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BARRIERS TO AND ENABLERS FOR EUROPEAN RAIL FREIGHT TRANSPORT FOR INTEGRATED DOOR-TO-DOOR LOGISTICS SERVICE. PART 1: BARRIERS TO 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. Examining and identifying the barriers in the part 1 (with the pan-Pacific examples of rail freight transports), the part 2 of the paper focuses on recommending clear actions and steps as enablers for the rail freight industry in general and operators in particular. The research in part 1 of the paper finds that:

- In many European countries, the rail freight market is not fully liberalised. In such market segment, infrastructure managers do act independently for incumbents and new entrant operators that hamper the progress of building a competitive market;
- The rail operators have not yet achieved the service quality (e.g. customer tailored service) needed for the modern supply chains;
- They operate ‘terminal-to-terminal’ but modern supply chain needs door-to-door service;
- They act primarily for the ‘terminal-to-terminal’ chain; but modern supply chain needs total transport chain; not a part of it.

BARIERY I MOŻLIWOŚCI DLA EUROPEJSKIEGO PRZEWOZU TOWARÓW KOLEJĄ DO ZINTEGROWANEJ OBSŁUGI LOGISTYCZNEJ DOOR-TO-DOOR. CZĘŚĆ 1: BARIERY MULTIMODALNEGO TRANSPORTU 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. Przy zastosowaniu metody przeglądu literatury artykuł składa się z dwóch części. 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 (U.S.) 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. Część 2. artykułu skupia się na rekomendowaniu jasnych działań i kroków jako szans dla branży przewozu towarów koleją, a w szczególności dla operatorów. Badania w części 1. artykułu pokazują, że:

- w wielu krajach europejskich rynek kolejowych przewozów towarowych nie jest w pełni zliberalizowany. W takim segmencie rynku, zarządcy infrastruktury działają niezależnie dla starych i nowo wchodzących operatorów, co utrudnia postęp budowy konkurencyjnego rynku;
- operatorzy kolejowi nie osiągnęli jeszcze jakości usług (np. dostosowanie usług dla klienta) potrzebnej w nowoczesnych łańcuchach dostaw;
- działają w sposób „terminal-to-terminal", a nowoczesny łańcuch dostaw wymaga usług „door-to-door";
- działają przede wszystkim dla łańcucha „terminal-to-terminal", a nowoczesny łańcuch dostaw wymaga całkowitego łańcucha transportowego, nie tylko jego części.

1. INTRODUCTION

A freight transport service is a derived demand created through an agreement between a buyer, situated in one place, and a seller, situated in another. The agreement is either to sell, or to buy goods, under certain conditions (e.g. price, quantity, time), for the purpose of either trade or final consumption. It is a derived demand because it is created only when there is a necessity of movement (or another form of value addition) of the product from one place to another. The buyer may buy the product for further value addition (raw material for manufacturing or semi-finished products for assembling in a factory) or to sell in the market (e.g. retailers) or to sell to the final customer, for consumption. Although Great Britain, Western Europe and the United States (U.S.) were the birth places of modern manufacturing, plants – both manufacturing and assembly - have slowly moved from the West to the East, in search of low production costs. Countries such as India, China, and Indonesia have turned into global factories, producing for global customers, including the West. Even within the developing world, the movement of manufacturing plants continues, with countries such as Bangladesh able to lower the cost of manufacturing inputs (e.g. labour) still further. For example, in the garment-manufacturing sector, Bangladesh is now the second largest exporter in the world, behind China.

Following manufacturing, or assembly, products are transported to the global market. The Western (developed) countries are hosting both assembly plants (for such products as cars) and high value-adding factories (for such products as sophisticated weapons, commercial and fighter planes). The effect in European countries has been a decline in export volume of such consumer goods and an increase in imports from Far East through major ports and in containers [1]. This change in production and consumption patterns can be further understood from the fact that in 2011 the major net (exports minus imports) exporting countries were: Russia (139 billion EUR), China (111), and Japan (58 in

2010), while the United States and the EU-27 were net importers, with 562 and 160 billion EUR respectively [2]. This demonstrates a clear change to freight transport customer types in Europe (and other developed countries), necessitating a different set of service offerings and a revised marketing approach from freight transport and logistics service operators and other relevant transport chain partners. There has been another change in the attitude towards the way goods are moved. Increasingly, buyers, sellers and other stakeholders - such as government, or consumers - are considering negative environmental impacts (e.g. pollution, noise) as an important issue, caused by transport services. Compared to other transport modes, such as road, rail transport is seen as environmentally friendly, as it emits lower greenhouse gases (e.g. CO2). However, rail freight operators cannot be complacent about this environmental image. They must offer a competitive and reliable service, to shippers and consignees, to make the supply chain competitive. There can be three types of logistics service: freight logistics, container logistics and vessel logistics. Freight logistics can be defined as that part of the supply chain process that focuses on moving goods (e.g. in containers) along a transport chain. Container logistics optimizes the movements of the containers (or other) themselves - an operation that is directly linked to vessel or vehicle logistics, which is concerned with maximizing vessel/vehicle utilization [3]. As a comprehensive approach, the current paper addresses all three types of logistics, although major focus is on the competitive performance of rail freight logistics, as a partner, along the transport and supply chain.

1.1. Objective

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 or point-to-point rather than terminal to terminal 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.

1.2. Methodology and structure

Using a literature review method, the paper is presented in two parts. The part 1 focuses on identifying barriers to competitive rail freight transport service in Europe. For this the freight logistics services for global supply chains is discussed in section2. The European Union (EU) aims to establish a sustainable, competitive and reliable freight transport sector. Towards this, the EU Transport White Paper [4] sets a target of modal shift of 30% by 2030, and of 50% by 2050, from road freight transport for distances over 300km to rail (and waterways) transport. The freight logistics service is a partner of global supply chains. The rail freight industry in general and operators in particular need to understand this modern concept and practice accordingly. They need to follow recent trends linking their abilities, requirements of the market and setting strategies of rail freight transport operations. Then the performance of European rail freight transport is examined, in comparison to road freight transport (in section 3). This is followed, in section 4, by a discussion of rail freight market liberalization in Europe and, in section 5, rail freight transport in the U.S. Rail reform in the UK forms section 6. The research in the first and second segments identifies the factors and issues for making European rail freight transport operational competitive, effective, reliable, which in turn point towards the part 2 of the paper.

Examining and identifying the barriers in the part 1 (with the pan-Pacific examples of rail freight transports), the part 2 of the paper focuses on recommending actions and steps as enablers for the rail freight industry in general and operators in particular.

2. FREIGHT LOGISTICS SERVICES FOR THE GLOBAL SUPPLY CHAIN

In a competitive market, many companies see an efficient and effective logistics service as a means of creating differentiation, obtaining competitive advantage over competitors and retaining customers

[5]. Freight logistics is generally about adding ‘place utility’ to a product; for example, the product needs to be moved, from one place in one country, to another place in another country [6, 7]. The product could be a raw material, to be processed in a factory (adding ‘form utility’), thus it will need supply or material management;, or a semi-finished product, requiring further value addition, in a factory in another country, to turn it into a finished product. Finished products are then sold in the market, in different countries, requiring physical distribution and global distribution management. The movement of products (the carriage terminology is goods or cargo or freight) is known as freight transportation [8]. During transportation the product may need to be stored (i.e. the warehousing element of logistics), either adjacent to the factory or in a suitable place along the transit route, possibly in another country. This period of storage adds a further dimension of logistics: ‘time utility’. Factories obtain supplies from all over the world and, after adding ‘form utility’, sell their products in the global market place. A supply chain may need different types of storage: raw material ‘waiting for inbound supply’ to factory; ‘waiting for production in factory’; and the finished product ‘waiting for physical distribution’ (to be sold, or to the customer). In this process, Langley et al. [7] notes that companies seek to rationalise their global networks and introduce the important ‘global’ or ‘worldwide’ aspect into the arena of freight transport, logistics and supply chain. Inherently, this imposes challenges, including a higher level of volatility of supply and demand, due to the varying ability and quality of different partners along the transport and supply chain. For example, there is huge variety in the transport infrastructure condition, quality and capability of China, Russia and the European countries [9] yet, in a supply chain involving partners from all these countries, each must play a significant role in making it competitive, effective and reliable. A good transport infrastructure in just Europe, or China, is not enough to achieve this.

On occasion, supply chain unreliability and volatility can come from sources beyond the control of the supply chain and transport chain partners, for example from natural disasters. The unprecedented 2011 Tōhoku (Japan) earthquake and subsequent tsunami, on 11 March 2011, killed and injured thousands of people, destroyed thousands of houses, offices and factories and dismantled transport infrastructure, as well as many supply chains, e.g. Nissan’s UK car manufacturing transplant that receives inputs from, among others, Japanese manufacturing plants. However, to minimise the more usual and frequent volatility in the modern supply chain, the freight transport and logistics service providers, as supply chain partners, have an important role to play in providing a time- and cost-effective, reliable service. Achieving such a competitive and effective supply chain requires a competitive market environment and marketing strategy, including supply chain partners with the resilience capacity to respond to such occasional, or regular, volatilities. Many actors must play their part to achieve such a service, including transport chain actors, third party logistics service providers, port/terminal operators, port authorities and customs and border control agencies [8].

A transport chain may consist of so-called transport legs: deep sea (e.g. Singapore port to Rotterdam port in the Netherlands); short sea (e.g. Chittagong port in Bangladesh to Singapore port; and inland transport (by road, rail or waterways) at both ends of the transport chain. Depending on the final destination, the inland leg may need a combination of road and rail, or road and waterways, transport. There can be a variation in the demand and supply of freight transport and logistics services, due to scope, understanding, practice and the needs of customers, where concepts and practices such as just in time (‘JIT’), or ‘Push’ and ‘Pull’, play an important role. To determine an optimal inventory level, concepts such as JIT or ‘Pull’ technique are often applied, implying that the buyer will receive the product only when it is needed. This concept aims to have an effective inventory level of “zero” or “near zero” to eliminate/reduce the inventory cost (including capital and interest). The frequent and smaller shipment size associated with “zero” or “near zero” inventory, means a higher transport cost. It will also require a higher level of reliability in its transport service. The frequent transport service needs may lead to more environmental damage, by emitting higher CO2, for example.

A typical shipper (or consignee) is interested in buying a transport service from a single operator (say an international shipping line, or a multimodal operator) who will take responsibility for the completion of all legs, not just deep sea, or inland. For this, the shipping line may subcontract the inland transport to a rail freight operator, known as ‘carrier haulage’. Alternatively, the shipper may take the responsibility for the inland transportation, which is known as ‘merchant haulage’ [45].

Notteboom and Winkelmans [10] suggest that maritime shipping lines try to enhance the share of carrier haulage in Europe by, for example, establishing partnerships and alliances with shuttle train operations. To achieve a higher level of integrated transport service, by moving from 'push' logistics to 'pull' logistics, Monios [11] suggests an extended gate terminal haulage concept, where some of the traditional terminal activities, performed in a maritime port, are moved to an inland terminal, or port/depot. Depending on factors such as cargo type (e.g. high or low value, time sensitive), frequency and shipment size, distance, transit time etc., the inland, as well as total, freight transport service options can be determined, by either shippers, consignees, shipping lines or multimodal operator, depending who is in control of the transport chain. Notteboom and Winkelmans [10] suggest that the international shipping lines face obstacles in expanding the network of rail intermodal services, due to, among others, the fact that the European railway sector is partly liberalised. This liberalisation is addressed in the next part of this paper.

Rodrigue and Notteboom [12] suggest that the 'push' logistics system involves a limited level of integration between suppliers, manufacturers and distributors. In contrast, a 'pull' logistics system aims to achieve a higher level of efficiency, through integration and synchronization. For such services, the question is whether rail can be a partner in the pull logistics chain, or whether it will continue its activity in the push logistics chain, in a more segmental way. Due to its dynamism, responsiveness and proactive roles, logistics customers may prefer road, for short to medium distance; road-maritime intermodal transport, for longer distance; and even road-air intermodal transport solutions, for higher value goods. Thus, it might be said that rail is a less favourable transport mode, in such situations. By contrast, the 'push' system is a traditional concept that implies a manufacturer will produce products in large quantities and make them ready for sale in the market. This practice requires the manufacturer to maintain a certain level of inventory; this may be stored in different warehouses, in a variety of locations, and will require in-factory movement of the materials - mostly performed by localised road transport. Assumptions and forecasts about future sale potential are also required. In this traditional approach, the buyer also will purchase product in larger lot sizes; will maintain a level of inventory, necessitating warehousing facilities, involving capital and interest cost plus warehousing costs such as rent, lighting, heating, security etc. In this case, a slower and possibly less reliable transport service may be acceptable, making transport cheaper. In such situations, rail and waterways transport services become favourable modes of transport. Product characteristics and market opportunities may influence the desired level of inventory and the type of transport involved. For example, seasonal products, such as multiple-design Christmas cards, will elicit different behaviour than standard products that are sold all year round. As well as transport service type, transport haul is an important factor influencing inventory levels.

Cargo centres in Europe are densely situated, requiring lower average transport haul compared to other continents, for example North America. But rail is inherently more competitive over long distance transport as well as on high-density traffic corridors, for example in North America [13]. Currently, European rail freight transport does well for low value high volume cargo (e.g. coal) for longer transport haul for big customers (such as power plant). It can be noted road freight transport is generally competitive and suitable for short distance for both small and medium size (SME) and non-SME customers; but there are many road freight transport services in Europe that are competitive over distances of more than 400km. For example, Jackson et al. [14] notes that, for distances over 500km in the EU-27 and CH, in 2009, about 19% of low-density, high value (LDHV) cargo was transported by road transport. In contrast, rail freight transport is competitive for longer distances; although Jackson et al [14] argue that, for LDHV cargo, a modal shift from road to rail freight transport is possible. They claim that over a distance of 200km, between terminals and with pre- and post-haulage added, rail can be competitive as a door-to-door rail intermodal service. Gouvernal and Daydou [15] links the rail freight sector's success in attracting more (non-traditional rail) cargo - whether LDHV or other for SMEs or non-SMEs customers - with the degree of market liberalisation that exists. Considering this, the next section will focus on rail freight performance in Europe, the UK and the U. S. and also on rail liberalisation.

3. RAIL FREIGHT TRANSPORT IN EUROPE

In 2011, with a population of 501 million, the Gross Domestic Product (GDP) of the EU-27 amounted to $17, 552 billion, a 25.1% share of world GDP. In comparison, with a population of 310 million, the GDP of the United States was 21.6% ($15, 094 billion) of world GDP ($69, 971.5 billion) (16).

Within the EU27, in 2011, an estimated total of 3824 billion tonne-kilometres (btkm) of goods were transported. This is a slightly lower figure than in 2010, and includes intra-EU air and sea transport, but excludes transport between the EU and the rest of the world. Of this, road transport accounted for 45.3%; intra-EU maritime transport for 36.8%; rail for 11%; inland waterways for 3.7%; oil pipelines for 3.1%; and intra-EU air transport for only 0.1%. Between 1995 and 2011 (see Figure 1), total freight volume increased, from 3060 btkm to 3824 btkm, a total growth of 25.0%. From a modal point of view, over the same period, road freight transport volume increased, from 1289 btkm to 1734 btkm - a total growth of 34.6%. In contrast, rail freight transport has increased by 8.8%, from 386 btkm to 420 btkm, over the same period [16]. The lower growth in rail freight volume is due partly, on the one hand, to the structural change in manufacturing industry and consumption pattern, previously discussed and, on the other hand, the lack of response to the new freight transport requirement [1].

Another important aspect of European rail freight transport is single wagon-load (SWL) traffic that provides input to the full trainload freight service between hubs; but its share declined from 41% of total rail freight volume in 2002 to 31% in 2008 due to intense competition from road [17]. The inland transport containers are also dominated by road freight transport (see figure 2) [18, 19]. Road congestion is becoming an increasingly serious problem, where rail freight can be seen as an important alternative solution [15].

With this freight transport performance, the European Union [4, 19] desires to achieve a low carbon economy by 2030/2050 through optimising the performance of multimodal transport, achieving a modal shift of 30% by 2030 and 50% by 2050, from road freight transport (over 300 km) to rail and waterways transport. Multimodal transport, compared to uni-modal road and air, consumes less energy and emits less CO2 and is thus more environmentally friendly [20].

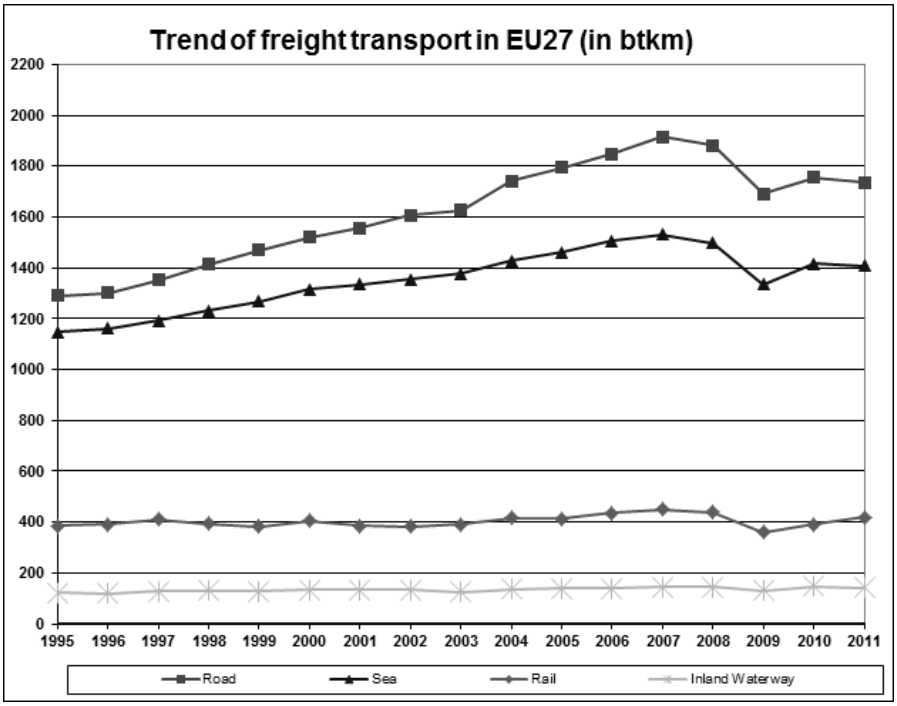

Fig. 1. Trend of freight transport volume in EU27 [16]
Rys. 1. Tendencja wielkości przewozów towarowych w UE-27 [16]

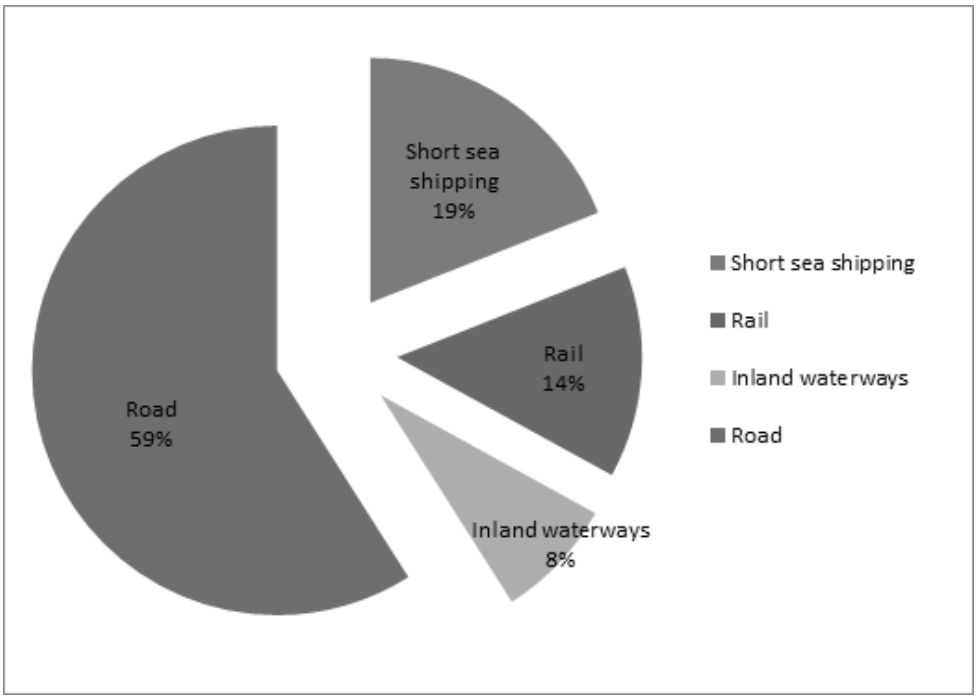

Fig. 2. Typical inland distribution of containers from maritime ports [18]
Rys. 2. Typowa dystrybucja śródlądowa kontenerów z portów morskich [18]

4. RAIL FREIGHT MARKET LIBERALIZATION IN EUROPE

Monios [11] illustrates the impact of rail liberalisation by citing one traffic route between Valencia and Coslada in Spain. In the liberalised environment, the share of rail traffic has increased from 10% in 2007, to 40% in 2010, carried by some new entrant private operators and incumbent RENFE. To enhance competitive ability and to increase market share of rail freight transport to a reasonable level, or at least at the pace of GDP growth, through improved competitiveness and efficiency, the railway transport ownership and operation have been reformed in Europe, from a command economy to a market-based, open, competitive one. Since 1991, this has been achieved through a series of Directives and through three Railway Reform Packages, suggesting that the Railway Directive 91/440/EEC of 1991 was an important turning point for rail liberalisation in Europe [15, 21]. Subsequently, the reform packages were issued to transform the state owned and operated European national railways (both freight and passenger) into commercial companies, to allow them to compete with each other (i.e. intra-rail competition) in a free market. Another objective of these reform measures is that the European rail freight market becomes free for new entrant private operators. Ultimately, both incumbent and new rail entrant operators will be able to compete with each other, as well as with other modes, e.g. road. One important objective of the European rail liberalisation was, and still is, the separation of infrastructure managers (IM) from operational services (railway undertaking - RU) so that the IM play a fair and independent role, in terms of easy and non-discriminatory access to path allocation and for charging, for both incumbent and new entrants, to prevent anti-competition practices.

Since 1 January 2007, the European rail freight market has been ostensibly a free market, where both incumbent and new entrant operators are able to compete on every line and in every EU member state [22]. However, as expected, reforms were not universally applied in all countries. Some (e.g. UK) went for full implementation (and beyond) e.g. complete separation of infrastructure and operation, while others remain at the opposite end of the spectrum [23]. The reformed UK rail freight market has become a success story, showing 2.5% annual growth (in tonne-km), even registering growth during recession, in both tonnes and tonne-km [1]. The study links the success of UK rail with privatisation in 1996 [1]. In contrast, the Railway Gazette International [24] reports that the European

Court of Justice found that Hungary and Spain failed to comply with the obligation of separating IM from train operators, as per the First Railway Reform Package. The Court also found that the state railway holding company models in Austria and Germany complied with the legislation; however Lloydsloadinglist.com [25] reports that Europe's two biggest state railways - Deutsche Bahn (DB) and SNCF - have locked horns, accusing each other of unfair competition in the rail freight market. It can be noted here that the IMs in both countries are sister organisations of the government owned and operated RUs. Lloydsloadinglist.com [26] also reported that DB Schenker's French rail freight subsidiary, Euro Cargo Rail (ECR), has made claims that rival operator Fret SNCF, subsidiary of French state railways SNCF, is engaged in anti-competition practices. ECR claimed that the rival is still offering below-cost rates, despite hefty fines by the rail regulator in 2012. Following a complaint lodged by ECR in 2009, Fret SNCF was criticised, in December 2012, for a number of commercial practices that were designed to hinder and delay the arrival of new market entrants into the French rail freight market, which runs contrary to the railway reform measures.

The above examples of complaints and criticisms demonstrate that, in reality, some national IMs (and/or regulators) in Europe are not separated from the operations. Thus, directly or indirectly, some operators gain advantage from their government owned and operated sister organisation, funded by the taxpayer, which detracts from the creation of a truly competitive rail freight market. This may contribute to slower growth of rail freight volume, despite the aforementioned reform initiatives, directives, reform packages and warnings from the European commission. The European Commission [27] issued its Fourth Railway Package on the 30 January 2013, focussing on, among other things, the clear separation of infrastructure from operation; facilitating the easy entrance of new operators; and rail authorisation and safety certification through one single authority – the European Railway Agency (ERA) - to improve the competitiveness and quality of service whilst reducing bureaucracy. Recognising its pros and cons, the Community of European Railway and infrastructure companies (CER) opined that the package will deeply affect the functioning of the railways and favour the creation of an EU Network of National Regulatory Bodies, for example, National Safety Authorities instead of ERA [28]. The International Union for Road-Rail Combined Transport (UIRR) [29] expressed its appreciation for 'mandatory structural separation for integrated state-owned railway companies'. Considering the fact that DB and SNCF are important players in rail freight (and passenger) transport in Europe, Nash [30] suggested that 'Possible alternatives to full separation might include enhanced measure to prevent discrimination within holding groups, strengthening rules on independent decision making, or placing essential functions such as capacity allocation and the setting of infrastructure charges into a separate body.' However, Railway Gazette [31] reports that the European Parliament has adopted by a large majority amendments that has scaled back the proposals on the independence of infrastructure management and financial transparency within vertically-integrated holding group structures. With this development, the author think that there will be a little change or improvement compared to the pre-Fourth Railway Package market environment.

The concept of contestability was first introduced by Baumol [32] by that states that 'it is possible to get the benefits of competition without the requirement of a large number of competing firms'. This is probably true in the case of intra-rail competition, as there is always some sort of oligopoly in such services as rail freight transport, since only a few rail operators can be allowed to operate on a particular route or corridor. But these operators have to compete with other modes, in particular road. Thus, rail freight operators have to be able to compete with other modes by offering, among other differentiators, competitive services with higher reliability and lower prices. In the case of other (than rail) modes, the IMs (e.g. Highway Agency for road transport in the UK) are separated from the operations (e.g. road haulage) to ensure a competitive and contestable market for all. Brewer [33] suggested the requirements for a contestable market include: costless market entry and exit; entry that involves very small or no sunk costs; all firms (incumbent and new entrant) being subject to the same regulations; and market pricing practices that prevent the use of responsive pricing by the incumbent operators. Most of these competitive market conditions were contained in the focus of the Fourth Railway Reform Package, noted before; but unfortunately did not get approval by the European Parliament.

There are further complexities in the European rail freight sector: for example, the sharing of railway lines with passenger trains; higher priority for passenger trains than for freight trains [13]; lower freight train speed; net weight of freight wagons; and ageing wagon fleets. The complexity of rail transport in Europe can be understood from the following statement:

'The West Coast Main Line (in the UK) is the busiest mixed traffic railway in Europe. There are 12 different operators. Fast and slow passenger trains mix with each other and heavy freight trains. Different trains stop at different stations, with different frequency, and other lines join it at regular intervals. And like Transport for London we need to find time to deliver maintenance and upgrade work.' [34]

Few of these complexities exist in the United States' (U.S.) rail freight sector, making comparison irrelevant. However, in order to learn lessons from the U.S. rail reform measures, the performance of its rail freight sector is discussed in the next section.

5. RAIL FREIGHT TRANSPORT IN THE UNITED STATES

The rail freight transport sector in the U. S. has been performing much better than its European counterpart and ownership and operational differences should be noted. Virtually all U.S. railway networks and infrastructure (except the Northeast Corridor, owned by Amtrak) are owned by freight lines (operators) for their business operational purposes, while passenger operators (mainly Amtrak) operate as tenants on the freight lines. Unlike Europe, this prevents passenger trains being given higher priority over freight trains. One rail freight operator competes with another, as there are two or more railways, operating in parallel routes, in addition to the competition from trucking sector [13]). However, the Federal Railroad Administration (FRA), under the U.S. Department of Transportation, regulates operations. In Europe, by contrast, individual IMs (e.g. Network Rail in the UK) and/or respective rail regulators (e.g. ORR- Office of Rail Regulator, in the UK) regulate operations, although efforts are in place (as proposed in the Fourth Railway Package) to establish ERA as the single regulator. The FRA oversees operations to ensure a competitive environment, although there are complaints of monopolist charging rates by freight operators to customers (shippers/consignees), in certain geographic locations, who may have access to only one rail freight operator. Also, the U.S. rail transport haul is much longer than in Europe. (Section 2 already discussed the need for a longer transport haul in effective operation of rail freight services.)

The total volume of goods transported has increased from 4162 btkm in 1990, to 5866 btkm in 2007 (a growth of c41%). Of this, road transport has increased from 1239 btkm in 1990 to 1922 btkm in 2007 (55% growth). During the same period U.S. railways achieved a total of 70% growth, from 1554 btkm in 1990, to 2656 btkm in 2007 [35].

Many people link reform measures with the U. S. railways' success story. For example, Spychalski and Swan [36] suggest that three reform measures: the Railroad Revitalization and Regulatory Reform Act of 1976 (4R Act); the Staggers Rail Act of 1980 (SRA); and the Interstate Commerce Commission (ICC) Termination Act of 1995 (ICCTA) have downsized as well modernised the U. S. rail freight industry. This has resulted in reduced freight rates and dramatic improvements in productivity. Figure 3 displays the effects of reform measures (in particular the Staggers Action of 1980) on US railway industry. Spychalski and Swan [36] concluded that the success was achieved through the termination of loss-making services, use of more modern and efficient equipment, flexible work rules, and reductions in employment, rather than through structural change in the industry, unlike that in Europe. Levinson [37] reports that 'Trucks and railcars that had often been forced to return empty were able to get cargo for backhauls. -- --. For the first time, railroads and their customers could negotiate long-term contracts setting rates and terms of service. ---. Freight transportation within the United States was reshaped dramatically. Costs fell so steeply that by 1988, U. S. Shippers – and, ultimately, U. S. consumers – saved nearly one-six of their total land freight bill'. The Economist [38] reported that 'before deregulation America's railways were going bust. The return on capital fell from a meagre 4.1% in the 1940s to less than 3% in the 1960s. In 1970 the collapse of the giant Penn Central caused a

huge shock, including a financial crisis. By 1980 a fifth of rail mileage was owned by bankrupt firms. Rail's share of intercity freight had slumped to 35% from 75% in the 1920s.'

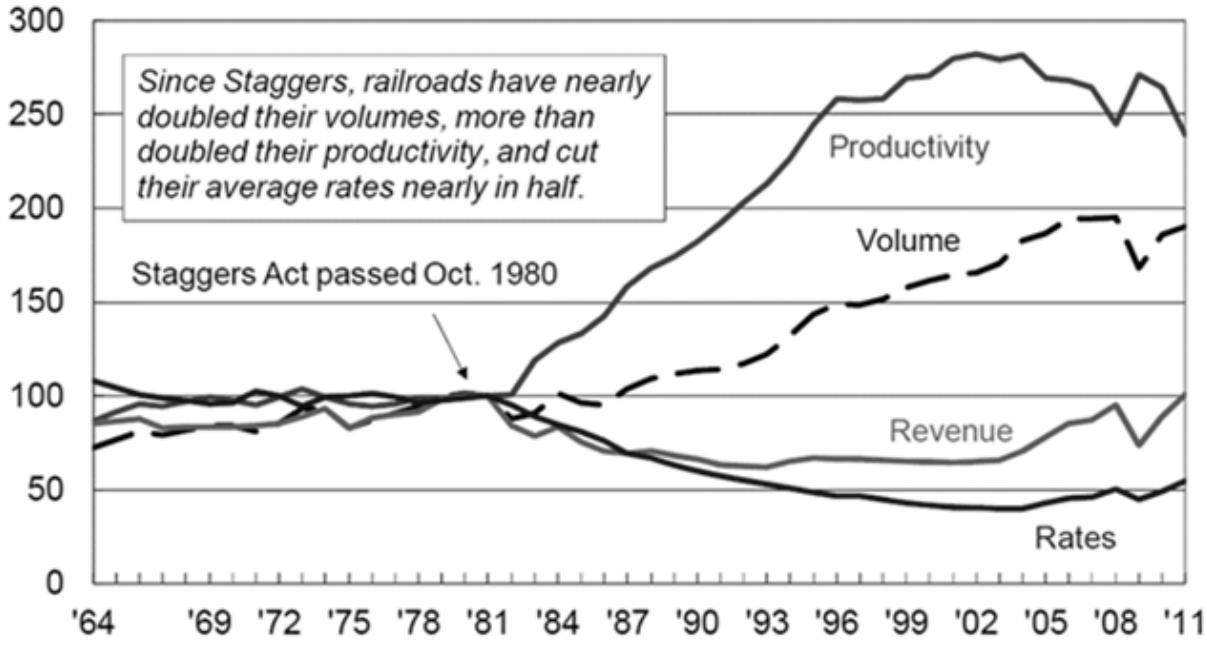

Fig. 3. U. S. rail freight before and after the Staggers Act 1980 (1981=100) [39]
Rys. 3. Przewóz towarów koleją Stanów Zjednoczonych przed Ustawą i po Ustawie Straggers 1980 (1981=100) [39]

6. UK RAIL REFORM – A GOOD EXMAPLE?

From the perspective of European railway reform, the UK can be seen as a good example. In all three Rail Liberalisation Indices: 2004, 2007 and 2011, UK railways stood at the top of the ranking conducted by IBM Global Business Services [23]. Since privatisation in 1996, rail freight has undergone a transformation programme, resulting in transportation of an increased share of consumer goods. Customers such as Jaguar Cars, Tesco, and Sainsbury, with high value goods, are increasingly being added to the rail freight customer base and consumer goods transport by rail has increased by 75% over the last eight years - the greatest growth of any freight market [39]. Since July 2007 a Strategic Freight Network (SFN) has been in place, that takes opinion from a stakeholder group that includes ports, shipping lines, manufacturing, logistics service providers, retailers, quarrying and construction and, of course, rail freight service users, to ensure a highly functioning UK rail freight industry. The SFN consists of a series of linked schemes, with a rolling programme of investments in more productive infrastructure - e.g. loading gauge enhancement to allow taller 9'6" container movement; locomotives, wagons and terminals - aimed at improving the performance, economic efficiency and capacity of freight on rail [39-42]. Since privatisation, the productivity of the UK rail freight operation has improved substantially. For example, freight operating company staff numbers per freight train kilometre have fallen significantly (from 1998-99=100 to about 66 in 2008-09) [43]. The improvement in the productivity of UK rail freight operation can be observed from the fact that, despite the decline in train kilometres between 2005 and 2011, the tonne kilometres remained almost unchanged, implying longer and heavier trains. Also the average transport haul length per train has increased in recent years [1]. Reliability and/or punctuality are at the top of the priority list for many types of customers, in particular for consumer goods. The punctuality of freight train operations improved continuously until 2009-2010, since when there has been a decline (see Figure 4), for unknown reasons. The current research attempted to explore the reasons and whether the causes of

delay were attributable to train operators, terminal operators, network, or shippers. The author strongly believes independent research is needed to unearth the true information on, among others, productivity, punctuality and causes of delays.

The freight performance measure (FPM) provides an indication of punctuality for freight journeys where 'on time' means arrival at final destination within 10 minutes of schedule. The FPM allows freight operators to measure performance in similar manner to the public (passenger) performance measure (PPM), which provides an indicator of passenger train performance and which has been in place for a long time. This is particularly important when freight demands equal priority in terms of path allocation, infrastructure charge and other operational aspects. Overall, before privatisation total freight volume was in decline whereas and since privatisation the annual volume of freight moved by rail has increased; albeit at a slower rate (see Figure 5). The fluctuation in total rail freight volume (tkm) is primarily due to the fluctuation in coal transport, attributable to two main reasons: the changeable demand for coal for power stations and the choice of port of entry relative to the consuming power station. It can be noticed that, in recent years, the total volume of net freight moved by rail has increased, despite a decline in coal transport, as rail freight operators have substituted other cargoes by adopting marketing strategy and also due to improvements in the railway network (e.g. higher gauge clearance to accommodate high cubes/containers) and. Very recently, coal volumes have begun to recover, due to high gas prices. The Port of Felixstowe [44] reveals that scheduled freight trains (of Freightliner, GB Rail freight and DB Schenker) are arriving at their terminals from inland origins (such as Birmingham, Manchester, Scunthorpe, Bristol, Doncaster, Ditton, and Daventry) almost 24 hours a day, six days a week (not Sundays), averaging 30 services per day. There is more demand for rail freight services than these routes can accommodate. Another example of good rail freight operational practice is that the port of Southampton is operating in and out rail freight services regularly. It can be noted that average transport haul in the UK is short. With this limitation, the UK rail freight operators have been able to respond to the structural change (from raw material and semi-finished to semi-finished and consumer goods) by working closely with ports, an important partner along supply chains, with effective marketing strategy as well as the government's efforts and supports (e.g. in the form of grants) to enhance infrastructure e.g. gauge clearance (to allow transport of high cubes), which has led to significant increase in the share of containerised cargo in the total rail freight volume [1].

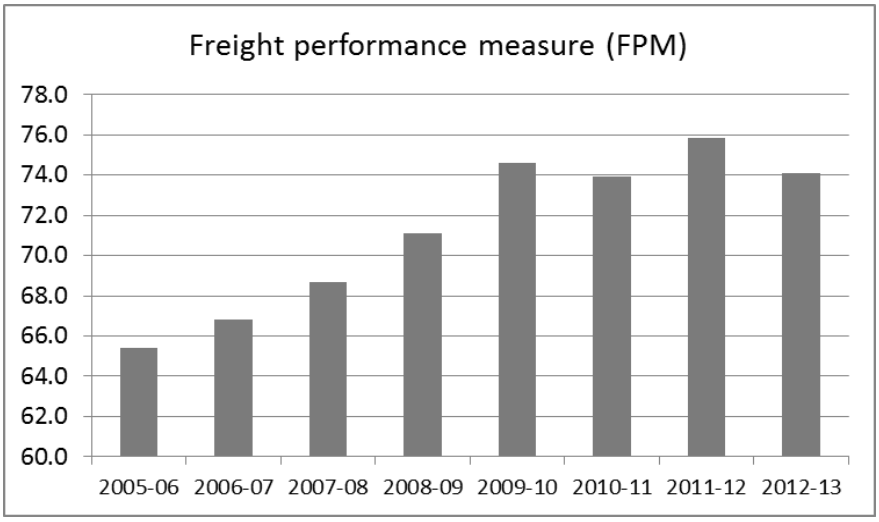

Fig. 4. Punctuality of UK freight trains (data from Network Rail, UK)
Rys. 4. Punktualność pociągów towarowych w Wielkiej Brytanii (dane z Sieci Kolejowej UK)

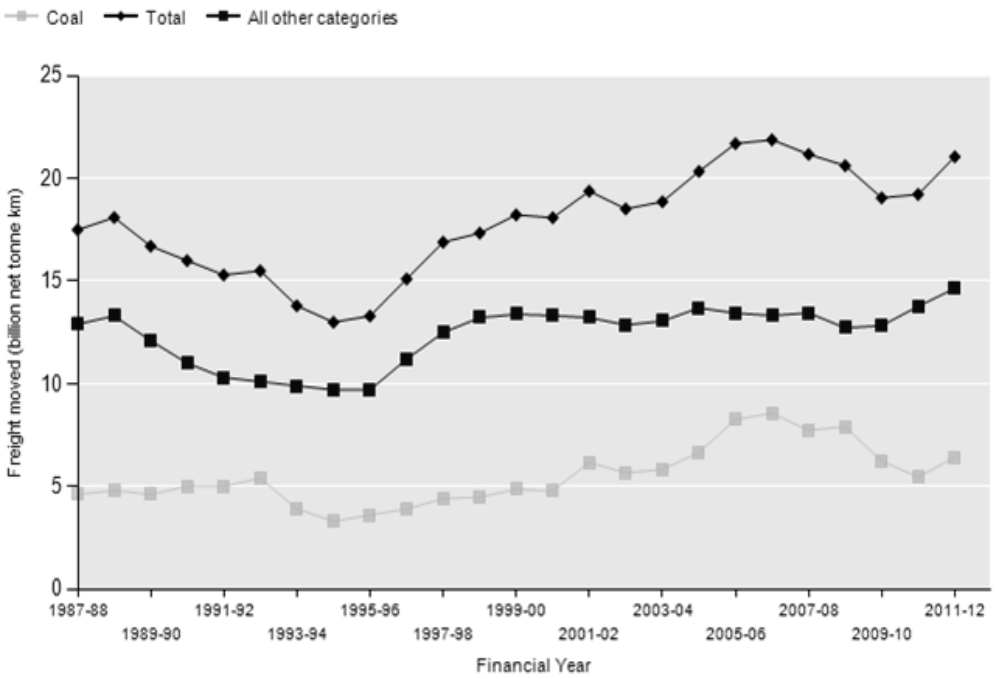

Fig. 5. Net Annual Freight moved by rail before and after privatisation (in 1996) (btkm)
Rys. 5. Roczny przewóz netto przewozu towarów koleją przed prywatyzacją i po prywatyzacji (w 1996 r.) (btkm)

7. KEY BARRIERS TO THE COMPETITIVENESS OF EUROPEAN RAILFREIGHT

The study finds that the key barriers to the competitive rail freight service in Europe are:

- The European rail freight transport market is not yet fully liberalised to allow free and fair competition among the incumbents and new entrants. This situation restricts the competitive ability of the rail freight operators.
- Currently the rail freight operators offer segmental 'terminal-to-terminal' services whereas the supply chain for European customers requires 'integrated' 'door-to-door' services, as a supply chain partner.
- Currently they offer service to mainly big customers with low value high volume cargoes and generally do not include SMEs with comparatively higher value cargoes that represent a significant market share.

The readers are requested to read the part 2 of this paper that will recommend actions and steps, as enablers, to remove the barriers noted above to achieve a competitive rail freight transport system in Europe.

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