

STUDY OF RELEVANCE CRITERIA GOVERNING LONG-DISTANCE UNACCOMPANIED ROAD TRANSPORT

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ABSTRACT

Roll-on/roll-off (ro-ro) railway and seaway concepts refer to regular, frequent, heavy vehicle transport offers permitting modal transfer through concentration of goods flows on rail and sea itineraries. Existing experiences reveal that the success of such services depends on a number of prior conditions and requires the adhesion of road transport companies. Whilst unaccompanied transport appears to be a more economically relevant solution than accompanied transport, it does nevertheless impose major organisational constraints and meeting of market requirements. The study controlled by the Sétra and presented here reflects thinking on relevance criteria governing long-distance unaccompanied goods transport. Its aim is to understand how a road transport company would use an unaccompanied transport service and the conditions under which it would be ready to do so. The first part of the study comprised a bibliographical analysis of existing work on the subject. Thirty or so interviews is then conducted at French and Italian transport companies using the Autoroute Ferroviaire Alpine and the Toulon – Civitavecchia roll-on/roll-off seaway. Analysis of these interviews allows us to provide solutions to the problem raised by these transport modes.

1. STUDY CONTEXT AND AIMS

1.1. Context

For a number of years, growth in goods traffic, road network saturation and environmental concerns are as many factors, which have been prompting the European Union and national authorities to set up alternative systems to road transport that are both economically competitive and more respectful of our living environment. In particular, roll-on/roll-off railway and seaway concepts have been developed. These concepts designate heavy vehicle transport offers permitting model transfer through concentration of goods flows on rail and sea itineraries. Such services involve establishing viable, regular and frequent transport links; they distinguish themselves from conventional combined transport by the fact that the transported equipment is a road transport vehicle (tractor unit and semi-trailer). Moreover, such services can be implemented in accompanied transport mode (tractor unit and driver accompany the semi-trailer on the train or boat throughout the transport operation) or in unaccompanied mode (only the semi-trailer makes the rail or sea journey).

However, existing experiences reveal that successful launching and perpetuation of such services depends on a number of prior conditions, in particular the adhesion of road transport companies and freight forwarders. Carriers using these services must implement appropriate organisation not only in the case of accompanied transport, but also, and above all, in the case of unaccompanied transport. Whilst unaccompanied transport appears to be a more economically relevant and ecological solution, it does nevertheless impose major organisational constraints and market conditions and these are sometimes difficult to satisfy.

The General Head Office of sea and transport of the French Ministry of transport and equipment therefore decided to instigate reflection on relevance criteria for unaccompanied long-distance road transport of goods, with a view to clarifying State decisions in terms of developing this type of transport system. The present study, conducted with the Centres d'Etudes Techniques de l'Équipement (CETE) Méditerranée, Lyon and Nantes, is controlled by the Sétra.

1.2. Study aims

The purpose of the study is thus to prompt the emergence of relevance criteria for using a long-distance unaccompanied transport service within the scope of a road transport company's activity. This means understanding how a road transport company would use an unaccompanied transport service and the conditions under which it would be ready to do so, especially in view of pure road or accompanied transport options.

We will attempt to answer the following questions. Under what conditions are carriers ready to use long-distance unaccompanied services? What are the impacts on the carrier in work organisation terms? What advantages are there for the transport company? At what price? What is the impact in cost terms? What are the decisional criteria (price, overall distance, pre- and post-delivery distances, logistical area location, delivery times and compliance, security of equipment and goods, reservation system, driver status, customs formality performance, statutory and fiscal constraints, etc.)? Is there a threshold effect with respect to using such a service (company size, goods volume, transfer terminal distance)? Does resorting to this type of service depend on the company's activity (transport, logistics, etc.) and strategy? What types of companies are capable of setting up organisations for using this type of service?

2. BIBLIOGRAPHICAL ANALYSIS

Bibliographical analysis is specifically based on the documents quoted as references. Its aim is to provide initial clarification of the issues raised and to identify points requiring further detailed work. We note that most studies on the subject of roll-on/roll-off railways and seaways give extensive consideration to technical issues (capacity, etc.) and economic calculations (profitability, capturable traffic potential, etc.), but that potential user expectations and opinions are only rarely addressed. Bibliographical analysis reveals that the roll-on/roll-off railway or seaway market is effectively a road transport market, the customers of these services being road transport companies. Understanding the latter's requirements is therefore important to ensure that the roll-on/roll-off railway or seaway fall within the same logic.

2.1. Price

Transport price would seem to be an essential decisional factor for the shipper. Resorting to a roll-on/roll-off railway or seaway must therefore exclude additional cost for the transport company, the most frequent decision-maker in relation to transport mode. The total transport price (including pre- and post-delivery operations, cargo transshipments at terminals and rail or sea journey) must not be higher than the price of the corresponding door-to-door direct road journey.



Figure 1 – Transport chain for a roll-on/roll-off railway or seaway compared with road transport

In the SNCF Fret study [5], interviews conducted reveal a transport company tendency to differentiate the accompanied transport price from the unaccompanied transport price. The accompanied transport price under market conditions would be 0.8 €/km, calculated based on the equivalent current road transport cost for the same journey. Transport companies reckon that the price for unaccompanied trailers should be less than the price for complete units. The comparison factor is no longer the road transport cost for the same journey, but a hypothetical rail price. Average price indications around 0.6 €/km per unaccompanied trailer were advanced.

2.2. Reliability: delivery time compliance

Compliance with delivery times is a more determining parameter than transport rapidity and is often virtually as significant as the price criterion. Reliability is even more sensitive and important when using unaccompanied transport (driver waiting at terminal). Roll-on/roll-off railway and seaway services must therefore offer high quality of service and a service's durability is frequently referred to. Changes in a transport company's organisation induced by using such a service can only be implemented if the service offer is effectively durable.

2.3. Flexibility

Flexibility offered by road transport is reflected by availability and a capacity for responding to variations in the customer transport requirement. Amongst other things, this flexibility is ensured by ease in resorting to subcontracting, itself facilitated by ever greater competition between Eastern European countries. Moreover, road transport can be backed up by organisations such as staging points, which allow optimisation of working hours, improved productivity and reduction in delivery times.

Bibliographical analysis reveals that roll-on/roll-off railway and seaway services cannot provide flexibility similar to that offered by road transport. Nevertheless, the frequency proposed by roll-on/roll-off services is a significant factor for the road transport company. The possibility of occasionally using a transport service under accompanied transport conditions, when it is regularly used under unaccompanied transport conditions, also constitutes a flexibility factor. Finally, these services may offer the least constraints in terms of reservation or administrative formalities.

2.4. Transit time and time management

Transit time cannot be reduced by too much, yet transport rapidity does not necessarily seem to be a determining criterion, even though this notion of time is especially dependent on the type of goods transported. What appears more pertinent to using a roll-on/roll-off railway or seaway service is the transport company's time management and, in particular, his control of driver working hours.

2.4.1. *Accompanied transport*

In accompanied transport, time spent on a train or boat can be considered rest time under certain conditions (sufficiently long journey, couchette availability, etc.). In statutory terms, in France, any uninterrupted period of at least one hour, during which a driver's time is free, is considered a rest period. The compulsory daily resting time is 11 hours, but adjustments are possible (possible division into a maximum 3 periods with one period of at least 8 consecutive hours). A bed or couchette must be available to the driver during his daily rest time. Waiting times are not taken into account, when calculating rest time.

On the other hand, in the case of the Autoroute Ferroviaire Alpine, time on the train cannot be considered rest time (only a 3-hour journey and no couchettes) and therefore does not reflect a saving in terms of heavy vehicle driver remuneration. Time spent on the train is waiting time, which can be combined with a 45-minute break if need be, thereby limiting the company's "loss" in driver payroll terms. The driver can then retake the road as soon as he leaves the train, as long as his daily working hours are respected.



Figure 2 – Aiton terminal, Autoroute Ferroviaire Alpine (© Sétra)

2.4.2. *Unaccompanied transport*

A longer rail or sea transit time is usually more acceptable within an unaccompanied transport framework, especially if the journey corresponds to a night passage. The need to limit terminal waiting time to a minimum was expressed. Some studies propose a 15-minute time period for setting down/picking up a trailer and completing administrative formalities. In other cases, a waiting time of one hour is simply requested.

Finally, an essential factor is the "use", to which the driver could be put, after setting down a trailer, for example in an unaccompanied transport case. Thus, the "CATRAM" study [1]

reveals three types of terminal operating range, allowing establishment of a link between the pre- and post-delivery distance and the type of service (accompanied or unaccompanied) selected by the transport company:

- a sufficiently short distance allowing a driver to perform several rotations per day; an empty return can be accepted; an unaccompanied service would seem relevant;
- a distance of between 250 and 350 km (distance corresponding to a 4h30 driving time, the statutory time before a first compulsory rest of one hour) is suitable for unaccompanied service usage; the driver brings a trailer to the terminal and returns to his point of departure during his working day; empty return is difficult to accept in this case;
- a distance exceeding 350 km would seem suitable for accompanied service usage because it does not fall within conventional road transport schemes (break-time control, driving time, driver staging points, systematic search for triangular routes for irregular or unbalanced traffic).

However, interpretation of interview data will show us that time management depends on the carrier's specific organisation and the geographical characteristics of its customers. It is therefore difficult to derive conclusions, but these data can possibly provide guidelines for positioning a terminal.

2.5. Transport company size

The bibliographical analysis attempted to determine whether transport company size has an impact on accompanied or unaccompanied use of a roll-on/roll-off railway or seaway service. The "CATRAM" study [1] proposes a typology, based on the size of goods transport companies, which aims to compare company size and positioning with respect to the types of accompanied or unaccompanied services offered. This study highlights the organisational impossibility of small and medium road transport companies to use unaccompanied services and their strong reticence in using accompanied services due to the insufficiency of their flows. On the other hand, large groups are more likely to use these transport services and are capable, in principle, of implementing the network organisation allowing them to use unaccompanied services.

2.6. Conclusion of bibliographical analysis

At first sight, accompanied long-distance transport does not appear economically rational because of trailer, tractor unit and driver immobilisation. However, we have seen that many parameters affect the issue. Another example is the fragmented nature of the road transport sector in Spain and Italy, which may lend weight to the case for using an accompanied service to the extent that this requires no specific terminal traction organisation.

The bibliographical analysis reveals that there is fundamental link between rail or sea transit time, pre- and post-delivery distances (or times) and driving time organisation by the transport company. This relationship will be more closely examined in the following section.

More generally, the bibliographical analysis highlights transport company interest in using these types of services in the event of a satisfactory price - transit time – service offer. Transport companies do, however, question the benefit of casting doubt over an organisation, which gives satisfaction. It should also be stated that road congestion does not appear to be sufficiently extensive at present to encourage transport companies to change transport mode.

3. INTERVIEW PERFORMANCE

Around 30 interviews of French and Italian users of the Autoroute Ferroviaire Alpine roll-on/roll-off railway or the Toulon – Civitavecchia roll-on/roll-off seaway users were conducted to answer the questions raised above. These highlight, in particular, certain practices as well as adaptation of the road transport mode to using another mode. Interviews were conducted to gain experience feedback from using a service already in existence and not in relation to a projected new service. So, the idea of interviewing transport companies not using this service was ruled out because their answers would only have been declarations of intention provided without in-depth thought on work organisation and costs.

3.1. Two study services

The Toulon – Civitavecchia seaway is a roll-on/roll-off service operated by GLD Lines, offering accompanied or unaccompanied heavy vehicles transport between Toulon in France and Civitavecchia (near Rome) in Italy. The service offered comprises a departure every Tuesday, Thursday and Saturday in the Toulon – Civitavecchia direction and a departure every Monday, Wednesday and Friday in the Civitavecchia – Toulon direction. The sea journey takes 15 hours as a night passage.



Figure 3 – "Eurostar Valencia" roll-on/roll-off vessel in the port of Toulon (© CETE Méditerranée)

The Autoroute Ferroviaire Alpine is a roll-on/roll-off rail service initially developed as an experiment, but today its operation has been perpetuated. This service corresponds to an accompanied or unaccompanied transport offer for tankers and low-load semi-trailers transiting between Aiton (Maurienne valley) in France and Orbassano (near Turin) in Italy. The service offered comprises 4 departures per day in both directions, 5 days a week. The journey time is 3 hours. Rolling stock used (Modalohr railcars) allows simultaneous vehicle loading without vertical handling.

3.2. Methodology

3.2.1. *Preparation of interview record*

The working group prepared an interview record based on the study aims and information revealed in the bibliographical analysis. This full record is intended to assess in detail the transport company's context, activity (offer and demand), organisation and constraints and

to thereby understand the framework surrounding use of a roll-on/roll-off railway or seaway service.

The first part of the questionnaire therefore concerns the company and its activity. The following aspects are addressed: company general data, transport offer (traffic types, locations, available resources, reactivity, use of subcontracting, etc.) and transport demand (constraints, regularity, origins/destinations, etc.).

The second part of the questionnaire deals specifically with transport company usage of the roll-on/roll-off railway or seaway service. Reasons for using such a service are considered first: choice by default? Impact of road congestion? Who decides in terms of modal choice? Regular or occasional use? Advantages and drawbacks? etc. Accompanied or unaccompanied transport service usage is then more specifically addressed: What usage? Why? For which traffic? Organisation set up? Description of a few typical circuits? etc. This analysis is then performed with respect to the various criteria referred to above (cost, reliability and transit time compliance, flexibility and frequency, traceability, transfer terminal service); the view of the transport company, the accompanied or unaccompanied user of the service, is effectively studied.

Finally, the transport company is asked open questions and can thus transmit messages, in particular concerning his more general view of alternative modes to road transport and measures, which could encourage him to use them.

3.2.2. Interview preparation and performance

A letter introducing the study and its aims was sent to transport companies by the principal (The General Head Office of sea and transport). Study managers then contacted the French and Italian companies, ideally through their operations managers and/or operational directors. Interviews were conducted during the months of February and March 2007. The results presented below are therefore totally partial and have not yet been subjected to in-depth interpretation. Nevertheless, the combined results will be available in the spring of 2007 and their analysis will be presented during the 23rd World Road Congress in September 2007.

3.2.3. Port of Toulon survey

A 3-day survey of accompanied or unaccompanied drivers embarking or disembarking at the port of Toulon was conducted in preparation of the interview phase and to gain an initial view of traffic on the Toulon – Civitavecchia roll-on/roll-off seaway. This survey permitted collection of quantitative (vessel loading, duration of operations, tonnages, etc.) and qualitative (vehicle type, nationality, type of goods, transport company names, transport organisation, goods origin and destination, etc.) data.

Survey representativeness (number of vehicles surveyed / total number of vehicles) was 56%. A 21% unaccompanied transport rate was noted for these three days. Traffic imbalance in favour of the Italy – France direction (61%) and a 5% empty heavy vehicles rate were observed for this survey period.

With regard to origins/destinations, table 1 shows us that, whilst the great majority of traffic transits from or to France or Italy, some origins and destinations are further away: the United Kingdom, Belgium, Spain, etc. Concerning Italy, it should be noted that the area involved is to the south of Rome. These origin/destination data will be later cross-

referenced with accompanied/unaccompanied transport data and will thereby provide information in answer to the questions raised above.

Table 1 – Origins/destinations for Toulon – Civitavecchia seaway (3-day survey)

Origin \ Destination	Italy	France	Spain	Tunisia	United Kingdom	Turkey	Netherlands	Greece	unrecorded
Italy	-	46	11	-	2	-	1	-	2
France	52	-	-	1	-	1	-	1	1
Belgium	5	-	-	-	-	-	-	-	-
Spain	4	-	-	-	-	-	-	-	-
Tunisia	-	1	-	-	-	-	-	-	-
United Kingdom	1	-	-	-	-	-	-	-	-
Luxemburg	1	-	-	-	-	-	-	-	-
Portugal	1	-	-	-	-	-	-	-	-
unrecorded	1	-	-	-	-	-	-	-	-

In connection with the type of goods transported, the survey conducted during these 3 days reveals, in particular, high representativeness of the “chemicals” category.

3.3. Initial results

As stated above, transport company interviews are being conducted during drafting of this paper and the information available at present does not permit detailed analysis. The results presented here represent initial information in answer to the questions raised and not constitute the study final lessons. Detailed analysis of the final results will be presented at the 23rd World Roads Congress in September 2007.

3.3.1. *Type of companies concerned*

It would seem that the type of company using roll-on/roll-off railway or seaway services varies. Some are independent transport companies; others are agencies of large transport and logistics groups. It would appear that users of these services most frequently large companies with fairly high turnovers running long-distance international transport operations. Smaller companies are involved however: 80% of Toulon – Civitavecchia seaway users are small and medium enterprises (source: GLD Lines).

These companies are sustained by regular flows, but ensure organisational flexibility, in particular by resorting to subcompanies, when reacting to occasional demands. Finally, transport company location is most often linked to market proximity and customer production premises.

3.3.2. *Choice of using a roll-on/roll-off railway or seaway service*

First and foremost, it should be stated that the transport company decides almost systematically whether to use roll-on/roll-off railway or seaway services. The customer (shipper) simply imposes a performance obligation.

An economic argument is the first reason put forward by transport companies using these services. Using such a roll-on/roll-off service enables them to benefit from savings (often 20 – 30%) on the journey cost, on the one hand because of the pricing offered and, on the other hand, through vehicle immobilisation (savings on tyres, fuel, etc.). However, it should be noted that the pricing proposed by the AFA does not allow the true costs of the service to be covered.

Savings are also achieved in terms of managing driver working hours. In the case of a night passage lasted long enough, an accompanied transport driver is travelling during his rest time, which represents a saving for his employer. The unaccompanied transport organisation, for its part, allows the same turnover to be generated with less human resources.

Furthermore, safety (tunnels, mountain roads, etc.) and reliability (e.g. Fréjus tunnel closure) arguments favouring roll-on/roll-off services over road transport are also raised. Some transport companies also refer to the possibility of loading 44 tonnes, when using roll-on/roll-off services and “moving” the lorry during public holidays, when traffic restrictions are in force on the road.

Finally, several transport companies believe that using roll-on/roll-off services represents a “durable” solution, both in ecological and economic terms, because they reckon that the future of certain crossings, Alpine for example, will depend on solutions of this type. On the other hand, we note that, whilst congestion problems are quite strongly experienced by transport companies, especially in urban areas, these difficulties are in fact not a determining criterion for altering a company organisation or localisation.

3.3.3. *Accompanied or unaccompanied transport: which organisation?*

We observe that this type of service and the organisations set up are most frequently based on a specific traffic. There is no typical organisation and solutions are most often developed on a case-by-case basis in response to particular constraints.

A first case corresponds to setting up a complex organisational scheme in response to a specific traffic and whose characteristics and volumes are known in advance. The transport company can then implement “dedicated” means (equipment and drivers) and may be able to combine the use of accompanied and unaccompanied transport services and road journeys to optimise its transport plan. It can be supported by a partner or subcompany, but can equally set up its own independent internal organisation. For example, dispatching a first consignment by road or as accompanied transport can enable the transport company to provide a driver at the destination, who can manage the other semi-trailers transiting as unaccompanied transport. A return by road can, for example, be justified by the need to reload in a badly located area to envisage using the service implemented for the outward journey.

Another scheme corresponds to the case in which a French transport company sets up a partnership with an Italian counterpart (or vice-versa), for example for major, regular traffic flows. Using an unaccompanied transport service then appears to be more obvious, even though the transport company may resort to an accompanied transport service in response to certain emergencies. In this case, use of unaccompanied transport imposes extensive organisational costs (operation management) and establishment of cooperation to optimise the transport plan.

The transport company’s organisation would seem to be directed towards using the accompanied transport service for irregular or small traffic flows. In this case, there is no requirement for setting up a specific organisation.

This information would seem to indicate that using an unaccompanied transport service necessitates establishment of a complex organisation; the transport company must ensure

itself of regularity, durability and a sufficient volume of traffic flows before instigating this course of action.

3.3.4. Study services in the face of transport company requirements

The interviews would appear to provide clarifications in respect of the factors studied above.

It seems that price is effectively an essential criterion. French transport companies reckon that the proposed price allows an overall transport cost reduction of 5 to 20%. Transport companies are not prepared to pay more for the service, but some admit that, at equivalent cost, they would use the roll-on/roll-off railway or seaway.

Transit time is decreased in the case of the Toulon – Civitavecchia roll-on/roll-off seaway and is increased in the case of the Alpine roll-on/roll-off railway. This transit time variation is integrated into the transport scheme. For example, a transport company using the Autoroute Ferroviaire Alpine indicates that, to certain customers, it has proposed performing their transport on a day A / day C basis, enabling the company to use the first morning shuttle (day B) and to thereby negotiate a lower transport price for this fairly empty shuttle. Moreover, transit time reliability is a very important factor; interviewed transport companies considered the studied services reliable. This point is vital.

Whilst price and transit time compliance are obvious requirements, these interviews also reveal that roll-on/roll-off railway or seaway services must be capable of conforming, whenever possible, to flexibility requirements. We can here quote a transport company, who said, "For alternative modes to be attractive, we have ensured that they maintain the flexibility of the road: frequency, ease of loading and unloading". The need for a flexible reservation system and short administrative formality times was mentioned during the course of the interviews. The frequency issue is also often addressed, especially for the Toulon – Civitavecchia service, for which a daily departure is wanted; the current three weekly departures being considered insufficient. As described previously, the organisations set up would indeed justify this expectation.

4. CONCLUSION

It appeared necessary to interact directly with transport companies and to study the patterns and organisation adopted by these users in order to gain an understanding of relevance criteria governing roll-on/roll-off railway and seaway services. The number of interviews conducted remains fairly small and does not allow final and representative conclusions to be drawn at the time of drafting this communication. On the other hand, interpretation of all questionnaires will enable full presentation of study conclusions at the 23rd World Road Congress in September 2007.

Nevertheless, a number of initial facts can now be recorded in answer to the questions raised. Unaccompanied transport services represent, in principle, the most relevant usage from an economic standpoint because driver immobilisation leads to loss of productivity. Transport companies stress, in particular, the need for more efficient usage of both human and physical resources. The conducted interviews do nevertheless show that use of similar services under unaccompanied transport conditions most often demands a complex organisation with or without partners in the destination country. Costs generated by this organisation (e.g. dedicated resources) impose the need for large-scale, regular traffic. It would seem that large transport companies enjoying sufficiency in terms of both

flows and human and physical resources have more chance of implementing schemes permitting the use of unaccompanied transport.

However, use of roll-on/roll-off railway and seaway services is most often decided on a case-by-case basis. Depending on the constraints imposed by such traffic, the possible reloading locations and the offer proposed by the roll-on/roll-off service, any transport company, irrespective of its size, could set up an organisation enabling it to use these services under accompanied or unaccompanied conditions.

The choice of mode depends almost systematically on the road transport company, so the key issue resides in the quality of the proposed offer: the closer this offer to that of road transport, the more it is likely to interest the transport company. Price and reliability are vital; the latter would seem to be a factor with respect to which these services are especially well positioned. Service flexibility also appears to be a necessary requirement, high frequency (one departure per day would seem to be a minimum), in particular, is a criterion essential to ensuring that the transport company can establish an optimised transport plan.

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