rail freight; competitive ability; transport chains; supply chain; door-to-door

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BARRIERS TO AND ENABLERS FOR EUROPEAN RAIL FREIGHT TRANSPORT FOR INTEGRATED DOOR-TO-DOOR LOGISTICS SERVICE. PART 2: ENABLERS FOR MULTIMODAL RAIL FREIGHT TRANSPORT

Summary. The objective of this paper is to examine and identify barriers to and enablers for the European rail freight transport services as a transport chain partner along the supply chains in the changing market scenario. The changing market scenario includes, among others, requiring 'door-to-door' rather than 'terminal to terminal' and integrated service, competitive ability to attract non-rail cargo type, changes in the customer requirements (e.g. reliable service) and changes in the operational requirements and practices. Using a literature review method, the paper is presented in two parts. The part 1 focuses on the identification of barriers to the European rail freight service by reviewing freight logistics services for global supply chains followed by the current performance of European rail freight transport followed by a discussion on the rail freight market liberalisation in Europe. Then rail freight transport in the Unites States (U.S.) is discussed. The research notes that although the background, scope and necessity for reform measures in Europe differ from those of the U.S., some lessons can be learned and the main lesson is that an appropriate reform measure can enhance rail sector competitive ability in Europe.

The part 2 of the paper is dedicated to recommend some concrete steps and actions as enablers to remove the barriers identified in the part 1 to develop multimodal rail freight transport. The enablers for multimodal rail freight transport include:

- European rail freight transport market needs full liberalisation so that incumbent and new entrants can compete freely.
- The rail operators need to acquire service (e.g. customer tailored services, door to door service) quality offered by road freight operators.
- They need to conduct a combination of ‘terminal-to-terminal’ and door-to-door operations, as and when needed;
- They must build partnership with freight forwarder or 3PLs to include all types of customers including SMEs and customers of non-rail (low density high value) cargo.
- They need to use the consolidation centres that facilitate bundling of cargoes in particular for the urban areas which are the location of majority European customers.

BARIERY I MOŻLIWOŚCI DLA EUROPEJSKIEGO PRZEWOZU TOWARÓW KOLEJĄ DO ZINTEGROWANEJ OBSŁUGI LOGISTYCZNEJ DOOR-TO-DOOR. CZĘŚĆ 2: CZYNNIKI WPŁYWAJĄCE NA MULTIMODALNY TRANSPORT TOWARÓW KOLEJĄ

Streszczenie. Celem niniejszego artykułu jest zbadanie i zidentyfikowanie barier oraz możliwości dla usług europejskiego przewozu towarów koleją jako partnera łańcucha transportowego wzdłuż łańcuchów dostaw w zmieniającej się sytuacji na rynku. Zmiana sytuacji na rynku obejmuje między innymi potrzebę „door-to-door", a nie „terminal-to-terminal" oraz usługi zintegrowane, konkurencyjną zdolność przyciągania niekolejowych typów ładunków, zmiany wymagań klientów (np. niezawodny serwis) oraz zmiany w wymaganiach operacyjnych i praktykach. Z zastosowaniem metody przeglądu literatury artykuł jest przedstawiony w dwóch częściach. Część 1 koncentruje się na identyfikacji barier dla usług europejskiego przewozu towarów koleją przez przegląd towarowych usług logistycznych dla globalnych łańcuchów dostaw, a następnie przez bieżącą wydajność europejskiego transportu towarów koleją, po czym przez dyskusję na temat liberalizacji rynku przewozu towarów w Europie. Omówiony został przewóz towarów koleją w Stanach Zjednoczonych (USA). W badaniu zauważono, że choć tło, zakres i konieczność działań reformatorskich w Europie różnią się od tych z USA, można wyciągnąć pewne wnioski, a główną lekcją jest to, że właściwym środkiem reformy można zwiększyć zdolności konkurencyjne sektora kolejowego w Europie.

W części 2 artykułu zaproponowano konkretne kroki i działania umożliwiające usunięcie barier rozwoju multimodalnego transportu kolejowego transportu towarowego zidentyfikowanych w części 1 artykułu. Czynniki wpływające na multimodalny transport towarów koleją to:

- europejski rynek przewozów towarów koleją wymaga pełnej liberalizacji, tak aby obecne i nowe podmioty mogły swobodnie konkurować;
- operatorzy transportu kolejowego muszą pozyskiwać jakość usług (np. usług dostosowanych do indywidualnych potrzeb klienta, serwis „door-to-door") oferowanych przez operatorów transportu drogowego;
- operatorzy muszą przeprowadzać kombinacje operacji „terminal-to-terminal" i „door-to-door", jeśli i kiedy jest potrzeba;
- operatorzy muszą budować partnerstwo ze spedytorami lub 3PL dla wszystkich klientów, w tym małych i średnich przedsiębiorstw oraz klientów nie transportujących koleją (mała gęstość, wysoka wartość);
- operatorzy muszą korzystać z ośrodków konsolidacyjnych, które ułatwiają pakowanie ładunków, w szczególności na obszarach miejskich, co występuje w przypadku większości europejskich klientów.

1. INTRODUCTION

The objective of this paper is to recommend enablers to remove the barriers to the European multimodal rail freight transport services as a transport chain partner along the supply chains in the changing market scenario. The changing market scenario includes, among others, requiring 'door-to-door' rather than 'terminal to terminal' and integrated service, competitive ability to attract non-rail cargo type, changes in the customer requirements (e.g. reliable service) and changes in the operational requirements and practices. Using a literature review method, the paper is presented in two parts. The part 1 identified the barriers by reviewing freight logistics services for global supply chains followed by an assessment of the current performance of European rail freight transport followed by a discussion on the rail freight market liberalization in Europe. Then the rail freight transport in the Unites States (U.S.) is reviewed. The study noted that although the background, scope and necessity

for reform measures in Europe differ from those of the U.S., some lessons can be learned. Then the UK rail reform was examined with a question on board whether it is a good example in the changing market scenario. Taking the example of British railway reform, the paper argued that the European rail can be more competitive by removing the barriers identified in the part 1.

To remove the barriers, the next section recommends some clear steps and actions as enablers for a competitive multimodal rail freight transport service followed by summary and conclusion in section 3. Further research areas are suggested in section 4.

2. ENABLERS TO REMOVE BARRIERS TO EUROPEAN RAIL FREIGHT TRANSPORT

This section recommends some enablers that the European rail freight operators need to adopt a new operational approach in the new market scenario. To remove the barriers identified in part 1, the new approach includes a set of actions and steps, discussed below, such as adoption of an appropriate reform measure and its appropriate and timely implementation; integration within the transport chain for door-to-door service; removal and/or simplification of border crossing; a consolidation service for the extension of the customer base; efficient operation of SWL and SWL groups; improved productivity and transhipment terminals.

2.1. Reform measures and implementation

Due to the differences of background, needs and context, the European rail freight industry cannot copy the reform measures implemented in the U. S., but lessons can be learned. Lessons from the UK rail freight operation however, are easier for Europe to apply, since they share common background and history. Possibly the main lesson, from both examples, is that an appropriate reform measure, correctly implemented, will enhance the performance of the European rail freight operators. The European Commission has adopted many reform measures that have liberalised the market to a certain degree, but many countries have been half-hearted in their reform or have abused loopholes (e.g. the lack of clear guidance on the separation of operation from infrastructure). The rail freight performance described earlier demonstrates that the reform measures have not been enough to improve efficiency and competitiveness to the level of the U.S. or UK. Taking together recent rulings from the European Court of Justice, and the complaints noted above, it is clear that some infrastructure managers are not working independently towards incumbent and new entrant private rail freight operators. As a result, the market is distorted that hampers progress in building a competitive operational environment for European rail freight industry. The European Commission needs to address the issue, by providing a clear set of rules, removing any loopholes and ambiguities about the deadline for separation of infrastructure and operations, and providing both implementation deadlines and penalties for non-performers. Without this there can be little hope of achieving a dramatic change in the performance of the European rail freight sector, such as that which has taken place in the U.S.

2.2. Door-to-door service

Only a small part of total cargo movements starts and finishes at rail (or other) terminals. An efficient, effective and reliable freight transport and logistics service generally requires a door-to-door transport service, served by a number of transport chain actors. Depending on many factors, including distance between the origin and destination, shipment size, frequency of shipment, cargo type (e.g. time sensitive - flowers, high value - automotive parts, low density - toilet paper, insulation materials), the freight transport function can be performed by a uni-modal (e.g. truck only) or multimodal (e.g. road + rail + road) system. Multimodal transport is not just the involvement of two or more modes of transport. Islam et al. [1, p.384] states that ‘Multimodal transport includes carriage by at least two different modes and international multimodal transport covers the door-to-door movement of goods while under the responsibility of a single contract’. Thus rail freight transport has to be integrated into this door-to-door service operational model. It must also form part of a single contract for the service.

Currently, rail freight operators offer a shuttle service between two terminals, which is, in most cases, only an operational segment of the total door-to-door service required. Hence, rail freight operators must integrate their services with other transport chain actors. For this, it is vital that all transport actors in the supply chain - including effective and efficient modal transfer points, SWL and Full Train operators, road hauliers and/or 3PLs, and shippers/consignees - work together, as true partners.

2.3. Removal and/or simplification of border crossing

Despite an absence of physical border control for almost all other services, this function is very much alive - in a negative sense - in the case of rail freight operation in Europe. UIRR [2, p.11] reports that 88% of road-rail combined transport consignments passed through at least one border in 2012. Here, a consignment corresponds to the transport capacity of one lorry on the road equivalent to 2.0 TEUs. RETRACK [3, p.5] reported border waiting time ranging from 2.5 hours (in Western European countries, such as between the Netherlands and Germany), to 7 hours (Eastern European countries, such as between Hungary and Romania). In contrast, road freight transport is not affected by border crossing related delays. From the experiences of pan-European services, under recently completed studies such as RETRACK [3 - 5] and CREAM [6; 7], it is evident that the simplification and/or removal of border control processes will significantly improve the productivity, competitiveness and overall operational capacity of the rail freight service. Another important problem in pan-European rail freight service operation is the inconsistent national rail networks. So an interoperable network and well-coordinated management of network (Infrastructure Managers – IMs), managed under an umbrella authority with responsibility and authority, such as ERA [8], will be vital. The necessity is also evident from the self-explanatory title of the EU's Transport White Paper 2011: 'Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system' [9].

2.4. Consolidation service for extension of customer base

Another aspect of current European (and many other) rail freight transport systems is a customer base that consists of large shippers/consignees (e.g. coal to power plants) and voluminous, low value cargo. In fact, small and medium size enterprises (SMEs) form a significant portion of total freight volume transported. The rail freight operators have failed to attract these SME customers in their customer base. It is not too difficult to include them in their customer list; for example they can do so by employing the services of road hauliers, freight forwarder or third party logistics (3PL) service provider. Islam et al. [1, p. 387] states that 'A freight forwarder is not usually a carrier but an intermediary between cargo interests and the carrier, who arranges goods carriage from origin to destination, but does not undertake carriage or accept liability as a carrier'. Another approach might be forming an alliance and partnership with the trucking companies, for a last mile solution, or for pick-up from origin and delivery to destination. A third approach, complementary to the second approach of alliance and partnership, can be extending its reach by having its own trucking fleet in different major cargo origin/destinations. Consolidation service centres (CC) in rail terminals permit scheduled rail freight services to be operated between two hub terminals (see figure 6). The CC can be public (for multiple users) or dedicated (to one user) freight forwarder(s), or be run by an extended arm of the rail freight operator.

Morlok and Spasovic [10] found that, despite its relatively short distance compared to the rail movement, drayage (trucking portion to offer door-to-door service) accounts for a large part of intermodal, (or multimodal), origin to destination costs and is a major factor in service quality, as perceived by the shipper. Morlok and Spasovic [10] suggested that, by redesigning the total operation, substantial cost savings could be achieved. Along this line, there is positive news that the development of door-to-door rail multimodal services in Europe is in progress. For example, DB Schenker Logistics [11] claims that 'as a specialist in European land transport, both by road and rail, DB Schenker Logistics connects all of the important economic regions in over forty European countries via a dense network of regular scheduled services.' Lloydsloadinglist.com [12] reports that Avtrde (a UK based Global Aviation Component Services Provider) has selected DB Schenker to store, manage and

provide local logistics services to support its Dubai and Singapore based operations. Other European rail operators can follow such operational and marketing steps, in order to offer a door-to-door service.

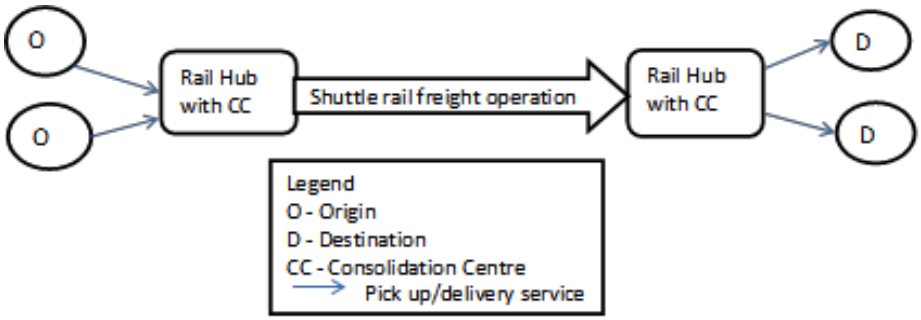

Fig. 1. Multimodal rail (with shuttle) freight service operation [source: The Author]
Rys. 1. Multimodalny transport towarów koleją (z promem) [źródło: Autor]

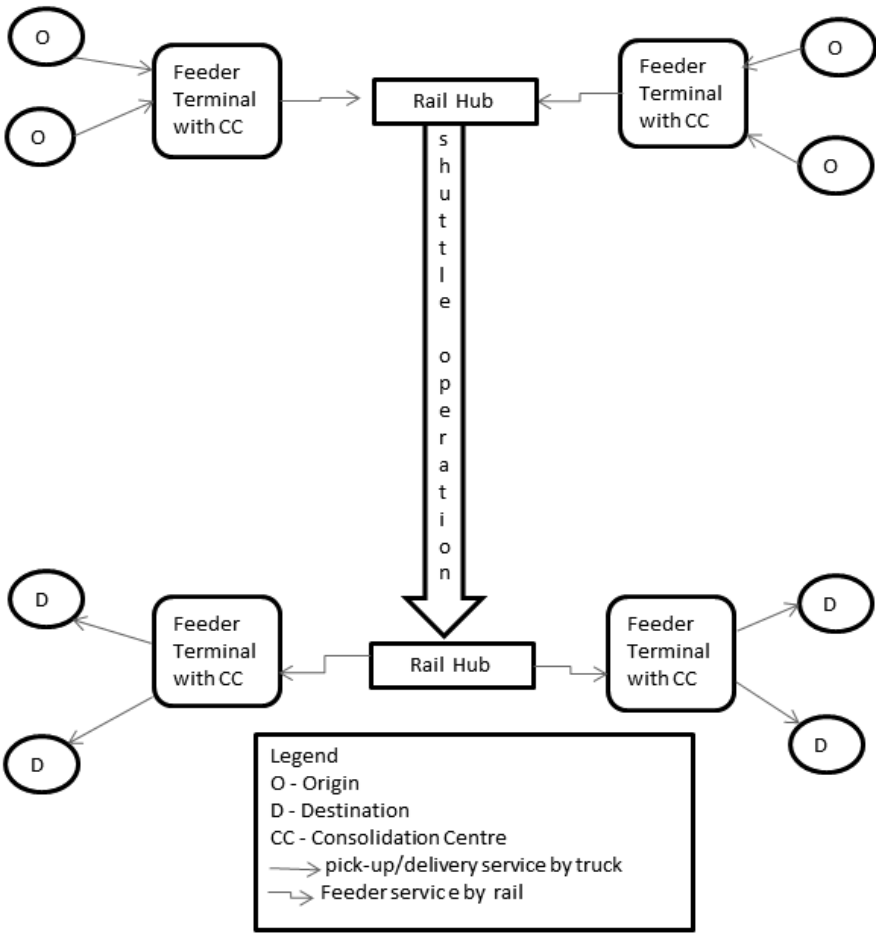

Fig. 2. Multimodal rail freight (with feeder and shuttle) service operation [source: The Author]
Rys. 2. Multimodalny transport towarów koleją (z podajnikiem i promem) [źródło: Autor]

2.5. Single wagon-load (SWL) and wagon groups

Marinov et al. [13, p. 7] notes that the concept of SWL 'services is in favour of capillarity and normally implies that one wagon will form the composition of more than one train, as it completes its journey from origin to its destination'. Thus the transport of SWLs forms an important part of total supply and transport chains for Europe. Consolidation, or bundling of SWL and wagon group, is conducted from the feeder line to the rail hub, for Full Train Load between Hubs, and for block and shuttle trains. But UIC [14] reports that most of the European Railway operators are losing money with their SWL operations, although it is claimed that the RETRACK rail freight operator successfully operated such SWLs and wagon groups, by applying a hub and spoke model [15; 16] without consolidating the cargoes of SMEs (discussed in previous approach) and other major customers. Woroniuk et al. [17, p. 83] suggests that the operation of the block and shuttle trains is less complex than the operation of SWLs. They found that by employing these block and shuttle trains service on average a freight growth of 5% to 10% were achieved on some major European rail corridors. To support such services, a feeder line operator can consolidate the cargoes of SME customers at the CC at rail terminals (see figure 7), on some of the major, longer corridors. Further research is needed to explore such a crucial issue.

2.6. Improved productivity

Railway productivity is noted as a key issue in many applied research papers [e.g. 4; 7; 18] and other documents [e.g. 8; 9] and reports [e.g. 19; 20), since improved productivity will increase competitiveness. There are many ways of improving rail's productivity. For example: CREAM [7, p. 44] suggests that rail's productivity can be improved, by the optimised exploitation of traction resources; higher operational flexibility; reduced shunting costs at rail yards; improved reliability of services; reduced border stopping times; and reduced border station occupation times, with consequently reduced transit times. In the search for higher productivity, the MARATHON [18] study considers four main drivers: rail freight capacity generation; an increase in commercial speed, leading to better service; traffic bundling (discussed in previous section), for economies of scale; and reduced operating costs. With these drivers, the study argues for the operation of faster, longer and heavier freight trains on selected European routes. K+P Transport Consultants [20] suggest that by introducing longer or heavier trains, 35% of train-kilometres could be saved. Similar opinion (i.e. 30% productivity gain through longer and heavier trains) is expressed by UIRR [2, p. 3]. Another important way of gaining productivity is to conduct advanced capacity management. The problem with the measurement of rail freight productivity lies in the fact that it is far from clear what is meant by 'productivity.' Is it productivity of the rolling stocks (that includes wagons and engines) for the whole year, or for the operational period, or and/or how many days per year? SPECTRUM [21, p. 71] study proposes an innovative rail freight operation for low-density high value (LDHV) cargo to achieve higher asset utilisation, operating on 300 days per year - a considerable increase compared to current practices (in the rage of 250-260 days a year). According to the schedule of the Port of Felixstowe, UK rail freight operators operate six days per week, which represents a 14.3% loss of available capacity. Perhaps 'rail freight capacity' might be a better phrase than 'productivity' here. It is understandable that train drivers need at least a day off - they can't work 7 days per week. Also it is questionable whether a 24/7 usage of a locomotives is possible. They need resting and/or maintenance period. Besides, the track might need maintenance as well and indeed the rail freight resources such as rolling stock and drivers might well be employed on Sundays as well. And such examples are not necessarily a good guide to improved productivity (i.e. efficiency) of operations, but there is a loss of capacity for moving freight. Rolling stock that carries full loads and returns empty (which is mostly the case, due to imbalance of trade) gives on average a 50% load factor, although some [e.g. 22] claims of 60% load factor. A further research is needed to properly understand railway productivity and its current measurement practices and to recommend - what should be done for improved productivity.

2.7. Efficient and effective transhipment terminals

Ballis and Golias [23, p. 421] suggest that a typical road-rail terminal may have the following elements: rail sidings for train/wagon storage, marshalling and inspection purposes; transhipment tracks for train loading/unloading operations; storage or buffer lanes for different intermodal loading units (ILUs) such as swap-bodies, ISO containers and semi-trailers (i.e. the rear parts of trucks, including wheels); loading and driving lanes for trucks; and gates with an internal road network. For an efficient rail freight operation, particularly for LDHV cargo, SPECTRUM [21, p.24] study includes in its criteria for transhipment terminals: per unit time handling capacity (of train/truck/ILU; storage (spatial) capacity; the ability to tranship different ILUs -trailers; handling time and cost. Hansen [24, p. 385] suggests that 'the development of intermodal container transport is hampered in part by the cost associated with the shunting of trains in marshalling yards, inland and port railway terminals'. Mertel et al. [25] emphasises the efficient usage of transhipment terminal capacity, with appropriate handing equipment for different types of ILUs. The ILUs have different dimensions that require different sets of handling equipment in inland and maritime terminals. ISO containers have standard sizes (e.g. 20ft, 40ft, 45ft long), developed over a long period of time, originally for maritime transport and subsequently for pre- and post-haulage beyond maritime ports, with corner fittings and strong side walls. Thus terminals worldwide are equipped with standard handling equipment [26]. Continental Europe extensively uses 'swap-bodies' - (European) standard freight containers, conforming to Euronorms EN 283, EN 284 and EN 452 for construction and design, as well as EN 13044 for marking and identification, used for road and rail transport. As the structure of the swap body is light (compared with ISO containers), it is less suitable for waterways transport, due to stacking limitations. Swap bodies give certain advantages over ISO containers e.g. higher utilisation of capacity, by accommodating standard pallets. Road freight transport operators in Europe, using swap bodies, enjoy the extra advantage that they offer loading/unloading from three sides: back and two sides, or curtain sides, instead of steel walls. In contrast the loading/unloading to and from an ISO container is only performed from the rear and will require handling equipment (such as forklift) at the origin, destination and intermediate (transhipment) points. Transhipment terminals are generally equipped with such tools, but origins and destinations, if they are final customers, are generally not. Transhipment terminals can be private - dedicated to a particular operator - or public, with open access to all operators. It is expected that a terminal built by public money be open access, to multi-operators, on a non-discriminatory basis [2, p.10]. Rail freight wagons are currently suitable for carrying ISO containers and swap bodies, but the transport and transhipment of semi-trailers by rail requires extra activities, due to its non-standard size, wheels and corner fittings. All in all, given the complexities of different loading units, rail transhipments terminals must be equipped with all appropriate equipment, have sufficient sidings for railways and be efficient in loading and unloading cargo units.

3. CONCLUSION

The objectives of this paper are firstly to examine the competitive ability of European rail freight transport operators as a transport chain partner along the supply chains in the changing market scenario; to identify the barriers to the competitive ability and then to recommend some steps and actions as enablers to improve their competitive ability. Using a literature review method, the paper is presented in two parts. This part 1 concentrated on identifying the barriers to an efficient and competitive European rail freight transport system. The second part concentrated on recommending enablers for the system. To understand modern concepts, practices and trends, the paper discussed freight logistics services, for global supply chains. The current performance of rail freight transport is then discussed and compared to road freight transport, followed by a necessity of discussion on rail freight market liberalisation, together with a brief background, history and a look at the operational complexities in Europe. The study found that the liberalisation was not fully implemented in many countries that are a barrier to achieving competitive ability of rail operations. The study notes that, although the background, scope and necessity for reform measures in Europe differ from those of the

U.S, a lesson can be learned that an appropriate reform measure will make rail freight sector competitive. With the pan-Pacific examples of railway reforms, and ostensibly successful rail freight operations, the study found that although most customers require door-to-door and integrated services but, currently, European rail freight operators offer terminal-to-terminal services for big customers and do not include SMEs - which form a large proportion of the total freight market - in their rail freight customer list. This suggests that a different approach is needed to capture this segment of the market, for example the use of third party logistics (3PL) services. The study recommends the following steps:

- European rail freight transport market needs full liberalisation so that incumbent and new entrants can compete freely.
- The rail operators need to acquire service (e.g. customer tailored services, door to door service) quality offered by road freight operators.
- They need to conduct a combination of 'terminal-to-terminal' and 'door-to-door' operations;
- They must build partnership with freight forwarder or 3PLs to include all types of customers including SMEs and customers of non-rail (low density high value) cargo.
- They need to use the consolidation centres that facilitate bundling of cargoes, in particular for urban areas which are location of majority of the European freight transport customers.

4. FURTHER RESEARCH

Identified through the literature reviews, future research will be needed to explore the following issues:

- Performance measures are an important tool to improve a service. The study finds that in-depth research is needed to measure the productivity of the European incumbent and new entrant rail freight operators, with particular focus on the current practices of asset (rolling stock, engines) utilisation; the true state of punctuality and what is responsible for the late arrival of freight trains; path allocation to railway undertakings (freight versus passenger); and capacity management of infrastructure.
- Identification of strengths and weaknesses of current practice in SWL operation on some major routes, including suggestions for route-specific, effective business models.
- Identification of barriers to the integration of railway undertakings with door-to-door transport chains and the associated steps required to break them down.

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Received 13.03.2013; accepted in revised form 27.08.2014