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Rail Reforms, Learnings from other Sectors and new Entrants

Working Paper 2 of the study LowCarb-RFC - European Rail Freight Corridors going Carbon Neutral
Zurich, Karlsruhe, 30 May 2018

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Editorial Information

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Content

1. Introduction

Missing public acceptance, lack of punctuality and internal shocks such as the disruption of service on essential routes like the Rhine Valley Railway in summer 2017: the rail freight sector in Europe is facing enormous challenges. Simultaneously, actors in the rail freight market are increasingly conceding ground to the road freight transport sector. Technological progresses such as autonomous vehicles, super lorries or platoons challenge the rail and shipping markets. Despite advances in the field of electrification of road transport: the increasing importance of road freight transport might rather raise instead of mitigate carbon emissions. This development clearly conflicts with the ambitions of the European Commission to significantly reduce CO2 emissions. According to the EU Commissioner for Transport, Violeta Bulc, "rail freight will need to play a larger part in an integrated European transport system" (Bulc 2014). In light of current developments, however, this seems to be all the more a challenge. The railways' role in climate mitigation and the rigidity of their market share define the research project LowCarb-RFC, out of which this working paper emerged.

Context: The LowCarb-RFC project

This publication is one of three summary reports of work performed within the study "Low Carbon Rail Freight Corridors for Europe" (LowCarb-RFC). The study is co-funded by Mercator-Foundation and the European Climate Fund over a three-year period from September 2015 to November 2018 and is carried out by the Fraunhofer-Institutes for Systems and Innovation Research (ISI, Karlsruhe) and for Logistics and Material Flows (IML, Dortmund), INFRAS (Zurich), TPR at the University of Antwerp and M-FIVE GmbH (Karlsruhe).

The LowCarb-RFC study concentrates on long-distance freight transport along major European corridors as this sector is among the most steadily growing sources of greenhouse gas emissions in Europe, and which is most difficult to address by renewable energies and other standard climate mitigation measures in transport. Starting from the classical suite of approaches avoid, shift and improve the LowCarb-RFC methodology concentrates on mode shift to rail and mitigation measures in all freight modes along the two major transport corridors crossing Gemany: Rhine Alpine (RALP) from the Benelux countries to Northern Italy and North-Sea-Baltic (NSB) from Benelux via Poland to the Baltic States. Besides major European strategies the project concentrates on the implications for transport policy at the intersection of these two corridors, which is the German Federal State of North-Rhine Westphalia (NRW). The project focuses on rail as a readily available alternative to carry large quantities of goods along busy routes by electric power, and thus potentially in a carbon neutral way. Within this setting, the project pursues three streams of investigation:

- **Stream 1: Railway Reforms**. This thematic area responds to the idea of rail freight as a strong pillar of climate mitigation policy. It considers the slow pace of climate mitigation in the freight transport sector and asks the question how regulatory frameworks, company change management processes or new business models can accelerate them.
- **Stream 2: European Scenarios and Impacts**. For rail, road and waterway transport along the two corridors, cost and quality scenarios are established and their impact on modal split, investment needs and sustainability modelled. This stream is the analytical core of the study and shall provide the basis for the subsequent analysis of pathways of interventions.
- **Stream 3: Case Study NRW**. This step eventually breaks down the transport scenarios and intervention pathways to the local conditions in NRW and looks at the implications for investments or de-investments in certain infrastructures, jobs, economic prosperity and the environment.

Purpose of this working paper

This working paper contributes to Stream 1 of the LowCarb-RFC project. It sheds light on key institutional characteristics of the European rail freight market. By considering current developments in the European transport market, it aims at identifying decisive mechanisms that might lead – or prevent – a carbon neutral transport system in Europe by the end of this century. Currently, the rail freight market is confronted with numerous barriers to any kind of change. In a nutshell, the rail market in Europe can be characterized as a complex and rigid institutional setting. Against the backdrop that there are multiple actors – such as technology providers, infrastructure managers as well as policy and labour unions – playing a key role in the rail freight sec-tor, the interconnections are complicated. At the same time, state-owned railway companies and powerful incumbents, labour unions and state institutions used to slow down potential changes. In order to compete with logistic service providers on the road in a successful manner, however, there is a strong requirement to modernize the rail freight sector. It is without question, that massive improvements are required to meet the ambitious goals of getting climate neutral freight corridors. Here, new entrants in the rail freight sector might be of major importance as they challenge current institutional structures.

In order to better understand necessary steps and limits for reforming the logistic sectors, railway and policy institutions, this paper is structured along the following analytical framework. First, it sheds light on railway reforms in Europe as well as on national pathways. Second, it briefly describes liberalisation processes in other sectors. Lastly, it focuses on practical experiences by new entrants. By identifying institutional preconditions, business models, opportunities and barriers, it intends to provide an overview of best practises and success factors.

2. Liberalisation of the rail freight market

In the recent past, the European Commission has set itself an ambitious goal: revitalising the rail transport in the European Union by boosting competition. According to the Commission "a more competitive and efficient rail industry is a prerequisite for achieving the targets of reducing emissions […]" (European Commission 2018). However, the liberalisation of the rail market turns out to be a challenge.

About two decades after the first liberalisation measures in Europe, the results are still mixed. With respect to the current situation in most countries, Crozet el al. (2014) argue, that "rail freight is still facing a double-imperfect competition". According to the authors, this mismatch is reflected in intermodal competition ("off balance between road and rail") on the one hand, as well as in intramodal competition on the other hand (Crozet el al. 2014: 6).

This subchapter aims at shedding light on the second aspect: the competitive situation between railway operators. In view of liberalisation processes in the rail freight sector, it provides a brief overview of recent developments on the one hand, as well as on the current situation in Europe and selected countries on the other hand.

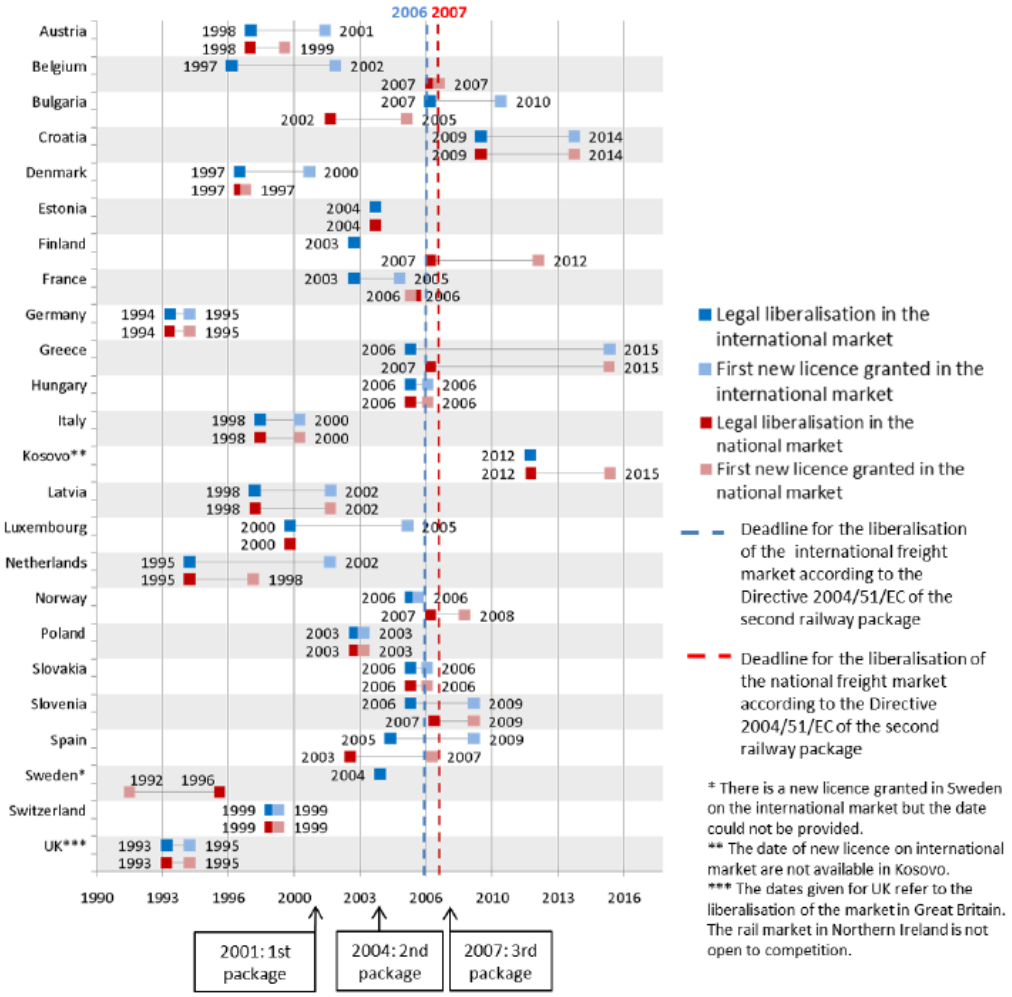
2.1. European level

The extent of rail freight liberalisation in Europe varies from one country to another. Crozet et al. describe the processes "as a slow movement that is gradually taking place throughout Europe" (Crozet et al. 2016). Western European Countries, such as the Netherlands, United Kingdom or Germany, were among the first ones that liberalised their rail freight markets, starting in the mid-1990s. In contrast to that, Eastern and Central European Countries, such as Hungary, Slovakia or Slovenia, started their reforms in the early years of the 2000s (Crozet 2016: 12).

As described in the LowCarb-RFC working paper (Doll, Maibach et al. 2017) in more detail, the Second Railway Package (2004) demanded that access to the entire EU rail network must be granted for all types of rail freight services and service providers by 2007. Since this point in time, freight services have been fully open to competition (European Parliamentary Research Service 2016a: 12; Grenfell et al. 2013). This leads to the following question: What are the main features these liberalisation processes?

In order to get an overview of the liberalisation progresses in selected European countries, scholars such as Crozet (2014) refer to the Independent Regulators Group (IRG-Rail), as national regulators were "not always independent" (Crozet et al. 2014: 22). This is why the "Market Monitoring report", published by the IRG-rail group (2017), is considered at this point.

Figure 1: Legal liberalisation of freight market and first new licence (IRG-Rail 2017)



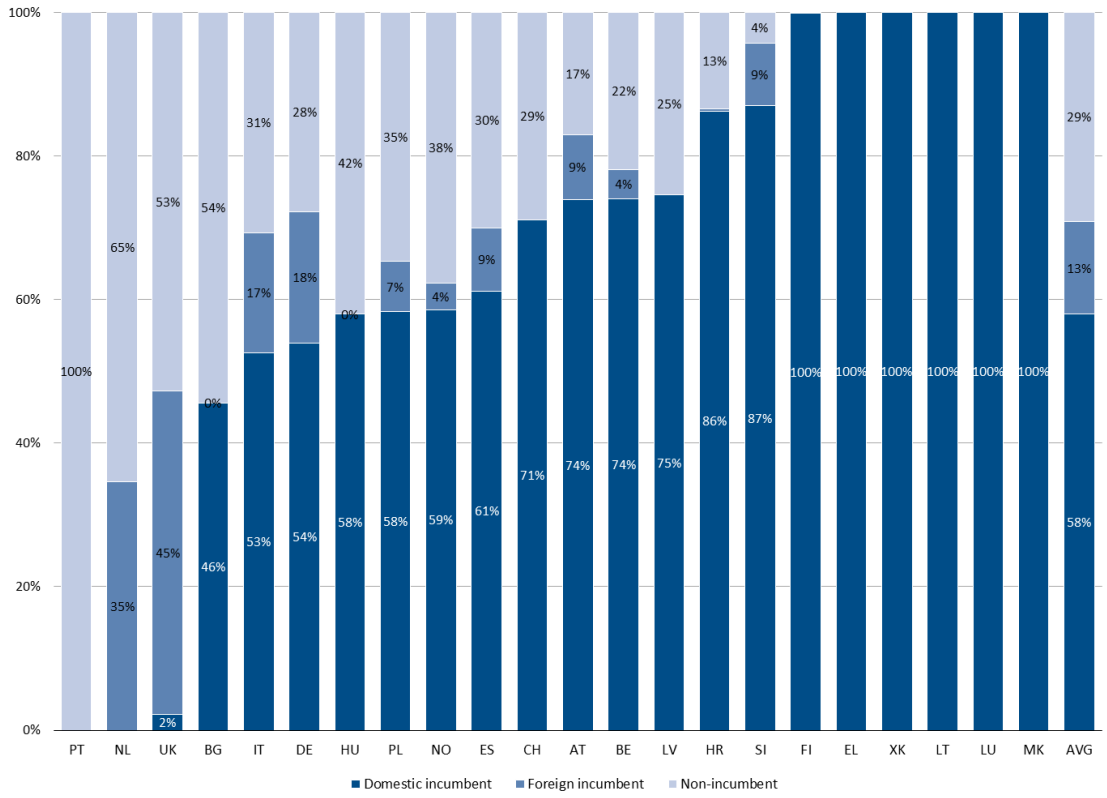
Source: IRG-Rail Market Monitoring Report 2017: 26.

In a nutshell, it can be stated that the liberalisation of the rail markets is still "insufficient" – as argued in a report by the European Parliamentary Research Service (2016) for instance. In most European countries, incumbent operators still dominate the freight market (European Parliamentary Research Service 2016a, Crozet 2016: 13).

Again, however, a comparison between varying countries indicates, that the current situation is far from consistent. In Sweden or in the United Kingdom for instance, the market share of competitors is comparatively high (European Commission 2016a, IRG-rail 2018b, IRG-rail 2018c). Contrary to this, countries such as Lithuania or Luxembourg do not have liberalised rail

freight markets at all: In 2016, the domestic incumbents dominated the markets in these countries by 100 percent (IRG-rail 2018b, IRG-rail 2018c). The following figure provides an overview of the share of competitors in the freight market.

Figure 2: Market shares of freight railway undertakings 2016 (based on net tonne km)



AVG = Average for all countries which provided data.

Sources: IRG-rail 2018b, IRG-rail 2018c.

In theory, this coincides with the European Court of Auditors definition according to which rail freight operators are operating in a "competitive market" (European Court of Auditors 2016: 5). On the one hand, the number of companies might serve as an indicator to assess the openness of a market for new entrants. On the other hand, however, the market share of new entrants itself cannot explain the intensity to what a market is competitive as the authors of the IRG market monitoring report point out.

2.2. National level

This subchapter sheds light on rail liberalisation processes on a national level. It explicitly focuses on the following countries: Belgium, Germany, Italy, Poland, Switzerland and the Netherlands. For each country, it indicates major reform steps within the rail sector. By referring to scholars or recently published literature, each part concludes by briefly shedding light on central lessons learned. Regarding both, the historical review on liberalisation processes as well as the lessons learned, this part cannot claim for completeness. However, by illustrating some of the major measures and consequences, this chapter aims at providing a basis for the further analysis of the institutional factors and the following discussion.

Following the Independent Regulators' Group (IRG) "new entrants" are railway undertakings "that are not related to an incumbent" (IRG-rail 2017: 12). The European Court of auditors defines new entrants in the rail freight market as "a rail freight operator (other than the incumbent freight operator) licensed to the applicable EU and national rules, operating in the competitive market" (European Court of Auditors 2016: 5). In other words, new entrants are not necessarily non-incumbent railway undertakings. The definition also includes companies which are incumbents in other countries – such as Deutsche Bahn or SNCF for instance – and enter a foreign market as a "new entrant" (IRG-rail 2017: 12).

2.2.1. Belgium

Van de Voorde and Vanelslander (2014) claim, that – in comparison to other European countries – rail freight transport does not have "a prominent position" in Belgium (Van de Voorde and Vanelslander 2014: 3).

Table 1: Belgium

Year	Key measures
1991	SNCB (Société nationale des chemins de fer belges) turned from a state company to a "public limited company with an independent management" (Van de Voorde and Vanelslander 2014: 11).
2005	Transformation into a holding company (SNCB Holding and the two daughter companies Infrabel and SNCB).
2013	Initiative to transform the holding structure; consisting of Infrabel as infrastructure manager and N-SNCB as train operator.

Sources: INFRAS with data from Van de Voorde and Vanelslander (2014).

Van de Voorde and Vanelslander (2014) are very critical of the results of the liberalisation processes in Belgium. Even though the minimum requirements of the EU directive 91/440 – demanding a separation between network and operations – were met, the authors question whether this really served the underlying objectives: to gain an efficient and competitive market (Van de Voorde and Vanelslander 2014: 12).

Despite this critical perspective, the authors consider that the reform resulted in three essential outcomes: the separation of rail infrastructure and services, the fact that rail facilities were easier to access and that the independence of regulators was guaranteed. Van de Voorde and Vanelslander conclude that this "far-reaching liberalisation process" resulted from pressure on a European level (Van de Voorde and Vanelslander 2014: 32).

2.2.2. Germany

The railway sector reform ("Bahnreform") initiated the liberalisation process of the German railway sector. The Fall of the Berlin Wall represents a historical turning point. Several factors – such as an unsatisfactory performance with respect to rail transport of passengers as well as of goods – increased the pressure on policy actors to reform the rail sector (Schwilling & Bunge 2014: 36).

Table 2: Germany

Year	Key measures
1994	Transformation of the two state enterprises "Deutsche Bundesbahn" and "Deutsche Reichsbahn" into the Deutsche Bahn AG. By implementing Directive 91/440/EC transportation markets were opened for entrant firms.
1994	Separation of Deutsche Bahn AG into five subsidiaries.
2008	Plans to partially privatise Deutsche Bahn AG failed.
2013	Proposal for a new railway regulatory law was blocked in the second chamber (Bundesrat). Its aim was to enhance competition in the railway sector.

Source: INFRAS with data from Haucap & Pagel 2014, Kirchner 2011, Schwilling & Bunge 2014.

In their analysis of the development of rail freight in Europe, Haucap and Pagel (2014) argue, that in Germany "intra-modal competition has developed well, especially in comparison to markets in other EU member states" (Haucap & Pagel 2014: 17). Regarding current developments, however, the authors criticize the following two aspects: On the one hand, despite the liberalisation process, the ownership of rail infrastructure and operating services has not been separated. Due to its vertically integrated structure, Deutsche Bahn AG owns subsidiaries such as DB Schenker Rail AG (transport services) and DB Netz AG (infrastructure manager). On the

other hand, the European Commission as well as the German Monopolies commission have suggested "to vertically separate the infrastructure and transport services more clearly" in order to guarantee non-discriminatory access (Haucap & Pagel 2014: 17).

2.2.3. Italy

On the one hand, the opening of the Italian railway sector came into force "well ahead of the deadlines set by the European Union", according to Lanfranco Senn and Tatiana Cini (2011). On the other hand, the authors underline that the market share of rail did not considerably increase due to the reforms.

Table 3: Italy

Year	Key measures
1992	Conversion of Ferrovie dello Stato (FS) (today: Ferrovie dello Stato Italiane, FSI) to a joint stock (state-owned) company.
1999-2001	Law 388/2000 granted open access to the railway infrastructure; the former monopoly FS "became a licensed railway undertaking". In the aftermath of EU directive 91/440 Trenitalia was created (Senn & Cini 2011).
2003	2003: Full liberalisation of freight international services (OECD 2013: 126); Law 188/2003 allowed international freight undertakings to access the railway.
2007	Full liberalisation of freight domestic services (OECD 2013: 126).

Source: INFRAS with data from Desmaris 2016, OECD 2013, Senn & Cini 2011.

According to Lanfranco Senn and Tatiana Cini (2013), the railway sector in Italy "remains full of barriers to competition". In their analysis, the authors underline, on the one hand, the reform processes and efforts to liberalise the sector within the past two decades. On the other hand, they underline the existing hurdles. Among these barriers are "non-availability of rolling stock, lack of secondary markets and of interoperability" (Senn & Cini 2013: 10).

2.2.4. Poland

According to Engelhardt (2011), recent developments in the Polish rail sector are two-fold. On the one hand, it has progressed a lot, especially since Poland became a member of the European Union. On the other hand, however, the author argues that the achievement of reforms is "still not satisfactory" (Engelhardt 2011: 159).

Table 4: Poland

Year	Key measures
1990-2003	The state-owned company "Polskie Koleje Panstwowe" (Polish State Railways) was re-structured, reformed and privatized.
2004-2009	Implementation of most EU legislative acts.

Sources: INFRAS with data from Engelhardt 2011, Pieriegud 2014.

In his analysis, Engelhardt argues that Poland's regulatory model "is fully adjusted to the European law" (Engelhardt 2011: 159). The author states that companies of the PKP Group play a "dominant" – however declining – role on the comparatively "new" rail market in Poland. The fact that private operators are gaining in relevance, is assessed as "indicative of increasing liberalisation". Despite this progress, Engelhardt expects an oligopolistic market structure in the future where a few undertakings might dominate the market (Engelhardt 2011: 157). Similarly, Jana Pieriegud (2014) concludes that a difference to other European markets is, that "a small group of companies deliver more than 90% of transport performance in the rail freight market in Poland" (Pieriegud 2014: 12)

2.2.5. Switzerland

In comparison to EU member states, the rail freight sector in Switzerland stands out: There, its modal share is – according to the European Court of Auditors – about 170 percent higher than the average in the European Union (European Court of Auditors 2016: 47). In a report, published by the Swiss Federal Office of Transport in 2012, it is argued that the railway reforms in the recent past have set the baseline for "good framework conditions for the railways" in Switzerland (Swiss Federal Office of Transport 2012: 16).

Table 5: Switzerland

Year	Key measures
1996/1999	Railway Act and Railway Reform 1: Modification of the legislative conditions for railway operation: i.e. separation of operation and infrastructure, more competition on the rail network (especially rail freight), liberalisation of the rail freight sector (Swiss Federal Office of Transport 2012, 2018).
from 2005 (2007/2010)	Railway Reform 2: subdivided into three packages; i.e. equal treatment of all transport companies; improvement of interoperability with actors from the EU and improvement of the organisation of public transport infrastructure Swiss Federal Office of Transport 2012, 2018).

Source: INFRAS with data from Swiss Federal Office of Transport 2012, European Court of Auditors 2017, Swiss Federal Office of Transport 2018.

In general, it can be stated that the Swiss railway sector often serves as a role model for other countries and actors from abroad (cf. European Court of Auditors 2016: 3). Desmaris (2014), who analyses the reforms of passenger rail, highlights two positive outcomes resulting from the reforms of passenger transport: a "more efficient use of public funds" on the one hand as well as a "significant improvement in the quality of services for passenger rail" (Desmaris 2014: 4). With respect to rail freight transport, the Swiss "road-to-rail policy" (Swissinfo.ch 2011) plays a decisive role: On the one hand, Switzerland increased the weight limit of trucks up to 40 tonnes. On the other hand, however, a heavy vehicle tax was introduced in 2001. The objective of this policy is to significantly reduce the number of trucks (max. 650,000 in 2018) that cross the Alps every year. This policy was strengthened by popular votes as well as by huge investments into the infrastructure and rail expansion as in the Gotthard Base tunnel for instance (Swiss Federal Office of Transport 2016, Gottardo 2016)

2.2.6. The Netherlands

By comparing the market structure of the Netherlands and Belgium, Van de Voorde and Vanelslander (2014) argue with respect to the Dutch rail market that it has "truly transformed since the liberalisation, much more than the Belgium market" (Van de Voorde & Vanelslander 2014: 14).

Table 6: The Netherlands

Year	Key measures
1995	The rail way operator NS (Nederlandse Spoorwegen) was split up into various daughter companies.
2000:	The freight division NS cargo was sold to Raillon (subsidiary of DB Logistics).
2002:	The infrastructure management and the main operator were fully separated.
2005	Railways Act came into force (Ministry of Transport Public Works and Water Management 2010).

Source: INFRAS with data from Deville & Verduyn 2012; Dionori et al. 2011, Ministry of Transport, Public Works and Water Management 2010; ECMT 2005.

According to a report published by the OECD, the Dutch Railway Act has led to partial liberalisation of the railway market. While there are still restrictions with respect to passenger transport, the rail freight transport is "fully open for competition" (OECD 2013: 147). However, the OECD report criticises the fact that there "have been few developments in the Dutch railway market following liberalisation of the international rail tracks". The report states that there are capacity constraints and entry barriers for international actors (OECD 2013: 150).

2.3. Lessons learned

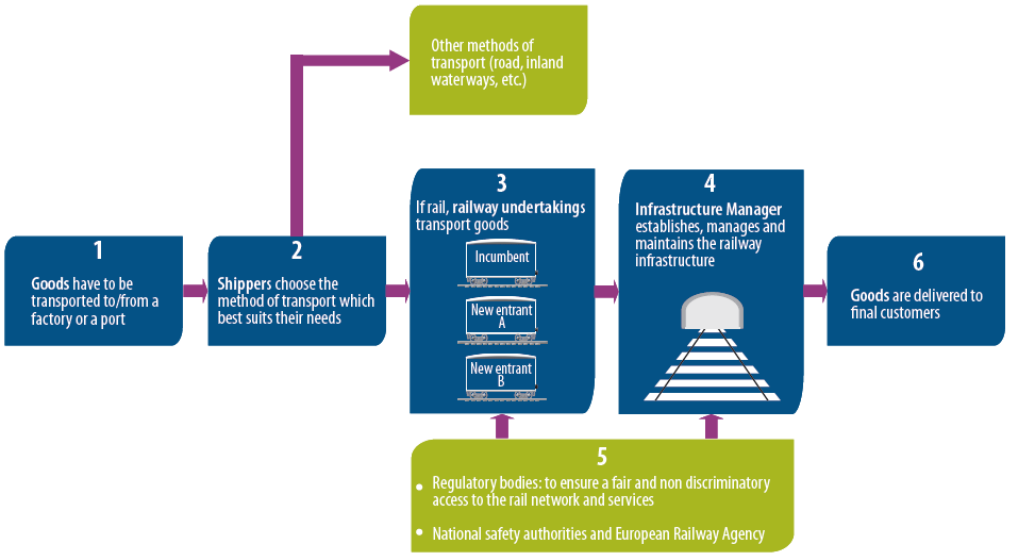
This subchapter illustrated the extent to what the liberalisation approaches vary from one country to another. In general, it can be concluded that the rail freight sector is struggling with the fact that national strategies are still very different. According to the European Parliamentary Research Service (2016), new entrants often face barriers and discrimination, especially due to the strong position of incumbents. In order to find pathways towards climate neutral freight corridors, it therefore is of key interest to further discuss and question these barriers.

3. Institutional framework of the freight transport sector

The prevalent institutional theory (cf. Working Paper by Gandenberger et al. 2018) refers to a group of actors which constitutes a recognized area of institutional life as organisation field. Based on these theoretical insights, this chapter aims at providing a deeper analysis on the connections between the relevant actors in the rail freight sector.

Regarding this, a report by the European Court of Auditors (2016) on rail freight transport in the EU serves as a useful starting point. It provides a figure that illustrates the main stakeholders that are involved in the rail freight system.

Figure 3: Main rail freight transport stakeholders (European Court of Auditors 2016)



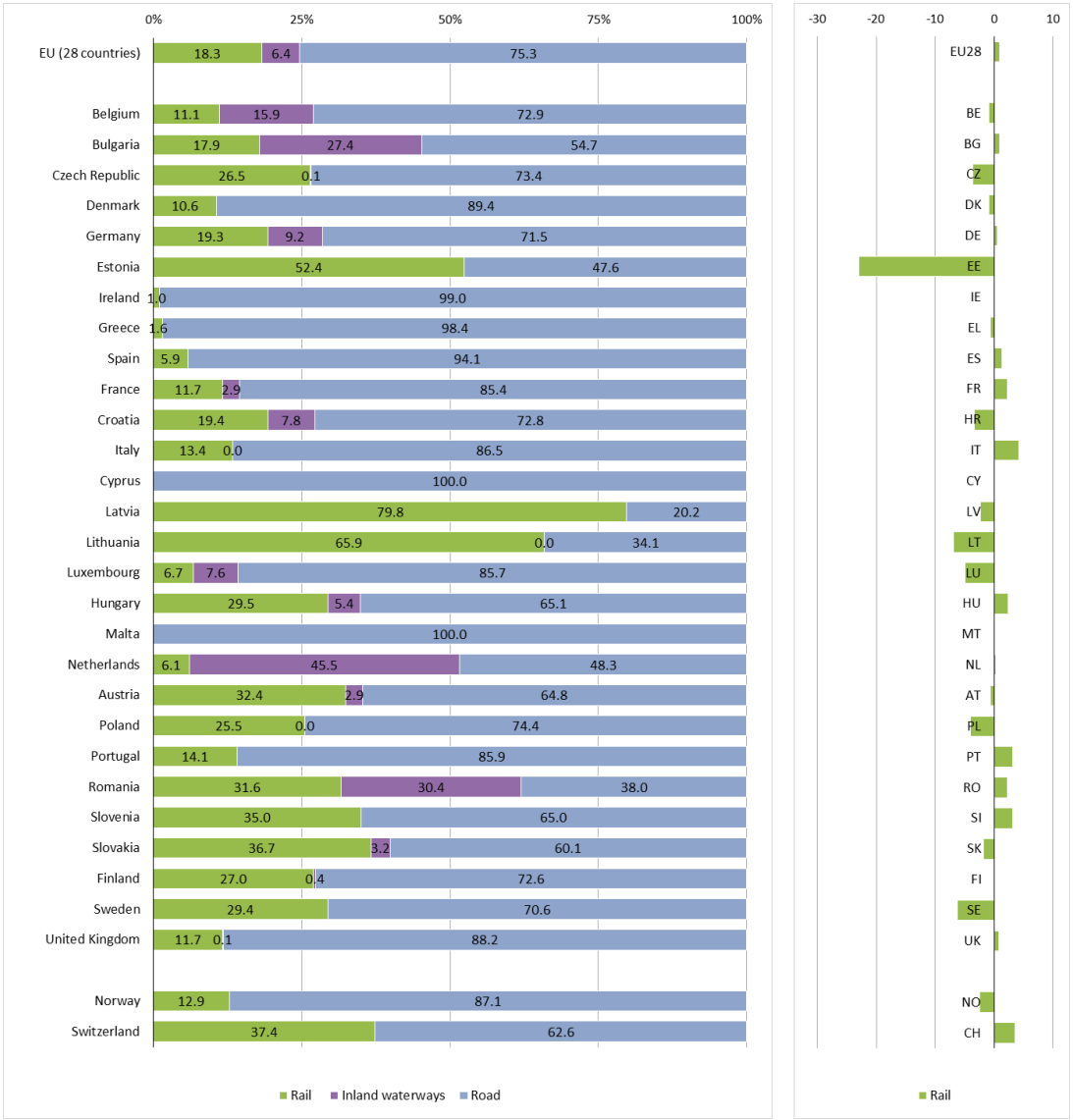
Source: European Court of Auditors 2016: 13

3.1. Main actors and modes of transport

Which actors are – from an institutional as well as from a regulatory perspective – playing a key role in the transport freight sector? As illustrated in the figure above, the European Court of Auditors explicitly highlights the following five groups of actors: shippers, railway undertakings, infrastructure managers, national regulatory bodies as well as national safety authorities (European Court of Auditors 2016: 12). In addition, there are further stakeholders that are of great necessity for a smooth transportation process such as operators of ports and terminals along the corridor (Austrian Ministry for Transport, Innovation and Technology 2015).

As illustrated in the figure above, shippers choose the method of transport "which best suits their needs" (European Court of Auditors 2016). To what extent is this the case with respect to the railways? The following figure provides an overview of the modal split of inland freight transport.

Figure 4: Modal split of inland freight transport 2015 (% of total tkm) and change in railway transport since 2010 (in percentage points)



EU28 includes rail transport estimates for Belgium (2015), inland waterways transport estimates for Finland and does not include freight transport for Malta (negligible); BE (estimated values for 2015), FI (estimated values for 2010) (Eurostat 2017a)

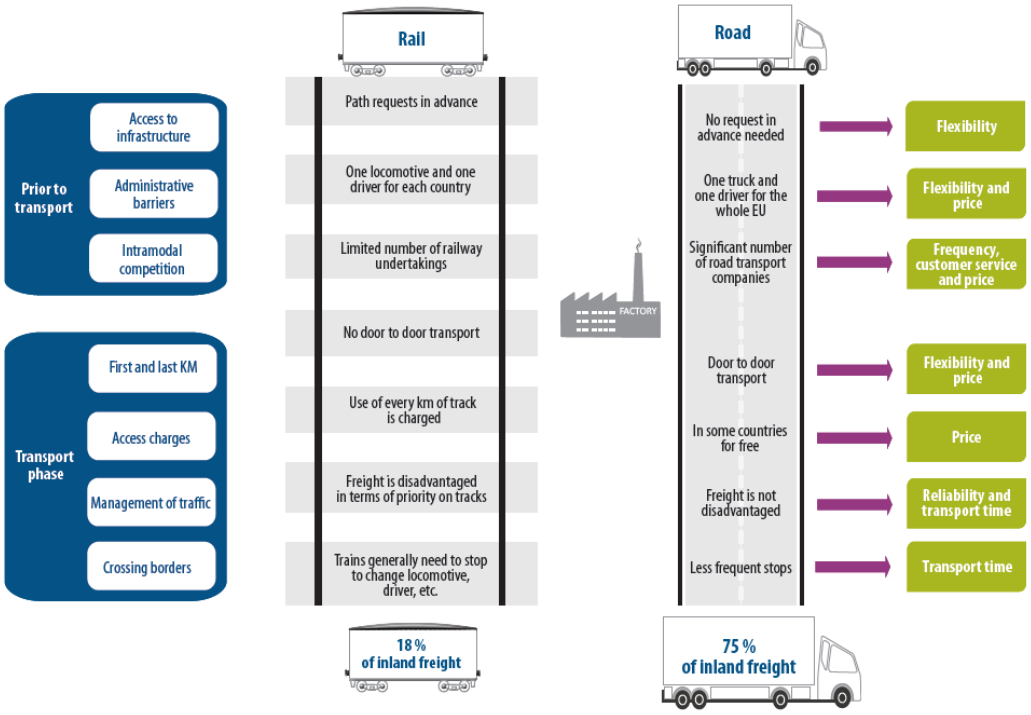
Graphic INFRAS. Source: Eurostat 2017a.

Overall, the modal split of freight transport in the European Union has been stagnating since 2010. On average, about 18.3 percent of the modal split of freight transport can be assigned to railways (2015) (Eurostat 2017a). In the non-EU country Switzerland, however, the share of rail

freight transport was about 37 percent in 2015. In Germany, Italy, the Netherlands and Switzerland the share of rail freight transport slightly increased compared to 2010. In Belgium and Poland, however, the share of rail freight transport decreased between 2015 and 2010.

The interface between box 2 and box 3 in the figure illustrated above, raises the following question: what causes the decision of shippers to choose a specific method of transport? Regarding this, the European Court of Auditors argues in a rather provocative manner: "Shippers chose methods of transport on the basis of business criteria, and not on the basis of EU policy priorities" (European Court of Auditors 2016: 28).

Figure 5: Comparison of some of the challenges faced by rail freight transport compared to road (European Court of Auditors 2016)



Source: European Court of Auditors 2016: 29

According to the European Court of Auditors, factors such as reliability, prices, customer service, frequency and transport time, rank among the most important criteria for shippers who have to choose between rail freight and road haulage as a method of transport (European

Court of Auditors 2016: 28). Based on their investigations in five EU member states[1] and interviews with relevant policy makers and operators[2], the authors of the report outline numerous observations that illustrate the competition between railways and road haulage – as well as the barriers, railway undertakings have to face.

However, as discussed in the following chapter, these challenges might be a chance for new entrants to step in. With respect to the success factors of road haulage, Crozet et al. for instance attribute an ability "to generate productivity and to respond to the changing nature of goods" to this mode of transport (Crozet et al. 2014: 8).

3.2. Excursus: Intermodal transport

In its White Paper – roadmap to a single European transport area – the European Commission states: *"In longer distances, options for road decarbonisation are more limited, and freight multimodality has to become economically attractive for shippers. Efficient co-modality is needed"* (European Commission 2011a: 7).

Achieving this objective involves, according to the European Commission, the combination of various transport modes. With respect to the act of shifting long distance transport away from road within the same transport chain, three different types of transport can be distinguished.

[1] Czech Republic, Germany, Spain, France and Poland (European Court of Auditors 2016: 21)
[2] i.a. Commission staff, Member State authorities, rail freight operators and other stakeholders (European Court of Auditors 2016: 21)

Table 7: Types of Transport

Type	Multimodal transport	Intermodal transport	Combined transport
Definition	▪ Carriage of goods by at least two different modes of transport.	▪ Movement of goods (in one and the same loading unit or a vehicle) by successive modes of transport without handling of the goods themselves when changing modes. Vehicle can be a road or rail vehicle or a vessel.	▪ Intermodal transport where the major part of the journey is by rail, inland waterways or sea and any initial and/or final leg carried out by road is as short as possible.
Example	▪ e.g. road transport + rail transport	▪ e.g. road transport + rail transport ▪ e.g. one container	▪ e.g. road transport + rail transport ▪ e.g. one container ▪ only short distance on road; major part on inland waterways or maritime transport
Subcategory	▪ None	▪ Type of multimodal transport.	▪ Type of intermodal transport

Source: European Commission 2016b: Combined Transport Directive 92/106/EEC; European Commission 2017a.

By referring to numerous scientific literature and authors, Mathisen and Hanssen (2014) point out two main advantages that can be assessed to intermodal freight transport (cf. Mathisen & Hanssen 2014: 612):

1. External costs of intermodal transport solutions are comparatively low

Regarding this statement, the authors refer to Forkenbrock (2001), according to which "the external costs of an intermodal train per tonne-km, is only 28% percent of a general freight truck" (Mathisen & Hanssen 2014: 612). Even though intermodal transport is expected to be more environmentally friendly than unimodal transport, comparisons between the external costs of these two modes of transport shall be treated carefully. According to Braekers et al. (2009), who discuss key models for the comparison of the two transport types, external costs due to transport – such as noise or pollution – highly depend on the specific situation. Besides, parameters such as load factors, train lengths or distances, the authors consider factors such as vehicle characteristics, speed limits, but also the period of time when the good is transported as relevant for the calculation of external costs (Braekers et al. 2009: 10).

2. Intermodal transport is less energy intensive than freight transport by road

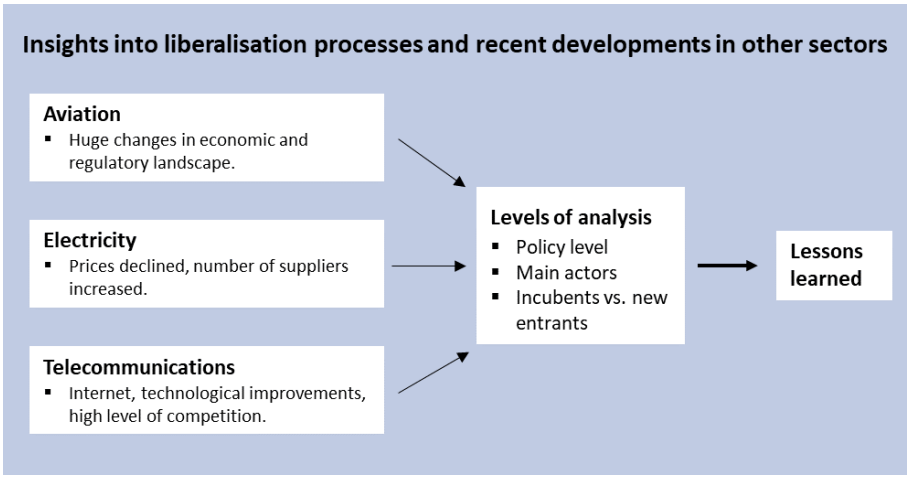
It can be assumed that the extent to what intermodal transport really is less energy intensive than unimodal transport, strongly depends on the specific share of transport vehicles. Regarding this, the European Commission (2016) considers combined transport – which is a specific form of intermodal transport – as being stimulatory for "the more energy efficient and environmental friendly modes of transport". According to the Commission, this originates from the fact, that combined transport is characterised by reducing the use of trucks during the transport chain to a minimum. This key characteristic can be considered as the most important difference to intermodal transport which is defined in a "mode-neutral" way (European Commission 2016b: 20).

4. Insights into liberalisation processes and recent developments in other sectors

What determines liberalisation processes in general? And to what extent might the rail freight sector profit from experiences made in other markets? This subchapter aims at shedding light on recent liberalisation processes and reforms. In the past decades, numerous markets in Europe were liberalised. These processes implied enormous changes – and had great impacts on actors, products and business models.

This subchapter aims at describing main developments in three markets of interest: aviation, electricity and telecommunications. Even though reforms, business models etc. in these sectors are only comparable to a limited extent to the railway market, a brief outline of key characteristics might help in classifying recent developments. The analysis is based on internal expert interviews as well as literature and focuses on three main aspects: the policy level, the main actors and the differences between (former) incumbents and main actors. At first, it highlights key indicators such as the regulatory framework, main policy measures or production models. Second, it indicates key characteristics of the main actors that shape the various markets. Third, it provides brief insights into general strategies, business models and levels of cooperation of incumbents and new entrants in these markets. The following chapter concludes by summarizing main factors that support or limit successful developments of (new) business models.

Figure 6: Analytical framework (chapter 4)



Graphic INFRAS.

4.1. Policy level

According to Crozet et al. (2014) deregulating and opening the market were among the "main policy options" for the EU to encourage sustainable development in the rail freight. In this context, the authors explicitly highlight parallels to recent developments in the air transport sector as well as in other network industries such as energy and telecommunications (Crozet et al. 2014: 6).

Therefore, this subchapter aims at shedding light on the policy level of these sectors. It briefly describes key characteristics such as the regulatory framework, main policy measures as well as markets, access conditions and the level of competition.

By comparing air to rail transport, Crozet et al. point out the large market share of "major companies". The authors underline that – despite deregulation – some airlines managed to survive and even dominate the competitive environment at specific airports: e.g. British Airways (London Heathrow), Air France (Paris CDG) or Lufthansa (Frankfurt). On the one hand the liberalisation led to "fierce competition, many bankruptcies and fragile profitability for many traditional airports". On the other hand, however, the above-mentioned airlines prevailed by adapting strategies (e.g. higher number of seats) (Crozet et al. 2014: 31).

From a general perspective, ambitions to achieve a transition to a sustainable energy system strongly influence current developments in the electricity market. The main features of the underlying transformation processes are determined in the "Energy Roadmap 2050", which was communicated by the European Commission in 2011 (European Commission 2011b). Major baselines for these steps were set by past or recent liberalisation processes – of which some are described in the following table. The energy transition – including measures to promote the use of renewable energy – represents a change in perspective on a policy level that distinguishes the electricity market from the aviation or telecommunications sector.

Table 8: Policy level (1/4)

Indicator	Aviation	Electricity	Telecommunications
Regulatory framework	▪ Market access: Initially, international aviation was based on bilateral agreements between individual countries; nowadays it is shaped by the so-called "Freedoms of the Air" (among which "consecutive cabotage" is one of the most relevant rights) (ICAO2018 Maibach 2017). ▪ Pricing: Originally, highly regulated (flying as a luxury good); today: full flexibility, huge differences in prices. ▪ Technical regulations (safety & security): From the outset, the aviation market has been highly international. In comparison to rail freight market low market entry barriers (international standards are predominating). ▪ On the one hand, infrastructure (airports) and transport (air traffic, airlines) are naturally separated. On the other hand, however, regional airports often depend on few specific airlines (e.g. on one specific budget airline).	▪ EU: In contrast to the competitive energy market today, most member states had monopolised electricity and gas markets in the 1990s (European Parliamentary Research Service 2018). ▪ EU: An important milestone within the liberalisation process was the "Second Energy Package". Its transposition into national law was in 2004. Thanks to this package, consumers are "free to choose" which gas or electricity supplier they want (European Parliamentary Research Service 2018). ▪ Switzerland: In contrast to the EU, only large-scale consumers are free to choose their electricity supplier; for small scale consumers or households, however, this is not possible. The market will be gradually liberalised (UVEK 2018; BFE 2017). ▪ For the EU, the full liberalisation of the electricity market is a prerequisite for the planned electricity agreement between the EU and Switzerland (FDFA 2015). Infrastructure: Electricity grid is kind of a monopole; however, it can be used by several suppliers.	▪ In general, the European Commission underlines that competition in telecommunications throughout Europe increased within the last years. ▪ In addition, it states that incumbent providers were forced to reduce their prices (European Commission 2012).

Sources: INFRAS with data from European Parliamentary Research Service 2018, UVEK 2018, BFE 2015, FDFA 2015, European Commission 2012.

Table 9: Policy level (2/4)

Indicator	Aviation	Electricity market	Telecommunications
Main policy measures	▪ Three levels of liberalisation in the 80s and 90s (1987, 1990 and 1992) (Maibach 2017). ▪ Further policy measures in environmental, safety and security issues. ▪ Mainly policy measures on an international (instead of national) level.	▪ EU: Step-by-step liberalisation of the internal energy market. ▪ Between 1996 and 2009, three main legislative packages of measures were adopted. ▪ Their main focus was on market access, transparency, and regulation, consumer protection etc. (European Parliament 2017).	▪ In the late 1980s the EU started to liberalise the telecommunication market step-by-step; the liberalisation of voice telephony for instance started in the late 1990s (Liikanen 2001). ▪ In 2015 the EU "Digital single market strategy" was adopted. In a nutshell, it aims "to open up digital opportunities for people and business", as the European Commission describes it (European Commission 2017b). ▪ Among the major regulatory steps was the abolishment of mobile roaming charges within the EU in 2017 (European Commission 2017b).
Market(s)	▪ Two levels of services: 1) Continental (incl. national) vs. intercontinental air connections. 2) Passenger vs. cargo market; the cargo market in air transport consists of "belly cargo" and specialised cargo (such as DHL, FedEx etc.) (cf. Stoffregen et al. 2017).	▪ EU: The European Parliamentary Research Service differentiates between two main markets: retail and wholesale markets. ▪ Simultaneously, it underlines that these markets "may vary in geographical scope, ranging from local offers on the retail market to transnational wholesale markets" (European Parliamentary Research Service 2016b: 6). ▪ With respect to the transport of electricity, various grid levels can be distinguished. In Switzerland for instance, there is a difference between supra-regional, regional and local distribution systems (Swissgrid 2017).	▪ The electronic communications sector includes, among other things, the fixed broadband market as well as the mobile market (European Commission 2014a). ▪ Media channels, such as phone, internet or TV, that were originally separated from each other, increasingly merge.

Sources: INFRAS with data from European Commission 2017b, European Parliament 2017, European Parliamentary Re-search Service 2016b, Stoffregen et al. 2017, Swissgrid 2017, European Commission 2014a, Liikanen 2001.

Table 10: Policy level (3/4)

Indicator	Aviation	Electricity	Telecommunications
Production models	▪ Technological improvements: e.g. longer flight distances possible, new materials, larger airplanes (such as Airbus A380), improved jet engines, research activities in alternative fuels. ▪ Hub airports: transfer points instead of only direct air connections (A-B) (alliances, feeder airlines).	▪ Currently, in most European countries, the electricity generation is mixed. Energy sources are: renewable, nuclear and fossil fuels (Eurostat 2017b). ▪ With respect to future developments, the EU Commission expects a "more variable and decentralised electricity production" (European Commission 2017c: 2). ▪ Technological improvements: e.g. smart grids, smart metering.	▪ With respect to recent developments, EY argues that the telecommunication industry "is continuing to change at breakneck speed" (EY 2015: 7). ▪ Technological improvements and new consumer habits (social media, e-commerce etc.) shape the production model (European Commission 2014a: 6).
Investment conditions	▪ International business and global capital: nowadays investments from all over the world possible; not only in airlines but also in airports (mostly privatized).	▪ In order to reduce greenhouse gas emissions in Europe, the electricity market in Europe requires "significant investments". ▪ As a consequence, the EU encourages investments, especially in grids and low-carbon electricity generation (European Parliamentary Research Service 2016b: 2).	▪ The European Commission aims to invest in high-capacity networks (European Commission 2016c). ▪ In general, investments in the electronic communication sector strongly vary from one EU member state to another.

Sources: INFRAS with data from Eurostat 2017b, European Commission 2017c, European Parliamentary Research Service 2016b, EY 2015, European Commission 2014.

Table 11: Policy level (4/4)

Indicator	Aviation	Electricity	Telecommunications
Access conditions	▪ Rule of law: Aviation law liberalised (cf. regulatory framework): i.e. following the decision by the European Court of Justice on bilateral aviation agreements in 2002. ▪ Technical conditions: for instance, with respect to pilots, there are still differences in training and education. In general, however, requirements and access conditions are comparable (i.e. English is main language). ▪ Certain airports are specialised in Cargo transport (such as Cologne, Leipzig); logistics companies especially concentrate on these hubs.	▪ Ensuring fair market access is among the most important objectives of the liberalisation process with respect to the EU internal energy market (European Parliamentary Research Service 2016b). ▪ The underlying principles are characterized by the "right of access for third parties to electricity grids, free choice of suppliers for consumers" (European Commission 2017a: 2). ▪ However, electricity providers that want to enter a foreign market, are, among other things, partly confronted with barriers such as missing language skills and difficult network access (Swiss Economics 2015: 34).	▪ With respect to market regulation, the European Commission points out the fact that regulators in several EU member states "continued the trend towards lifting ex ante regulation of certain markets" (European Commission 2014a: 12).
Level of competition	▪ High level of competition in the aviation market with respect to the air connections. ▪ However, air cargo is not as competitive as passenger market.	▪ Level of competition varies from one country to another. In 2013, four (or less) electricity providers dominated the markets of 17 European countries, each having a market share of at least 80 percent (Swiss Economics 2015: 38). ▪ According to the European Commission, prices declined by 35% to 45% between 2008 and 2012 in the EU (European Commission 2014b).	▪ High level of competition: price pressure in the mobile market of most European countries; in each country, there are about 3-4 operators (European Commission 2014a: 9).

Sources: INFRAS with data from European Commission 2017a, European Parliamentary Research Service 2016b, Swiss Economics 2015, European Commission 2014a, European Commission 2014b.

4.2. Main actors

The following comparison sheds light on the main actors that characterize the aviation, electricity and telecommunications sector. It outlines the relevance of incumbents and new entrants by pointing out the competitive context and their market shares. Besides it briefly describes the main interests of policy actors, interest groups, infrastructure providers and consumers. With respect to the latter group of actors, consumers, the description of the key characteristics allows to conclude that the bonds between clients respectively consumers and former incumbents or new entrants are getting much less important.

Table 12: Main actors (1/2)

Indicator	Aviation	Electricity	Telecommunications
Incumbents	▪ In Europe, (former) flagship carriers (i.e. Swiss, Lufthansa) are still existing; however, they are challenged by new actors (low-budget airlines). ▪ Most of the (passenger) airlines are cooperating in airline alliances (Star Alliance, Skyteam, Oneworld).	▪ EU: Before the liberalisation, "few quasi-monopolistic companies" dominated the electricity market in the EU. ▪ Today it is increasingly competitive in the EU (European Parliamentary Research Service 2016b: 6).	▪ With respect to fixed broadband, the EU average market share of incumbents was about 41% in 2015 (European Commission 2015: 9).
New entrants	▪ Numerous budget airlines (i.e. Ryanair, Easyjet) entered the market within the last decade. ▪ In cargo traffic however, the number of new entrants is by far not as high in the passenger market.	▪ According to Swiss Economics, foreign actors have a high market share in Belgium, Hungary and in the UK. In contrast to that, Germany and France appear to be difficult to access for foreign suppliers (Swiss Economics 2015: 36).	▪ Mobile market: In most European countries, the share of incumbents in the mobile market decreased as a consequence of the liberalisation (BAKOM 2014: 54). ▪ In most EU countries, the share of the three main operators range between 25% and 35% (European Commission 2014a: 9). ▪ In Switzerland, however, clients seem to be more oriented towards the incumbent: In 2012 the market share of "Swisscom" was about 59% (BAKOM 2014: 54).
Policy actors	▪ International bodies are of great importance; Highly identical; rather liberalising the aviation market than regulating it.	▪ In general, EU member states have a high level of autonomy; for instance, with respect to the composition of energy sources (Swiss Economics 2015: 20).	▪ National as well as international bodies, whereas the EU plays an increasing role (Digital Single Market), e.g. with respect to the abolishment of roaming fees in EU member states.

Sources: INFRAS with data from European Parliamentary Research Service 2016b, Swiss Economics 2015, BAKOM 2014, European Commission 2015, European Commission 2014a.

Table 13: Main actors (2/2)

Indicator	Aviation	Electricity	Telecommunications
Interest groups	▪ Environmental associations are increasingly criticizing economic growth and air pollution; apart from that there exist further interest groups such as trade associations etc.	▪ Among other actors that can be related to the group of electricity or network providers, environmental associations or citizens' movements are of great relevance; e.g. with respect to their resistance against nuclear power plants or coal power stations.	▪ Citizens' movements against cell towers (in fear of effect of mobile phone radiation and human health, as for instance in Germany or Austria).
Infrastructure providers	▪ Airports are mostly private institutions; separated from air traffic itself; traditionally, airports were state property; internationally financed.	▪ Electricity is delivered by distribution network operators (DSO).	▪ A standard for broadband employment does not exist: public funds for ensuring access in rural areas vs. encouraging competition especially in urban areas (European Parliamentary Research Service 2015: 11).
Clients/Consumers	▪ Passengers (businessmen, tourists etc.) ▪ Cargo: postal traffic, transport of fresh goods (vegetables) etc.	▪ In comparison to other sectors, the needs and requirements of consumers are comparatively straightforward; if they can count on the supply of electricity. ▪ However, there is an increasing differentiation between regular and green power on the market; consumers, for instance, have the possibility to choose suppliers that offer green electricity.	▪ Generally speaking, there are increased demands: EY observes a "new generation of consumers" that expects high quality and "will quickly switch providers when convenience and quality do not meet their expectations" (EY 2015: 18).

Sources: INFRAS with data from European Parliamentary Research Service 2015, EY 2015.

4.3. Incumbents vs new entrants

At least in parts, the role and position of incumbents respectively new entrants in the rail freight sector, strongly varies within the three sectors outlined below. All sectors – including the rail freight sector – have in common that former incumbents have to compete with new entrants in most countries. The following indicators illustrate that these actors partly opt for the same strategies, as they point out their comparatively low prices, for instance.

Table 14: Incumbents vs. new entrants

Indicator	Aviation	Electricity	Telecommunications
Main focus	▪ Incumbents: apart from short-distance flights, incumbents especially count on long-distance flights (intercontinental) ▪ New entrants: often focus on short-distance flights with occasional longer flight distances (i.e. Europe-North Africa).	▪ Distinguishing features between suppliers on the retail market are prices and origin of the offered electricity, e.g. renewable energy sources (European Parliamentary research service 2016b: 6).	▪ Incumbents as well as new entrants increasingly try to offer "everything from a single source": mobile internet access, TV, broadband etc.
Company structure	▪ Incumbents: traditionally large companies (consisting of numerous divisions). ▪ New entrants: mainly concentrate on air traffic.	▪ Incumbents: Often former monopolies. ▪ New entrants: company size comparatively smaller.	▪ Incumbents: In small countries the incumbent's market share is often higher than in comparatively big countries.
General strategy	▪ Incumbents: Mainly highlighting quality attributes (commercials often highlight service concepts on board etc.). ▪ New entrants: Mainly focusing on stressing their low ticket prices.	▪ Incumbents: Varies across Europe; in certain countries, however, barriers to entry into the electricity market for new entrants seem to be comparatively high (Swiss Economics 2015: 55). ▪ New entrants: Often focus on specific aspects in electricity supply (cf. business models).	▪ Incumbents: often highlight quality attributes ("best network"). ▪ New entrants: mainly point out their low prices.
Business models	▪ Incumbents: mainly approach hub airports or main airports; wide range of services not only on board (e.g. different classes) but also at the airports. ▪ However, partly adapt business models of new entrants. ▪ New entrants: often approach former military airports due to lower charges; limited services on board; outsourcing of products; using possibilities of digitization (i.e. online check-in).	▪ Incumbents: separation of electricity networks (grids) and power plants, national markets remain. ▪ New entrants: Often underline differences to incumbents (i.e. eco-power, lower prices, local energy production).	▪ Incumbents as well as new entrants increasingly try to outbid each other's prices, quality or service packages.
Level of cooperation	▪ Incumbents: formed or joined alliances (i.e. "Star Alliance"). ▪ New entrants: Mainly act autonomously.	▪ According to the European Commission, there is an increase in cross-border trade of electricity between EU countries (European Commission 2017c).	▪ In parts, incumbents and new entrants share cell towers; however, this strongly depends on regional conditions; basic supply is often guaranteed by state.

Sources: INFRAS with data from European Commission 2017c, European Parliamentary research service 2016b, Swiss Economics 2015.

4.4. Lessons learned

In general, actors in the rail freight market might profit from experiences or decisions that were taken in other sectors. But what can these actors learn from past or recent developments in the aviation, electricity or telecommunications sector? To what extend does the rail freight sector lag behind? Which measures might be necessary to improve future performance? Based on the above-outline key characteristics – with respect to the policy level, main actors as well as incumbents and new entrants – the following subchapter discusses some lessons that can be learned from these sectors.

Incumbents tend to adapt business models and strategies from new entrants

The comparison indicates that incumbents often tend to adapt business models from their competitors. This development is especially visible in the aviation market. Former incumbents such as Lufthansa or Swiss had to reduce costs in order to be able to compete with budget airlines. Even though the aviation market for passengers is comparable to the rail freight sector only to a limited extend, it symbolises the necessity of being open-minded for (unconventional) developments. Simultaneously, new entrants might push innovative ideas and strategies.

Prices really matter – but switching costs[3] have to be taken into account as well

Especially with respect to the electricity and the telecommunication market, aspects such as labels seem to be of minor importance for most clients. Given that certain qualitative standards are guaranteed – and comparable, – clients mainly base their decisions on the prices they have to pay. On the other hand, possible switching costs of changing a provider have to be taken into account. It might be the case that clients not necessarily decide to receive their power from an alternative market player, just because of cheaper prices. There seem to be other factors with respect to the decision-taking process (e.g. mutual trust, personal contacts) that seem to be of importance.

A regulatory framework, that is valid on an international level, helps to reduce national differences

Despite the before-mentioned reforms that took place in Europe: contrary to other markets, the rail freight sector is still regulated on a very national level. In light of increasing transnational freight and passenger transport, however, international approaches and solutions to common problems, seem to be all the more important. Among the most obvious factors in the

[3] "Switching costs" are defined as "[…] costs that a consumer incurs as a result of changing brands, suppliers or products. Although most prevalent switching costs are monetary in nature, there are also psychological, effort- and time-based switching costs." (Investopedia 2017).

rail freight market for instance, rank the so-called multiple electricity system. If it should work out to agree on solutions that are more international, this might be a strong asset to establish transnational freight transportation on the railways.

English should be accepted as the main working language – at least in cross-border traffic
To agree on one language – at least in cross-border traffic – could simplify working processes as well as employment costs. Against the backdrop of the fact that transnational rail freight transport not only crosses national but also language borders, the aviation market might serve as a role model here again. A common use of basic technical terms not only helps to avoid misunderstandings. It also expands the network of engineers that can be appointed for transnational transportation. As it is the case in the aviation market, English might serve as a main working language.

Comparing the rail freight sector with other sectors is – of course – only possible to a limited extend. This applies in particular with respect to the costs that have to be covered in air respectively land transport, as the German association "Mofair" argues. Contrary to air traffic, which profits from the air space, land traffic is confronted to large investments in relevant infrastructure (Stoffregen et al. 2017).

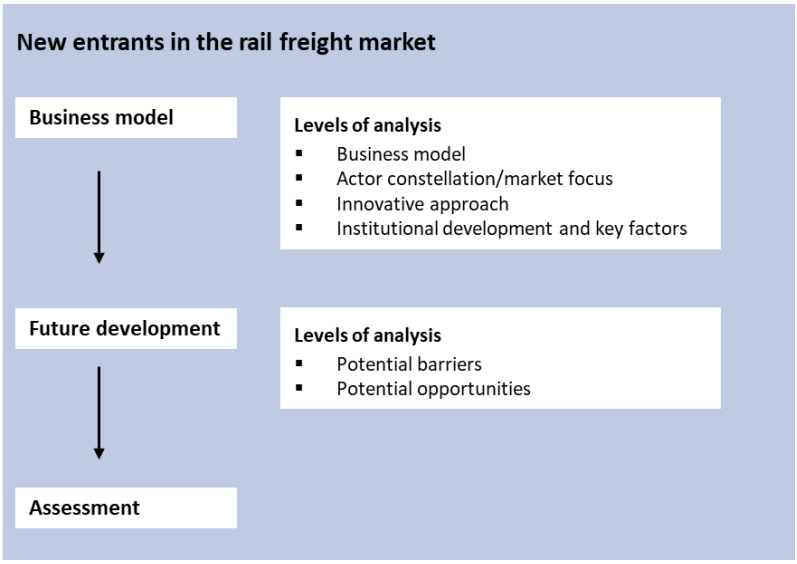
5. New entrants in the rail freight market

Which strategy is successful? What kind of innovations are required in order to compete with national incumbents in the rail freight market? To better understand practical experiences, the following analysis of new entrants aims to provide an overview of best practices and success factors as well as a list of possible market barriers and critical market entry factors.

The following subchapter sheds light on five selected companies that (recently) entered the rail freight market. The analysis especially investigates cases that are based in Germany or in Switzerland. The companies either focus on transport services, logistics or terminal management systems. Some of the new entrants compete with the prevalent incumbents in the respective countries. Others are developing products or provide solutions to the rail freight market that are, to a certain extent, innovative. With most of them we held bilateral talks on the "Transport Logistic" exhibition in Munich (in May 2017).

All selected companies have in common that they are either characterized by flat hierarchies, technological innovations or "unusual" business models – or even by a combination of these indicators. By briefly analysing their business models as well as their products and innovations, the subchapter provides an overview of business models of new entrants in the rail freight market.

Figure 7: Analytical framework (chapter 5)



Graphic INFRAS. Basis: Bilateral talks with representatives from the most-mentioned companies at the "Transport Logistics"-exhibition in Munich (May 2017) and desktop research.

5.1.1. Cargo Beamer

Business model

As a logistics service provider, CargoBeamer's business model relies on a system designed to improve the work steps of unaccompanied combined transport. The company, which was founded in 2003 and is based in Leipzig, Germany, argues that due to technical restriction today "only 15 percent of the road freight traffic" are suitable for a combination of road and rail transport (Cargo-Beamer 2018b). Its innovative answer to this imbalance is an intermodal, fully automated transport system that enables to load semi-trailers horizontally without any specific technical requirements. The company is based on a private initiative. In 1998 two engineers, Hans-Jürgen Weidemann and Michael Baier, started to develop the idea. In the course of the following years the idea "CargoBeamer" was patented. In 2004 it gained financial funding from a "R&D-association project funding" technology programme and started to cooperate with companies in the rail freight market (CargoBeamer 2018a).

Actor constellation/market focus

CargoBeamer mainly competes with existing crane container terminals. In order to get semi-trailers from the road on the rail, using cranes is the most conventional way nowadays. However, this procedure is not only time-consuming but also expensive, as the semi-trailers need be modified (by example with special biting edges). Therefore, many haulage providers avoid combined transport. According to CargoBeamer AG more than 90 percent of semi-trailers are not suitable for crane terminals as they are not equipped in an appropriate manner (Cargo-Beamer 2014).

Innovative approach

CargoBeamer promises to load any type of trailer on its terminals from the motorways to the railways within little time. The horizontal loading process can be compared to interchange procedures in public transport (CargoBeamer 2018b, CargoBeamer 2018c).

Institutional development and key factors

Even though the business model and concept of CargoBeamer was already developed in the late nineties, it took about one decade until the first prototype terminal in Leipzig was developed and constructed. Institutionally, the opening of this terminal can be declared as a milestone in the company's history as it visualizes the potentials of this loading technique (Cargo-Beamer 2018a). The company not only tries to expand its idea on the German market but also underlines its transnational vision "throughout Europe" (CargoBeamer 2018d). On its website, the company lists about five employees (CargoBeamer 2018e). Thus, it can be assumed that

the individual competences of the team members are of key importance with respect to the institutional development and approaches. In July 2016, Cargo Beamer announced to have signed an agreement with “Atop Beijing” und the “Zhongche Group” that aim at producing and CargoBeamer railwagons and terminal technology in China and to operate at the Chinese market (CargoBeamer 2016).

Potential barriers

Since many haulage providers fully focus on road transport, it can be assumed that they have reservations with respect to combined transport. As a consequence, Cargo Beamer might need to invest a lot of resources in order to convince these ventures to switch to the railway. In addition, the implementation of the technique highly depends on the availability of areas that meet the necessary requirements (such as enough space, access to roads and railway infrastructure). In addition, their geographical position is of key importance. The implementation of the technique requires a solid financial basis as well as the endurance for time-consuming bureaucratic procedures. These factors are strong determinants with respect to the competitiveness of the company in general and the CargoBeamer technology in specific.

Potential opportunities

Due to the fact that most types of trailers are eligible for this system, CargoBeamer has the capacity to provide numerous haulage providers access to the rail freight market. Being present at exhibitions such as the Transport Logistic fair in Munich in May 2017 boosts the company’s level of awareness on the market. There is a chance to expand the national and international network.

Assessment

Recent agreements with partners from China, that were signed in 2016 (CargoBeamer 2016), symbolize a certain degree of sustainability with respect to future developments and increasing transnational cooperation. Against the backdrop of the fact that nowadays most haulage providers only focus on motorways, CargoBeamer also has to convince these actors from the advantages of combined transport. For a new entrant, this is indeed a challenging starting point. Simultaneously, the company also should point out the qualities of their innovative system. One can assume that CargoBeamer could be a catalyser in getting more goods from the motorway onto the railway. In the end, however, it is also necessary to concede that CargoBeamer is an important but comparatively little piece of the transport chain. Recent developments such as the disruption of services on the railway line between Karlsruhe and Basel in summer 2017,

might serve as a "chance" to imply possible assets of a technology such as CargoBeamer – not least in view of the specific requirements of transalpine freight transport.

5.1.2. BLS Cargo

Business model

BLS Cargo is a corridor haulage provider which is based in Bern, Switzerland, and was founded in 2001, as a subsidiary of the BLS AG, which is primarily owned by the canton of Berne and the Swiss federation (BLS Cargo 2018a, BLS 2018a, BLS 2018b). A key factor of the company's business model is its transnational network with partners from all over Europe. Apart from operating itself in Switzerland as a traction provider, BLS Cargo cooperates with haulage providers from various countries. Thanks to this transnational network, the company is able to provide services for products that are coming from the North Sea and are needed to be transported to the Mediterranean (BLS Cargo 2018b). In contrast to many other haulage providers, BLS Cargo has a competitive advantage with respect to the functioning of their locomotives. These so-called multi-system locomotives can be used transnational and cross-border without the necessity of being changed (BLS Cargo 2016).

Actor constellation/market focus

According to its own statement, the market share of BLS cargo in Swiss transit rail traffic is about 25 percent (BLS Cargo 2018a). By calling itself "the Alpinists", the company points out its transnational market focus and its railway network that runs across the Alps from the Netherlands and Germany to Italy (BLS Cargo 2018b). In Switzerland, BLS Cargo's main competitor is SBB Cargo. Until 2014, Deutsche Bahn held a 45 percent stake in BLS Cargo. The initial reason for Deutsche Bahn to invest in BLS Cargo was, to not leave the transport market across the Alps to the Swiss incumbent (NZZ 2014). Since 2017 the French company SNCF Logistics has held 45 percent of BLS Cargo (NZZ 2017).

Innovative approach

Thanks to its international network with haulage transport providers from all over Europe, BLS Cargo is able to offer transnational transport solutions to its clients. This network and the use of multi-system locomotives enables the company to provide transportation across borders without wasting time in changing locomotives for instance. It underlines its ability to "excel along the entire Alpine corridor" (BLS Cargo 2018b). Apart from that, BLS Cargo also provides numerous additional services such as train inspections, operational services or the opportunity to cover locomotives with advertisement (BLS Cargo 2018b).

Institutional development and key factors

BLS cargo has always been connected to international partners, having broad experience in the rail freight market in neighbouring countries. With respect to its international network, BLS Cargo explicitly points out its competences in establishing "linguistic and cultural links between northern and southern Europe" (BLS Cargo 2018b). In this respect, the multi-system locomotive can also be declared as an innovation that is enabled by an institutional framework that is shaped by a large network of international partners.

Potential barriers

Even though BLS Cargo stands out with its multi-system locomotive, the need for such a product also symbolizes the barriers, traction providers are confronted with. Varying electricity and safety systems across Europe were and are still obstacles for rail freight service providers, especially in comparison to the road transport. In addition, one can assume that cooperation with partners from several countries requires a lot of resources.

Potential opportunities

Through international cooperation and multi-system locomotives, the corridor haulage provider BLS cargo is able to compete with road transport services. After having received 15 multi-system locomotives, the company expects further 13 locomotives by 2018 (BLS Cargo 2016). Due to such investments, there is a chance for the company to further expand the network and establish itself as a competitor of SBB Cargo within Switzerland.

Assessment

At the "Transport Logistic" exhibition 2017 in Munich, BLS cargo had a booth right next to DB Schenker. This position might be interpreted as a symbol for the company's ambitions. Thanks to its experience, it can be assumed that BLS Cargo will be able to further strengthen its transnational institutional framework. However, these connections also strongly depend on further developments of the rail freight market in other countries. While the share of rail freight transport in Switzerland is comparatively high, that the share of road transport in neighbouring countries might further increase. Therefore, investments in multi-system locomotives are strong arguments for the rail freight sector.

5.1.3. railCare

Business model

RailCare is a Swiss transport service provider with a focus on unaccompanied combined transport. It is exclusively active in Switzerland with a focus on the transport of fresh and daily goods. As a subsidiary company of the Swiss retail group "Coop", it especially transports consumer goods for the supermarket chain within Switzerland. In addition, railCare also transports goods for companies such as "Emmi", "Heineken" or "McDonalds" (SRF 2016, railCare 2018a).

Actor constellation/market focus

The company is a wholly-owned subsidiary of the Coop Group, which is one of largest retail and wholesale providers in Switzerland. In total, the Coop universe encompasses about 2,200 sales outlets in retail (Coop 2017). railCare was founded as "tradecare AG" in Baden, Switzerland. In 2009, it was renamed and got its contemporary label. In 2010, Coop acquired 100 percent of "railCare". The retail company justified this takeover by underlining its aim to further intensify the transport of goods on railways (Moneyhouse 2017; Coop 2010, Swissinfo.ch 2010).

Innovative approach

railCare explicitly points out the advantages of transporting goods on railways: According to the company, it is often claimed that Switzerland was too small for rail freight transport. On its website, railCare disapproves this claim by underlining the assets of unaccompanied combined transport ("single point of contact") even within comparatively small distances (railCare 2018b). Against the backdrop of the fact that railCare especially focuses on rail freight, its main focus appears to be comparatively unusual: the transport of fresh and daily goods such as vegetables and fruits. The company's fleet comprises of trains and wagons as well as of lorries (railCare 2018b, railCare 2018c). Containers, of which numerous are equipped with refrigeration plants, are loaded from the road-ways on the railways – and vice versa (railCare 2018d). The company compares its trains to local trains ("S-Bahn), as they are comparatively fast and reliable (railCare 2018b). According to its own statement, railCare aims at reducing the traffic volume on the Gotthard motorway. Regarding this, it might also profit from the Gotthard Base Tunnel, which opened in 2016 (AlpTransit 2018).

Institutional development and key factors

Thanks to the takeover by the Coop group in 2010, railCare intensively cooperates with one of the biggest retail players in Switzerland. Since its foundation in 2007, the order quantity increased. In 2016, the company had about 300 employees (railCare & Coop 2016). In total about

five locomotives and 20 to 25 trains are in service every day. This amounts for about 250 semi-trailers (SRF 2016).

Potential barriers

It is striking that railCare already highlights potential barriers on its website. On the start page the company raises question such as “Why should I switch to the rail even though I am satisfied with the road?” or “Are trains suitable for the transport of consumer goods?” (railCare 2018a). Statements like these symbolize barriers of railCare in daily business. It can be assumed that many companies are not thinking about switching to the rail transportation as the distances within Switzerland are comparatively small or as rail freight is perceived as not flexible enough. Therefore, it is of great importance for companies such as railCare to prove the opposite.

Potential opportunities

Against the backdrop of the fact that the number of inhabitants as well as traffic jams might increase, rail freight transport in Switzerland might gain in importance. By offering unaccompanied combined transport, railCare can provide a “single point of contact” (cf. railCare 2018b) which can be seen as an asset. Due to its partnership with the Coop group, railCare is able to rely on a guaranteed volume of goods.

Assessment

railCare brings forward convincing arguments for transporting consumer goods on the rail instead on the road. On its website, it directly deals with arguments that question rail freight transport in Switzerland. Thanks to its cooperation with the Coop group, railCare has a broad network with further companies that might be interested in environmental transport. The Swiss milk processor Emmi AG for instance, explicitly highlights its cooperation with railCare – and the avoidance of truck transportation (Emmi 2017). However, in the end, railCare can not only rely on the fact that rail freight transport is less harmful to the environment. To further convince future clients, the company has to steadily invest into flexibility measures and its efficiency, in order to being able to compete with the comparatively low prices in road transportation (cf. Railway Gazette 2017).

5.1.4. Captrain Deutschland

Business model

Captrain Deutschland is a rail logistics provider which is situated in Berlin. As it consists of about 15 rail transport and rail infrastructure companies, Captrain Deutschland is represented in Germany (such as in Bremen, Dortmund and Neu-Ulm) as well as in several European countries (Austria, Czech Republic, Denmark, the Netherlands, Poland, Switzerland and Sweden). Among other things, the company is specialised on the transportation of industrial goods such as coils of steels, coal and chemicals (SNCF Group 2017). Furthermore, it provides numerous logistics solutions such as "last mile shunting services" or workshops (Captrain Deutschland 2017a).

Actor constellation/market focus

Captrain Deutschland was founded in 2010 and is part of Captrain, "the international European rail transport brand" of the French SNCF logistics Group (SNCF Group 2017). In addition to its German section there also exist Captrain companies in Belgium, Italy and Romania. On its websites Captrain Deutschland as well as SNCF explicitly stress the fact that the company has local presences, rail transport and infrastructure companies, in numerous European countries: "We thus provide the necessary regional knowledge and you have a personal point of contact in your immediate vicinity" (Captrain Deutschland 2017a).

Innovative approach

This European network – consisting of operational offices and affiliates – is described as a main quality by Captrain Deutschland (Captrain Deutschland 2017a). In order to underline its international services, the company states the fact that its fleet encompasses multi-system locomotives that can be deployed across borders. On its website, Captrain Deutschland explicitly points out its "mission to provide highly personalised solutions" (single point of contact). In order to underline this, the company provides examples of its "long-standing customer relationships" such as with Salzgitter Mannesman Precision for which it transports round billets and hollows (Captrain Deutschland 2017a).

Institutional development and key factors

Both, the SNCF Logistics Group as well as Captrain Deutschland highlight on their websites the advantages of being connected to each other as well as to its affiliates in Belgium, Italy or Romania. In 2016, Captrain Deutschland had about 1400 employees (2014: about 1240 employees) and a turnover of about 332 million euros. According to its own statement it possesses about 175 locomotives and 2'500 freight cars. In 2015 about 50 percent of the total transport

volumes (54.7 million tonnes; 8.0% of the traffic performance) were steel and scrap (Captrain Deutschland 2017a, 2017b, 2015).

Potential barriers

As many other rail logistics providers, Captrain Deutschland also competes with logistics service providers on the road. Apart from that it might be confronted with the pervasive lack of available train drivers. In July 2017, the company launched a job advertising campaign that is looking for train drivers in an "usual" manner: As an eye catcher, the company printed a job advertisement on one of its locomotives with a roaring lion, that aims at symbolising the power of the freight trains (Captrain Deutschland 2017a).

Opportunities

Captrain Deutschland, as a holding, is presented in various regions in Germany as well as in neighbouring European countries. This international network might be an asset. A further advantage is that the company has, according to its own statement, multi-system locomotives. This ensures the transportation of goods across borders without complicated changes of locomotives.

Assessment

In comparison to other rail logistics providers, it is striking that Captrain Deutschland actively shows pictures of responsible contact persons as well as managing directors on its website. From the customer's perspective, this might underline the company's ambition to provide individual services by ensuring "face-to-face communication" (Captrain Deutschland 2017a).

5.1.5. HSL Logistik GmbH

Business model

The HSL Logistik GmbH describes itself as a train operating company. Apart from rail freight traffic it is also licensed to operate in passenger rail traffic. The service range includes block train transports (liquids, cars and trucks as well as bulk goods), shunting services (shunting terminals e.g.in Bremen or Rostock) as well as special loads (e.g. "last-minute" trains). Apart from that the company offers vocational training such as for engine drivers in its academy called "HSL Akademie GmbH" (HSL Logistik GmbH 2017a)

Actor constellation/market focus

As it is stated on its website, HSL Logostik GmbH was founded in 2003, by "a private railway operator" (HSL Logisitk GmbH 2017a). One year later it received its EVU license. In 2009 a subsidiary company in the Netherlands was founded, followed by affiliates in the Czech Republic, Austria and Belgium. The company mainly focuses on "regional and superregional rail freight". Moreover, it offers shunting services in Hannover as well as at the ports of Rostock, Hamburg and Rotterdam (HSL Logistik GmbH 2017a). In 2015 the company founded an own academy in Hamburg. The HSL Akademie offers training opportunities for engine drivers as well as for dispatchers.

Innovative approach

In its company's brochure, HSL Logisitik GmbH explicitly points out its customer-oriented thinking and the management's proximity to its customers. In addition, it highlights its ambition to provide transparent planning as well as unbureaucratic procedures. HSL Logistik claims to be able to guarantee a punctuality of 94 percent (HSL Logistic GmbH 2017b). In 2016, it was announced that HSL "has placed its first order for new-build locomotives" (HSL Logistik GmbH 2017b, Railway Gazette 2017). The transportation of hazardous materials ranks among the key priorities of the company (share of about 46 per cent; HSL Logistic GmbH 2017b).

Institutional development and key factors

According to its own statement, HSL Logistik GmbH is the largest private service provider in Germany. In 2017, the company had about 200 employees and possessed about 50 locomotives. In its company's brochure, HSL Logistik points out its ambitions with respect to future developments: apart from further optimising digital processes it aims at cooperating with the company Cargo Beamer in order to further improve combined traffic offers. Moreover, the company emphasizes the fact that it uses about 42 percent green electricity HSL Logistik GmbH 2017b: 4, 6, 8).

Potential barriers

As the company explicitly highlights on its website, HSL Logistik GmbH is "in direct competition with road logistic of German domestic container shipping as well as other train operating companies". Apart from that it can be assumed that it is, similar to other companies that operate in rail freight traffic, confronted with a lack of qualified personal. On its website, the company aims at recruiting engine drivers by offering a welcome bonus of 2000 Euros (HSL Logistik GmbH 2017a).

Opportunities

At the same time, the HSL Logistik GmbH actively offers trainings for potential engine drivers. Against the backdrop of the fact that the company has its own academy, it might be able to reduce the lack of engine drivers by target-oriented trainings.

Assessment

Following the company's brochure, the strategy of HSL Logistik seem to be very future-oriented: not only with respect to its willingness to improve software solutions and combined transports, but also regarding their investments in training measures. Authentic team pictures underline the company's ambition to provide customer oriented services. However, against the backdrop of the fact that the company claims at being the largest private rail logistic service provider in Germany, further investments in its web presence

5.1.6. Lessons learned

It is without question that new entrants have competitive advantages in comparison to incumbents. The analysis indicates for instance, that they immensely profit from the fact that they are comparatively small and structured in a less hierarchical way. Therefore, they can offer very individual solutions to their clients. New players commonly evolve around specifically profitable market niches and do need to carry the burden of large and widely unprofitable infrastructure and service networks.

However, new entrants are often only able to focus on specific regions or goods they can transport. In order to compete with incumbents and strong competitors, new entrants should further invest in partnerships and alliances – including actors from other countries. Regarding this, BLS Cargo, that cooperates with rail freight companies from neighbouring countries, serves as an example. In addition, new entrants should further highlight their individual competences on the market – not only to attract clients, but also possible investors.

6. Specific barriers and opportunities for new entrants

The following chapter aims at shedding light on the main drivers and barriers, new entrants are confronted with. It mainly bases on two elements: recently published literature on the one hand and informal interviews with representatives from railway undertakings (new entrants)[4] on the other hand. At this point a special report by the European Court of Auditors (2016)[5] on rail freight transport in Europe should be highlighted, as it served as an important input for the following discussion. There, the authors describe what they observed within the framework of an audit that was carried out between 2014 and 2015 in five EU member states, namely the Czech Republic, Germany, Spain, France and Poland (European Court of Auditors 2016: 8).

6.1. Barriers and challenges

Lack of qualified personnel in the rail freight sector

In the railway sector, several actors underline the high level of skills that engine drivers have to meet. In comparison to lorry drivers for instance, a certain level of language skills is indispensable, in order to be entitled to transport goods across borders (cf. European Court of Auditors 2016: 42). The question is, to what extent such varying requirements lead to unfair competition? This might be an additional reason, why many actors in the rail freight market are confronted with a lack of qualified personnel.

Comparatively low working conditions for lorry drivers

Apart from a lack of qualified personnel, several logistics service providers in the rail freight market complain about an imbalance with respect to the working conditions. According to them, there are logistic service providers which keep working conditions in road transport at a comparatively poor level. Especially with respect to salaries, there seem to be large differences across Europe. Consequently, however, logistic service providers in the rail freight market not only have to cope with a lack of qualified personnel as it is mentioned above, but also with an imbalance in salary conditions compared to road transportation.

Varying electricity and safety systems

In Europe, there are numerous electricity and safety systems (cf. European Court of Auditors 2016: 42). For lorries, it does not really make a difference whether roads are cross-border or

[4] The informal interviews with representatives from new entrants were conducted at the «Transport Logistic» exhibition that took place in May 2017 in Munich (cf. http://www.transportlogistic.de/index.html).
[5] European Court of Auditors 2016: Rail freight transport in the EU: still not on the right track

not. With respect to locomotives, however, crossing a border often is accompanied by a change in the electricity and/or the train control system. Consequently, rail haulage providers cannot transport goods from one country to another without specific measures (i.e. changing the locomotives). Even though multi-system locomotives exist, purchasing them is very cost-intensive. In contrast to incumbents, many new entrants often do not have enough capital to afford such machines.

Combined traffic or rail freight transport often is less attractive with respect to the prices

The environmental benefits of rail freight transport, such as lower emissions might have advertising appeal for companies. In this respect railways are unquestionably more attractive than roads. In the end, however, the costs are decisive. Often, actors that focus on road transportation have competitive advantages with respect to the prices they are able to offer.

Dependency on infrastructure

Disruption of services such as on the railway line between Karlsruhe and Basel in summer 2017 – where existing tracks sank because of construction works – symbolize the dependency of the rail freight sector on the available infrastructure. The line had to be closed for several weeks. Due to limited alternatives, rail freight transport service providers either had to make complicated detours or to switch to road transport (Deutsche Welle 2017, Railfreight.com 2017).

6.2. Strengths and opportunities

High level of flexibility thanks to small company sizes

Due to their small size, it can be assumed that new entrants in the rail freight sector are able to react to individual consumer needs in a flexible manner. Several companies highlight their ambitions to provide individual solutions. As many small companies have comparatively flat hierarchies, changing standardized working methods in an unbureaucratic way might be easier for them than for the large, established firms.

Growing networks through personal contacts

Several new entrants that were considered for this paper present pictures of their team members on their websites as well as in their brochures. This might be assessed as a manner to distinguish themselves from (allegedly) anonymous incumbents. Through their presence at trade fairs such as "Transport Logistic" in Munich in 2017, many newcomers are investing in the establishment of personal contacts and growing networks.

Innovative solutions challenge incumbents

Several new entrants stand out with innovative solutions in logistic services. Even though it is difficult to assess the potential for success, there are some promising examples. CargoBeamer for instance aims at improving combined transport by providing the opportunity to load semi-trailers horizontally. By the end of July, the intermodal operator “RailRunner” has entered the European market. Instead of hauling wagons, the company provides a system that enables locomotives to haul freight trucks and load units (CargoBeamer 2017, RailRunner 2017).

Individual customer service possible (e.g. due to low number of employees)

It is striking that many companies underline their individual services and customer-oriented thinking. The low number of employees, respectively the existence of a core team, is often considered as an opportunity to provide personal and close contact to clients.

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LowCarb-RFC Project Publications

The below list of 9 working papers and 3 summary reports is in parts preliminary as some of the material is in preparation by the time of releasing this report. A current list of publications is at:

- Fraunhofer ISI: LowCarb-RFC project website: https://www.isi.fraunhofer.de/en/competence-center/nachhaltigkeit-infrastruktursysteme/projekte/lowcarb_rfc.html
- Stiftung Mercator, Climate-Friendly Freight Transport in Europe: https://www.stiftung-mercator.de/en/project/climate-friendly-freight-transport-in-europe/
- Transport & Environment, Low Carbon Freight: http://lowcarbonfreight.eu/

Working Papers

Doll, C., J. Köhler, M. Maibach, W. Schade, S. Mader (2017): The Grand Challenge: Pathways Towards Climate Neutral Freight Corridors. Working Paper 1 of the study LowCarb-RFC - European Rail Freight Corridors going Carbon Neutral, supported by Stiftung Mercator and the European Climate Foundation. Fraunhofer ISI and IML, INFRAS, TPR and M-Five. Karlsruhe.

Petry, C. and M. Maibach (2018): Rail Reforms, Learnings from Other Sectors and New Entrants. Working Paper 2 of the study LowCarb-RFC - European Rail Freight Corridors going Carbon Neutral, supported by Stiftung Mercator and the European Climate Foundation. Infras. Zurich.

Gandenberger, C., Köhler, J. and Doll, C. (2018): Institutional and Organisational Change in the German Rail Transport Sector. Working Paper 3 of the study LowCarb-RFC - European Rail Freight Corridors going Carbon Neutral, supported by Stiftung Mercator and the European Climate Foundation. Fraunhofer ISI. Karlsruhe.

Meyer, N., D. Horvat, M. Hitzler (2018): Business Models for Freight and Logistics Services. Working Paper 4 of the study LowCarb-RFC - European Rail Freight Corridors going Carbon Neutral, supported by Stiftung Mercator and the European Climate Foundation. Fraunhofer ISI. Karlsruhe.

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Van Hassel, E., Vanelslander, T and Doll, C. (2018): The Assessment of Different Future Freight Transport Scenarios for Europe and the North Rhine Westphalia region. Working Paper 7 of the study LowCarb-RFC - European Rail Freight Corridors going Carbon Neutral, supported by Stiftung Mercator and the European Climate Foundation. TRR, University of Antwerp and Fraunhofer ISI. Antwerp.

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Eiband, A., A. Klukas, M. Remmer, C. Doll, @@@? (2018): Local Impacts and Policy Options for Northrhine-Westphalia. Working Paper 9 of the study LowCarb-RFC - European Rail Freight Corridors going Carbon Neutral, supported by Stiftung Mercator and the European Climate Foundation. Fraunhofer IML, Fraunhofer ISI. Karlsruhe.

Summary Reports

Petry, C., M. Maibach, C. Gandenberger, D. Horvat, C. Doll, S. Kenny (2018)
Myth or Possibility – Institutional Reforms and Change Management for Mode Shift in 'Freight Transport. Summary Report 2 of the study LowCarb-RFC - European Rail Freight Corridors going Carbon Neutral, supported by Stiftung Mercator and the European Climate Foundation. Infras, Fraunhofer ISI, T&E. Karlsruhe.

Doll, C., J. Köhler, A. Eiband, E. van Hassel, S. Mader (2018): The Contribution of Mode Shift and New Technologies to Climate Mitigation in Freight Transport. Summary Report 1 of the study LowCarb-RFC - European Rail Freight Corridors going Carbon Neutral, supported by Stiftung Mercator and the European Climate Foundation. Fraunhofer ISI, Fraunhofer IML, TPR/UNiv. of Antwerp, M-Five. Karlsruhe.

Doll, C. et al. (2018): Policy and business - how rail can contribute to meet transport climate targets in the freight sector. Summary Report 3 of the study LowCarb-RFC - European Rail Freight Corridors going Carbon Neutral, supported by Stiftung Mercator and the European Climate Foundation. Fraunhofer ISI, Fraunhofer IML, TPR/UNiv. of Antwerp, M-Five. Karlsruhe.