Task 4)

- **Railway infrastructure managers**

- RFF
- SZDC
- PLK
- CFR SA

- **Incumbent rail freight operators**

- Fret SNCF
- CD Cargo
- PKP Cargo
- CFR Marfa

- **New rail freight operators**

- Europorte (France)
- Eurorail (France)
- Eurocargorail (now DB Schenker France) (France)
- Eurofer / Eco modal (France)
- CTL (Poland)

- **Other market players and stakeholders**

- Ministry in charge of transport (France)
- Geodis (France)
- IBS (Germany)
- ISBA (Poland)
- Trade Trans (Poland)
- Polcont(Poland)
- Professor Antonowicz (ex UTK General Manager)
- Railway Research Centre in Poland
- Gefco (France)
- Objectif OFP (France)
- AFWP (France)
- Arcelor Mittal
- Arkema
- I Log /Poulsard (OFP in Franche Comté)
- Ferrovergne (OFP in Auvergne)
- Lormafer (wagons maintenance)

Annex IV - Freight transport market in the EU

1. Freight transport market in the EU

FREIGHT TRANSPORT

billion tonne-kilometres

	ROAD	RAIL	INLAND WATER-WAYS	PIPE-LINES	SEA	AIR	TOTAL
1995	1 289	386	122	115	1 146	2	3 060
1997	1 352	410	128	118	1 193	2	3 202
1998	1 414	393	131	125	1 232	2	3 297
1999	1 470	384	129	124	1 268	2	3 377
2000	1 519	404	134	127	1 314	2	3 499
2001	1 556	386	133	133	1 334	2	3 544
2002	1 606	384	133	128	1 355	2	3 608
2003	1 625	392	124	130	1 378	2	3 652
2004	1 742	417	137	132	1 427	3	3 857
2005	1 794	413	139	136	1 461	3	3 946
2006	1 848	435	138	136	1 505	3	4 064
2007	1 914	448	145	130	1 532	3	4 173
2008	1 881	440	145	125	1 498	3	4 091
2009	1 690	361	130	119	1 336	2	3 639
2010	1 756	391	148	121	1 415	3	3 833
2011	1 734	420	141	119	1 408	3	3 824
1995–2011	34.6 %	8.8 %	15.6 %	3.2 %	22.8 %	25.9 %	25.0 %
per year	1.9 %	0.5 %	0.9 %	0.2 %	1.3 %	1.4 %	1.4 %
2000–2011	14.2 %	4.0 %	5.4 %	– 6.4 %	7.1 %	2.8 %	9.3 %
per year	1.2 %	0.4 %	0.5 %	– 0.6 %	0.6 %	0.2 %	0.8 %
2010–2011	– 1.2 %	7.3 %	– 4.8 %	– 1.7 %	– 0.5 %	– 1.2 %	– 0.2 %

FREIGHT TRANSPORT FOR INLAND MODES

billion tonne-kilometres

	ROAD	RAIL	INLAND WATERWAYS	PIPELINES	TOTAL
1995	1 289	386	122	115	1 912
1997	1 352	410	128	118	2 007
1998	1 414	393	131	125	2 063
1999	1 470	384	129	124	2 107
2000	1 519	404	134	127	2 183
2001	1 556	386	133	133	2 208
2002	1 606	384	133	128	2 251
2003	1 625	392	124	130	2 271
2004	1 742	417	137	132	2 427
2005	1 794	413	139	136	2 482
2006	1 848	435	138	136	2 556
2007	1 914	448	145	130	2 638
2008	1 881	440	145	125	2 590
2009	1 690	361	130	119	2 300
2010	1 756	391	148	121	2 416
2011	1 734	420	141	119	2 414
1995–2011	34.6 %	8.8 %	15.6 %	3.2 %	26.3 %
per year	1.9 %	0.5 %	0.9 %	0.2 %	1.5 %
2000–2011	14.2 %	4.0 %	5.4 %	– 6.4 %	10.6 %
per year	1.2 %	0.4 %	0.5 %	– 0.6 %	0.9 %
2010–2011	– 1.2 %	7.3 %	– 4.8 %	– 1.7 %	– 0.1 %

MODAL SPLIT

(%)

	ROAD	RAIL	INLAND WATER-WAYS	PIPE-LINES	SEA	AIR
1995	42.1	12.6	4.0	3.8	37.5	0.1
1997	42.2	12.8	4.0	3.7	37.3	0.1
1998	42.9	11.9	4.0	3.8	37.4	0.1
1999	43.5	11.4	3.8	3.7	37.6	0.1
2000	43.4	11.5	3.8	3.6	37.5	0.1
2001	43.9	10.9	3.7	3.8	37.6	0.1
2002	44.5	10.6	3.7	3.6	37.6	0.1
2003	44.5	10.7	3.4	3.6	37.7	0.1
2004	45.2	10.8	3.5	3.4	37.0	0.1
2005	45.5	10.5	3.5	3.5	37.0	0.1
2006	45.5	10.7	3.4	3.3	37.0	0.1
2007	45.9	10.7	3.5	3.1	36.7	0.1
2008	46.0	10.7	3.6	3.1	36.6	0.1
2009	46.5	9.9	3.6	3.3	36.7	0.1
2010	45.8	10.2	3.8	3.1	36.9	0.1
2011	45.3	11.0	3.7	3.1	36.8	0.1

Notes: Air and Sea: only domestic and intra-EU-27 transport; provisional estimates.
Road: national and international haulage by vehicles registered in the EU-27.

MODAL SPLIT

(%)

	ROAD	RAIL	INLAND WATERWAYS	PIPELINES
1995	67.4	20.2	6.4	6.0
1997	67.3	20.4	6.4	5.9
1998	68.5	19.0	6.4	6.1
1999	69.8	18.2	6.1	5.9
2000	69.6	18.5	6.1	5.8
2001	70.5	17.5	6.0	6.0
2002	71.4	17.1	5.9	5.7
2003	71.6	17.3	5.4	5.7
2004	71.8	17.2	5.6	5.4
2005	72.3	16.6	5.6	5.5
2006	72.3	17.0	5.4	5.3
2007	72.6	17.0	5.5	4.9
2008	72.6	17.0	5.6	4.8
2009	73.5	15.7	5.6	5.2
2010	72.7	16.2	6.1	5.0
2011	71.8	17.4	5.8	4.9

Note: Road: national and international haulage by vehicles registered in the EU-27.

(from EU transport in figures, statistical yearbook 2013)

Annex V – Stakeholders consultation

Direct interviews with associations

During the first phase of the stakeholder consultation, the Consultant held a number of meetings or telephone conference calls with associations representing the main groups of stakeholders.

Table 22 – List of consulted associations

Association	Place	Date
CER	Brussels, Belgium	10 October 2013
EIM	Brussels, Belgium	10 October 2013
X Rail	Telephone conference call	29 October 2013
ERFA	Telephone conference call	29 October 2013
CEFIC	Telephone conference call	2 October 2013
UIP	Telephone conference call	24 October 2013

The aim of these meetings was to share the scope of work and to discuss on the main objectives of the study and on possible input from the stakeholders.

These meetings resulted very useful in order to fine tune the questionnaires forms which were sent out to IMs and RUs during the second phase of the consultation.

CER, EIM and ERFA directly contributed to the process by providing contact details of IMs and RUs to be involved in the survey exercise.

All associations were invited to present their position at the workshop which was held in Brussels on 15 November 2013.

All associations listed above plus other ones that participated at the workshop or expressed interest to be involved will be interviewed again in the next phase to further analyse the study conclusions on fact findings and to share possible actions and recommendations.

Survey and interviews with RUs and IMs

Approach

During the "fact finding phase" of the study a questionnaire has been sent to all the interested stakeholders with the aim at completing and updating the set of available information to be used as input in data analysis.

In agreement with the Commission, the direct survey and the interviews were focused on IMs and RUs of ten key countries. The original selection of key countries was: Czech Republic, France, Germany, Italy, Poland, Sweden, Switzerland and United Kingdom.

The key countries have been selected to cover:

- the different views / strategies of relevant national stakeholders on SWL among European countries, in order to addres a variety of situations[42];
- their geographic distribution
- the respective share of SWL traffic to total rail traffic (both countries presenting stable and declining SWL traffic have been considered).

The Consultant welcomed the suggestions coming from the Commission to:

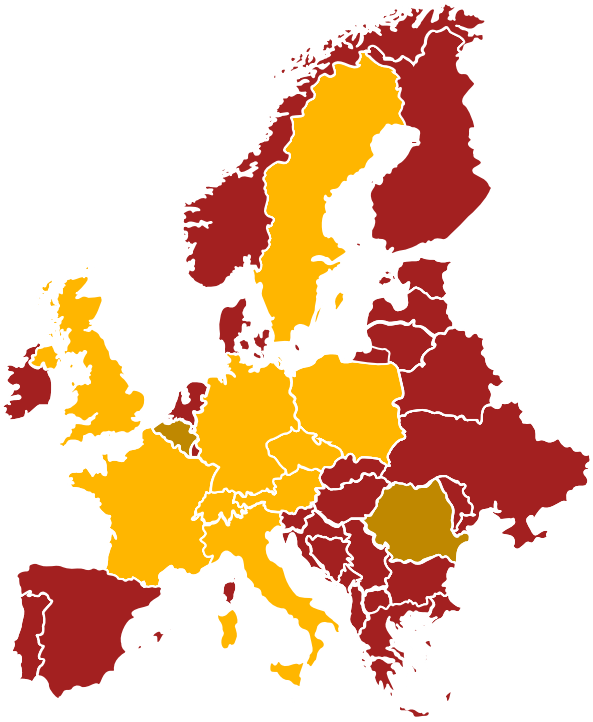
- analyse also a further large country of the Eastern Europe (Romania was selected) since in such area there have still very dense rail infrastructure that might be relevant for SWL services, even if this appears to be declining
- consider in the analysis also Austria due to its geographical location and the importance of SWL traffic.

Finally, Belgium was added following the suggestions received from relevant stakeholders associations.

The final set of 11 key selected for data collection encompasses the following: Austria, Belgium, Czech Republic, France, Germany, Italy, Poland, Romania, Sweden, Switzerland and United Kingdom as indicated in the map hereinafter:

[42] Seven western European freight transport operators, such as: DB Schenker Rail in Germany, SNCB Logistics from Belgium, the Swedish Green Cargo, CFL Cargo from Luxembourg, Suisse SBB Cargo, CD Cargo from Czech Republic and Rail Cargo Austria signed an alliance named X-Rail which aims to give strength to the Single Wagonload service. In contrast with the X-Rail alliance the Italian railway company, Trenitalia, has launched a restructuring of Single Wagonload offer, concentrating it only on some main strategic connections and marshalling yards. In France situation is even more radical, SNCF declared in 2010 that according to its new rail plan for the future, it was going to dismiss this activity, causing the increase of trucking with two million vehicles per year. In Spain, no classic SWL service exists since several years.

Figure 51 – Map with key countries selected for the fact findining analysis



In some countries not only the incumbent railway undertaking participated to the consultation. The questionnaire, indeed, was sent, also, to private operators (e.g. ERFA members) enlarging the overall number of companies involved in the consultation.

Two different questionnaires have been sent out to RUs and IMs.

Table 23– Recap of the different questionnaires types

Cluster	Questionnaire type	Cluster size	Countries involved
Incumbent RUs	RU	17	Austria, Czech Republic, France, Germany, Italy, Poland, Romania, Sweden, Switzerland and United Kingdom
Other RUs (including ERFA members)		7	France, Sweden, Poland, Belgium, Germany, Austria
Infrastructure Managers	IM	10	Austria, Czech Republic, France, Germany, Italy, Poland, Romania, Sweden, Switzerland and United Kingdom

Most of stakeholders have been visited and or engaged by telephone in order to provide instructions on how to filling in the questionnaire or in a second phase to discuss the responses provided.

The questionnaire sent to IMs concerned:

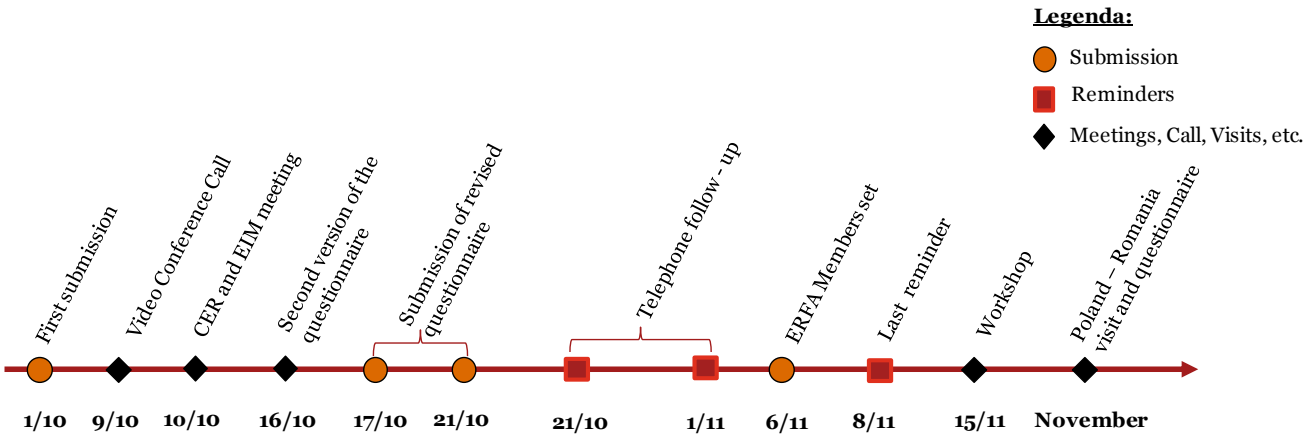
- Present and past infrastructure (e.g. marshalling yards, freight station, sidings, technologies, etc.)
- Present and past SWL traffic
- Future expected development

The questionnaire addressed to RUs focused on:

- Present and past volume and traffic (e.g. total, SWL, intermodal-combined, conventional / national, international, transit, etc.)
- SWL segments or transported commodities
- Information on locomotion fleet
- Production methods and resources for SWL
- Performance indicators for SWL services, load-factors, etc.
- Analysis of costs and cost structure
- Business models adopted and potential for improvement

The blank questionnaire forms are available in the following Annexes

The chart below summarises the main milestones of the survey process.



Status

As overleaf shown in Figure 51 and Table 23, even if data collection focused on eleven key countries, also stakeholders of other European countries have been involved.

Table 24– Global survey status

	Incumbent RUs	Other RUs (including ERFA members)	IMs	Total
Questionnaires sent	*15*	*9*	*10*	**34**
Questionnaires received	*12*	*3*	*9*	**24**
Response rate	**80%**	**33%**	**90%**	**71%**

Table 25 – Survey participation by countries

Country	Incumbent RUs	Other RUs (including ERFA members)	Infrastructure Managers
Austria	Rail Cargo	LTE	OBB Infrastruktur
Belgium	BLogistics	-	-
Czech Republic	CD Cargo	-	SZDC
Denmark (*)	DB Schenker	-	-
France	SNCF Geodis	Europorte	RFF
Germany	DB Schenker VDV (1)	Cap Train	DB Netze
Hungary (*)	Rail Cargo Austria	-	-
Italy	Trenitalia Cargo	Fer Cargo members	RFI
Netherlands (*)	DB Schenker	-	-

Country	Incumbent RUs	Other RUs (including ERFA members)	Infrastructure Managers
Poland	PKP Cargo	Freightliner Poland ZNPK	PKP Lines
Romania	CFR Marfa	-	CFR SA
Sweden	Green Cargo	Hector Rail	Trafikverket
Switzerland	SBB	HUPAC Cross Rail	SBB
United Kingdom	The Rail Freight Group (2)	-	Network Rail
Total	**15**	**9**	**10**

Legend:
Response received
Response not received

(*) Countries involved in data gathering only for SWL traffic

(1) VDV declared that its associated companies provides services for DB Schenker

(2) RFG declared that after privatisation of the railways, SWL services were closed as not being economic.

As suggested by Table 25, a number of non incumbent RUs (mostly ERFA members) have been invited to reply to the questionnaire. However, the rate of response has been low also since for some of these stakeholders the volume of SWL business is of small relevance.

Workshop

On 15 November 2013 a workshop was held in Brussels by the European Commission with the support of PwC and University of Rome – La Sapienza. Most relevant stakeholders and representatives of all the parties someway involved in SWL business were present.

Table below (Table 26) provides the list of organizations which were represented at the workshop. The participation by stakeholders and comments by stakeholders suggest that there is great interest in Europe around SWL.

Table 26 - List of organisations / association which attended the event

Name and surname	Company
Abt Christoph	DB
Adamek Bernhard	SBB Cargo
Ambrogio Livio	EIA
Artuso Diego	PwC
Bahrenburg Fred	DOW

Name and surname	Company
Bastidon Pauline	CER
Baudesson Laurence	Essenscia
Boholm Karolina	SKOGSINDUSTRIERNA
Bostan Mike	CLECAT
Buyse Frederic	IFB
Coart Francois	ERFA
Counet Albert	AC+ Consult SPRL
D'Hont Laurie	ESC
De Cnijf Marc	Eurorail
De Haut de Sigy Romuald	ARKEMA
DeMadonna Andrea	UNIFE
Di Lallo Georges	FFA
Fusco Gaetano	Università di Roma
Godet Christine	SBB Cargo
Guglielminetti Paolo	PwC
Heiming Monika	Eimrail
Hendrix Heidi	Infrabel
Hunold Bettina	DB
Kjoerrefjord Ole	Hector Rail
Krueger Olaf	Kuehne Nagel
Lagraulet Marie France	PwC
Lancellotti Paola	ESC
Laouadi Sarah	SNCF
Licciardello Riccardo	Università di Roma
Lochman Libor	CER
Lombard Bernard	CEPI
Luebberink Werner	DB
Lunadei Emiliano	PwC
Martisiute Maria	EIM
Musso Antonio	Università di Roma
Orus Jean-Pierre	RFF
Peterhans Gilles	UIP
Pitnik Alfred	Rail Cargo
Price Maria	UIP
Schmitt Bernard	UIC
Stienen Annika	VDV
Thinieres Andre	OFP
Tonon Pierre	ERFA
Toubol Armand	n.a.
Trier Sabine	EFT Europe
Van der Jagt Nicolette	CLECAT
Van Riel Don	Trimodal Europe B.V.
Verlinden Jos	CEFIC
Wehrmeyer Heinrich	Xrail

The aim of the workshop was to:

- present the approach of the study;

- share the preliminary findings with the most relevant stakeholders;
- gather additional information for the study;

The workshop was opened by the European Commission which provided a brief introduction on the policy context and a description of the aim of the study.

PwC and University of Rome contributed to the discussion by presenting the findings of literature reviews and of survey activities, including:

- Traffic
- Infrastructure
- Production methods
- Business models

None specific objection has been registered concerning the findings and figures presented, which were substantially well received by the audience.

In the second session of the workshop several associations provided a speech:

Table 27 – Associations' providing a speech / presentation during the workshop

Association	Presenter
CER	Libor Lochman
ERFA	François Coart
OFP	André Thinières
UIP	Peter Gillehans
CEFIC	Jos Verlinden
IBS	Olaf Kruger
EUROFER / Arcelor Mittal	Georges di Lallo

The workshop was closed with an extensive session of open discussion. Several stakeholders provided their views and suggestions for the way forward. The most relevant issues[43] raised during the discussion were:

- SWL is the rail supply for small and medium size shipments of goods; thus, it represents with intermodal transport the direct competitor to road, and its abandonment risks to deprive some market segments of any rail freight supply (not all freight being suitable to be moved on ITUs, intermodal transport is not always an alternative solution).
- there is a common consensus about the need of SWL services for certain types of goods (i.e. chemicals) and therefore dismantling such services could even

[43] Details on the content of the workshop, as well as on interventions from stakeholders can be found in the Workshop Minutes.

impact the entire industry even generating the need of plant closure or relocation;

- SWL under a critical mass cannot be profitable. Therefore there is need to bundle the traffic in places such as freight villages (offering both shunting service for wagonload traffic and transhipment of ITUs). For industrial sites connected by private sidings to the main network, conventional SWL may convey "less-than-trainload" shipments to the nearest yard to compose full train loads, but when such sidings are not available, the shipment can be moved through intermodal solutions to be used in combination with SWL. This might ensure sustainability of rail transport avoiding that freight is shipped by road transport;
- regulation for rail transport shall be more effectively implemented to create fair competition and guarantee access to relevant facilities;
- capillarity of the rail network is mandatory, thus it is necessary to implement policies and operating solutions allowing keeping private sidings in operation as well as the marshalling and shunting yards still necessary for the service (possibly with funding from States / EC);
- development of RUs specialised in the management of the "last mile" operations ("short liners") is seen from many participants as a key element for the sustainability of the system in terms of quality and productivity.

Participation by stakeholders and comments by stakeholders suggest that despite the relative decline observed in some countries, there is great interest in Europe around SWL.

Second consultation for policies identification

Approach

The focus of the second consultation was targeted on the identification and definition of measures that would promote a positive development of the SWL market.

To this aim the Consortium have prepared a new questionnaire addressed to all stakeholders: sector's associations and to interested players (RUs and IMs) which have already actively contributed during the first phase of the study.

The consultation was aimed to widely collect stakeholders' views on measures and possible supporting policies that would promote a positive development of the SWL market in order to assess the need for possible European Union (EU) actions that could help to invert the current profitability and quality decrease leading to difficulties to match the changing market requirements.

Therefore the scope of the second survey was to evaluate the presented actions indicating the expected relevance to re – launch the sector. Stakeholders could also propose other additional measures if deemed useful.

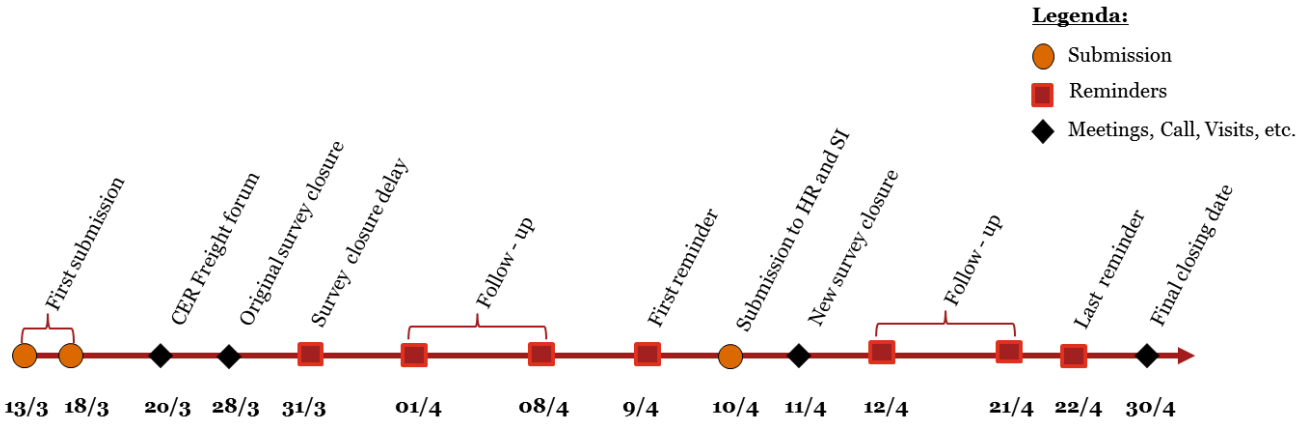
The areas and the specific actions under investigation have been selected on the basis of the issues emerged from the first part of the study (including the ones pointed out by the stakeholders in the workshop) as well as from the analyses of relevant data and information undertaken.

A very important element of the second survey, was to highlight the key practical actions that can contribute to the re-launch of the SWL for the market segment where it remains a key transport technique to compete with road transport.

The blank questionnaire is available in the annex at chapter 0.

Timing

The chart below summarises the main milestones of the survey process.



Considered the importance of this consultation the closing date, originally established for the 28 of March, was postponed twice, by agreement with DG-MOVE, until to the end of April in order to enlarge the number of responses thus having a better overview of the industry feeling about the proposed topics thanks to a better penetration rate.

In addition shall be highlighted that the CER freight forum meeting held the 20 of March permitted to discuss and have further feelings by the stakeholders about the questionnaire.

Status

The postponement of the closing date permitted to achieve a good overall penetration rate of 64% thus confirming the interest of the rail freight industry to the SWL mode of transport.

The most active stakeholders in providing responses during this phase of the study were the Associations; three out four responded to the questionnaire indicating a good willing to cooperate to the study probably because they are the more involved.

Other clusters showed a lower penetration rate, in comparison with associations; nevertheless at least one out two provided their feedbacks and comments.

Table 28 - Survey penetration rate by cluster

Cluster	Sent	Received	Penetration rate
Associations	28	21	75%
IM	8	4	50%
RU	22	12	55%
Total	**58**	**37**	**64%**

Participation at official meetings of stakeholders' associations

In the last phase of the Study, the project team was invited to take part at official meetings and conference of some stakeholders' association (such as CER and European Shippers Council). Such meeting were an opportunity to present preliminary outcome of the Study, as well as to further discuss the possible actions and recommendations that emerged as the most "popular" ones in the second survey.

Annex VI – Questionnaires of the stakeholders consultations

Questionnaire of the first stakeholders consultation

COUNTRY: xxxxxxx
RU: xxx

Analysis of the situation of SWL in Europe

General instructions: *Please, provide at least the data in the yellow boxes. If data are not available, please write "n.a.". If data are not public, please write "n.p."*

DATA OR INFORMATION		UNIT	DETAIL LEVEL	2008	2009	2010	2011	2012	2013
Rail Freight Volume	**Total rail**	**Millions tkm**	**National**						
			International IN						
			International OUT						
			International						
			Transit						
			Total						
		1000 t	**National**						
			International IN						
			International OUT						
			International						
			Transit						
			Total						
	SWL	**Millions tkm**	**National**						
			International IN						
			International OUT						
			International						
			Transit						
			Total						
		1000 t	**National**						
			International IN						

			International OUT						
			International						
			Transit						
			Total						
	Intermodal	**Millions tkm**	**National**						
			International IN						
			International OUT						
			International						
			Transit						
			Total						
		1000 t	**National**						
			International IN						
			International OUT						
			International						
			Transit						
			Total						

DATA OR INFORMATION		**UNIT**	**DETAIL LEVEL**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Rail Traffic	**Total rail**	**1000 trains km**	**National**						
			International IN						
			International OUT						
			International						
			Transit						
			Total						
	SWL	**1000 trains km**	**National**						
			International IN						
			International OUT						
			International						
			Transit						
			Total						

DATA OR INFORMATION	**UNIT**	**DETAIL LEVEL**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Key commodity types moved by SWL	**1000 t**	**Agricultural Products and Foodstuffs**						
		Fertilizer and Chemical products						

		Heavy Industry (incl. Transport equipments)						
		Others						
		Total (%)	100%	100%	100%	100%	100%	100%

If data is not available, please indicate one of these data range: A = up to 10 % (included), B = from 10% to 25% (included), C = from 25 % to 50% (included), D = from 50% to 75% , E = more than 75%

DATA OR INFORMATION	UNIT	DETAIL LEVEL	2008	2009	2010	2011	2012	2013
Wagon Fleet	Number	Covered wagons						
		High sided wagons						
		Flat wagons						
		Other wagons						
		Total wagons						

Please, provide data or one of these data range: A = up to 5000 (included); B = from 5000 to 20000 (included); C= from 20000 to 50000 (included); D = from 50000 to 100000 (included); E = more than 100000.

DATA OR INFORMATION	UNIT	DETAIL LEVEL		2008	2009	2010	2011	2012	2013
Freight Loco fleet	Number	Diesel loco							
		Electric loco							
		Total							
Type of Loco	Number	Shunting							
		Long distance	Single voltage						
		Long distance	Dual-system						
		Total							

Please, provide data or one of these data range: A = up to 100 (included); B = from 100 to 500 (included); C= from 500 to 1000 (included); D = from 1000 to 3000 (included); E = more than 3000.

DATA OR INFORMATION	UNIT	DETAIL LEVEL	2008	2009	2010	2011	2012	2013
SWL traffic generated/ attracted by private siding	% train km of SWL	Generated						
		Attracted						
		Total						
SWL traffic generated/ attracted by private siding	% t km of SWL	Generated						
		Attracted						
		Total						
SWL traffic generated/attracted by inland intermodal	% train km of SWL	Generated						
		Attracted						

terminals*		**Total**						
SWL traffic generated/attracted by inland intermodal terminals*	**% t km of SWL**	**Generated**						
		Attracted						
		Total						
SWL traffic generated/ attracted by ports	**% train km of SWL**	**Generated**						
		Attracted						
		Total						
SWL traffic generated/ attracted by ports	**% t km of SWL**	**Generated**						
		Attracted						
		Total						

Please, provide data or one of these data range: A = up to 10% (included); B = from 10% to 25% (included); C= from 25% to 50% (included); D = from 50% to 75% (included); E = more than 75%.

Current and future production methods and resources for SWL

Description of the operating mode of SWL in the country

DATA OR INFORMATION	UNIT	DETAIL LEVEL	2010	2011	2012	2013
Av. distance from production sites	**km**	First mile				
		Marsh. yard - Marsh. yard				
		Last mile				
		Total				

Please, provide data or one of these data range: A = up to 100 (included); B = from 100 to 500 (included); C= from 500 to 1000 (included); D = from 1000 to 2000 (included); E = more than 2000.

DATA OR INFORMATION	UNIT	DETAIL LEVEL	2010	2011	2012	2013
Av. Transit Time	**hours**	First mile				
		Marshalling				
		Travel				
		Last mile				
		Total				

Please, provide data or one of these data range: A = up to 12 (included); B = from 12 to 24 (included); C= from 24 to 48 (included); D = from 48 to 72 (included); E = more than 72.

DATA OR INFORMATION	UNIT	Description
Existence of last-mile services	Yes/No	

DATA OR INFORMATION	UNIT				2010	2011	2012	2013
Wagon filling rate (availability of empty wagons)	%							

Please, provide data or one of these data range: A = up to 25%(included); B = from 25% to 50% (included); C= from 50 to 75% (included); D = from 75% to 90% (included); E = more than 90%.

DATA OR INFORMATION	UNIT		2010	2011	2012	2013
Marshalling yards encountered by a wagon during a trip	Number	Max				
	Number	Average				

DATA OR INFORMATION	UNIT	2010	2011	2012	2013
% of SWL traffic operated through Mixed trains (or, at least, existence of such services)***	% train -km				
% of SWL traffic operated through Mixed trains (or, at least, existence of such services)***	% t km				

Please, provide data or one of these data range: A = up to 25%(included); B = from 25% to 50% (included); C= from 50 to 75% (included); D = from 75% to 90% (included); E = more than 90%.

DATA OR INFORMATION	UNIT		2010	2011	2012	2013
Reliability of SWL	%	*Deliveries without damages (or different indicator)*				
Punctuality of SWL	%	*Trains within 1 h (or different indicator)*				

Please, provide data or one of these data range: A = up to 25%(included); B = from 25% to 50% (included); C= from 50 to 75% (included); D = from 75% to 90% (included); E = more than 90%. If you use different indicator please provide its definition in the box below and the related value in the table.

Business Models for SWL: analysis of the current state and of potential improvements

DATA OR INFORMATION	UNIT	2010	2011	2012	2013
Unit tariff of SWL traffic	€/tk or €/tr.km				

Unit tariff of SWL traffic by type of goods	Agricultural Products and Foodstuffs					
	Fertilizer and Chemical products					
	Heavy Industry (incl. Transport equipments)					
	Dangerous Goods					
	Others					
Criteria for differentiated tariffs and prices	Volumes	€/tk or €/tr.km				
	Number of trains					
	etc					

Analysis of costs and cost structures of SWL

DATA OR INFORMATION	UNIT	2010	2011	2012	2013
Elementary costs	€/tk or €/tr.km				
of which:					
Cost of a marshalling yard transfer and its variations					
Cost of a border crossing and its variations					
Cost of a collection / delivery service and its variations					
Cost of a border crossing and its variations					
Cost of a inter - marshalling yard transfer and its variations					
Influence of regularity of shipments, nb of wagons / shipment, other criteria on costs	%				

COUNTRY:
xxxxxxx
IM: xxx

Infrastructure for SWL: current situation and possible developments

Information about current situation

DATA OR INFORMATIONS	UNIT	DETAIL LEVEL		2010	2011	2012	2013
Operational Marshalling Yards	Number	Country					
		Data Source					
Please, provide data or one of these data range: A = up to 5 (included); B = from 5 to 10 (included); C= from 10 to 30 (included); D = from 30 to 50 (included); E = more than 50							

DATA OR INFORMATIONS	UNIT	DETAIL LEVEL		2010	2011	2012	2013
% of SWL traffic managed	%	Country					
		Data Source					
Please, provide data or one of these data range: A = up to 10 % (included); B = from 10 % to 20 % (included); C= from 20 % to 40 % (included); D = from 40 % to 60 % (included); E = more than 60 %							

DATA OR INFORMATIONS	UNIT	DETAIL LEVEL		2010	2011	2012	2013
Private sidings open to traffic	Number	Country					
		Data Source					
Please, provide data or one of these data range: A = up to 5 (included); B = from 5 to 10 (included); C= from 10 to 30 (included); D = from 30 to 50 (included); E = more than 50							

DATA OR INFORMATIONS	UNIT	DETAIL LEVEL		2010	2011	2012	2013
Railway freight stations	Number	Country					
		Data Source					
Please, provide data or one of these data range: A = up to 50 (included); B = from 50 to 100 (included); C= from 100 to 150 (included); D = from 150 to 200 (included); E = more than 200							

DATA OR INFORMATIONS	UNIT	DETAIL LEVEL		2010	2011	2012	2013
Freight stations/terminals (with SWL traffic) with self-marshalling/shunting operations carried out by the RU	Number	Country					
		Data Source					
Freight stations/terminals (with SWL traffic) with self-marshalling/shunting operations carried out by the IM	Number	Country					
		Data Source					
Please, provide data or one of these data range: A = up to 50 (included); B = from 50 to 100 (included); C= from 100 to 150 (included); D = from 150 to 200 (included); E = more than 200							

DATA OR INFORMATIONS	UNIT	DETAIL LEVEL		2010	2011	2012	2013
Intermodal terminals operating SWL	Number	Country					
		Data Source					
Freight terminals for multimodal transport with pre/post haulage by truck	Number	Country					
		Data Source					
Marshalling yard and sidings in port areas linked with national railway networks	Number	Country					
		Data Source					
Please, provide data or one of these data range: A = up to 5 (included); B = from 5 to 10 (included); C= from 10 to 15 (included); D = from 20 to 30 (included); E = more than 30							

Description of Technologies used for the management and operation of services.

Historical Trends

DATA OR INFORMATIONS	UNIT	DETAIL LEVEL	2003	2004	2005	2006	2007	2008	2009
Operational Marshalling Yards	Number	Country							
		Data Source							

Please, provide data or one of these data range: A = up to 5 (included); B = from 5 to 10 (included); C= from 10 to 30 (included); D = from 30 to 50 (included); E = more than 50. If data are not available, please provide at least a general description in the box below (For example: The number of Operational marshalling yards is increased/descreased/etc. in the last 10 years because of …)

DATA OR INFORMATIONS	UNIT	DETAIL LEVEL	2003	2004	2005	2006	2007	2008	2009
% of SWL traffic managed	%	Country							
		Data Source							

Please, provide data or one of these data range: A = up to 10 % (included); B = from 10 % to 20 % (included); C= from 20 % to 40 % (included); D = from 40 % to 60 % (included); E = more than 60 %. If data are not available, please provide at least general a description in the box below (For example: The % of SWL traffic managed is increased/descreased/etc. in the last 10 years because of …)

DATA OR INFORMATIONS	UNIT	DETAIL LEVEL	2003	2004	2005	2006	2007	2008	2009
Private sidings open to traffic	Number	Country							
		Data Source							

Please, provide data or one of these data range: A = up to 5 (included); B = from 5 to 10 (included); C= from 10 to 30 (included); D = from 30 to 50 (included); E = more than 50. If data are not available, please provide at least a general description in the box below (For example: The number of private siding open to traffic is increased/descreased/etc. in the last 10 years because of …)

DATA OR INFORMATIONS	UNIT	DETAIL LEVEL	2003	2004	2005	2006	2007	2008	2009
Railway freight stations	Number	Country							

		Data Source	
Please, provide data or one of these data range: A = up to 50 (included); B = from 50 to 100 (included); C= from 100 to 150 (included); D = from 150 to 200 (included); E = more than 200. If the data are not available, please provide at least a general description in the box below (For example: The number of railway freight stations is increased/descreased/etc. in the last 10 years because of …)			

Provisions

DATA OR INFORMATIONS	UNIT	DETAIL LEVEL		2014-2018	General description
New freight stations that will be placed in service before 2018	**Number**	**Country**			
		Data Source			
New private siding that will be placed in service before 2018	**Number**	**Country**			
		Data Source			
New marshalling yards that will be placed in service before 2018	**Number**	**Country**			
		Data Source			
Please, provide data or one of these data range: A = up to 2 (included); B = from 2 to 5 (included); C= from 5 to 810(included); D = from 10 to 15 (included); E = more than 15. If data are not available, please provide at least a general description in the box below.					

Questionnaire of the second stakeholders consultation

Q1. Do you object the publication of your identity data and/or your contribution ? (tick as appropriate)

The contribution or part of it may be published.	
I object to the publication of my personal identity data (publication in anonymous form, but with indication of the organisation or association).	
I object to the publication of my personal identity data and of the name of organisation or association (publication in anonymous form).	

In case of no answer to Q1, it is assumed that the contribution can be published.

Respondents information

Q2. I speak on behalf of: (tick as appropriate)

Myself	
An individual organisation	
An association representing other organisations	

Q3. Can you please identify yourself and which organisation or association you represent?

Organisation / association name	
Country(ies) of operations	
Respondent's name and family name	
Job title	
Email	
Telephone	

Q4. Please indicate the category better representing your activity or your members' activity: (tick as appropriate)

IM	
Terminal manager	
RU	
Short liner	
Other	

Q5. If other, please specify:

SWL Information Platform(s)

Background

The creation of common SWL information platform(s) can increase and improve the cooperation between all stakeholders involved in the provision of SWL services. Such platforms are particularly useful for new operators but not only since a good and deep knowledge of the market is mandatory to enhance the business of each railway undertaking.

Two different types of platforms can be identified:

- With static information (e.g. providing information on last-mile infrastructure and local "short line" operators);
- With dynamic information (giving to operators access to the information about the actual position of wagons and estimated time of arrival along the entire planned trip. This would

increase the transparency of SWL related operations and the opportunity to provide clients on timely and updated information on their shipments).

The development of such platforms could be supported with Member States or European Commission funds; but if this is the case it is important to consider that the platforms will be need to be public and freely accessible to all the operators.

Commons standards to develop wagon tracking (and related platforms) are already present inside TAF – TSI therefore, making use of ever-improving telematics for vehicle localisation and algorithms for routing and maintenance, it is becoming increasingly possible with ICT to increase the efficiency in assigning wagons to trains and withdrawing them from service for maintenance (including on-condition, preventative).

Q6. Please, use the box below to integrate or comment the proposed background

Solutions / actions emerged in the first phase of the study, suggestion of relevant stakeholders

Q7. Please, indicate the relevance of the proposed actions in re-launching SWL services in Europe (tick with an "X" the blank cell below the preferred level of relevance)

<table>
<tr><th>Actions / solutions</th><th colspan="3">Relevance for the re - launching of SWL services</th></tr>
<tr><td rowspan="4">EU to co-fund a static information platform capable to:

• make available the information about last – mile infrastructure;

• make available the information about existing short line operators in the region.</td><td>Irrelevant</td><td>Relevant</td><td>Very Relevant</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">Explain why the action is relevant or suggest how to improve it:</td></tr>
<tr><td colspan="3">Are any other useful information to be added to the platform?</td></tr>
<tr><td rowspan="4">EU to co-fund a dynamic information platform providing tracking and tracing of wagons</td><td>Irrelevant</td><td>Relevant</td><td>Very relevant</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">Explain why the action is relevant or suggest how to improve it:</td></tr>
<tr><td colspan="3">Are any other useful information to be added to the platform?</td></tr>
</table>

Q8. Please add here other proposed solutions and actions not yet presented in this questionnaire:

	Description of additional actions	**Comment on relevance of proposed actions**
Additional action 1		

Additional action 2		

Regulation-related burdens for SWL operators and competition with road

Background

Some stakeholders claimed that the survival and development of SWL services could be affected by unnecessarily strict regulatory provisions that may prevent SWL to fairly compete, in particular, with road transport. Such excessive regulatory burdens might concern both the infrastructure or the operations as they can result from national regulations or from European legislation.

The **certification of private (industrial) sidings** can be excessively burdensome and costly. For example in the Central and Eastern Europe in the past all industrial sidings were state owned and managed by the railway monopoly. Today their status is still unclear and often this "grey area" implies the need for same regulations of other tracks making difficult and costly to satisfy the rules to get the proper "certification". For a private company this might appears as a non - priority investment that might even cause the decision of closing down the siding in order to save on costs.

Also, the **requirements in terms of safety** (incl. signalling equipment) for lines that are used only by freight trains have mentioned as to some extent disproportionate. The obligations to be fulfilled are often the same whether for the national network where both Freight and Passenger trains run, and on secondary freight specialised lines (i.e. rules for operations, equipment needed to operate, etc.)

Finally, a **fair level of competition with other transport modes** shall be guaranteed to avoid dumping from modes (especially road) reducing the potential of SWL rail freight transport. Regarding this point, it should be noted that the competitiveness of road transport is expected to increase. As an example, the new foreseen regulation about mega trucks (expected to be voted by April 2014), is expected increase the weight and dimension of trucks travelling by road, would make freight transport by lorry 20% cheaper (as noted by a report for Transport and Environment by CE Delft). Besides, regulations and controls on road transport (e.g. on safety issues such maximum weight of vehicles, speeding, driving time etc.) are mentioned not to be effectively enforced in some Member States.

Q9. Please, use the box below to integrate or comment the proposed background

Solutions / actions emerged in the first phase of the study, suggestion of relevant stakeholders

Q10. Please, indicate the relevance of the proposed actions in re-launching SWL services in Europe (tick with an "X" the blank cell below the preferred level of relevance)

Actions / solutions	**Relevance for the re - launching of SWL services**		
Simplified certification rules for private sidings (private sidings should not be subject to the same requirements set for standard railway lines).	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
Provisions allowing simplified requirements in terms of technical characteristics and of signalling equipment for railway lines which are exclusively used by freight trains.	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		
Encourage the polyvalence and flexibility of workers in the rail transport sector to enhance the productivity increasing the competition of rail freight transport	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		
EU monitoring fair level of competition with road in particular with respect to safety-related rules (maximum weight, speed limits, driving time limits …) and setting specific targets for their enforcement level	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		

Q11. Please use the boxes below to propose other solutions or actions on simplification of regulatory burdens, and to comment on their relevance:

	Description of additional actions	**Comment on relevance of proposed actions**
Action 1		
Action 2		

Q12. Please use the boxes below to propose other solutions or actions and to create a fair level of competition between road and rail modes of transport:

	Description of additional actions	**Comment on relevance of proposed actions**
Action 1		
Action 2		

Stimulate the development of "short liners"(last mile operators)

Background

The last mile services requires different kind of equipment and organisation than the ones necessary for main line train services. Large railway undertaking have usually limited interest in focusing on such activities, that they see as unprofitable, since they represent a relatively small volume in terms of train*km and require specific equipment (e.g. shunting locomotives) and staff that are not easy to be efficiently employed. On the other hand, such "last mile" services are essential for the quality and efficiency of SWL, and the lack of them may result in further contraction of potential market volume for SWL.

Thus, the development of "short liners" i.e. operators focusing on the last mile operations (shunting wagons to final destination or from the initial origin) is considered by many stakeholders as an essential element to avoid further decline of SWL. Under this organisational model the national RU is responsible for the main traction lines, whereas the short liners (opérateurs ferroviaires de proximité) are responsible of the activities within the last mile sections.

As reported during the recent workshop in Brussels, in France short liners have progressively gained an important space in the market. According to OFP (*Opérateyrs Ferroviaires de Proximité*), for instance, in France there are two short liners already focusing on such last miles services, and two additional short liners will be active in the near future.

Specific interventions have been mentioned among the necessary actions to accelerate the development of such kind of operators (and eliminate obstacles e.g. in terms of regulation).

Q13. Please, use the box below to integrate or comment the proposed background

Solutions / actions emerged in the first phase of the study, suggestion of relevant stakeholders

Q14. Please, indicate the relevance of the proposed actions in re-launching SWL services in Europe (tick with an "X" the blank cell below the preferred level of relevance)

Actions / solutions	**Relevance for the re - launching of SWL services**		
Simplify the requirements and obligations for operators which operate only on secondary freight specialised network (i.e. rules for operations, equipment needed to operate, etc.)	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		
Provide dedicated lines of funding (e.g. with an up-coming successor of Marco Polo program) for such kind of services. This will provide support in the first months/years of new SWL operations when the costs are higher than the revenues.	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		
Pressing on national regulators to more quickly react in case of access discrimination to "new" operators, including the ones operating last mile services only.	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		
Port authorities should also be involved to launch initiatives for the management of the last mile services (how?)	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		
Allow MSs to provide for Public	Irrelevant	Relevant	Very relevant

Actions / solutions	Relevance for the re - launching of SWL services		
Service Obligations for the operation of last mile SWL services which are key for the functioning of an industrial area, port or other specific market.			
	Explain why the action is relevant or suggest how to improve it:		

Q15. Please use the boxes below to propose other solutions or actions and to comment on their relevance:

	Description of additional actions	Comment on relevance of proposed actions
Action 1		
Action 2		

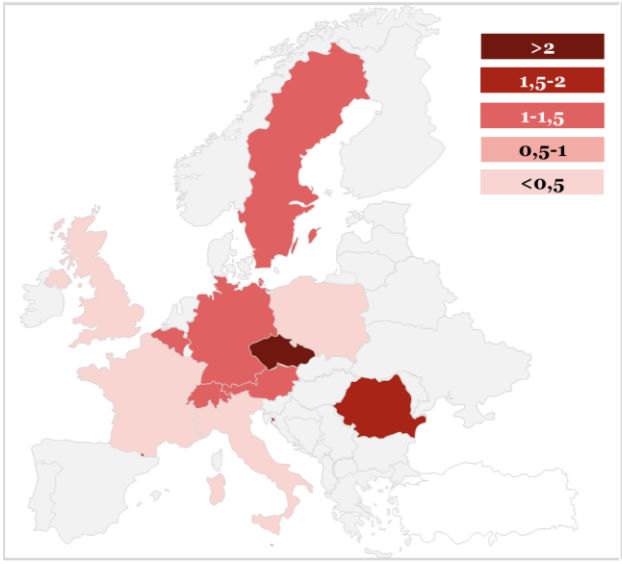
Availability of infrastructures managed by the Infrastructure Manager to the SWL traffic

Background

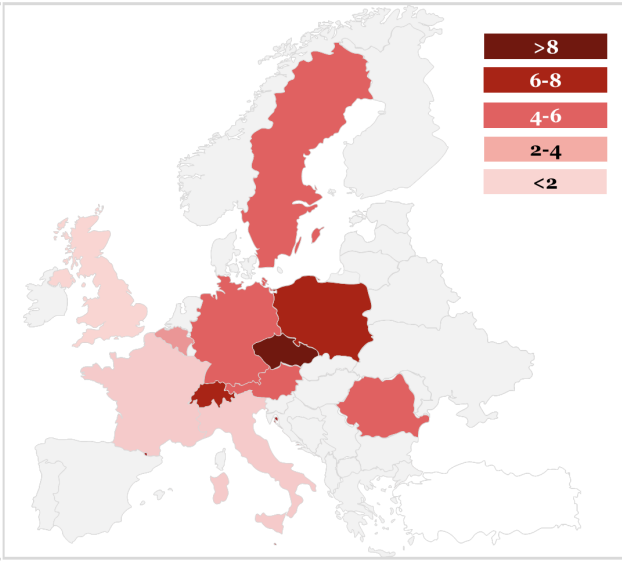
Maintenance and rehabilitation of last-miles, train formation facilities is a priority to allow the survival of the system.

The following maps provide the a graphic indication of the spatial density of infrastructural facilities within some European countries related to the marshalling yards and freight stations[44] with respect to rail network extension.

[44] A freight station is a facility belonging to an Infrastructure Manager with several rail sidings in which freight is loaded onto conventional wagons.



Operational marshalling yards/1000 km rail network



Freight stations /100 km rail network

Generally, it can be noted that countries pursuing SWL are the ones more oriented to the preservation of the SWL related infrastructures. On the contrary countries like France, Italy and UK developing "marshalling-free" SWL service (requiring only shunting operation on flat yards) to combine wagons from different clients show a tendency in down - sizing the SWL related infrastructures. However, such trereducing teh available infrastructure supply is likely to be also due to the reduction of total SWL traffic (only high volumes make sustainable the management of large hump yards).

The SWL rail freight transport is highly dependent by the availability of the infrastructures used for the "last – mile" operations (i.e. arrival and departure tracks, marshalling and shunting yards, freight stations etc.). The incumbent infrastructure manager should be encouraged to ensure open access to all infrastructures: commercial terminals, sidings and last mile lines etc. The fair and equal access to such infrastructures will allow for offering competitive shunting activities to all operators further supporting the development of the SWL load market.

Other aspect to be considered is that when the incumbent RUs decide to abandon a given facility (a marshalling yard or a train formation facility), the infrastructure manager is likely to face operating & maintenance costs not justified by the existing traffic. This might urge them to close the facility with low or no traffic. As a consequence, the network is losing capillarity and this is likely to hamper the launch of new services from other RUs.

Q16. Please, use the box below to integrate or comment the proposed background

Solutions / actions emerged in the first phase of the study, suggestion of relevant stakeholders

Q17. Please, indicate the relevance of the proposed actions in re-launching SWL services in Europe (tick with an "X" the blank cell below the preferred level of relevance)

Actions / solutions	**Relevance for the re - launching of SWL services**		
Foster full implementation of all the railway packages to remove the remaining obstacles promoting full and open access for to all relevant freight infrastructure & services currently managed by the IM.	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
Press national regulators to quickly react on access discrimination between "new" and "historic" operators.	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		
Full separation between rail-infrastructure managers and railway undertaking, to ensure full independency of the former in the decision making about access to the infrastructure, facilities to be kept open etc.	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		
Require independent management of marshalling yards or terminals hubs based on periodically renewed contracts. The renewals should be granted by transparent call for tenders procedures.	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		

Actions / solutions	Relevance for the re - launching of SWL services		
In case the incumbent IM intends to dismantle a station, a market analysis shall be performed by the IM before taking the final decision on the closure (so that eventual future market needs are taken into account in the decision).	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		
Request MSs for explicitly providing Public Service Obligations for the management of unprofitable infrastructure which are key for the functioning of SWL services.	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		

Q18. Please use the boxes below to propose other solutions or actions and to comment on their relevance:

	Description of additional actions	Comment on relevance of proposed actions
Action 1		
Action 2		

Private sidings are not properly maintained or adequately developed

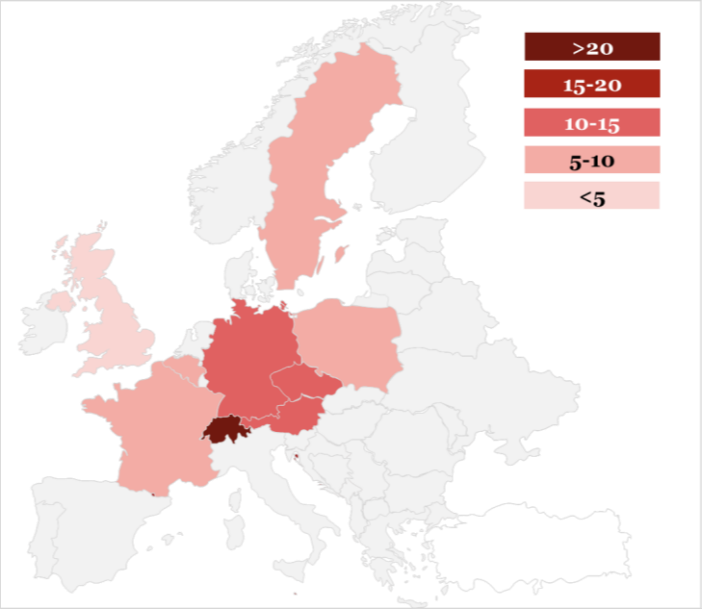
Background

Private sidings establish a link between an industrial plant or a warehouse, and a rail station or a railway line. They are a crucial element for the functioning of the SWL system, since they provide a

direct access of SWL demand to the rail network. Hence their availability and timely maintenance is essential for SWL market.

Many stakeholders, especially on the customer side, expressed their concern on the progressive dismantle of the private sidings or on the difficulties to be faced to develop new ones.

Information and data collected during the first part of the study allowed for the calculation of the density of sidings per some European countries: density has been defined as the number of private sidings per 100 km of network extension for each country.



As it can be noted, some countries and their IMs support the use of private siding and encourage their development, even with funding (Switzerland, Austria, Germany). Other countries and IMs present low density of sidings which is the result of the closing down on marshalling yards and shunting yards .

Q19. Please, use the box below to integrate or comment the proposed background

Solutions / actions emerged in the first phase of the study, suggestion of relevant stakeholders

Q20. Please, indicate the relevance of the proposed actions in supporting the availability of private sings (tick with an "X" the blank cell below the preferred level of relevance)

Actions / solutions	**Relevance for the re - launching of SWL services**

Funding / incentives for the construction, modernisation and rehabilitation of private sidings (also prevent their dismantling) or the creation of new ones.	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
In case the IM intends to dismantle a freight station that is the starting point of an industrial siding, make compulsory the provision of sufficient notice (i.e. at least 12 months) before the implementation, in order to allow consultation with operators and shippers & define alternative solutions	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		

Q21. Please use the boxes below to propose other solutions or actions and to comment on their relevance:

	Description of additional actions	**Comment on relevance of proposed actions**
Action 1		
Action 2		

12.1. Track access charges regimes penalising the SWL trains

Background

In some countries SWL services tend to pay higher track access charges in comparison with block train services due to fixed costs (i.e. a fixed charge per train) that is distributed on smaller amount of tonnes (SWL have usually lower payload).

A study conducted by OECD in 2008 25 reviewed the charges applied to passenger and freight trains in 25 different European countries: nine out of 25 countries have adopted a charging system including a fixed charge per train or train*km (i.e. same fee independently from the train weight). Among such countries the most important are: France, Germany, Belgium, Hungary and Spain.

In general, this implies that SWL services "suffer" more than other types of rail freight services in case of increase of the track access charges. In fact, SWL trains are generally light trains composed by few wagons otherwise waiting times in marshalling yards would be too long: in Romania most of inter-marshalling yards trains have only few wagons (10-15).

Besides, the quality of the train path is not always considered in the definition of the infrastructure charges. SWL train usually do not require paths with the same level of speed and priority of intermodal or passenger train, so they could benefit of a differentiation of charges depending upon the quality of the path.

Q22. Please, use the box below to integrate or comment the proposed background

Solutions / actions emerged in the first phase of the study, suggestion of relevant stakeholders

Q23. Please, indicate the relevance of the proposed actions in re-launching SWL services in Europe (tick with an "X" the blank cell below the preferred level of relevance)

Actions / solutions	**Relevance for the re - launching of SWL services**		
Discourage charges regimes which base the calculation on full train or on large ton ranges. These systems penalise SWL trains which tends to be shorter and lighter than other type of freight trains.	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		
In some countries combined transport trains are subject to "commercial" reduced access charge, these reductions should be extended also to SWL trains.	Irrelevant	Relevant	Very relevant
	Explain why the action is relevant or suggest how to improve it:		
Re-define track access charges in a way that reflects the train path's quality and the level of priority. This would result in lower fees for SWL trains.	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		

Q24. Please use the boxes below to propose other solutions or actions and to comment on their relevance:

	Description of additional actions	**Comment on relevance of proposed actions**
Action 1		

Action 2		

12.2. Technology innovations

Background

Technology applied to SWL rail freight transport will permit to increase the overall productivity thanks to their impacts on the different sub systems such as infrastructure and wagons.

Hereinafter are listed and briefly commented the technologies having a potentially positive impact on the development of SWL transport were identified.

They are broadly categorised in three categories according to they are mainly:

4. infrastructure-related
5. vehicle-related
6. ICT solutions.

The proposed technologies aim to increase the effectiveness and efficiency of the SWL services thanks to:

- the better use of the available capacity (infrastructures and rolling stock);
- the more effective and efficient operations.

The final goal is to increase the appeal of SWL operations to customers persuading them to use rail services.

Q25. Please, use the box below to integrate or comment the proposed background

Proposed actions

Q26. Please, indicate the relevance of the proposed technologies (infrastructures) in re-launching SWL services in Europe (tick with an "X" the blank cell below the preferred level of relevance)

<table>
<tr><th>Actions / solutions</th><th colspan="3">Relevance for the re - launching of SWL services</th></tr>
<tr><td rowspan="8">Horizontal transhipment solutions (including loading under catenary), moveable catenary</td><td>Irrelevant</td><td>Relevant</td><td>Very Relevant</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">Explain why the action is relevant or suggest how to improve it:</td></tr>
<tr><td colspan="2">Is the proposed technology mature and applicable (Y / N)?</td><td></td></tr>
<tr><td colspan="2">If "no", shall it be funded for research (Y / N)?</td><td></td></tr>
<tr><td colspan="2">If "yes", shall it be funded for retrofitting and purchasing (Y / N)?</td><td></td></tr>
<tr><td colspan="2">If "mature", is your company willing to adopt such technology (Y / N / not applicable)?</td><td></td></tr>
<tr><td rowspan="8">Improved automatic wayside brakes for marshalling yards</td><td>Irrelevant</td><td>Relevant</td><td>Very Relevant</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="3">Explain why the action is relevant or suggest how to improve it:</td></tr>
<tr><td colspan="2">Is the proposed technology mature and applicable (Y / N)?</td><td></td></tr>
<tr><td colspan="2">If "no", shall it be funded for research (Y / N)?</td><td></td></tr>
<tr><td colspan="2">If "yes", shall it be funded for retrofitting and purchasing (Y / N)?</td><td></td></tr>
<tr><td colspan="2">If "mature", is your company willing to adopt such technology (Y / N / not applicable)?</td><td></td></tr>
</table>

Q27. Please, indicate the relevance of the proposed technologies (rolling stock) in re-launching SWL services in Europe (tick with an "X" the blank cell below the preferred level of relevance)

Actions / solutions	**Relevance for the re - launching of SWL services**		
Modified wagon concepts for faster loading, purpose built wagons for specific market segments	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
	Is the proposed technology mature and applicable (Y / N)?		
	If "no", shall it be funded for research (Y / N)?		
	If "yes", shall it be funded for retrofitting and purchasing (Y / N)?		
	If "mature", is your company willing to adopt such technology (Y / N / not applicable)?		
Road-rail engines for last mile services, remote controlled shunting locomotives	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
	Is the proposed technology mature and applicable (Y / N)?		
	If "no", shall it be funded for research (Y / N)?		
	If "yes", shall it be funded for retrofitting and purchasing (Y / N)?		
	If "mature", is your company willing to adopt such technology (Y / N / not applicable)?		

Actions / solutions	**Relevance for the re - launching of SWL services**		
Automatic coupling systems	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
	Is the proposed technology mature and applicable (Y / N)?		
	If "no", shall it be funded for research (Y / N)?		
	If "yes", shall it be funded for retrofitting and purchasing (Y / N)?		
	If "mature", is your company willing to adopt such technology (Y / N / not applicable)?		
Hybrid-based traction schemes, rolling stock for higher speed.	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
	Is the proposed technology mature and applicable (Y / N)?		
	If "no", shall it be funded for research (Y / N)?		
	If "yes", shall it be funded for retrofitting and purchasing (Y / N)?		
	If "mature", is your company willing to adopt such technology (Y / N / not applicable)?		

Actions / solutions	**Relevance for the re - launching of SWL services**		
"Intelligent wagon" communicating its physical status, position, door opened or not etc. (with improved batteries allowing enough autonomy)	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
	Is the proposed technology mature and applicable (Y / N)?		
	If "no", shall it be funded for research (Y / N)?		
	If "yes", shall it be funded for retrofitting and purchasing (Y / N)?		
	If "mature", is your company willing to adopt such technology (Y / N / not applicable)?		
Self-propelled wagons / wagons with own driver cab.	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
	Is the proposed technology mature and applicable (Y / N)?		
	If "no", shall it be funded for research (Y / N)?		
	If "yes", shall it be funded for retrofitting and purchasing (Y / N)?		
	If "mature", is your company willing to adopt such technology (Y / N / not applicable)?		

Q28. Please, indicate the relevance of the proposed technologies (rolling stock) in re-launching SWL services in Europe (tick with an "X" the blank cell below the preferred level of relevance)

Actions / solutions	**Relevance for the re - launching of SWL services**		
Capacity booking schemes.	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
	Is the proposed technology mature and applicable (Y / N)?		
	If "no", shall it be funded for research (Y / N)?		
	If "yes", shall it be funded for retrofitting and purchasing (Y / N)?		
	If "mature", is your company willing to adopt such technology (Y / N / not applicable)?		
Wagon / consignment tracking and tracing, consignment condition monitoring.	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
	Is the proposed technology mature and applicable (Y / N)?		
	If "no", shall it be funded for research (Y / N)?		
	If "yes", shall it be funded for retrofitting and purchasing (Y / N)?		
	If "mature", is your company willing to adopt such technology (Y / N / not applicable)?		

Wagon fleet and locomotive fleet management.	Irrelevant	Relevant	Very Relevant
	Explain why the action is relevant or suggest how to improve it:		
	Is the proposed technology mature and applicable (Y / N)?		
	If "no", shall it be funded for research (Y / N)?		
	If "yes", shall it be funded for retrofitting and purchasing (Y / N)?		
	If "mature", is your company willing to adopt such technology (Y / N / not applicable)?		

Q29. Please use the boxes below to propose other solutions or actions and to comment on their relevance:

Other technologies (provide description below)	**Relevance for the re - launching of SWL services**
	Comment on relevance of proposed technology:
	Is the proposed technology mature and applicable (Y / N)?
	If "no", shall it be funded for research (Y / N)?
	If "yes", shall it be funded for retrofitting and purchasing (Y / N)?
	If "mature", is your company willing to adopt such technology (Y / N / not applicable)?

	Comment on relevance of proposed technology:	
	Is the proposed technology mature and applicable (Y / N)?	
	If "no", shall it be funded for research (Y / N)?	
	If "yes", shall it be funded for retrofitting and purchasing (Y / N)?	
	If "mature", is your company willing to adopt such technology (Y / N / not applicable)?	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