

Albers, Sascha; Heuermann, Caroline

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## Competitive dynamics across industries: An analysis of inter-industry competition in German passenger transportation

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# Working Paper Series

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Working Paper 109

## **Competitive Dynamics across Industries: An Analysis of Inter-industry Competition in German Passenger Transportation**

### **Authors**

Sascha Albers

Caroline Heuermann



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### **Authors**

*Dr. Sascha Albers*

University of Cologne  
Dept. of Business Policy & Logistics  
Albertus Magnus Platz  
50923 Köln, Germany  
Tel. +49 221 470-6193  
albers@wiso.uni-koeln.de

*Dr. Caroline Heuermann*

TUI Deutschland GmbH  
Karl-Wiechert-Allee 23  
30625 Hannover, Germany  
Tel. +49 511 567-8205  
caroline.heuermann@tui.de

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## **Competitive Dynamics across Industries: An Analysis of Inter-industry Competition in German Passenger Transportation<sup>1</sup>**

**Abstract:** Whereas analyses of competitive dynamics have hitherto focused on analysing the effects of intra-industry interaction on firm performance, we explore and analyse competition between actors that stem from different industries. This inter-industry focus is novel and interesting, as it allows the exploration of competitive parameters between rivals that differ substantially in their resource endowments, organisational structures, practices and cognitive schemes. The inter-industry focus is also important, since many industries are converging and thus instil competitive interaction between actors that were traditionally separated by industry boundaries. The empirical context for this study is the competitive interaction between airlines and railways in Germany. Based on expert interviews and grounded theory analysis, we shed light onto hitherto neglected facets of awareness, motivation and capability as drivers of competitive actions. We thereby contribute to both competitive dynamics as well as transport strategy literatures.

**Keywords:** Strategy, competitive dynamics, air transport, railway

**JEL-Classification:** L10, L91, M19

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<sup>1</sup> This paper will be published in one of the forthcoming issues of *Schmalenbach Business Review (sbr)*.

# 1 Introduction

Competitive dynamics has emerged as a powerful theory in strategic management that is concerned with explaining and predicting competitive interactions between rivals and the impact of these interactions on firm performance (Ketchen et al. (2004)). In the competitive dynamics model, awareness, motivation and capability (AMC) represent the key drivers of such competitive behaviour and thus, are key determinants of interfirm rivalry (Smith et al. (2001)). Various components of these drivers and their impact have been identified (e.g. firm size and age for awareness, past performance or market dependence for motivation, and resource similarity for capability) and tested in a now substantial number of empirical studies (Smith et al. (2001), Ketchen et al. (2004)).

Common to these advances in competitive dynamics research is an industry-focused application of the rivalry concept and its AMC drivers: Empirical studies have been conducted in single industry (e.g. airlines (Baum and Korn (1999)), automobiles (Yu et al. (2009)), retail (Boyd and Bresser (2008))), and in multi-industry settings (e.g. leader-challenger pairs across 41 industries (Ferrier et al. (1999))) where, however, the unit of analysis is still the industry-bound actor-reactor dyad. Such an intra-industry focus is useful since firms in an industry are traditionally considered as the closest competitors (Porter (1980)). It would also be sufficient if rivalry across industry boundaries was not, or only marginally, observable or observable, but theoretically or strategically irrelevant since it does not differ from intra-industry rivalry. However, we argue that neither is the case: The analysis of competitive interactions with players from different industries is frequent and gaining importance, especially as more and more markets converge and therefore turn traditionally separated, highly diverse firms into intense rivals (Bröring et al. (2006), Hsu and Prescott (2011)). It is also theoretically and practically consequential since, given the hitherto identified industry-centric AMC components, such competitor diversity is suspected to influence the degrees of awareness, motivation and capability to interact (Chen et al. (2007)). For example, resource similarity (firm level) and a common competitive history among rivals (relational level) have been found to influence the awareness driver in competitive dynamics (Jayachandran et al. (1999), Young et al. (2000)) - due to the focus on direct (intra-industry) rivals, however, the variance along these components hitherto remains limited. Also, it has been argued that industry characteristics (industry level) have an impact on the motivation to (re)act (Smith et al. (2001)) – but these results were (naturally) obtained by comparing industry structure effects of competitive interaction among extant rivals within industries, holding industry conditions for the relevant actor-reactor-dyad constant. The effect of different industry backgrounds of actor and reactor on the motivation and

capability as well as on their competitive interplay were not yet a major scholarly concern but are likely to be substantial in their competitive interplay.

We propose that the analysis of such inter-industry competitors therefore can offer additional insights into and potentially expand relevant components along the awareness-motivation-capability dimensions; especially, we argue that the differences in resource endowment, cognitive schemes and institutional expectations in their (hitherto) relevant industry context exert a major influence on rivalry. Such a broader approach holds the potential to allow a better understanding and prediction of the competitive interplay among direct and indirect rivals. This has also been stressed in a recent study by Marcel et al. (2010), and also Chen et al. (2007) remark in their concluding discussion that “[f]uture research should consider potential or ‘unseen’ rivals and those outside of an industry [...] – the ‘peripheral competitors’” (p. 115).

In this paper, we address this issue with an exploratory study of two heterogeneous sets of players that are traditionally attributed to different industries in order to explore the drivers and effects of their competitive behaviour. The German passenger transportation market seems to be a suitable context for such an exploratory endeavour, with a high density of rail and (low cost) air transport services as well as a high degree of interaction of the companies involved. Especially the market entries of a large number of newly founded airlines, primarily low cost carriers (LCC), and their increasing prominence during the last years profoundly altered the competitive landscape (Dobruszkes (2006, 2011)). Such competition, for instance, has already resulted in airline market exits on the Cologne-Frankfurt route that is now served exclusively via rail. The inverse situation was observable on the Cologne-Hamburg route where German rail operator Deutsche Bahn (DB) terminated operations of its Metropolitan business train product in 2004 after Hapag Lloyd Express’ market entry in 2002 and an interim period of intense competition on this route. Overall, airlines lowered prices, increased frequencies and the variety of destinations offered, also to secondary cities, and therefore increased the competitive tension with regard to long-distance train operators.<sup>2</sup> Rail companies, on their part, increased the quality of their products and the speed of their connections. Both transport modes therefore became increasingly viable alternatives in the eyes of the customers, resulting in major strategic challenges for the companies involved (Friebel and Niffka (2009), Heuermann (2007), Keeling (2011)). Given this competitive interplay between air and rail operators, their perception, motivation and implementation of competitive strategies and tactics represent interesting objects of analysis from a competitive dynamics perspective.

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<sup>2</sup> On several of DB’s trunk routes, i.e. those routes that are served hourly by ICE high speed trains between 5am and 10pm, airlines now offer a substantial seat capacity as well. For example, Cologne-Berlin is serviced 25 times daily, Frankfurt-Berlin is operated 22 times, and Frankfurt-Munich is connected with 14 daily flights.

We thus take a strategic management perspective to identify drivers and effects of the competitive interplay, or the “jockeying for position” as Ketchen et al. (2004) put it, that are rooted in organisational characteristics, as well as the relevant task and institutional contexts of the actors on which we focus. We do not aim to define relevant markets to assess general rivalry levels, or to assess market outcomes in an industrial organisation tradition, but intend to use the heterogeneity of the competing organisations of our analysis to advance our understanding of organisation-level drivers of competitive interaction, that, according to competitive dynamics reasoning, are essential for achieving and maintaining competitive advantage.

We proceed as follows: After a short overview of the competitive dynamics model and the relevance of the industry focus within the AMC perspective, we report the results of the semi-structured interviews we conducted with experts from German airline and railway companies, scientific institutions and consulting firms, and explore the cause and effect of competitive interaction among airlines and railway companies. Based on the empirical work results, we formulate amendments and refinements of the rivalry drivers that result from our inter-industry study, and conclude.

## **2 The Awareness-Motivation-Capabilities Perspective and the Relevance of Inter-industry Analyses in Competitive Dynamics**

Competitive dynamics research is concerned with the analysis of strategic moves and countermoves and their impact on competitive advantage (Smith et al. (2001)). Action characteristics as well as those of the actor (attacker) and reactor (defender) have been found to relate to the likelihood and speed of a response which in turn influence firm performance (Smith et al. (1992, 2001)).

Awareness, motivation, and capability are key to understanding the form and effect of a competitive (re)action (Chen (1996); Chen et al. (2007)). The (re)actor’s *awareness* of the competitive interdependence and the managerial opportunities arising from it influence to which extent the company realizes competitive interaction at all and whether it understands how its performance could be favourably influenced by engaging into such competitive interaction. Prior studies have assessed awareness along such factors as organisational age (Miller and Chen (1996a), (1996b)) and the firm’s information processing capabilities as reflected in its organisational structures (Smith et al. (1992)). For example, in case of the latter, the more



formalised and complex the structure of an organisation, the higher is the danger of delayed information processing and biased information dissemination (Smith et al. (1992)). Resource similarity among the rivals has also been highlighted as an important component of awareness, as a firm can easier understand and assess the consequences of an attack by a rival with more similar resources, which leads to a pronounced deterrence effect of resource similarity (Chen (1996)). The impact of a rival's reputation, and thus, past competitive behaviour, has been analysed as an awareness driver (Smith et al. (1992)), and familiarity with a given rival is highlighted as one explanation for reduced rivalry in multi-market situations (Jayachandran et al. (1999)).

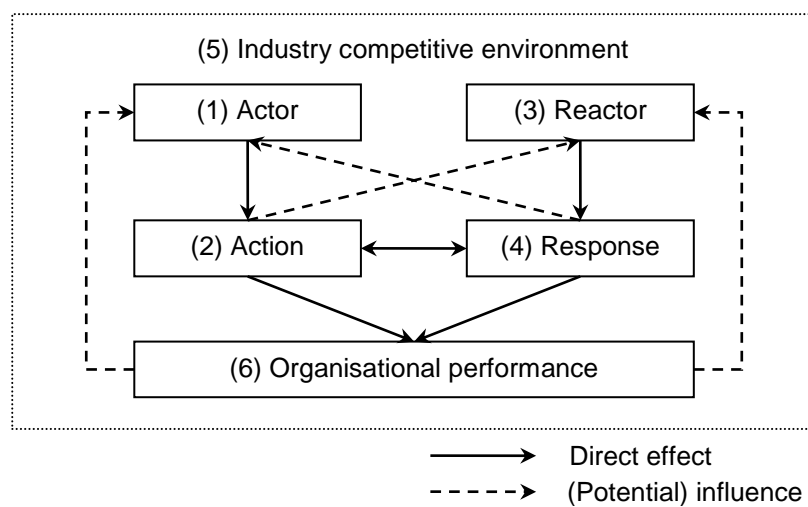


Figure 1: Competitive Dynamics Model according to Smith et al. (1992, 2001)

Whereas all of these aspects have been fruitfully analysed in intra-industry settings, many of the ways in which these factors affect the awareness of competitive rivals can be assumed to differ in the case of inter-industry competitors. According, for example, to the industry lifecycle model, industries in the growth and maturity stages have, inter alia, established dominant product designs, widely diffused production technologies and knowledgeable customers (Malerba and Orsenigo (1996), Utterback and Suarez (1993)). Since these dominant designs, technologies and customer expectations differ from industry to industry they also have resulted in differences in organisational structures and cognitive schemes of both, top management team as well as middle line managers, and thus shape rivals' perceptions of relevant competitors, competitive actions and consequences for their own firm's behaviour (Marcel et al. (2010), Reger and Palmer (1996)) – in other words, their awareness drivers. Also, resource similarity will be low in the inter-industry case which, according to traditional competitive dynamic arguing, is reflected in a

lower degree of awareness of actions among the rivals since actions and reactions might not be perceived as consequential for the rivals. However, given the observable interaction across various industry boundaries, it appears necessary to explore more or less relevant dimensions of resource similarity that actually impact the rivals' competitive behaviour. In some industries whole incumbent firm populations have been virtually eliminated by rivals from different industries whose product offerings became a viable alternative in the eyes of the customers and where the incumbents were at first unaware of the rival's threat and then unable to adapt to its competitive actions (Barr et al. (1992)). It thus seems worthwhile to study in more depth the perceptions of competitors with different industry backgrounds.

The *motivation* to induce or respond to a competitive action depends on the expected future outcome, or consequences of that action for a firm. Motivation will, for example, be influenced by the degree of market dependence since a firm which is highly dependent on a certain market will vie for its market position more vigorously (Smith et al. (2001)). Also, market commonality has been proposed as a major component of a firm's motivation to attack or retaliate, since firms that meet in several markets have a higher reciprocal retaliation potential and tend to know and understand each other comparatively well due to their joint competitive history (Jayachandran et al. (1999)), resulting in a lower attack, but a higher retaliation likelihood if market commonality is high (Chen (1996)). Depending on the market definition, inter-industry rivals can also compete in various markets (e.g. geographical markets), rendering the multi-market contact argument principally viable in this context. However, given the different resources and dispersed competitive histories, the motivation of inter-industry rivals to act or react might be influenced by additional or other features. Since future expectations and projections of consequences of rival actions on own performance constitute the motivation to act (or react), and the bases for these expectations or projections are potentially uncertain in inter-industry settings, an identification and assessment of the determinants of these expectations and projections that motivate rivals to their behaviour appears necessary, especially, since the competitive assessment between rivals can be asymmetric (Chen (1996)).

Finally, the *capability* to act depends on factors like organisational slack (in terms of resources that serve as buffer, whilst giving the firm managerial flexibility to respond to competitive or environmental changes) and organisational size (as an approximation for the ability to efficiently influence market environment and competitors as well as a measure for the amount of slack resources). Also, organisational complexity is seen as a component of action capability, since more complex and bureaucratic organisations will take more time for decision making and action implementation which has a negative impact on their capability (Smith et al. (1989), Smith et al. (1991)). Resource similarity, important for the awareness driver, is also

consequential for the capability of an actor. However, the capability argument that is based on resource similarity focuses on a different aspect: it is not the information gathering and processing aspects of the competitor intelligence system of the rivals, but the effectiveness of the attack that is in focus, i.e. the resources to mobilise and the capabilities to implement forceful or quick actions (or responses). The established hypothesis is that the more similar the resources, the less likely an attack, but the more likely is an effective retaliation measure against an attacker (Chen (1996)). The apparent dissimilarity of resources in inter-industry settings, however, leaves only minor space to fruitfully apply and interpret this finding to our context. Rather than focusing on the likelihood of an attack or response, it appears to be valuable to exploit this dissimilarity and also potential asymmetry in resource endowments among inter-industry competitors to analyse their effect on effective action or reaction capabilities.

The motivation and the capability to act or react have also been associated with characteristics of the industry environment of the firm. However, already within the dominant single industry focus of extant studies, these external factors have been widely neglected (Smith et al. (2001)). Due to different values and norms that evolve in an industry, as well as different regulations, the motivation and capability of a firm to react might be severely restricted. Among the factors that affect competitive interactions in their specific *industry competitive environment* are industry growth, market concentration, and barriers to market entry and exit. Growing demand will alleviate the necessity to vie for market positions and engage in aggressive moves and countermoves. Similarly, a higher market concentration entails a higher potential of oligopolistic collusion, leading to reduced competitive interaction. High barriers to entry and low barriers to exit may have a similar effect since competition does not increase due to newcomers and easy market exit (Smith et al. (2001)). By abandoning the single industry context it becomes possible to directly compare enabling or disabling industry features in the direct interaction among rivals. Whereas the effects of such aspects as regulation, customer expectations and macro-cultural related factors (e.g. fair and appropriate behaviour in an industry) are clearly relevant for firm competitive behaviour and performance, they are hitherto held constant in competitive dynamics studies of rivalry.

Thus, given the extant focus of the competitive dynamics literature and the raised differentials to that focus in the inter-industry situation, we explore drivers and effects of competitive interaction among such so-called “peripheral” competitors. In the following we present the results of our exploratory study of competitive interaction between German railways and airlines.

### **3 Exploratory Study of Inter-industry Competitive Interaction Between Airlines and Railways**

In order to understand influencing conditions as well as performance outcomes of airline and railway competitive actions and reactions, we conducted 13 semi-structured interviews with experts from German airline and railway companies, scientific institutions and consulting firms in spring/summer 2006 (see Appendices A and B). The qualitative data collected in the form of interview texts were further structured and conceptualised by using the Grounded Theory method (Strauss and Corbin (1998a, 1998b), Charmaz (2002)). The theory of competitive dynamics and the underlying model served as a basis for analysing and structuring the data to gather insight into the particular AMC determinants of inter-industry competitive interaction. We subsequently report the interview results, organised along the main themes that emerged from these interviews (Heuermann (2007)).

#### **3.1 Perceived Competitive Intensity**

Airlines and railways perceive the intensity of competition differently. From the railways' perspective, the perceived competitive intensity differs in general and is dependent on the specific route considered, but is particularly high on routes with travel times between 3-5 hours. Since the market entry of various LCC, air-rail competition is more intense. However, the geographic location of the airport and the existing transport connection to the city centre have a major influence on the perceived route-specific competitive intensity. "Pure" LCC like Ryanair, which predominantly serve remote secondary airports with partially insufficient connection to the public transport system are generally seen as less competitive than those LCC that serve the major airports, such as Easyjet.

There is a perception that since the emergence of LCC, competition with incumbent airlines has also intensified: The introduction of low cost quotas by incumbents affects the rail network on an even broader scale – but only as a side effect of increased intra-airline rivalry. As a railway representative describes:

"Especially in Germany [...], this is a more or less network-wide issue. We are aware that competition-wise, this is not exactly helpful. But our perception is that the triggering factors are primarily the LCC, and Lufthansa reacts to them. [...] This bundle of incumbent and LCC [...] is struggling and there is a collateral damage for the railway."

The perceived inter-industry competition is also dependent on the clientele served. The business travellers' modal choice usually depends on total travel time and frequency. Airline

competition is traditionally more significant here, as the business customers' willingness to pay is comparably high, particularly with low advance booking time. In contrast, leisure travellers usually choose between road transport, rail and air based on price, with travel time being of less importance.

Overall, the perceived intensity of inter-industry competition with airlines primarily depends on the route distance and necessary travel time, the proximity of airports to the city centre, the ratio of rail and airline capacities offered, as well as the respective demand segment. Besides these general influencing factors, some interviewees suggested that air and rail travel additionally compete for image: Railways are seen as the more antiquated, traditional means of transport, whereas air travel implies a certain modern and progressive status. However, railways are emerging as more attractive and prestigious due to high-capacity high-speed routes as well as modern trains and stations, while air travel, promoted by LCC, becomes a day-to-day commodity. Furthermore, airlines and railways are also involved in a "fiscal competition", as the two traffic modes vie for financial privilege accorded by public authorities (e.g. tax exemption of kerosene in the EU, state subsidies for rail infrastructure).

From the airlines' perspective, inter-industry competition with rail traffic is altogether perceived as less intensive. However, the competitive situation differs considerably within the German national market and some international relations. Some interviewees from LCC report that railway traffic represents only marginal competition. There are no or very sporadic routes on which they perceive to be rivalled by the operating railway companies:

"There is no airline where emergency sessions would have taken place due to the inner-German rail traffic. [...] Apart from the squabbling about who gets subsidies, that is a political-economic topic, but not when it comes to passenger streams."

Although product improvements such as travel time reduction (e.g. on the Frankfurt-Paris route) are noticed, this does not pose a real competitive threat from these airlines' point of view. The long-term planning horizon of their railway competitors (more than 10 years) due to their infrastructure dependency is given as the main reason for this perception:

"Dusseldorf-Hamburg could definitely be a [competitive] route, if it really was a high-speed route with 300 km/h. [...] But planning is not even under way there. I have planning certainty on this route until 2015, [...] that is 10 years, so I can lean back."

Also, railways are rather seen as potential cooperation partners which can offer complementary feeder services for air traffic. Other LCC representatives, however, acknowledge the general existence of competition with DB in the German national market. On an international

scale, a noticeable competition is perceived e.g. on the Cologne-Paris route where the Thalys high-speed train operates with prices of 19, 29 or 49 Euro.

Overall, a considerable asymmetry concerning the perceived inter-industry competition between air and rail companies becomes apparent. Especially in Germany, rail traffic is seen as minor competition, at least according to the LCC interviewed. However, railways seem to come more into the focus of airlines: All interviewees are aware of the fact that DB has significantly adapted its market appearance and acts more aggressively towards its competitors.

### **3.2 Monitoring the Inter-industry Competition**

The perceived competitive intensity is reflected in concrete measures carried out by the actors in order to monitor inter-industry competition and competitors. In total, the railway companies interviewed well observe and systematically analyse the route specific development of competition as well as the competitive moves shown by airlines. For example, DB incorporates airlines into its competitor analysis, which takes place at least once a year and includes the analysis of airline service frequencies and prices on relevant national and international routes. When LCC emerged in Germany, DB increased the frequency of its competitor analyses to several times a year. Moreover, in view of the serious threat caused by LCC, a project team was founded in order to monitor inter-industry competition and work out adequate countermeasures. Later, the project results were transferred into line management, and a systematic analysis of LCC competition is conducted less often. In cooperation projects of DB with other European railways (e.g. “Rhealys”, “Rheinalp”) comprehensive competitor monitoring has also been implemented.

By contrast, the airline companies show a great interest into the general media coverage about price actions and promotions of DB in Germany, but do not conduct dedicated and systematic market research on railway competition.

### **3.3 The Impact of Competitors’ Actions**

The most obvious impact of the airlines’ actions on railways consists in losses of passengers on a variety of routes. However, according to some interviewees, the market stimulation by LCC also brought about positive effects. From their perspective, the market entry of LCC can be considered as an “exogenous market disruption”, which has triggered a greater market

orientation within the formerly state-owned railways. In this respect, airline competition has even helped the railways to accelerate their necessary strategic and organisational reorientation.

Price policy and promotion in rail traffic serves as an example of this development: The price aggressiveness of LCC resulted in a stronger price sensitivity of customers so that in Germany for example, the prices of DB were seen critically (Meffert et al. (2005)). Through a stronger price orientation and the clear communication of base prices, DB could improve its price image throughout recent years. Hence, inter-industry competition eventually pushed this change in price and communication policy as there was an urgent necessity for DB to react to the increased price pressure by LCC.

The development and refinement of the Internet as a distribution channel for rail services represents a second example: LCC exclusively focused on online distribution, and customers quickly got accustomed to the booking procedure and conditions. Furthermore, price transparency and comparability increased. Consequently, railway companies, e.g. the SBB (Swiss national railways) felt the urge to technically refine their booking systems and force their online distribution:

“[...] to be an e-company, which did not really come true. And this [...] was really shown to us by the LCC, this is how you can do it. And this has put us and our management heavily under pressure.”

Apart from that, one interviewee also mentioned a direct positive impact of LCC on the demand for railway transport, provided that prices are competitive:

“Partially we also profit from the destinations which make Switzerland and Germany become more present in the market and thereby induce additional traffic.”

On the contrary, the airline representatives interviewed did not consider competitive actions of railways to have any (negative) impact on their business:

“We offer bargains 2-3 months before departure date. If then a month later the railway says, I follow suit on the same route, then our clientele is already taken care of.”

### **3.4 The Influence on Own Actions**

The interviews revealed that the actions pursued by railway companies are – at least in part – influenced by the competitive behaviour of airlines. Since the intensification of inter-industry competition, railways carried out a variety of price measures in order to enhance their

competitive market position. At the same time, these price measures also aim at systematically increasing the railways' capacity utilisation.

The development of new distribution channels is a suitable instrument to improve customer price perception and increase capacity utilisation. In general it can be stated that, during recent years DB acted much more aggressively in Germany. Even if this may not be entirely ascribed to airlines or even LCC, these inter-industry competitors are accounted for in selected cases, e.g. on the Rhealys high-speed route between Frankfurt and Paris:

“When arranging our schedule, we consider [...] that certain departure times are more interesting for certain customer groups. Let's take the early morning departure: There, of course, we look at what time you arrive in Paris City with the first plane. Of course, we try to arrive at a comparable time with our first train.”

Beyond these marketing measures, DB considered other reactions to the competitive threat of LCC, such as frequency adjustments. Nevertheless, it was concluded that, on demand-intensive point-to-point routes with significant airline competition, DB offered a high service frequency anyway, and that an increase of service frequency would have yielded no further results. Additional suggestions, which had been worked out by the respective internal project team, were largely not implemented. As a reason for this, the interviewees mentioned controversies about the effectiveness and customer acceptance of these measures, as well as the size of the organisation resulting in potentially long, cumbersome decision-making processes. As a railway representative remarked:

“[...] the railways are [...] still state railways, and these are really heavy tankships difficult to manoeuvre...sometimes years pass by until something happens there.”

A topic frequently mentioned by the interview partners is the transfer of different elements of the aviation production system to rail traffic. The Swiss SBB, for example, adapted network control and booking systems from air traffic to its rail network, which led to a marked increase of punctuality, speed, reliability and market coverage. Other measures in this context were less successful, such as the introduction of the price system “PEP”<sup>3</sup> by DB. The PEP system widely contained elements of the yield management systems used by airlines and was introduced in December 2002. However, higher complexity and various booking constraints hindered customer acceptance of this new price system and the PEP system was soon abrogated and extensively adapted:

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<sup>3</sup> „PEP“ denotes „Preissystem und Erlösmanagement im Personenverkehr der DB AG“ (Wilger and Krämer (2002)).



“They simply tried to apply the yield management from air traffic, that led to enormous losses and an extreme complexity that you can’t market to the clientele in rail traffic. [...] Every potential customer had to search for a connection in a huge table and take many restrictions into consideration, that was simply expecting too much. [...] Fundamental mistakes were made.”

A price system better adapted to the specialties of railway traffic was established, which led to a more effective demand control and higher capacity utilisation of DB long-distance trains. These experiences show the importance of production system specific differences between air and rail traffic, as they significantly mould the costs and complexity of competitive measures as well as the time horizons for their implementation.

From an airline perspective, due to the only small perceptible effects of competitive moves shown by railways, a reaction interdependence with rail traffic is not identified by the interviewees. As an airline representative observed:

“If other traffic modes, e.g. railways, lose traffic, then this is regrettable, but it is not our aim to impair other traffic modes.”

However, on a few routes it becomes apparent that substantial improvements of rail services (e.g. travel time reductions through infrastructure modernisation) can provoke airline market exits or prevent airline market entries. Here, the by far greater flexibility of the productions system of airlines allows for a quick adaptation of its flight network: If a certain route becomes unattractive and does not generate the revenue required, airlines can comparably easily switch their capacities to other, more attractive routes.

### **3.5 The Influence of the Industry Environments**

The expert interviews revealed that the general industry environments exert a major influence on competition. Differences between the two industries can be identified on a competitive, systemic and societal level.

On a *competitive level*, the liberalisation and privatisation of the European airline industry is by far more advanced than is the case for the railway sector. Consequently, a vivid competition among incumbent and newly entered airlines has emerged over a couple of years. Some interviewees mentioned the competition among airlines to be much more intensive and threatening, so that particularly small airlines direct their limited management capacities exclusively to airline competition. This corresponds to the previous results concerning the small extent to which airlines monitor inter-industry competition with railways at all. On the contrary, in rail traffic, direct intra-industry competition on a European scale is only slowly emerging due

to the strong home market orientation of railways. Therefore, railway companies focus on their currently strongest inter-industry competitor: airlines. Also, airline and railway markets are handled completely separately in a political sense. The obviously existing strong interdependencies between the two traffic modes are not reflected in regulatory policy. Many of the experts interviewed asserted the general requirement to coordinate subsidy policy as well as value added and energy taxation across industries.

On a *systemic level*, the degree of standardisation in air and rail traffic differs significantly. Since full liberalisation in 1997, there is only one single European airline market, underlying standardised procedures. Moreover, the worldwide aircraft market is similarly standardised as there are only a few globally operating aircraft manufacturers; airport infrastructure underlies widely uniform requirements worldwide. Railway infrastructure, however, differs sometimes significantly from nation to nation, so that there is little standardisation of infrastructure (e.g. concerning signalling, the electricity system and track gauge) and rolling stock. These systemic differences additionally limit the competitive flexibility of railways vis-à-vis their airline competitors and complicate the establishment of internationally coordinated rail services.

From a *societal perspective*, the industry environment of railway companies also varies from nation to nation. The historical background of establishing railway networks and the political importance ascribed to railways still show their influence today. For example, the rather decentralized German rail network contrasts considerably with the mono-centric structure of the French railway system, which also translates to different degrees of complexity in network planning and coordination. Also, railway traffic is subject to a high degree of public awareness and social expectations in many European countries. For example, in Germany public expectations of a nationwide, affordable passenger rail service conflict with provisions of the German rail reform from 1994, which sets out that rail traffic should become financially viable by itself, putting rail operator DB in a position of ambivalent expectations which it can hardly meet at the same time:

“This is a very sensitive system, and with the railway, it’s all very transparent. If the railway allowed itself what the airlines partially do, delays, cancellations...but the railway is always under observation.”

“Prices are always a sensitive issue, and, being a railway company, I can never change standard fares from one week to another. Today 51 Euro, tomorrow 53 Euro...the general public would never concede such price policy to us.”

Airline companies on the contrary can benefit from a quite independent route policy. Particularly LCC are subject to very little or no social expectations, so that they can follow a cherry-picking strategy and freely decide on the routes served.

Overall, the empirical analysis shows that railway companies, but also partially airline companies, carry out a broad variety of competitive moves in order to react to increased inter-industry competition. Additionally, a more comprehensive development takes place: Most notably the air traffic exerts a lasting effect on the competitive behaviour of railways. Concerning the perceived intensity and ascribed significance of the mutual competitive threat, a considerable rail-air asymmetry becomes obvious.

## **4 Competitive Dynamics Implications of Inter-industry Competition between Airlines and Railways in Germany**

As the explorative study of inter-industry competitive dynamics reveals, the AMC components characterising the airline and railway firms involved – and therefore the nature and outcome of their competitive interplay – are significantly shaped by several factors that have yet only been marginally explored. Especially, the following can be extracted from the interview data:

- (1) Production system design and planning flexibility as important specifications of general resource similarity that influence awareness and capability.
- (2) Cognitive schemes of relevant management executives that influence awareness and motivation and are especially important in understanding the perceived asymmetry between the inter-industry competitors.
- (3) Institutionalised expectations as factors that influence motivation and capability.

### **4.1 Production System Design and Planning Flexibility**

In competitive dynamics theory, resource similarity is frequently examined in order to explain competitive intensity and the actors' competitive moves. Also in our inter-industry competitive setting, the (dis)similarity of resources considerably influences the awareness and capability of railway and airline companies, but more specific facets of such dissimilarity can be identified. The great relevance of production system differences repeatedly surfaced in the explorative interviews. The conditions of the production system markedly affect costs, decision flexibility

and qualitative characteristics of the transport services and hence influence the awareness and capability of the actors in inter-industry competition. In rail traffic, strong interdependencies of the different transport products (e.g. routes) complicate the exact pricing of different relations and carry the inherent risk of price inconsistencies. Indirectly, this also has an impact on organisational performance: For example, yield management systems applied in the closed system of air traffic will always result in a more precise and effective utilisation control than this can be the case in the partly or entirely open system of rail traffic. Furthermore, in order to minimize travel times, train schedules have to be accurately interrelated, which is generally more complex than in air traffic due to the large number of potential stops and stations and thus, connection points. The capability of pursuing specific competitive measures on selected markets (routes) is therefore significantly restrained.

Also, the immanent flexibility as the capability to “quickly commit resources to new courses of action in response to change, and [...] act promptly when it is time to halt or reverse such resource commitments” (Shimizu and Hitt (2004), p. 45) considerably shapes the airlines’ and railways’ awareness and capability and consequently enlarges or limits the variety of their potential competitive measures. The relative flexibility of the production system and technologies used has an effect on the organisational processes involved and hence, also the time span to set up different competitive actions. In our interviews, DB’s rather complex organisational structure with its long decision-making processes was identified as counteracting flexible and quick reactions to the competitive threat of LCC. In aviation, measures that modify the existing network configuration (e.g. the inclusion of new routes) or network coordination (e.g. preparation of coordinated time schedules) can be implemented within a comparably short period of time, whereas in rail traffic, a time-consuming preparation is necessary (in Germany for example, even a marginal modification of train schedules requires a preparation time of at least eight months). In aviation, new routes can be included – provided the necessary slot and aircraft capacities as well as existing traffic rights – anytime within a few months. Different planning periods even more preponderate if rail infrastructure has to be newly constructed or upgraded in order to offer the service quality (e.g. speed) required. Airlines are by far more flexible here, as they can not only easily vary their production capacities on existing routes, but also vary their product range by switching existing capacities to new routes. Furthermore, the different flexibility of the underlying production systems is relevant in the case of unforeseen disturbances, e.g. due to the technical breakdown of rolling stock or aircraft: In aviation, replacement capacity can be easily shifted on short notice, whereas in rail traffic, it is more complicated to schedule the additional movement of rolling stock in the existing network system.

## **4.2 Cognitive Schemes**

Cognitive schemes are mental models constructed from an individual's earlier experiences and therefore strongly influenced by sensemaking processes over time (Ericson (2001)). At the same time, they shape future sensemaking processes, as they help individuals to interpret their environment, make predictions and guide action (Reger & Huff (1993)). Those mental models are unique to each individual and "change slowly even when environments change rapidly" (Reger & Palmer (1996), p. 34), resulting in cognitive inertia. Thus, cognitive schemes strongly determine the competitive behaviour of a firm and are – at least in the short term – relatively stable (Marcel et al. (2010)). In our study, it becomes apparent that the intensity of inter-industry competition is perceived to be much higher by the railways than the airlines, at least in Germany. This is not only reflected in a higher degree of the railway companies' awareness, but also in a stronger urge to take action and defend their market position in view of the considerable losses in passengers and yield on many routes.

Extant research suggests that managerial interpretation is linked to experience and that especially in stable environments, executives tend to develop ingrained schemas (Reger & Palmer (1996)). The railway industry represents an industry that was traditionally sheltered from competition and major environmental dynamism – railway managers are therefore likely to have developed stable cognitive schemes regarding their environment and, especially, concerning competitive threats. The new competitive situation with (low cost) airlines represented a rapid environmental change within months only. In such quick change situations, mental models can not be adapted quickly enough to keep pace with the environmental change, strategic mistakes are most likely to occur - managers might feel motivated to pursue competitive actions later revealed as inappropriate (Reger & Palmer (1996)). We find indicators of such decisions among the German railways: DB rapidly cut down prices to cope with their hitherto unperceived airline competitors, representing a generic, tactical move that resulted in substantial yield losses (see also Friebel & Niffka (2009)). With the understanding that airlines are actually relevant competitors that have different operational possibilities than their own organisations, railway executives tried to imitate managerial elements from air traffic to their own business, partly neglecting the distinct characteristics of the rail production system as well as the specific requirements of railway customers (as illustrated by the quotes in 3.4 above). Supporting this attempt to quickly overcome management's cognitive inertia and to induce different mental models was the recruiting of former airline executives, a strategy that has been reported to be appropriate to the changed competitive environment (Reger & Palmer (1996)).

By contrast, actors in the airline industry, which was liberalized much earlier, are more experienced with observing relevant competitors as well as exerting and assessing competitive measures to effectively handling competitive situations. From an airline perspective, railways are not always taken seriously as competitors, as has been pointed out repeatedly in the interviews above. However, here the stabilisation of the “low danger”-perception of railways is not without risk as railways are learning to adapt and to deal with both, the rigidities of their production system as well as with the handling of institutionalised pressures (see below).

Moreover, the interview results also reveal that individual cognitive schemes within the same company are likely to vary, resulting in time-consuming decision making processes and thus managerial inflexibility. At DB, the necessity to react was unequally perceived on different management levels. In contrast, particularly younger airlines are characterised by short decision-making processes and more concentrated responsibilities which reflect less distinct cognitive schemes and allow for a quicker reaction.

Overall, cognitive schemes of railway managers have undergone a change from no-competition to serious competition through the new airline competitors. Cognitive schemes among airline managers are only slowly beginning to be altered: airline managers only selectively see railways as major competitors. Hence, awareness and motivation are strongly determined by the cognitive schemes of the companies’ executives. The most likely cause for and at the same time consequence of these different cognitive schemes of airlines and railways are their very distinct industry histories. Common cognitive structures through shared experiences (Reger & Huff (1993)) have only begun to develop recently, still allowing for the observed highly asymmetrical perception of inter-industry competition, which in turn exerts a major influence on awareness and motivation.

### **4.3 Institutionalised Expectations**

The empirical analyses also revealed that non-firm specific factors influence the inter-industry competitiveness of railways and airlines. In rail traffic, traditionally there are certain social or political expectations and demands concerning the market behaviour of railway companies. In Germany, for example, DB is frequently still considered as obliged to provide affordable and ubiquitous easy-to-access transport services. However, DB was privatised more than fifteen years ago and since then is expected to yield profit. The existing expectations by society, by

politicians, and by customers therefore still considerably influence the competitive behaviour of DB and thus, also its competitive moves (Heuermann (2007)).

From a neo-institutional perspective, airlines and railways are subject to different institutional pressures (Bresser and Millonig (2003), Walgenbach (2006)) - the social and political requirements concerning the route network operated and the service frequencies offered are much lower in aviation than is the case in rail traffic. In the EU, every airline is allowed to freely decide about whether to operate or give up routes. Historically, rail traffic is supposed to provide access to even remote geographic areas at an acceptable price, and is thus commonly subject to a social mandate. Compared to aviation, the degree of freedom regarding route selection, frequencies, and scheduling is therefore limited in railway companies.

Several examples for the importance of institutionalised expectations can be found in German rail passenger transport. Here, the potential closedown of certain routes and the question of stops to be served on some connections are topics regularly and vividly discussed in politics and media, e.g. on the newly constructed high-speed line between Cologne and Frankfurt with two “new”, i.e. not initially planned, stops in Montabaur and Limburg Süd. By contrast, the French TGV network was consequently planned and implemented with a strictly limited number of stops, and certain geographic regions are not connected at all. It is doubtful that such a selective high-speed rail policy would be publicly accepted in Germany, thereby considerably influencing the route policy of the German DB. Moreover, price adaptations of railway companies are traditionally in the centre of media interest in some countries. Therefore, price increases of DB are basically accompanied by extensive justifications and apologies, which would be unacceptable in air traffic. Similarly, railway companies frequently encounter problems with their yield management strategy implying obligatory reservations, the mandatory use of the selected trains, or other booking restrictions. The public acceptance of such measures may be low (e.g. in Germany or Italy), as customers have to put up with restricted flexibility.

Institutionalised expectations influence the railways’ motivation to take competitive measures, as through conformity with these expectations public acceptance is granted. On the other hand, while considering institutional interests, the entrepreneurial scope of action and thus the capability to (re)act can be regarded as rather limited.

## 4.4 Synthesis

Overall, the study of inter-industry competition between railways and airlines in Germany has resulted in the identification of three major parameters that influence the dynamics of competition among them and hence, the participating firms' overall performance (an overview is provided in figure 2).

In the competitive dynamics tradition, the importance of resource similarity (or dissimilarity) is underscored. However, as set out in our initial motivation, we were able to specify further facets and implications of resource similarity due to the fundamental differences among our study objects. The competitive dynamics literature suggests that awareness increases with increasing resource similarity (e.g. Chen (1996)). In our case, where resource similarity in type (and amount) is particularly low, it is an interesting observation that our rivals are very much aware of each other, yet differ in their assessment of their rival's aggressiveness. The exclusive focus on resource *type* similarity (Chen (1996)) therefore is insufficient for an assessment of this competitive dynamics driver. It rather appears that *functional* resource similarity (Peteraf and Bergen (2003)), which refers to the assessment of the addressed customer needs, needs to be taken into account as an important awareness indicator as well. Our analysis therefore stresses the importance of assessing functional resource similarity rather than resource type similarity as components of the awareness dimension (Bergen & Peteraf (2002)).

With regard to the resource similarity's effect on the capability to take action, the role that resources play seems to be underscored as we have identified more specific components of such similarity: production system design and planning flexibility. The fundamental difference in decision lead time to change product offering features (even prices as the most tactical type of action) is a major factor in air-rail competition. The swiftness of airlines is a major advantage – and lets them even occasionally neglect rail as a viable competitor. This effect is supported by the differences in organisational size of the main actors (large DB and small to medium sized LCC).

Whereas the general resource similarity factor is well rooted in the competitive dynamics literature, the two parameters of cognitive schemes and institutionalised expectations are comparatively new to the competitive dynamics field. The importance of understanding management cognition effects in competitive dynamics has been repeatedly stressed in the literature (Chen et al. (2007)) and, based on our analysis, deserves much greater attention. Due to the scarce stock of shared experiences with each other and the resulting problems in forming



adequate assessments of competitor behaviour, a period of experimentation with old, but established competitive actions as well as the development of new actions to extend the competitive repertoires is necessary (Ferrier, Smith and Grimm (1999), Ferrier and Lyon (2004)). We have seen DB experimenting with processes and tactics from airlines due to the perceived urge to act or react, however, with mixed success. In our case, the differences in airline and railway managers' cognitive schemes and thus, interpretations of their competitive situations have proven to be a substantial influencing factor on awareness and motivation to engage in competitive interaction.

This is also true for the differences in the industry environment, and more specifically, in the role that institutionalised expectations play with regard to the motivation and capability of rivals to compete. Different institutionalised expectations in different industries can facilitate or hinder the motivation and capability to act or react. Whereas on the one hand the motivation for DB to react to their inter-industry rivals' moves might be high due to the anticipated (projected) consequences with regard to loss of passengers on a certain route, this positive effect is reduced when potential negative effects of that action on the legitimacy of the organisation are included. Clearly, rail operators face stronger institutional pressures that affect their competitive manoeuvring than airlines – an important indicator that the degree of the institutionalisation of the relevant environment (Walgenbach 2006) is a considerable determinant of the motivation dimension in the AMC framework. Similarly, institutionalised expectations affect the capability of an organisation: Even if the railway is motivated and willing to realize a certain action vis-a-vis a competitor (e.g. providing a non-stop high-speed service between Cologne and Frankfurt), political pressures in the form of legal regulations (regular stops on the way) can render this option impossible.

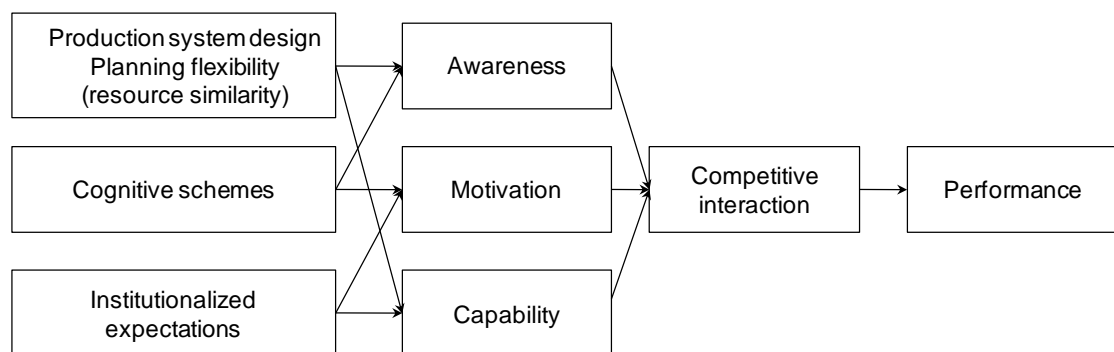


Figure 2: Overview of Identified AMC Components

## **5 Conclusion**

Based on the increasing rapprochement of many industries, the understanding of competitive parameters between actors across these industries becomes increasingly essential for managers and thus, also crucial to understand for researchers. With this paper we propose a first step to systematically explaining and conceptualising the functioning and current development of inter-industry competitive dynamics.

Using the increasing competition between airlines and railways as our empirical context, we explored the degree as well as the perceivably main determinants of inter-industry rivalry. We propose additional components of the AMC drivers in competitive dynamics with the concepts of production system design and planning flexibility as specifications of the general resource similarity construct, cognitive schemes and institutional environment on a general interaction level that will interplay with the more traditional AMC components in determining the degree of competitive rivalry. Therewith, we identify new facets of competitive dynamics from exploring the inter-industry context, enriching the AMC perspective.

We also contribute to narrowing two additional gaps in the competitive dynamics literature: we shed light on the role of management cognition and perception as requested by Chen et al. (2007) and also incorporate the influence of the industry environment, more specifically, its institutional context on competitive interaction.

Various avenues exist to potentially extend this research. Additional case analyses of inter-industry competition are needed to enrich the model with potential variables and relationships that we were not able to extract in our case. However, the identified constructs and their interdependencies identified here are sufficiently abstract and, in our view, coherent and convincing, to be transferred to and applied in other inter-industry settings in which industry boundaries are becoming increasingly permeable and thus, put heterogeneous actors into the competitive arena. For example, the analysis of the rivalry between cable and telecommunication providers that compete to bring Internet and data-services to companies and homes, or computer and telecommunications equipment providers in their endeavour to provide mobile data processing gadgets can provide additional empirical research sites. Longitudinal case analyses in these settings would be valuable to also grasp the longer term effects of such inter-industry jockeying and could provide deeper insights into performance implications while controlling for industry convergence. Additionally, confirmatory empirical studies in the traditions of Chen et al. (1992) and Ferrier (2001) to support the prevalence of additional, inter-industry specific

antecedents of performance differences either stemming from or in addition to resource heterogeneity, cognitive schemes, or differences in their institutional environment, are warranted. Such studies could result in valuable insights and guidelines for managers that increasingly have to cope with rivals stemming from diverse industry backgrounds and therefore often pose even more complex challenges than their traditional competitors.

## Appendix A: List of Exploratory Interviews

	<b>Time, place</b>	<b>Organisation</b>	<b>Type of institution</b>	<b>Interviewee (function or department)</b>
1	4/24/2006, 9:00 h, Cologne	Lufthansa Consulting GmbH	Airline	Senior consultant airport development
2	7/7/2006, 10:00 h, by telephone	Air Berlin PLC & Co. Luftverkehrs KG	Airline	Manager Euroshuttle
3	7/20/2006, 10:00 h, Munich	DBA Luftfahrt- gesellschaft mbH	Airline	Head of commercial development and planning
4	7/21/2006, 12:30 h, Cologne	DB Fernverkehr AG	Railway company	Strategic network management
5	7/25/2006, 10:30 h, Gießen	Justus Liebig University Gießen	Academic institution	Competition theory, competition policy, and transport economics
6	8/11/2006, 10:00 h, Frankfurt	Arthur D. Little GmbH	Consultancy	Senior Manager
7	8/11/2006, 13:00 h, Frankfurt	DB Fernverkehr AG	Railway company	Head of yield management
8	8/12/2006, 15:00 h, Bonn	formerly DB Fernverkehr AG	Railway company	Strategic network management; International alliances
9	8/16/2006, 10:00 h, Cologne	Germanwings GmbH	Airline	CEO
10	8/24/2006, 9:00 h, Cologne	DB Fernverkehr and Rhealys S.A.	Railway company	International project coordination Rhealys S.A.
11	8/29/2006, 16:00 h, Hanover	Hapag-Lloyd Express GmbH	Airline	Chief Commercial Officer; Revenue Management
12	9/8/2006, 11:00 h, Freiburg (Br.)	Deutsche Bahn AG; Schweizerische Bundesbahnen SBB	Railway company	Project Rheinalp (DB AG and SBB); Head for the German/Eastern market (SBB)
13	9/20/2006, 13:00 h, Frankfurt	DB Fernverkehr AG	Railway company	International alliances

## Appendix B: Central Questions of Exploratory Interviews

### A: Importance of and Experience With Intermodal Competition

1. How significant do you consider air (*rail*) traffic as a competitor of rail (*air*) traffic, in general and compared to other competitors (road, coach)?
2. In which situations do you consider intermodal competition to be particularly relevant? Can you name empirical examples?

### B: Behaviour and Success of Market Players

#### Actors and Actions

3. To what extent are you/is your company aware of intermodal competition?
4. To what extent do you monitor the competitive behaviour of airlines (*railways*) and their market development? Which data do you collect and analyse systematically?
5. Which concrete measures carried out by which airlines (*railways*) (e.g. price measures, promotion, market entries...) have you observed?
6. Which of these measures do you perceive as potentially threatening? Can you name examples?
7. What explicit reactions did you or your company consider and why?
8. Which of these measures did you eventually implement? Which organisational implications did the implementation have (e.g. financial, organisational resources)?
9. How do you evaluate the reactions by railways such as SNCF (iDTGV) in France or Trenitalia (TrenOK) in Italy?

#### Success/Consequences of Actions

10. Do you find these measures successful? What does success mean in this case?
11. Did these measures have consequences for modal split or strategic positioning?

#### Industry Competitive Environment

12. What do you think are the reasons for the varying intensity of intermodal competition in different European passenger markets (e.g. Germany – France)?

### C: Assessment of Future Development

13. Do you think intermodal competition will gain in importance in the future? Why (not)?
14. Which traffic mode will prevail in the long run?

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Department of Business Policy and Logistics  
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University of Cologne  
Albertus-Magnus-Platz  
D-50923 Cologne, Germany  
[spl@wiso.uni-koeln.de](mailto:spl@wiso.uni-koeln.de)  
[www.bpl.uni-koeln.de](http://www.bpl.uni-koeln.de)  
Phone: +49-221-470-3951  
Fax: +49-221-470-5007