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FUTURE SCENARIOS AND EFFICIENT TRANSPORTATION 2030 – DB SCHENKER

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Abstract

This paper refers to a vision of the future in terms of logistics and transportation provided and developed by the team from the worldwide company of German origin, DB Schenker. This company is among the best in the area, not just the perfect function in over 2,000 locations around the world and actually works with great success, but recently released and presented his plan or vision for the future scenarios in terms of transport and logistics Germany. First growth of logistics in Germany is shown as a percentage, and then through pictures and urban planning are shown visions or future scenarios to be completed by 2030. In this study is used the method of research for both current and previous logistic situations in Germany, and the vision for 2030 determined by inquiries of employees, experts at DB Schenker and under agreements with the Government of Germany.

Key words

Transport, Predictions, Environment, Logistic management

INTRODUCTION

The demand for freight transportation has been rising for many years at both national and global level. Existing transport volumes are already overloading today's infrastructure at difficult-to-expand bottlenecks. At the same time, population shifts are in evidence, indicating a growing number of people living in cities and metropolitan regions, while increasing individualization is another factor that will transform the logistics of tomorrow. These are just some of the trends that will intensify in the coming years, leading us to ask: How can Germany cope with transport volumes up to the year 2030 with its existing infrastructure? To answer this question, the Fraunhofer Institute for Material Flow and Logistics (IML) has produced its "Visions of the Future: Transportation and Logistics 2030" study, initiated by Daimler and DB Schenker. The study highlights the impact and developments associated with the megatrends that have been identified – globalization,

demographic change, urbanization, sustainability and resource scarcity – and presents approaches to solving these. It places these in nine future scenarios that combine the potential synergies of the individual approaches and identify and describe the research needed in the years ahead. The scenarios show ways of meeting the challenges of tomorrow and increasing the efficiency of transportation while protecting the environment and safeguarding the supply of goods.

Focusing on road and rail transportation in Germany, this paper presents the impacts and developments that have been identified and divides them into the five megatrends: globalization, demographic change, urbanization, sustainability and resource scarcity. Alongside recent studies and publications, it draws upon expert industry knowledge taken from interviews and discussions. Also there are previous researches from the work of DB Schenker by a highly professional team, and the results of previous plans and forecasts.

LITERATURE REVIEW

Main culprits or responsible for starting this so called project or plan views Logistics 2030 are Prof. Dr. Uwe Clausen, Fraunhofer Institut für Materialfluß und Logistik (IML) & Institut für Transportlogistik (ITL), Technische Universität Dortmund, Director, Klaus-Dieter Holloh, Daimler AG, Head of Advanced Engineering, Daimler Trucks and Michael Kadow, DB Mobility Logistics AG, Vice President Business Excellence DB Schenker. Setting the foundation for writing these predictions logistics in 2030, heads of DB Schenker and Daimler are served with the previous work of DB Schenker, the results of the past, previous planning and realization as well as literature and facts from other major companies, banks and government of Republic of Germany as well as many others, like: Acatech (2010), BMVBS Federal Ministry of Transport, Building and Housing (2011), BP Statistical Review of World Energy (2013), Bpb - German Federal Agency for Civic Education (2009), Bundesregierung (German Federal Government) (2009), Daimler Trucks (2012), Deutsche Post AG (2009), DVWG (German Association of Transport Sciences) (2009), Frankfurter Allgemeine Zeitung (2012), Holtbrügge & Welge (2010), Institute for Mobility Research (2005), Pfohl & Flickinger (1998), ProgTrans AG (2007), DB Schenker (2012), Schmidt & Kille (2008), Wietschel (2008) and the World Bank (2014).

FUTURE SCENARIOS 2030

Nine future scenarios are developed for road and rail freight transportation in the context of innovative and sustainable transport systems. These build on the trends and innovations already identified.

Integrating systems to enable goods in transit to be monitored and managed in real time

Increasing digitization and networking of objects provides the basis for the Internet of Things (cyber-physical systems). This gives rise to intelligent load carriers, which provide transport information for immediate processing. The rapid provision of information and communication between the load carriers themselves creates self-controlling and flexible transportation chains. The freight makes real-time decisions, based on real data and events, on the route it will take though the transportation network. It is possible to change the route or mode of transport at short notice and optimize transportation chains in terms of capacity utilization, transport time, environmental factors and costs. There is therefore more focus on the integration of different modes of transport and decentralized decision making in real time when it comes to scheduling and shipping. Managing the Internet of Things and combing it with intelligent traffic guidance systems makes better use of existing infrastructure capacity. For example, longer routes increase the transport volume but also save time and improve reliability. This has an impact on the internal processes of transportation and transshipment companies. The rapid provision of electronic information streamlines processes and eliminates the need for time-consuming data collection upon the cargo's arrival at its destination. A further advantage is the optimized planning and utilization of resources enabled by the preannounced arrival times. Vehicle-to-vehicle communication is extensively introduced. Transmitting data on status and surroundings means danger can be reduced or avoided as vehicle electronics intervene directly or warn the human driver. The Internet of Things helps to bring about new services based on the automated control of load carriers by the transportation network.

Using infrastructure efficiently with intelligent traffic guidance systems

In future, all road users' vehicles are equipped with ever more modern navigation devices. This enables extensive data to be transferred and offers new options to assist navigation. Infrastructure, too, becomes ever more closely integrated with such intelligent guidance systems. The integration of different modes of transport and infrastructure provides real-time data to guide road users. Freight traffic is clearly distinguished from private transport so that individualized traffic forecasts for different road users become a reality. To avoid traffic congestion, alternative routing shows each road user the most resource-efficient and quickest way to their destination and is customized to their individual needs. A precise forecast or arrival time can be given, enabling more efficient route planning in freight transportation. The route calculation not only includes major roads and highways, but also smaller roads. It

additionally takes into account environmental zones, preferred routes for trucks and road closures.

Individualized routing, customized to the type of vehicle and with networked assistance systems, therefore means more resource-efficient transportation on roads and rails alike. To make this system work, vehicles must be equipped over the coming years with the technologies needed to continuously transmit and receive real-time data.

Safe and efficient transportation with driver assistance systems

Greater communication and networking between road users in future is achieved by equipping growing numbers of vehicles with modern technologies. This increases the number of information sources that can be used to create a safe and efficient flow of traffic. Radar, infrared and video cameras on modern vehicle fleets, for example, enable additional information and hazards to be detected and identified. Networked assistance systems can use this data and inform the driver visually or acoustically. This takes the burden off drivers by supporting them in their work environment. Depending on the extent to which these technologies are applied in future, they take the form of individual driver aids to assist, for example, in maintaining a safe distance, keeping in lane and driving at night, or are developed and combined to make the leap from driver assistance to autonomous driving. Truck convoys are one possible use for this technology. The trucks drive themselves in a line at equal distance from one another, all controlled by a driver in the truck at the front of the convoy. The remaining trucks are accompanied by trained staff able to intervene in an emergency. In the shorter term, these autonomous technologies are used for internal transportation on self-enclosed factory sites, greatly facilitating processes on the ground. Combining autonomous vehicles with the integration of systems, i.e. using the Internet of Things – enables goods or products to be transported autonomously around the factory from one stage of the process chain to the next. Combing different approaches thus generates further potential synergy effects, improving the safety and efficiency of transportation.

Optimizing processes with intelligent freight cars

Intelligent freight cars are complemented by technological innovations such as automatic couplers and electro-pneumatic brakes. This leads to shorter process times in forming and dividing trains, reduced braking distance and faster response times by the train. The result is more effective use of tracks and improved safety thanks to advanced technology. Synergy effects exist here, for example with intelligent traffic guidance systems and integration of different modes of transport. The freight cars are able to decide their own transport route depending on the information provided. This direct communication simplifies processes and saves valuable resources in future.

Low noise levels in city logistics with alternative propulsion and new logistics concepts

Quiet nighttime transport in city logistics still offers major potential to take the strain off infrastructure as re-urbanization takes its course. If deliveries are to become so quiet that they can be moved to the nighttime, however, there is still a great deal of research work to be done, particularly in vehicle and propulsion technologies. Batteries must be made powerful enough to drive larger trucks or cover greater distances without needing a recharge.

Using capacity efficiently with modular container design for small transport volumes

To take the pressure off city centers, the modular containers are combined at intercompany handover points on the edges of urban areas, forming large loading units for the line haul, or prepared for delivery. Importantly, this requires an international standard for the containers to enable the principle to work across different companies and the different smaller loading units to be packed together efficiently into larger ones. This cooperative consolidation of transport volumes is used in future to provide appealing, individualized and efficient transportation services in CT networks.

Consolidating transport volumes with multimodal integration of different modes of transport

The integration of different modes of transport is complemented by the use of innovative, high-speed cargo handling technologies. Together with optimized interfaces, designing individualized and attractive CT networks enables improved capacity utilization across all transportation modes and companies. Harmful emissions of pollution and exposure to it, for example noise caused by city traffic, is reduced as a result. There is enormous potential to reduce costs at economic level through efficient resource use.

Modern work environments to make the logistics industry more appealing

Networked assistance systems and modern vehicle fleets support staff at their workplaces and ease the pressure on them. Such technology also makes it easier for people to join the industry, including those moving from other careers. Ergonomic and attractively designed workplaces, such as truck and train cabs, are another factor. Improving the industry's attractiveness and long-term training provision for skilled employees strengthens logistics and does not come at the expense of people's own private and professional goals.

More environmentally friendly transportation with alternative vehicle and propulsion technologies

Society's call for "green logistics" demands more environmentally friendly transportation in future. This is provided by modern vehicle fleets used in a way that optimizes energy use and carbon emissions. It involves developing both vehicle technologies, such as better aerodynamics to reduce CO2, and propulsion technologies. There is unused potential, not only in electric and natural gas propulsion, but also in existing combustion engine technology, which can be converted into further CO2 savings through changes to vehicle technologies. Trucks and locomotives can achieve additional energy efficiency in future with waste heat utilization. This greater engine efficiency cuts fuel consumption and thus conserves resources. In future, transportation concepts achieve considerable CO2 efficiency using optimized vehicle and propulsion technologies that are adapted to the situation. Modern vehicle fleets therefore save resources and make greater use of environmentally friendly energy sources. Combining adaptable, individualized route planning with intelligent traffic control systems enables further resource savings.

EFFICIENT TRANSPORTATION 2030

Germany is one of the world's most important logistics centers. This is thanks both to its location at the heart of Europe and its well-developed infrastructure. Figure 1 shows the geographical locations of Europe's largest logistics regions and illustrates their importance.

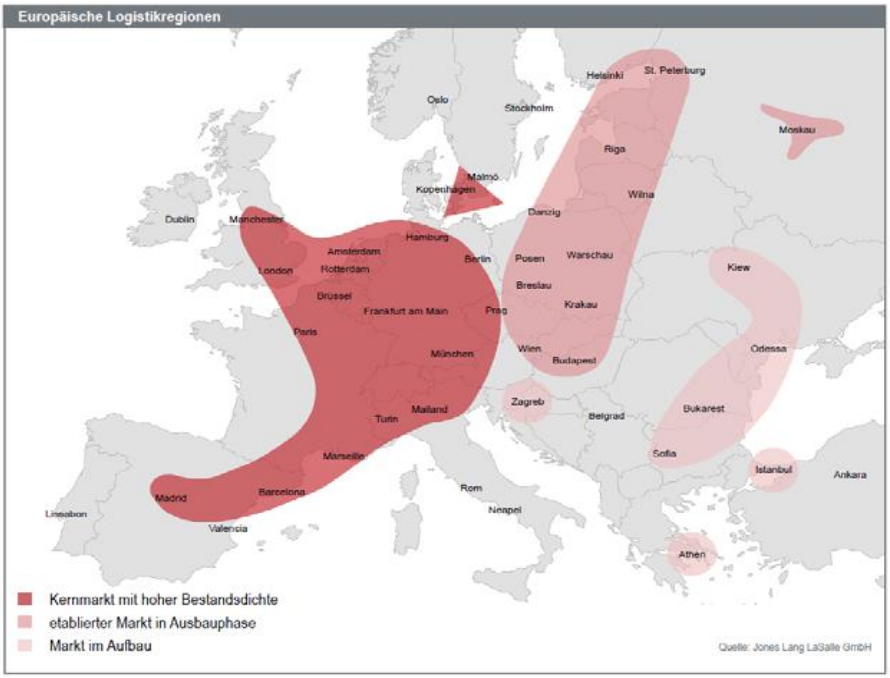

FIGURE 1. EUROPEAN LOGISTICS REGIONS

Source: Fraunhofer IML | Daimler AG | DB Mobility Logistics AG

The interaction of the nine future scenarios creates the overall picture of efficient transportation. The increase in digitization, in information flows before and during transport, and the ongoing development of vehicle and propulsion technologies, combined with networked assistance systems, are the prerequisites for efficient transportation and competitive industries in Germany in the year 2030. Optimizing the interaction between these individual visions enables further potential for improving efficiency to be leveraged. For example, technical improvements like intelligent freight cars support solutions of a more organizational nature – e.g. consolidation of transport volumes through multimodal integration of carriers. The Figure 2 shows this development in freight transport for Germany.

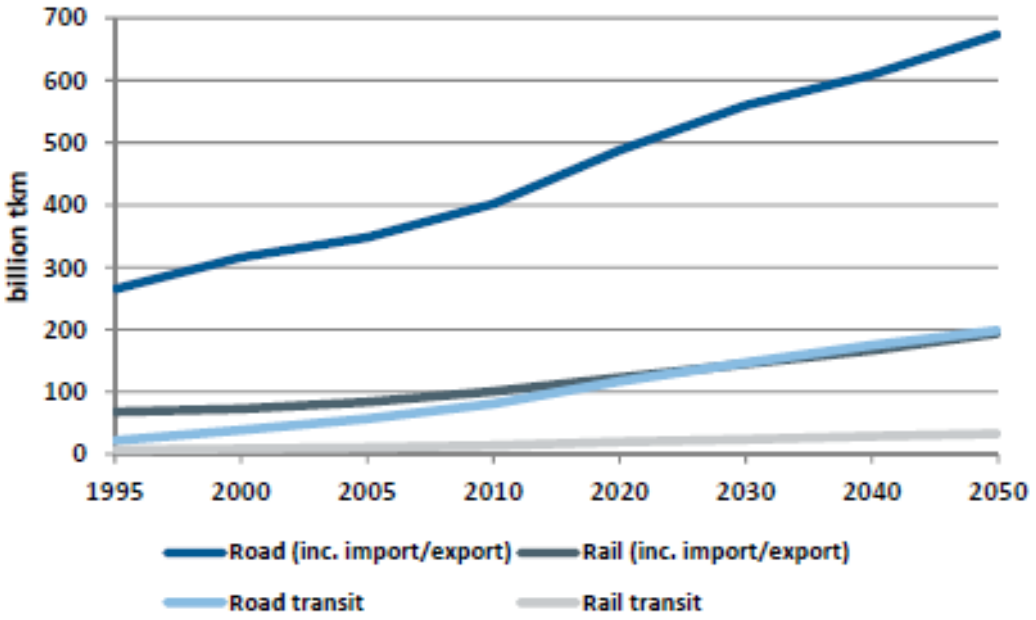

FIGURE 2: FORECAST OF VOLUME SOLD IN FREIGHT TRANSPORTATION, GERMANY UP TO THE YEAR 2050

Source: ProgTrans (2012: 94)

AREAS FOR ACTION

The future scenarios described here for achieving the objectives set and minimizing the impacts point to various areas for action that will help us to realize the vision of efficient transportation in the year 2030. The solutions present individual measures that, despite being full of potential, can only achieve the impact described in the future scenarios if they are combined with one another.

Like the individual solutions, the areas for action are categorized into the three areas of innovation: digitization, technology and flexible management. While digitization enables optimized planning based on real-time data, improving technology leads to optimized, energy-efficient and safe processes. Flexible management supports collaboration within and between companies. The areas for action identified are also grouped into four types of transportation: cross-carrier, rail freight, and local and long-distance road traffic. Figure 3 summarizes the areas for action in a matrix.

	Cross-carrier	Rail freight	Road (regional traffic)	Road (long-distance-traffic)
Digitization	Internet of Things (syber physical systems)	Intelligent freight cars Internet of Things (syber physical systems)	Intelligent traffic guidance systems Internet of Things (syber physical systems)	Intelligent traffic guidance systems Internet of Things (syber physical systems)
Flexible management	Deceleration Cooperative consolidation of transport volumes CT networks Integrating mode of transport	Attractive workplace design Cooperative consolidation of transport volumes	Quiet nighttime transport Cooperative consolidation of transport volumes	Attractive workplace design Cooperative consolidation of transport volumes
Technology	CT Networks Modular container design	Waste heat utilization Automatic coupling Autonoumos driving Hybrid locomotive	Vehicle and propulsion technologies Autonoumos driving Modern vehicle fleets Waste heat utilization Networked assistence systems	Vehicle and propulsion technologies Autonumos driving Modern vehicle fleets Waste energy utilization Networked assistence systems

FIGURE 3. MATRIX - SUMMARIZED AREAS FOR ACTIONS

CONCLUSION AND RECOMMENDATIONS

The future scenario we describe aims to achieve the objectives set and minimize impacts. It shows various areas for action that have been identified for efficient transportation in the year 2030. We categorize these into the three areas of innovation: digitization, technology and flexible management.

While digitization enables optimized planning based on real-time data, improving technology leads to optimized, energy-efficient and safe processes. Flexible

management supports collaboration within and between companies. These areas for action and their potential synergies give rise to the vision of efficient transportation in the year 2030.

With a focus on road and rail freight, scenarios are examined and developed for the future based on innovative and sustainable transportation systems in the context of growing transport volumes. Those scenarios require no more than minor changes to infrastructure. As well as identifying global trends, influential factors and effects on the efficiency of transportation, various solutions are described as capable of tackling future challenges and fulfilling the target requirements set.

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