A Study of Economic Impacts of Freight Speed Increase and Travel Time Reliability Improvements by Rail

Market analysis

JASPERS Lot 4 Framework Contract: Transport and Urban Infrastructure

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Market analysis

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1. Introduction

1.1 Aims and context of the project

The European Commission aims to develop a sustainable rail transport product and to stimulate innovative thinking on the technical and policy perspectives in the rail sector. Rail freight transport is an essential and feasible transport mode for transporting high volume goods over large distances across Europe and further. However, the railway market faces challenges and also opportunities due to the liberalisation of the rail freight market. This challenge has forced rail freight operators to increase their efficiency, for example by increasing the bundling of transport and decreasing last-mile operations. The share of combined road-rail transport using standard loading units, especially containers (=intermodal transport) is increasing and might be further increased.

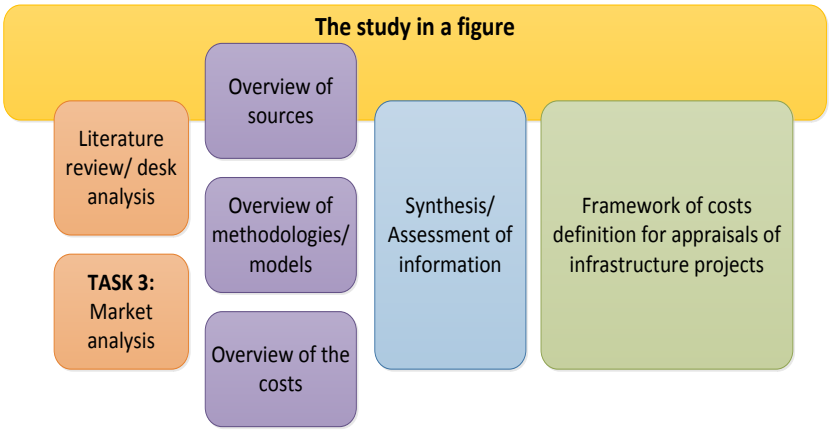
In parallel, the EC focusses on one European rail network for competitive freight transport by investing in interoperability of the railway network. European TEN-T policy aims to migrate from 1520mm wide track gauge (so called "Russian gauge") to 1425mm standard gauge and to harmonise the signalling systems by means of ERTMS and electrification. Nevertheless, the competition with road transport is severe. There are examples where almost no margin is left for shifting from rail transport to road transport.

These trends impact the decision factors for stakeholders regarding the use of rail for freight transport. The main objective of this study is to analyse how these trends influence the determinants for modal choice (between road and rail) and how to monetise these impacts for cost-benefit analysis of rail freight projects. To this end, this study will cover – but is not limited to – the following four topics for rail freight transport:

- Value of time (VOT)
- Value of (delivery time) reliability (VOR)
- Cost savings that result from technological innovations in the train system (such as uniform gauge, longer trains, increase in height limitation and electrification)
- Approaches and outcomes (e.g. elasticities) for estimating changes in modal split.

This task 3 concentrates on interpreting and making sense of the collected material from the literature study with the help of a number of interviews with several stakeholders, explaining differences and searching for commonalities. Task 3 aims to include the markets' point of view in a qualitative way to this study, to provide insight on the four topics mentioned above in rail transport and to evaluate findings from the previous task by means of market analysis. The overall approach of this study is presented in figure 1

Figure 1 - The study in a figure



1.2 Structure of this report

This report consists of three parts: methodology, synthesis and assessment. Chapter 2 explains how the interviewees have been selected and contacted, and provides an overview of the survey participants by country and by type of stakeholder. Chapter 3 focuses on the outcome of the interviews. First, a synthesis of the outcome will be given, justified by (best) practices as identified in the face-to-face interviews. Subsequently, an assessment of the outcome will be presented, bearing in mind the output as identified in task 2.

The report concludes with chapter 4, a general conclusion on the consistency of the information and the degree to which it can be transferred to other countries. This will form the basis for deciding the relevant inputs for task 4, again justified by practical examples from the interviews.

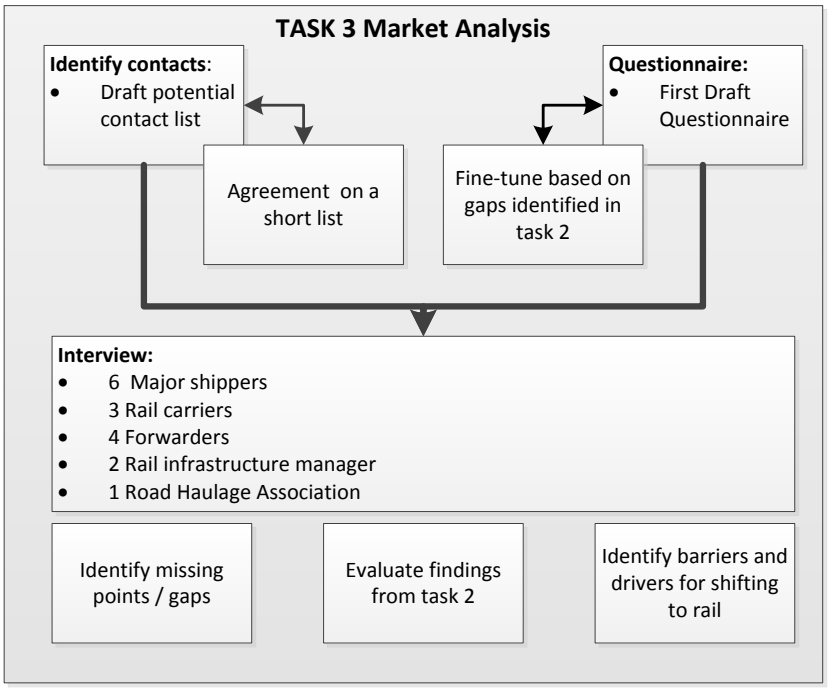
2. Market consultation - approach

This chapter outlines the methodology used to obtain valuable information on the market's point of view. The focus lies on the identification of the stakeholder's view on cost savings and modal shift drivers related to the more scientific concepts of value of time (VoT) and Value of Reliability (VoR).

Task 3 - market analysis - is of a qualitative nature and sheds light on the road and rail activities in the JASPERS countries. To enrich the desktop review and synthesis of data, this task provides the market perspective, which will additionally validate or confirm findings of the desktop review and provide a multi-actor perspective.

Figure 2 shows the consecutive steps that were taken for the preparation and execution of the interviews. The steps will be further elaborated in this chapter.

Figure 2 - Methodology for interviewing stakeholders



2.1 Identification of short list and contacting procedures

For the consultation of market parties and business stakeholders, the project team compiled a draft potential contact list, compiling different sources, i.e. consultancy's available networks and inputs from JASPERS. This first identification of stakeholders formed a database of 85 stakeholders. This database consists a stakeholders from different countries, with focus on specific countries, e.g. Czech Republic, Poland, Romania and Bulgaria.

From these 85 stakeholders, a selection of 30 organisations was made in a collaboration of all three parties involved in the study. On the 15th of September, each of these organisations received an official notification and request for participation from JASPERS. Unfortunately only 2 stakeholders responded positive to the message, inviting the project team at their premises.

Table 1 provides an overview of the breakdown of the first selection of contacts. This overview shows the wide variety of JASPERS countries.

Table 1 - First selection of contacts: breakdown by country

Country\Stakeholder type	AT	BG	CZ	HR	HU	LV	PL	RO	RS	Selected contacts
Selected contacts	1	5	9	2	2	1	5	4	1	30

Due to the low response from the invited organisations, it was envisaged by the consultants to take a different – more pro-active – approach to get appointments for the face-to-face interviews. The following steps were taken:

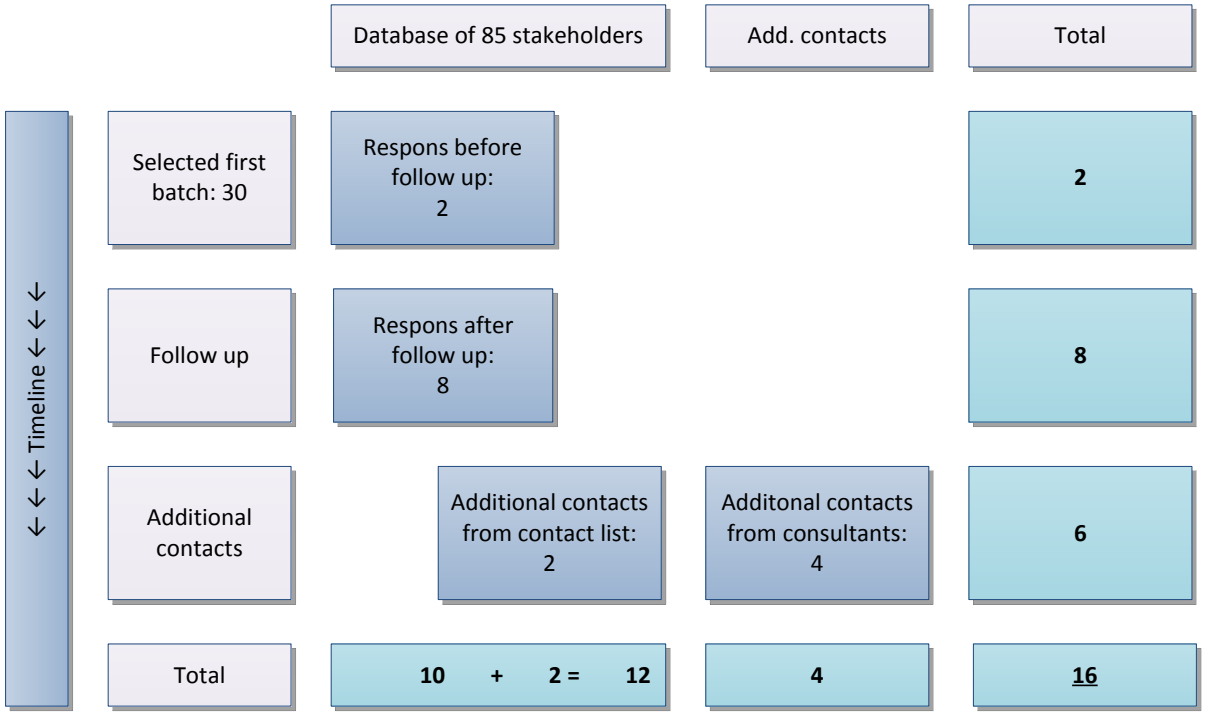
(1) Plan the trips in a specific timeframe (communication of specific timeframe for the interviews);

(2) Actively approach organisations from the database, situated in this country/area for a face-to-face interview in the given timeframe;

(3) Invite additional contacts from the consultant's database that are situated in the specific country or plan meetings with stakeholders during other events, e.g. FP7 BESTFACT.

This resulted in 8 additional responses from the pre-invited list of 30 contacts and 2 extra interviews from the contact list. Furthermore, 4 more participants were invited by means of different channels, e.g. private network of local partners of the consultant. In Figure 3, these steps are depicted.

Figure 3 - Process of contact identification and number of participation



An overview of the total number of conducted interviews breakdown by country and stakeholder type is presented in Table 2.

Table 2 - Conducted interviews: breakdown by country and type of stakeholder

Country\Stakeholder type	Forwarder	Rail Carrier	Shipper	Rail infra	Other	Conducted interviews
BG	1		3	1		**5**
CZ		1	1			**2**
HR					1	**1**
HU		1	1			**2**
LT		1				**1**
PL	3			1		**4**
SK			1			**1**
Conducted interviews	**4**	**3**	**6**	**2**	**1**	**16**

2.2 Preparation of questionnaire

As a guideline for the interviews, checklists were developed for different types of stakeholders. Two categories of service oriented stakeholders were distinguished, the demand side (shipper and forwarder) and the supply side (carrier). The Ministry of Transport was identified as another category stakeholder, as they are often closely related to the role of the infrastructure manager.

It was planned to have a meeting with the infrastructure manager / Ministry of Transport after the interviews with the service oriented stakeholders. The practices learned from these interviews would then be used to create a specific checklist for Infrastructure managers / Ministry of Transport.

A copy of the interview checklist is included in Annex 2 – Final checklist for interviewing stakeholders

2.3 Undertaking the interviews

The interviews took place over the period from **1st of October 2015** to **6th of November 2015** and each interview lasted approximately 60 minutes. The content of each interview was based on five different topics as set out in the checklist as follows:

1. Company information
2. General information on rail transport
3. How does a company measure the transport performance
4. Importance of cost, time and reliability for rail transport for different commodity types
5. Barriers and drivers for road and rail transport

A separate checklist was designed for each category to guide the interview in an interactive way. This means that during the first part of the interview some general questions were asked and selected items were revisited later in the interview by more detailed questions. Simultaneously, the feedback was checked with earlier remarks of the interviewee on the topics cost, time and reliability. This was either consistent, or led to more questions during the interview.

In general, the interviews gave interesting insights in the decision making factors for choosing transport mode, as well as which key factors (price/costs, transport time, transport time reliability and loss or damages) are considerably influencing their decision.

3. Synthesis of the interviews

This chapter illustrates a synthesis of the market consultation by providing market practices and individual cases related to rail and road transport in JASPERS countries.

3.1 Diversity in modal split and commodity type

The diversity of interviewees regarding the use of rail transport is noticeable. Table 3 indicates the transport modes used per stakeholder and shows the variety in type of users, ranging from intermodal and rail users to exclusively road transport users. Three interviewees (C3, S4 and S5) could not share or provide reliable data on modal share.

Table 3 - Main type of transport mode used by respondents

	Forwarder				Rail carrier			Shipper					
	F1	F2	F3	F4[1]	C1[2]	C2	C3	S1	S2	S3	S4	S5	S6
% road transport	5	0	99	0	0	0	n/a	50	62	100	n/a	n/a	50
% rail transport	0	40	0	100	90	5	n/a	50	38	0	n/a	n/a	50
% Intermodal transport	95	60	1	0	10	95	n/a	0	0	0	n/a	n/a	0

The two shippers who did not share the data on overall modal share regarding their business, indicated rail percentage of 90 to 100 % for their specific transport on a corridor between Eastern Europe and Western Europe. Two examples given were transport between Hungary and The Netherlands for agricultural products and between Poland and UK for manufactured products. For these two corridors the interviewees did not consider road transport as an alternative and they mentioned inland waterways and short sea shipping respectively as possible alternatives. Their choice for rail transport was based on an analysis of price/quality balance per transport corridor, and the market price is the decisive factor. They did not carry out an analysis to derive the cost component only related to the value of transport time or only related to the value of reliability.

In addition, the interviewed companies handle a variety of commodities. The following types of commodity were identified:

- Containers;
- Dry bulk;
- Liquid bulk;
- Military transport;
- Automotive (finished cars); and
- Temperature controlled goods (FMCG)

[1] The interviewee was able to indicate general rail freight figures only. The modal split figures are therefore based on this company's Rail transport department in Bulgaria. The Europe-wide modal split for this company is assumed to be different than this figure.

[2] The rail carrier preform the transport 100% by rail. However, this company also owns a forwarding division. This forwarding division is responsible for intermodal transport. Approximately 90% of the orders is transported by rail only, 10 % is using intermodal transport.

3.2 Assessment of the transport modes used

3.2.1. Importance of mode choice factors

The interviewees were asked to assess the importance of different mode choice factors, namely :

- price/costs;
- transport time;
- transport time reliability;
- probability of loss/damage.

A first clear conclusion here is that price or cost of the service is most important for almost all interviewees. This was indicated by all respondents as high or very high importance. Second in line is transport time reliability, closely followed by transport time itself. The lowest score for importance on mode choice in our sample is for the factor damage or losses, since this topic is often not considered to be decisive for choosing one specific mode of transport. Some interviewees indicated this topic to be not existing or not necessary to consider (0), and others indicated this as not applicable (n/a). One stakeholder mentioned that this risk was covered by the cargo owner if necessary, by means of insurance. Moreover, the infrastructure related damage or loss (accidents) are covered by rail operators.

The average scores per stakeholder group are only shown for the first three factors (price/cost, time and reliability). This is because of diversity and low response rate regarding the last factor "probability of loss/damage". In 7 out of 16 cases this issue was not applicable, not existing or not necessary to consider regarding their transport. Furthermore, the score "very low" importance were given regarding the transport of coal and coke and regarding the transport of cement and concrete elements.

An overview of the importance of factors is given in Table 4 and Table 5:

Table 4 - Importance of factors for mode choice; Individual interviewee's scores

	Forwarder				Rail carrier			Shipper					
	F1	F2	F3	F4	C1	C2	C3	S1	S2	S3	S4	S5	S6
Price/cost	5	4	5	5	5	-	-	5	4	5	-	-	5
Transport time	3	3	4	3	4	-	-	5	5	4	-	-	3
Transport time reliability	3	5	4	4	4	-	-	5	5	2	-	-	4
Probability of loss/damage	-	-	4	3	4.25	-	-	1	-	1	-	-	3

Used scale 1-5 (1 very low - 5 very high) For rail carrier, there was only one response

Table 5 - Importance of factors for mode choice; Average per type of stakeholder

	Forwarder	Rail carrier*	Shipper	*Average*
Price/cost	4.75	5.00	4.75	*4.78*
Transport time	3.25	4.00	4.25	*3.78*
Transport time reliability	4.00	4.00	4.00	*4.00*

3.2.2. Assessment of current level of service

The interviewees were asked to assess the current road and rail situation, related to the same four key factors. On average, the stakeholders assessed the price/costs factor to be more satisfactory for road compared to rail. Note that the difference between rail and road is limited. An overview of the

respondents input regarding the assessment of current road transport is summarised in Table 6 and Table 7. Furthermore, Table 8 and Table 9 summarises the responses regarding interviewees' assessment of the current situation in rail transport.

Table 6 - Assessment of the current situation in road transport; Individual interviewee's scores

	Forwarder				Rail carrier			Shipper					
	F1	F2	F3	F4	C1	C2	C3	S1	S2	S3	S4	S5	S6
Price/cost	5	-	4	5	3	4	-	5	3,5	5	-	-	5
Transport time	4	-	4	4	5	5	-	4	3,5	4	-	-	4
Transport time reliability	3	-	4	4	4,5	5	-	5	4	2	-	-	3
Probability of loss/damage	-	-	-	2	1,5	-	-	3	4,5	1	-	-	3

Used scale 1-5 (1 very low - 5 very high)

Table 7 - Assessment of the current situation in road transport; Average per type of stakeholder

	Forwarder	Rail carrier	Shipper	*Average*
Price/cost	4.67	3.50	4.63	*4.39*
Transport time	4.00	5.00	3.88	*4.17*
Transport time reliability	3.67	4.75	3.50	*3.83*

Table 8 - Assessment of current situation in rail transport; Individual interviewee's scores

	Forwarder				Rail carrier			Shipper					
	F1	F2	F3	F4	C1	C2	C3	S1	S2	S3	S4	S5	S6
Price/cost	5	5	5	4	3,5	4	3	4	3,5	Not applicable	-	-	5
Transport time	3	4	4	4	3	5	5	4	3,5		-	-	3
Transport time reliability	3	5	5	3	3,5	5	4	5	5		-	-	4
Probability of loss/damage	0	1	1	3	3,5	1	3	3	4,5		-	-	3

Used scale 1-5 (1 very low - 5 very high)

Table 9 - Assessment of current situation in rail transport; Average per type of stakeholder

	Forwarder	Rail carrier	Shipper	*Average*
Price/cost	4.75	3.50	4.17	*4.20*
Transport time	3.75	4.33	3.50	*3.85*
Transport time reliability	4.00	4.17	4.67	*4.25*

3.3 Proposed measures for enhancing rail freight transport

Stakeholders were asked to indicate which measures should be taken to improve rail freight transport in general. An overview of the suggested measures is given in Table 10. The tables illustrates that the majority of the interviewees indicated that in general the rail infrastructure should be improved. More specifically, different measures are indicated, e.g. prioritisation for intermodal transport and improve or increase the national intermodal terminals.

Table 10 - Indicated measures to improve rail freight transport (in number of interviewees)

	Forwarder	Rail carrier	Shipper	Infra Manager	Other
Changes in legislation concerning the restriction on gross weight for intermodal transport due to liquid bulk containers	1	0	0	0	0
Changes in legislation concerning the restriction on gross weight for intermodal transport related to a full block train	0	0	1	1	0
Rail infrastructure improvement: increase in line speed	3	1	2	1	1
Rail infrastructure improvement: maintenance on the tracks	2	1*	1	1	1
Rail infrastructure improvement: to allow increase in train length	0	0	1	1	0
Rail infrastructure improvement: capacity increase	0	0	1	1	0
Changing track access charges (principles of calculation and rates themselves)	1	1	0	1	0
Giving priority to intermodal transport (compared to passenger transport in terms of use of rail infrastructure).	3	0	1	0	1
Improved/ New intermodal terminals	2	1*	0	1	0
More communication with the demand side for investments regarding platforms/terminals to avoid investments in locations which are disconnected to the market.	1	0	0	0	0
More efficient organisation from the railway infrastructure manager	1	1	0	0	0
Grants to improve the rail fleet/assets or general subsidy	0	2*	1	0	0
Improving interoperability and providing combined (rail-road) services	0	1	0	0	0
Sufficient connection of seaports to railways	0	1	4	0	0
Increase predictability/reliability of railway transport	0	1	1	0	0
Increase of balance in the difference in state owned rail companies and new rail operators and / or Privatization of incumbent freight operators	0	0	1	0	0
More control for shippers	0	0	1	0	0
Minimization of isolated rail cargo	0	0	1	0	0
Environmentally friendly transport	0	0	0	1	0
Much higher degree of safety	0	0	1	1	0
Cheaper transport	0	0	2	1	0
Substantial energy efficiency	0	0	0	1	0
Daily/night time limit for Monster trucks	0	0	0	1	0

*indicates one negative feedback

For three measures the stakeholders gave mixed responses (these are marked with an asterisk*). One rail carrier indicated a negative impact for rail transport. The reasoning behind this negative response was the short term bottleneck for rail infrastructure caused by the maintenance or upgrading works. The existing rail freight flows either experience long delays or are obliged to find an alternative route. One railway carrier stated that his experience in this is that due to delays or rerouting transport time and reliability is

affected, which causes a modal shift towards road transport. After the maintenance or upgrading work are finished, this modal shift is not reversed. High efforts are necessary to win back the confidence from the market to get the cargo back to rail transport.

There were two other topics with mixed responses from the stakeholders regarding investments and subsidies. One rail carrier indicated a negative effect from investing in improvement or development of an intermodal terminal. For example, since terminals exist which are no longer in use in the Czech Republic, caution is needed for investments for an intermodal terminal and it is highly important to understand the intermodal market. The view of these interviewees is that existing infrastructure should be better utilised.

3.4 Expected impact of freight measures

Interviewees were asked to assess what would be the likely impact of the suggested measures on the following indicators:

- Reduction of rail transport time;
- Increase of rail transport time reliability;
- Reduction of loss/damage during rail transport.

3.4.1. Impact per stakeholder type

The likely impact can be clustered according to multiple selections, e.g. container vs bulk, North-East Europe vs South-East Europe and per stakeholder type. For this study it has been decided to make one overview of the expected impact, break down per stakeholder:

- forwarders (Table 11);
- rail carriers (Table 12); and
- shippers (Table 13).

These three tables show a brief summary of the expected impact as indicated by the stakeholders. Moreover, it was possible to draw different conclusions comparing other clusters.

Table 11 - Expected impact regarding Transport time, Transport time reliability and loss/damage (Forwarder)

	Forwarder			
	F1	**F2**	**F3**	**F4**
Reduction of transport time	Significant growth of cargo transportation by rail	Creation of extra time to combine cargoes → decrease transport costs → more competitive rail transport	More flexibility in transport chain --> cost savings	Significant growth of cargo transportation by rail
Increase of transport time reliability	No effect (reliability- not a problem)	Big effect → increase attractiveness of railway service	No effect (reliability- not a problem)	Significant growth of cargo transportation by rail
Reduction of loss/ damage	No effect (loss/damage- not a problem)	No effect (loss/damage- not a problem)	No effect (loss/damage- not a problem)	Small effect (loss/damage- not a big problem)

Table 12 - Expected impact regarding Transport time, Transport time reliability and loss/damage (Rail carrier)

	Rail carrier		
	C1	**C2**	**C3**
Reduction of transport time	Improved assets' utilization → lower costs → higher attractiveness	Decrease of lead time → enforced multiple trips → decrease of prices → higher competitiveness	n/a
Increase of transport time reliability	Higher competitiveness → More business opportunities	Higher competitiveness → More business opportunities	Decrease of costs
Reduction of loss/ damage	Higher competitiveness → More business opportunities	No effect (loss/damage- not a problem)	n/a

Table 13 - Expected impact regarding Transport time, Transport time reliability and loss/damage (Shipper)

	Shipper					
	S1	**S2**	**S3**	**S4**	**S5**	**S6**
Reduction of transport time	Shift from road to rail transport	No effect (transport time - not a problem)	Shift from road to rail transport (about 50% of cargo volume)	n/a	n/a	Shift of some cargo flows from road to rail transport
Increase of transport time reliability	Shift from road to rail transport	No effect (transport time - not a problem)	Shift from road to rail transport (about 50% of cargo volume)	No effect for already established rail transport	n/a	Shift of some cargo flows from road to rail transport
Reduction of loss/ damage	n/a	No effect	No effect (loss/damage- not a problem)	n/a	n/a	No effect (loss/damage- not a problem)

3.4.2. Container vs bulk

The expected impact indicated by the stakeholder cluster “container” (see also table 14), indicated that a reduction in transport time would result in a significant growth of rail freight transport, more competitiveness for rail transport and cost savings.

Less consistent is the response from the cluster “bulk”, whereas 3 out of 5 shippers indicated a shift from road to rail transport, while two shippers indicated that the reduction of transport time is not a decisive factor for choosing rail transport. For bulk transport, no comments were made which relates to more competitiveness for rail or cost savings as a result of transport time reduction.

For increase of transport time reliability, there is a mixed response for both clusters. Four interviewees indicated that an improved time reliability would have no effect on the modal share (two regarding container transport and two regarding bulk transport), while other 7 interviewees indicate an increase in attractiveness, significant growth of rail transport, higher competitiveness and some shift of cargo from road to rail.

The sample group (both containers and bulk) indicated that an reduction in loss or damage would have limited effect on the modal share. There is no distinction between these groups

Table 14 - Expected impact regarding Transport time, Transport time reliability and loss/damage (type of cargo: B= Bulk, C= Container & O = Other)

	Type of cargo	Reduction of transport time	Increase of transport time reliability	Reduction of loss/ damage
S5	**B**	n/a	n/a	n/a
S1	**B**	Shift from road to rail transport	Shift from road to rail transport	n/a
S3	**B**	Shift from road to rail transport (about 50% of cargo volume)	Shift from road to rail transport (about 50% of cargo volume)	No effect (loss/damage- not a problem)
S4	**B/C**	n/a	No effect for already established rail transport	n/a
C3	**C**	n/a	Decrease of costs	n/a
F1	**C**	Significant growth of cargo transportation by rail	No effect (reliability- not a problem)	No effect (loss/damage- not a problem)
F2	**C**	Creation of extra time to combine cargoes decrease transport costs more competitive rail transport	Big effect increase attractiveness of railway service	No effect (loss/damage- not a problem)
F3	**C**	More flexibility in transport chain --> cost savings	No effect (reliability- not a problem)	No effect (loss/damage- not a problem)
S6	**C**	Shift of some cargo flows from road to rail transport	Shift of some cargo flows from road to rail transport	No effect (loss/damage- not a problem)
F4	**C**	Significant growth of cargo transportation by rail	Significant growth of cargo transportation by rail	Small effect (loss/damage- not a big problem)
C1	**O**	Improved assets' utilization lower costs higher attractiveness	Higher competitiveness More business opportunities	Higher competitiveness More business opportunities
C2	**O**	Decrease of lead time enforced multiple trips decrease of prices higher competitiveness	Higher competitiveness More business opportunities	No effect (loss/damage- not a problem)
S2	**O**	No effect (transport time - not a problem)	No effect (transport time - not a problem)	No effect

3.4.3. North-East Europe vs South-East Europe

With respect to the expected impact of transport time reduction, the interviewees from the North-East Europe region showed mixed responses. 5 out of 9 indicated that some effect would be expected if the transport time could be reduced, while 4 interviewees indicated that it would have no effect on the current commodities transported by the companies or not applicable on their rail transport corridor.

Table 15 - Expected impact regarding Transport time, Transport time reliability and loss/damage (Region North East Europe)

	Reduction of transport time	Increase of transport time reliability	Reduction of loss/ damage
C1	Improved assets' utilization lower costs higher attractiveness	Higher competitiveness More business opportunities	Higher competitiveness More business opportunities
C2	Decrease of lead time enforced multiple trips decrease of prices higher competitiveness	Higher competitiveness More business opportunities	No effect (loss/damage- not a problem)
C3	n/a	Decrease of costs	n/a
S2	No effect (transport time - not a problem)	No effect (transport time - not a problem)	No effect
S4	n/a	No effect for already established rail transport	n/a
S5	n/a	n/a	n/a
F1	Significant growth of cargo transportation by rail	No effect (reliability - not a problem)	No effect (loss/damage - not a problem)
F2	Creation of extra time to combine cargoes decrease transport costs more competitive rail transport	Big effect increase attractiveness of railway service	No effect (loss/damage - not a problem)
F3	More flexibility in transport chain --> cost savings	No effect (reliability - not a problem)	No effect (loss/damage - not a problem)

The respondents allocated to the South-East Europe cluster however, indicated a noticeable expectation of growth when transport time could be reduced. One indicated a modal shift of about 50% (cargo volume).

Table 16 - Expected impact regarding Transport time, Transport time reliability and loss/damage (Region South East Europe)

	Reduction of transport time	Increase of transport time reliability	Reduction of loss/ damage
S1	Shift from road to rail transport	Shift from road to rail transport	n/a
S3	Shift from road to rail transport (about 50% of cargo volume)	Shift from road to rail transport (about 50% of cargo volume)	No effect (loss/damage- not a problem)
S6	Shift of some cargo flows from road to rail transport	Shift of some cargo flows from road to rail transport	No effect (loss/damage- not a problem)
F4	Significant growth of cargo transportation by rail	Significant growth of cargo transportation by rail	Small effect (loss/damage- not a big problem)

Similar responses were given for the effect of increase in transport time reliability. With respect to the South-East region, the 4 interviewees expected that an increase of reliability will result in significant growth of rail transport and a shift from road to rail. For the North-East Europe region the responses were more mixed. Whereas some indicated that transport reliability was not a problem and therefore no effect was expected. Others indicated that and increase in reliability would open up the market, making it more competitive to road transport.

3.4.4. Overall conclusions

That travel time is not the dominant factor according to the industry stakeholders. Other than price/cost which is a fundamental driver of all businesses, travel time is valued quite similar in importance to reliability. Nevertheless, it has already been noted that many of the reliability issues may have been converted into travel time by rail carriers and hence the industry perceives reliability issues through longer travel times.

There is a strong consensus amongst all stakeholders that travel time and reliability improvements will lead to a shift of goods towards rail.

Additionally, interviews showed that no impact is expected by the stakeholders if loss/damages in rail freight transport would be reduced. This shows that loss/damage is not considered as an important factor for choosing rail freight transport over road transport.

3.5 Interview feedback on rail freight issues (barriers) and best practices (enablers)

This section will continue in more detail, providing additional content and background information on identified problems, best practices and measures, clustered by the following four topics:

- Value of Time;
- Value of Reliability;
- Loss and damage;
- Modal shift drivers and barriers.

In each of these sections, statements from the interviews will be elucidated with the support of additional background information, best practices and use cases. The chapter will be concluded by a section on the costs structure for rail freight transport.

3.5.1. Value of Time

The interviews conducted for this study provided a wide range of potential drivers and barriers for transport time. Some will need to be incorporated in new methodologies, while others were already included to some extent.

Regarding this, this study aims to draw qualitative conclusions on Value of Time, based on the market point of view. This said, one of the major questions is, if the currently used key figures are still relevant and applicable. Interviews among different type of stakeholders in different JASPERS countries, showed a different perspective, sometimes even contrary to each other. One example is the topic rail infrastructure investments. Several stakeholders mentioned the rail infrastructure investments to be necessary for use of rail and expected further growth in transport flows.

Transport time was considered to be important by most of the interviewees. The share of intermodal transport business is still growing in several European countries. To accommodate this growth, rail carriers are aiming to increase the capacity and maintain or improve transhipment time. For example, in Poland, intermodal operators will invest heavily in new and existing container terminals for the next years, to reduce total lead-time for intermodal transport. In addition, alignment of different transport services (rail-rail, rail-road and hub-and-spoke services) is necessary to make rail freight transport competitive to other modes of transport.

Freight flows are not bound to the European Union borders and often non-EU countries function as transit countries. One forwarder indicated that for the Germany – Turkey corridor freight often transits Serbia. Even though other routes are possible, the Serbian route is preferred, by both rail and road transport. This involves a non-EU border crossing which implies the involvement of customs. It was considered by the interviewee that in general, the effect of customers on rail freight transport is less time consuming than for road transport. This envisages other border aspects specific for rail transport like changing locomotives and technical inspections at the border crossings are also time consuming. Border-crossing, especially (non)-EU country borders may also result in reliability issues, due delays and capacity constraints.

3.5.2. Value of Reliability

Transport reliability issues were indicated to be one of the major barriers for using rail transport. In some cases the transport demand cannot be handled with sufficient reliability by the railway industry. At this moment, the quality of the service for some train lines cannot be guaranteed by the operator and/or the forwarding agent, making other transport modes a better option. Key factor to guarantee the quality of

the service was indicated to be the infrastructure quality. In many Central and Eastern European countries, investments in and maintenance of infrastructure are lagging behind.

An example was given by the Bulgarian infrastructure manager who has compared the Bulgarian infrastructure to other countries. They found that the quality of the Bulgarian infrastructure is:

- lower than the level of Central and Western European countries
- similar to the level in Romania and Greece
- better than the level in some Balkan countries (Serbia, FYROM, Kosovo, Bosnia and Herzegovina).

Several countries are now trying to catch up by prioritising maintenance works of the rail network. Until this is realised, this results in speed restriction, detours and unreliable path planning. Furthermore, there are no benefits until there is a long distance corridor available where the infrastructure is of similar standard to Western European countries.

A Polish railway undertaking indicated that on international corridors a service level of 99% on-time delivery is currently realised; however on the domestic rail freight market, about half of the trains are arriving on time, while rest does not arrive on time. This is caused by an East-West international rail corridor, which recently was renewed under the flag of Rail Freight Corridor 8, whereas domestic rail corridors are not yet upgraded to meet the highest standards. These differences results in speed restrictions and maintenance works, and jeopardise the services' reliability.

A Bulgarian railway carrier indicated that about 50% of their planned trains (9 trains per week) is delayed. For international trains, these delays have even more impact, as the train will miss its path in the neighbouring countries. Most delays are caused by infrastructure maintenance or upgrade works. Maintenance work is often only communicated a few hours before departure, making it impossible to find alternative routes.

The reliability of an international rail freight service is dependent on the quality of the service on the complete chain (all legs) of the transport. Therefore it is possible to find bottlenecks in other countries than origin or destination. One shipper indicated a technical problem at the Eurotunnel to be a crucial factor for shifting from rail to other transport modes. In this particular case all transport between Eastern Europe and the UK had to be rerouted using short sea shipping, as this was the reliable and feasible alternative.

In addition, international rail freight transport is considered to be more difficult to arrange compared to road transport. This is especially the case in Central Europe, where rail freight transport is less harmonised between neighbouring countries. The more border crossing is needed, the less attractive rail freight transport becomes. The reason for this is the necessity of rail transport logistic alignment between different railway operators and the different cross border rail worker's regulations. This makes cross border operations a weak link in international rail freight transport.

An issue raised by interviewees relates to the use of block trains and the necessity of combining transport flows. Rail transport is interesting for long distance journeys (corridors) and fairly big volume and/or weight. Examples are the production sites of large shippers, which often have large freight volumes to and from different locations in Europe. For this type of transport, it is feasible to operate a full block train load between origin and destination. Large shippers indicated that full block trains are needed to make rail transport a feasible solution. For other commodities, especially containers, combining transport flows from two or more destinations would be a solution to achieve full length. However, this might impact the reliability of rail freight service. Delays may occur during shunting operations, and thus result in late departure. This directly affects the total lead time of rail transport, which makes rail transport more

expensive than necessary. To avoid such an expensive situation, Single Wagon Load operators are active in this field, and arrange complete rail transport chain from point A to point B[1].

Another visible trend for reliability for rail freight transport is the development of IT-systems to support rail stakeholders in improving the visibility and thus reliability of rail freight transport, e.g. Track and Trace of wagons or trains, as well as forecasting systems to calculate the expected time of arrival. This tracking &tracing needs were also highlighted in the Retrack project: "*While interviewed companies in the bulk sector in general do not need tracking & tracing, it is in much more demand by potential clients in the sector of maritime containers and swap bodies*".

Reliability issues however, apply not only to rail freight transport but also to other transport modes like road transport, e.g. low quality infrastructure, IT-system support and border-crossing issues. To maintain the overall satisfactory of current transport levels, industrial stakeholders will have to collaborate, and innovate together.

It was given that reliability issues on railways can be incorporated into longer timetable slots, which means that only the rail carriers are fully aware of the situation on the railways. The result of lengthening the timetable slots is a longer lead time, see also value of time.

One stakeholder in Bulgaria stated that time and reliability in general are relatively less important because of the gap in costs between rail and road transport, whereas road transport is considered to have very low costs. Within Bulgaria the competition between road hauliers is very high. This competition forces road hauliers to reduce costs for transport, making it impossible for intermodal transport in Bulgaria to compete with the low prices road transport is currently using, this is regarding domestic transport. Even when intermodal transport would normally be feasible, for example between Burgas (the main seaport) and Sofia, road is the most attractive option.

Overall the reliability of rail transport scored high in the current sample. During the RETRACK project[2] 21 companies were interviewed regarding the rail freight corridor between Rotterdam and Constanza. This resulted in mixed responses regarding reliability of rail freight transport: "*Currently, some interviewed companies are dissatisfied with the reliability of rail transport ("our trains are never on time!"), while others are more satisfied because there are also delays in road transport*". Another issue was cargo safety and security: "*The safety (cargo is less likely to shift in rail wagons than on road trucks) and security (cargo is less likely to be stolen) of the cargo plays an important role. On the one hand, the interviewed companies think rail transport is more secure than road transport; on the other hand it happens much more often that rail wagons are 'lost' for several hours or even days*". The more pertinent issues reflect the finding earlier that respondents in our survey see a greater potential for reliability improvements in Sout0East Europe.

3.5.3. Loss and damage

With respect to loss or damage during rail transport, 7 out of 16 interviewees indicated the factor "loss/damage" to be not applicable, non-existent or not necessary to consider. Some interviewees indicated loss/damage to be irrelevant (non-existent) for road transport, while they did mention it as relevant for the current situation in road and rail freight transport.

The two shippers who indicated the factor "loss/damage" not applicable, mentioned that the risk for loss or damage was fully covered by insurances and security. No information was provided by the respondents regarding the effect of the insurances and security to the transport cost. For these shippers the security is

[1] As for example is carried out by the H2020 program - Smart-Rail

[2] Retrack (EC, 6th framework programme), http://www.retrack.eu/

part of the total price they choose to pay for a certain transport and rail transport was their choice of mode because of the high volume, making road transport a far less attractive alternative. One other shipper, who indicated the factor non-existent, explained that loss is not an issue and risk of damage will reduce when the idle times will reduce. Nevertheless, this shipper made no interpretation of this reduction into an effect on transport cost.

3.5.4. Modal shift drivers and barriers

According to the literature review, modal split is calculated with respect to changes in transport time and cost. The mode choice for international and regional trade flows might also be sensitive to aspects such as shipment size and loading rates of the wagons or vehicles. One of the objectives of the interviews was to identify these drivers and barriers which affect the mode choice. An overview of different drivers and barriers in regard to modal shift is provided in this section.

Accessibility of the rail freight network and impossibilities for door-to-door service

Shippers willing to use rail freight transport as their main transport mode, face the challenge of railway access to the premises of the consignor and/or consignee. Today, for bulk transport door-to-door shipment is only possible if both the consignor and the consignee have direct access to the rail network. In all other situations, a transhipment point is required. This intermediate location increases the total door-to-door lead time and therefore costs, also the efficiency of using bulk wagons for transport is lost when pre- and end-haulage is necessary. Due the appearance of ISO-containers, transhipment of this type of goods is much more convenient. Thus, transhipment has less impact on intermodal transport than on bulk transport. These issues can be found all over Europe, but was identified especially in the Central European region.

One shipper indicated that they are planning to build a collection and distribution centre for consolidating construction goods/building materials transport flows between Bulgaria and China. Although large volumes are expected to be transported between the consolidation centre (industrial zone) and black sea seaports, there is no access to the rail freight network. This means that the benefits of this transport mode cannot be exploited. Investment in such rail freight access point is costly and cannot be funded by the company itself. The company is therefore dependent on the infrastructure manager.

Another shipper in the Czech Republic indicated that the capacity of the currently access track is insufficient to facilitate all transport by rail. This shipper currently exports approximately 3 trains per day of finished manufactured goods and has approximately 2 trains outbound and 2 trains inbound a day with raw materials and semi-finished products. However, this shipper indicated that they currently have sufficient volumes of finished goods to double the number of trains, from 3 to 6 trains per day, but the current infrastructure cannot accommodate this number of trains.

A national railway carrier indicated that not all core seaports in the Baltic region are sufficiently connected to the rail freight network. In order to increase the competitiveness of rail freight transport, all core seaports should be sufficiently connected to the rail freight system. A better connection to the network would make rail freight transport (also seaport related traffic) a more interesting option.

Part of the penalty of using rail transport is the unavailability of terminals and the impossibility to provide door-to-door transport. In a growing number of situations, railway undertakings and intermodal operators are choosing to deliver a full range of services regarding intermodal transport. The focus is no longer on offering reliable rail services, but more than ever on a full door-to-door service, including pre and end haulage, storage and empty container management. To this end, small steps are taken to provide door-to-door intermodal solutions to the shippers. Especially in North Central region, competing intermodal networks are being established and these are competitive to road transport. These networks have close relations with the seaports in the Baltic area as well as the seaport at the North Sea area.

Overall non-satisfaction of rail freight services

In Bulgaria, one stakeholder stated that the driver for choosing rail freight transport services is the low price, as for them, it is much cheaper than road transport for incoming raw materials (bulk). Unfortunately, on time delivery cannot be guaranteed due to the current condition of the infrastructure. Moreover, the condition of the available wagons in Bulgaria is not always satisfactory. Even though the price for rail freight transport is generally lower, the lead-time and reliability of the rail service influence the choice of transport mode.

Legislation restrictions for intermodal tank transport

In Poland, gross weight restrictions prevent further development of intermodal transport. This issue is indicated as a barrier for intermodal transport solutions in tank container logistics. Currently a maximum of 40 tonnes can be transported per transport unit. However, if this were increased to 44 tonnes per transport unit, rail transport could become more competitive than road transport in this sector, making it possible to shift more goods from road to rail transport. Currently 44 tonne transport units are allowed if the total 40ft length of a container is used. Tank containers are usually shorter, due to different restrictions on liquid bulk transport.

3.6 Costs structure for rail freight transport

3.6.1. The main components of transport costs by rail

The interviewees were asked to provide information on the costs structure to clarify which were the main elements of costs and to investigate variation between countries. Three forwarders in Poland and one rail carrier in the Czech Republic, all involved in container transport, indicated that approximately 60% of the costs for intermodal transport are rail related costs. The other 40% are due to last mile transport and terminal related costs such as handling. Pre and end haulage by road is considered to represent a relatively high proportion of the total cost.

For rail transport the following components are mentioned by a rail carrier and a shipper as principal components of transport costs. No order of precedence should be applied to this list in terms of importance or level of costs:

Table 17 - Identified costs for rail freight transport

Type of costs	***Type of costs***	***Description***
Infrastructure	*Access fee + Energy (electricity) costs*	*Different per country, also due to support (incentives) by country on country specific lines*
Fuel costs	*Diesel costs*	*Usually bought from the locations owned by state railways*
Rolling stock (locomotive & wagons)	*Rental or deprecation + Maintenance*	
Driver costs	*Wages*	*Driver costs varies per country, drivers from Eastern European countries are in general cheaper than drivers from western European countries*

Overhead was not separately mentioned by stakeholders

Furthermore, one rail carrier indicated that rail costs are also dependent on the political situation. The political situation may affect currency exchange instability and EU/Russia sanctions. Especially in the Baltic states, the EU/Russia situation has its impact. All Baltic countries rely mostly on transit flows through the

seaports at the Baltic Sea into Russia. A better political situation would support market growth which may result in lower prices.

In Bulgaria, the price for infrastructure use is based on volume, gross-tonne/km and length of transport. The current system does not differentiate between different equipment used; however, differentiation is made between passenger transport and freight transport.

Due to the relatively high volumes and heavy weight of dry bulk, rail and inland waterways are often better options than road transport. However, it may only be feasible when a full block train is running between origin and destination. Running half empty trains (not completely utilising the train length or weight) drives up the costs and makes rail transport less competitive.

3.6.2. Country differences in costs

Transport costs for rail freight transport vary per country. One example, as given by a forwarder is the differences between Germany and Poland. Track access charges in Poland are approximately twice as high as they are in Germany. On the other hand, labour costs for a Polish locomotive drivers are lower compared to a German driver's.

The following types of costs are indicated to be country specific:

Table 18 - Identified costs for rail freight transport (railway undertaking perspective); country differences (yes or no)

Type of costs	***Country specific? Yes or no***
Infrastructure	*Yes, different per country. Countries may decide to keep track access charges for one specific corridor low to support rail freight transport on that specific railway line. Also, countries that support rail freight transport may lower the charges.*
Fuel costs	*Yes, the price for fuel is partly determined by excise duties. Fuel prices can therefore deviate per country. Even though pump prices are reasonably similar across the EU, there are some exceptions. Other side, even the smallest deviation may lead to large differences on long haul.*
Rolling stock (locomotive & wagons)	*Partly, rental or deprecation costs should be comparable in each country. Maintenance costs may deviate per country as this also relies on direct labour costs.*
Driver costs	*Yes, driver costs varies per country, locomotive drivers from Eastern European countries are in general cheaper than drivers from western European countries. One example was given by a forwarder comparing Polish and German locomotive driver. No examples were given comparing one Eastern European country by another Eastern European country.*

3.6.3. Indicated factors influencing costs

Different interviewees indicated that the current rail freight industry is still using relatively old equipment. Due to the high investment costs of rolling stock (both locomotives and wagons), new railway undertakings rely mostly on old, used locomotives and wagons. When new equipment is used, e.g. new longer and lighter wagons, the costs can be reduced by 20% and in general, the operations are improved.

It was also indicated by one stakeholder that the costs for leasing locomotives are approximately 40% higher than when owning the equipment. Although improvements in the quality and interoperability of rail networks are likely to result in long-term benefits for rail freight operations, interviewees pointed out that they face difficulties in the transitional period. European TEN-T policy, for example, aims to migrate from 1520mm wide track gauge (so called "Russian gauge") to 1425mm standard gauge. Additionally, signalling systems will be harmonised to ERTMS (TSI), and greater parts of the network will become electrified. If these measures are implemented, it will become necessary for operators to invest in

compatible rolling stock and equipment. However, if companies face uncertainty regarding the phasing in of these major infrastructure investments, they may become more reluctant to go ahead with their own fleet renewal plans.

The effects of allowance of longer train length or increase in height limitation were not mentioned by the interviewees. One comment given by a infrastructure manager on the allowance of longer train length was that some part of Polish infrastructure in current state, especially rail bridges, was not able to carry longer trains. To allow the longer train length, the upgrade of these bridges is mandatory.

3.7 Assessment of the outcomes and relation with Task 2

All interviewees were very interested in the study and the subject. All agree on the fact that the price/cost and quality balance is key to find the successful rail transport product and to increase the use of rail transport.

In Task 2 (Research report on the meta-analysis), several studies were described which use or provide assumptions and analysis on a relatively high level of aggregation. The distinction levels are for example country level, regional level or mode of transport. This means that a common assumption could be made for a whole country, or that the difference in mode of appearance is not taken into account within a transport mode, e.g. one average fixed cost for rail transport without distinction between dry bulk, liquid bulk or container transport. These models are called macro-models and often used for strategic decision making. Especially for European projects, macro-models are often used since the aim of these studies is overall European scenario development.

The examples in the interviews of how freight transport was planned and how choices for transport modality were made are all micro-level examples. Moreover, the sample of organisations interviewed is small and not necessarily representative for goods transport by rail in Eastern Europe as a whole.

Nevertheless, the results of the market analysis yield a number of common issues which support the research carried out in task 2:

- Price or cost of providing transport services (which includes the transport-time dependent costs) is the most important factor in mode choice in freight transport.
- Time also is a key driving factor for rail mode share, as it drives not only the time that he goods are in transit but also the cost of provision of services. Therefore, the value of time per hour should be an important component of modal split models and of cost-benefit analysis of rail freight projects.
- According to the organisations interviewed transport time reliability is about equally important as transport time itself. Although not currently always used in assessing projects, the clear message is that some assessment of reliability is necessary; it should not be ignored because it can be important as factors that are routinely included. This refers to both the modal split models and the cost-benefit analysis. It is implied in the surveys that in many cases, reliability is being incorporated into timetables, thereby leading to higher (but more reliable) travel times.
- Product damage/loss seems of limited value as a decision factor in mode choice for most organisations interviewed, but can be important under exceptional circumstances (e.g. highly valuable products and a substantial risk of damage or loss for at least one of the modes). Therefore, it is not imperative to include this factor as a general rule in modal split analysis and project appraisal. However, allowance for damage/loss reduction benefits of a project could be made in the exceptional cases where this really matters.
- There are no other common influencing factors that should generally be included to explain modal split, but there are all kinds of firm-specific and transport-flow-specific factors that can create considerable variation around the influence of the general key influencing factors.

- There is a different set of views for container versus bulk material, with container more sensitive to time and reliability issues, suggesting a higher basic value of time and value of reliability for container transports.
- The unit rail transport cost can vary widely, since the length of the train (number of wagons) can differ. A full block train cost and single wagon load cannot always be compared. Large shippers who were willing to participate in an interview were often in favour of a full block train. The view from the full block train users was that organising, collecting and shunting of different wagonloads will lead to extra waiting and handling time which result in higher cost. This would make rail transport less attractive for their cargo type. In the case of the intermodal transport manager, this opinion was different. Collecting, combining and optimization in logistics were seen as a potential growth market.
- Introducing VoT and VoR per mode of appearance (container, solid bulk, liquid bulk, non-containerised general cargo) could be a valuable addition to the overall average approach. As mentioned before, a transport flow that does not combine cargo from different shippers or to different recipients is more favourable for bulk transport compared to combining wagons. For such transport flows, the loading locations are the same and the unloading locations are the same. For container and intermodal transport, this extra optimization and scheduling step of combining cargo flows is key to further growth and interviewees are more positive about the possibilities in the near future.

4. Conclusions

4.1 Overview

Task 2 (Literature review) described a number of econometric or modelling studies which either estimate or apply values of time (and reliability). Most of these studies rely upon data or estimations from national surveys carried out in Western European countries. Several have involved the implementation of large surveys e.g. stated preference surveys, in order to permit sophisticated statistical analysis across a range of market segments. Most studies show, or assume, that values of time are closely related to factor costs, i.e. that a delay of one hour 'costs' a similar amount to the cost of hiring the necessary factors of production (driver, vehicle, equipment) for an hour. If the literature shows specific values of time per European Member State, it will typically show lower values of time in Eastern Europe than in Western Europe, which are then justified by lower incomes per capita.

The survey carried out in Task 3, which covered 16 organisations across all the JASPERS countries, provides understanding of a number of selected cases across a fairly broad spectrum, and the ability to investigate areas of decision making at a micro (single agent) level. In this way it is possible to question whether the macro-level results from the literature review are backed up by the strategies being observed in the market.

Analysis of interview results naturally indicates complexity of decision making, and in some cases contradictory statements. Some respondents were transporting goods in circumstances where one mode of transport held a clear cost advantage (like large shippers for agricultural products) and where, at the margin, other attributes such as travel time and reliability were of secondary importance. Others were already satisfied with available travel times and levels of service, so were looking for improvements in other areas such as the technical possibilities at terminals and the willingness of harmonisation between different stakeholders; examples are given for intermodal container transport in Poland and Czech Republic. In many cases travel time and reliability were linked; delays caused problems both in terms of end to end times, and in schedule reliability. This kind of reasoning was applied either to single-mode transport (delays within the network) or to multimodal transport (delays at transhipment points), and cases were also highlighted in relation to cross-border transport, which is mainly involving the Balkan area.

Nevertheless, the results of the market analysis yield a number of common themes:

- Price or cost of providing transport services (which includes the transport-time dependent costs) is the most important factor in mode choice in freight transport.
- Time also is a key driving factor for rail mode share, as it drives not only the time that he goods are in transit but also the cost of provision of services.
- According to the organisations interviewed transport time reliability is about equally important as transport time itself.
- Product damage/loss seems of limited value as a decision factor in mode choice for most organisations interviewed.
- Compared to bulk transport, container transport is found to be more sensitive to time and reliability issues, suggesting a higher basic value of time and value of reliability for container transports.
- In the case of the intermodal transport manager, this opinion was different. Collecting, combining and optimization in logistics were seen as a potential growth market.
- Introducing VoT and VoR per mode of appearance (container, solid bulk, liquid bulk, non-containerised general cargo) could be a valuable addition to the overall average approach.

At face value, these examples of transport decision-making do appear to be familiar, and not especially characteristic of any specific European Member State or region. The fact that stakeholders provide sometimes contradictory answers is often related to their particular circumstances, and again this is likely to occur across different geographical regions. Therefore in many respects the answers given within the survey are similar to what might have been expected if the survey had been carried out in relation to Western Europe. It is important to note, incidentally, that many interviewees are describing international transport involving both Eastern and Western components, so that in the context of continental or global supply chains it would be illogical to expect different decision-making processes to be applied selectively.

In contrast, however, certain other statements made by interviewees do reflect specific regional issues. Many comments relate to the inadequacy of rail infrastructure, the prevalence of obsolete locomotives and equipment, missing rail links (e.g. to ports), shortages of road to rail terminals and even political issues related to the Russian Federation. Most of these issues refer to inadequacies within the supply of rail services, whereas there appears to be a much more level playing field across Europe for road services. In locations where rail services are based on outdated infrastructure and rolling stock, but where road services are carried out using modern equipment, rail will fail to capitalise on its natural scale economies, and road will tend to dominate. Under those conditions, all other things being equal, it is likely that aggregate modal choice may differ, in comparison to regions where rail networks are more modernised. Similarly, at the margin, rail time savings may not generate modal shifts in the same way, due to the fact that rail's cost advantage is not fully realised, or perhaps that capacity constraints have already taken effect.

A possible hypothesis from this study would be that fundamental demand behaviour (within the same market segment) does not significantly change from region to region. Supply side factors clearly do vary, including for example the proportion of wage costs to total transport costs, vehicle fleet ages, and vehicle utilisation levels, but these potential variations in underlying costs are still subject to market forces.

4.2 Input for task 4

Below, we list the findings from Task 3 that are of key importance for Task 4 (Guidance on project appraisal, including modal split modelling).

- For modal split modelling, cost or price is the key influencing factor.
- Time savings are important for both modal split modelling and as a benefit in project appraisal. The time savings need to be based on door-to-door movements, and need to include not only railway time but savings associated with reducing blockages due to border delays, connection to seaports, provision of intermodal terminals and physical restrictions (train length/bridge strength/signalling/electrification). A consequence of this is that projects that reduce any of these door-to-door time components will make train more attractive as a mode (substitution from road and maybe other modes to rail) and will lead to transport time benefits in project appraisal.
- Transport time reliability is of substantial importance and a methodology needs to be included in the work undertaken within task 4 to include it in both the transport modelling and in the form of transport time reliability benefits in cost-benefit analysis.
- Loss/damage of the goods generally speaking seems to be a rather marginal issue and is not likely to have a significant impact on modal split and project assessment. As such, it is a low priority in the preparation of assessment methodologies, though there might be exceptional situations where it is of importance.
- No need was identified to include other benefits than cost reduction, time gains and reliability gains.

- Another important element in Task 4 is an advice on the calculation of transport costs. The rail freight transport costs differ per country, and type of corridor (domestic, international) is an important related distinction. Very relevant further distinctions for transport costs are train length, type of traction (diesel versus electric) and type of train in combination with mode of appearance (bulk in block trains, general cargo in wagonload trains, containerised goods in container trains). Especially in the logistic organisation and its cost, the interviewees mentioned different perceptions for bulk transport and container transport.

Annexes

Annex 1 – List of sources for task 3

ECOPLAN and Panteia (2009). Assessing Sensitiveness to Transport WP 5: case studies, case study alpine crossing.

Annex 2 – Final checklist for interviewing stakeholders

Guidelines for interviewing: SHIPPERS/FORWARDERS; CARRIERS

1. Information about the firm

Country, type of firm, sector, type of goods ([CARRIERS] type of goods transported), expected future development of the market segments (handling type): liquid and dry bulk, container and car transport.

[CARRIERS] Responsible for door-to-door goods transport or for a specific component of the transport chain? If component, which?

2. Information about road and rail transport for/by the firm

Which modes are used now (%), incoming/outgoing transports, domestic/international?

Which parties determine the modes used (incoming, outgoing)?

Main reasons for choosing road/rail (key factors), if different then by the above 4 market segments.

Do you measure transport performance of road and rail? Which performance indicators?

Importance score on scale 1-5 (1=very low; 2=low; 3=moderate; 4=high; 5=very high) for impact on mode choice for possible key factors (price/cost, transport time, transport time reliability, probability of loss/damage and other factors mentioned by the respondent).

3. Assessment of the current situation in road transport

How does road score on price/cost, transport time, transport time reliability, probability of damage and other factors mentioned by the respondent, on a scale 1-5?

How will these factors for road develop in the next 5 years?

[SHIPPERS/FORWARDERS] Overall satisfaction with road transport?

4. Assessment of the current situation in rail transport

How does rail score on price/cost, transport time, transport time reliability, probability of damage and other factors mentioned by the respondent on a scale 1-5?

How will these factors for rail develop in the next 5 years?

[SHIPPERS/FORWARDERS] Overall satisfaction with rail transport?

5. How can rail transport be improved (lifting of barriers to rail transport)?

Which measures do you think would be most effective for shifting transport from road to rail? if different then by the above 4 market segments.

Size of the potential market growth (%) in rail transport (in total, not for the firm itself) from each of those measures (also include stop giving priority to passenger trains in all cases).

6. What would be the likely impact of these improvements for your firm?

What would happen to your operations if transport time by rail would be reduced substantially?

What would happen to your operations if transport time reliability by rail would be increased substantially?

What would happen to your operations if the probability of loss/damage to the goods would be reduced substantially for rail transport?

7. Premium freight market

Is there a premium freight market: a submarket that is highly time or highly reliability sensitive (e.g. lobsters)? If so, for which products?

8. Country differences in costs

Are there differences between countries/regions in the price/cost of transport services by road and rail?

[CARRIERS] What are the main components of transport costs, by road and by rail?

Guidelines for interviewing: MINISTRY OF TRANSPORT / Infrastructure Manager

This interview focusses on several aspects:

- General framework of rail transport
- Maintenance of infrastructure
- Usage/planning of infrastructure

1. Information about the country

Country:

2. Main type of goods transported in the country

Current situation on rail transport and its future development of each segment:

Mode of appearance	Share in %	Volume in tonnes	Future development +5 years	Import/export	Domestic	Transit
Liquid bulk						
Dry bulk						
Containers						
Car transport						
Others						

3. Current infrastructure in the member state / in Europe

How would you describe the quality of the railway infrastructure (regarding freight transport) in your country compared to Eastern European countries and Western European countries.

Which corridors would you consider most important for Rail freight services, both national and international

Please assess the reliability of the current network:

- What KPIs are used to measure the reliability performance?
- What are the main bottlenecks/barriers regarding reliability? What is the current Network capacity? What are the future plans?
- What are the average load factors (number of empty trains)? If different per mode of appearance, please specify.
- Regarding maintenance on the network, how do you maintain reliability rates? What is the current speed? What are the future plans?
- In general, what is the main aim for maintenance and improvement work (e.g. freight or passenger, increase maximum speeds, reduce noise levels, improve time factor, capacity improvement)

4. Infrastructure investments

Who decides on infrastructural investments?

Which decisive factors are considered?

Which stakeholders are involved in this decision making?

Do you use models to calculate ROI or any other key figure that support in decision making?

- Do these models consider Value of time for freight transport? Please elaborate on that.
- Do these models consider value of reliability for freight transport? Please elaborate on that
- Do these models consider modal shift of freight transport (e.g. shift from Road to rail)?
- How do you take into consideration, markets demand for specific improvements?

5. Demand side

Who is responsible for connecting the companies premises or freight villages to the main rail network?

Assess the impacts for the demand side on mode choice for possible key factors:

- price/cost,
- transport time,
- transport time reliability,
- probability of loss/damage
- other factors, namely…

scale 1-5 (1=very low; 2=low; 3=moderate; 4=high; 5=very high)

6. How can rail transport be improved (lifting of barriers to rail transport)?

Which measures do you think would be most effective for shifting transport from road to rail? if different per situation, then differentiated by the above market segments (domestic, import, export and transit).

Size of the potential market growth (%) in rail transport from each of those measures (also include stop giving priority to passenger trains in all cases).

7. Premium freight market

Is there a premium freight market: a submarket that is highly time or highly reliability sensitive? If so, for which products?

8. Country differences in costs

How are train services charged in your country (e.g. track access charges), based on volume, weight or length, is each train considered the same way?

Are there differences between countries/regions in the transport costs?

- In terms on maintenance cost
- Use of network

Annex 3 – Profiles of the stakeholders

Forwarder 1

Type of stakeholder	*Forwarder*
Country	*Netherlands*
Main transport corridors	*Netherlands - Poland*
Type of commodities	*Liquid bulk*
Type of rail wagons used	*Container wagons for liquid bulk containers*
Type of loading units	*Liquid bulk container(s)*

Forwarder 2

Type of stakeholder	*Forwarder and Rail Carrier*
Country	*Poland*
Main transport corridors	*Netherlands/Germany- Poland (North – South & East – West)*
Type of commodities	*Intermodal ISO containers*
Type of rail wagons used	*Container wagons*
Type of loading units	*Block trains on dedicated (pre-arranged) transport lane*

Forwarder 3

Type of stakeholder	*Forwarder*
Country	*Poland*
Main transport corridors	*Netherlands - Poland*
Type of commodities	*Temperature controlled goods (FMCG)*
Type of rail wagons used	*Trailer wagons for Trailers (Piggyback transport)*
Type of loading units	*Temperature controlled trailer(s)*

Forwarder 4

Type of stakeholder	*Forwarder and Rail Carrier*
Country	*Bulgaria*
Main transport corridors	*Germany – Turkey (Istanbul)*
Type of commodities	*Intermodal ISO containers*
Type of rail wagons used	*Container wagons*
Type of loading units	*Block trains on dedicated (pre-arranged) transport lane*

Carrier 1

Type of stakeholder	*Carrier & Forwarding division*
Country	*Hungary*
Main transport corridors	*Transport in Hungary, Slovakia, Romania, Slovenia and Croatia.*
Type of commodities	*All type of commodities*
Type of rail wagons used	*All wagon types*
Type of loading units	*Block trains*

Carrier 2

Type of stakeholder	*Rail Carrier*
Country	*Czech Republic*
Main transport corridors	*North Sea seaports – Central Europe & Central Europe – Adriatic port.*
Type of commodities	*Intermodal ISO containers*
Type of rail wagons used	*Container wagons*
Type of loading units	*Block trains on dedicated (pre-arranged) transport lane*

Carrier 3

Type of stakeholder	*Rail Carrier*
Country	*Lithuania*
Main transport corridors	*Lithuania - Russia*
Type of commodities	*All type of cargo including multimodal containers and swap-bodies*
Type of rail wagons used	*Depending on the freight type*
Type of loading units	*Block trains and combined transport*

Shipper 1

Type of stakeholder	*Shipper*
Country	*Bulgaria*
Main transport corridors	*Domestic freight flows*
Type of commodities	*Dry bulk (coal and coke)*
Type of rail wagons used	*Dry bulk wagons (10% privately owned)*
Type of loading units	*Block trains*

Shipper 2

Type of stakeholder	*Shipper*
Country	*Czech Republic*
Main transport corridors	*Czech Republic – all over Europe (large quantities to Germany and Russia)*
Type of commodities	*Finished goods (automotive)*
Type of rail wagons used	*Car wagons*
Type of loading units	*Block trains*

Shipper 3

Type of stakeholder	*Shipper*
Country	*Bulgaria*
Main transport corridors	*Domestic freight flows*
Type of commodities	*Concrete elements (building blocks)*
Type of rail wagons used	*No rail used*
Type of loading units	*No rail used*

Shipper 4

Type of stakeholder	*Shipper*
Country	*France*
Main transport corridors	*Hungary – The Netherlands – UK*
Type of commodities	*Dry bulk (agriculture goods)*
Type of rail wagons used	*Dry bulk wagons*
Type of loading units	*Block trains*

Shipper 5

Type of stakeholder	*Shipper*
Country	*Slovakia*
Main transport corridors	*Slovakia – BeNeLux - UK*
Type of commodities	*import: dry bulk (agriculture crops, cacao and wheat), export: containers*
Type of rail wagons used	*Different wagons depending on the type of commodity*
Type of loading units	*Block trains*

Shipper 6

Type of stakeholder	*Shipper*
Position	*Logistics Manager*
Main transport corridors	*Bulgaria – all over Europe*
Type of commodities	*(semi)- finished household appliances*
Type of rail wagons used	*Container wagons or conventional freight wagons*
Type of loading units	*Block trains*

Infrastructure Manager 1

Type of stakeholder	*Infrastructure Manager*
Country	*Poland*
Main transport corridors	*North – South & West – East (Rail Freight Corridor 8)*
Type of commodities	*All*
Type of rail wagons used	*All*
Type of loading units	*Different types*

Infrastructure Manager 2

Type of stakeholder	*Infrastructure Manager*
Country	*Bulgaria*
Main transport corridors	*East – West*
Type of commodities	*All*
Type of rail wagons used	*All*
Type of loading units	*Different types*

Other 1

Type of stakeholder	*Road Haulage Association*
Country	*Croatia*
Main transport corridors	*Croatia – Hungary/Bosnia and Herzegovina/other*
Type of commodities	*Any commodity that is possible to be transported*
Type of rail wagons used	*Not applicable*
Type of loading units	*Not applicable*

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