Diagnostic of the European Logistics and Road Freight Transportation Sector

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Abstract. Within this paper, an analysis of the road freight transport and logistics market at EU level is presented. Based on the findings of the AEOLIX project, a preliminary analysis of the market size, volume and share of the logistics sector in Europe is presented herein, along with the respective allocation of costs in differentiated categories. Similarly, the road freight transport sector is examined in terms of volume of transported goods and its evolution in time, number of freight transport operations by commercial vehicles, vehicles' age and kilometers travelled, distance class, and volume of cabotage in Europe. The paper concludes with a critical analysis of the presented data, delivering key messages for the future of freight transport in Europe regarding world trends, future drivers for successful business options in the sector and the role of SMEs therein, current needs in terms of services and related environmental concerns.

Keywords: Freight transport · Logistics market · Data analytics

1 Introduction

The logistics market size is the object of several analyses conducted in previous years both in Europe and worldwide. It is the nature of logistics and its undisputable place in today's business world that has attracted interest both from private and public stakeholders, in an effort to better understand its dynamics, spatial and temporal character and potential, and propose policy or other measures and actions towards its enhancement. To this end, the AEOLIX project aims to set the current play in the logistics and freight transport market identifying future needs and considerations that need to be looked at. In its framework, open data is utilized and analyzed towards concluding on the key messages for the logistics and freight transport sector of the future.

1.1 The Logistics Market Size and Volume

One of the most comprehensive market surveys for the European logistics sector is conducted annually since 1995 by the Fraunhofer IIS – Center for Applied Research on Supply Chain Services SCS [1]. As a standard reference work for the logistics industry, the "TOP 100 in European Transport and Logistics Services" provides the latest

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statistics and key figures for the European logistics market, in addition to outlining the market structures and players [2]. Some of their key findings reveal that compared to 2012 (€879.3 billion), the European logistics sector grew by €20 billion in 2014, reflecting a 2.6% increase in two years. These values used for describing logistics market size are not based on turnover but rather on costs for staff, vehicles, warehousing, administration and planning for logistic activities. In terms of market volume per segment, [2] report that more than 40% of the European logistics market volume is attributed to contract logistics, while there is an approx. similar share among other segments, with warehousing and terminal, ocean cargo and general truckload having the next bigger shares, concluding that the logistics sector is highly heterogeneous. It is interesting to correlate the notions of market volume and GDP in Europe. This indicator can be calculated by taking the ratio between freight transport performance (in ton-kilometers) and Gross Domestic Product (GDP) and indexing on a single reference year. In this case, we use the Eurostat database, where freight transport performance is an aggregate of inland transport modes: road, rail and inland waterways, as due to their predominantly international nature, air and rail transport are omitted from this analysis. The indicators are indices with the base period of 2005 and the indicator is presented in Fig. 1.

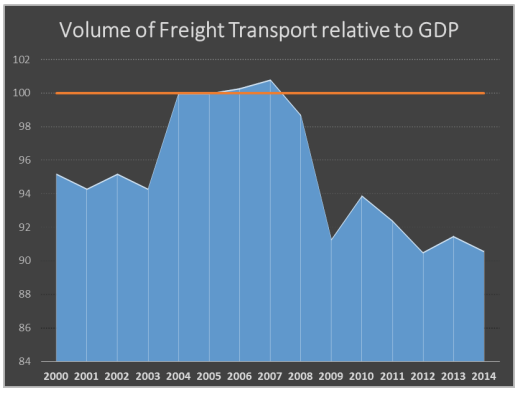

Fig. 1. Volume of freight transport relative to GDP (EU28) [3].

1.2 The Logistics Costs

In [2], a segmentation among the 5 main logistics costs categories in EU30 (incl. Norway and Switzerland) is conducted, revealing the dominance of transportation costs vs. all others (warehousing, inventory/carrying, order processing, administration). Similar findings at company level are found at [4]. The Davis Logistics Cost and Service Database is an ongoing annual survey that manufacturers, distributors and retailers participate in, in order to receive a customized benchmarking report of logistics costs and services. The database is an internationally recognized source of logistics costs and service information. Started in 1974, the Establish Davis Database

contains logistics costs in the following categories: transportation; warehousing; customer service (order/entry); administration; inventory carrying.

Data are summarized and reported annually; the May 2016 report includes a series of important findings for the logistics costs in general [4]:

- Logistics costs for the average company are 9.56% of sales and 68€ per CWT of cargo (the hundredweight (abbreviation: cwt), formerly also known as the centum weight or quintal, is an English, imperial, and US customary unit of weight or mass of various values. Hundredweight refers to 100 lb (45.359237 kg)).
- Logistics costs as a percent of sales increased from 2% to 3% between 2014 and 2015.
- Transportation and warehousing costs drove the increase while inventory carrying costs slightly decreased.
- Overall logistics costs are continuing on an upward trend.
- Companies with higher product values continue to have lower logistics costs.
- Smaller companies continue to have higher logistics costs.
- Service performance levels show a reduction in cycle time (from order to average delivery) and a decrease in product availability.

The breakdown of logistics costs per sales and cost per CWT of cargo reveals that transportation is the dominating cost (either as a percent of sales or of CWT). Warehousing costs have a higher importance when calculated based on weight, as there is a correlation between weight and volume, which is the main driver for warehousing costs. Over the course of the last 12 years, transportation costs are the only ones fluctuating (given their dependency on changing fuel prices, container rates, etc.), while marginal increases in shipping and warehousing costs are attributed to the increased value of cargo for the former and the recovery of the economy for the latter.

Economy of scale is observed when comparing logistics costs with the size of a company, as there is a reduction in the long-run average and marginal costs due to the increase in size of operations, i.e. larger companies experience lower logistics costs. Data from 2009 to 2015 reveal the latter in Fig. 2.

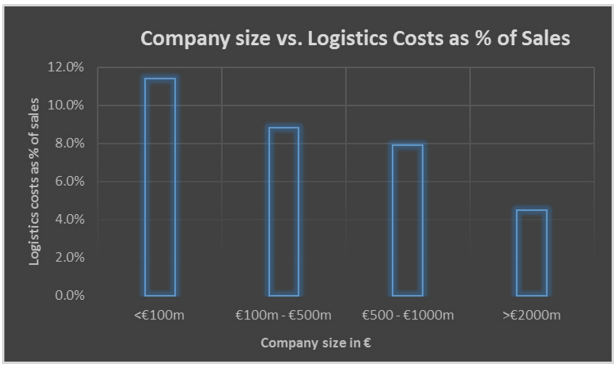

Fig. 2. Company size vs. logistics costs as % of sales (adapted from [4]).

Quite interestingly, logistics costs as a percent of sales keep trending upwards. As observed in Fig. 3, technological advances in the early 1990s have considerably decreased this figure, only for it to be increased both until the 2008–2009 market crash and after its initial recovery in 2013. However, this leaves potential for ICT services, or in this sense soft technological advances similar to the ones of AEOLIX, not directly associated with production, manufacture, warehousing or transportation itself, but with the management, coordination and optimization of those, to decrease this figure to a lesser percentage than today.

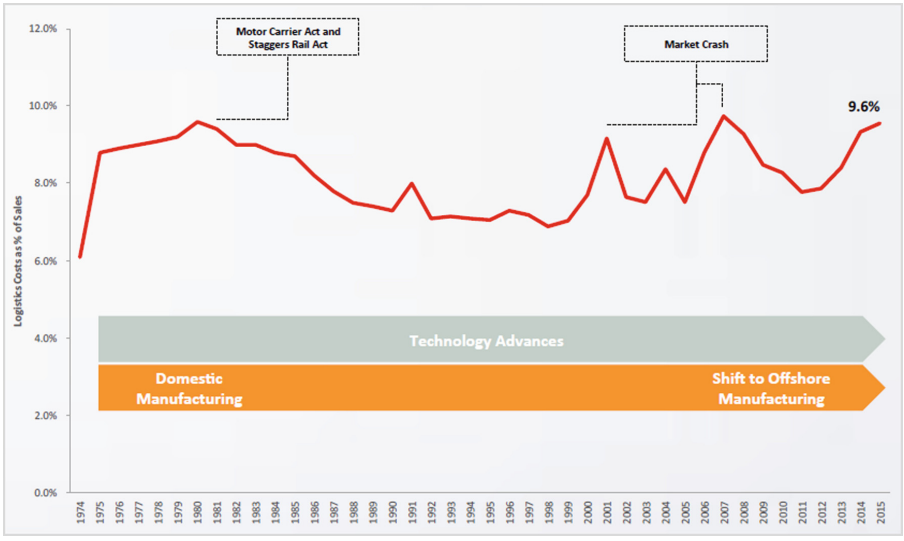

Fig. 3. Logistics costs as a percent of sales (1974–2016) [4].

2 Road Freight Transport

2.1 Volume of Transported Goods and Type of Transport

The role of road in the transportation of goods is slowly increasing in the past years. Although EUROSTAT reports an approx. 20% decline between 2007 and 2013, in the last 3 years there is a continuous upward trend for road transport of goods (+3%), which will bring the sector in the 2009 figures when the economic recession appeared worldwide. In general, road transportation is dominating goods transport in Europe and it is still under investigation whether reported decreased figures throughout the last decade are to be attributed to modal shift to other transport modes; on the contrary, it is mostly down to internal market changes, levels of productions at country-level, shift of the European economies to services and non-tangible products, etc.

Still, negligible as they might be when looking at the overall picture of modal share for goods transport in Europe, changes did affect SMEs that lost a significant share of the market when the latter shrinks (for any reason); this is especially the case for road

transportation where, as opposed to railway, pipeline and maritime of transport, business enterprises of lesser magnitude are easier to be formed, developed and operate, as investment costs for initiation are considerably lower. It is therefore crucial to safeguard such enterprises if competitiveness and innovation in Europe are to be reinforced through the logistics sector by making sure that any actions from policy to operational levels are directed their way.

Freight transport operations on the contrary though, are not increasing at a similar rate with the amount of goods transport in Europe [3]. This highlights the fact that after the 2009 recession a lot of transporters have started looking for solutions towards sharing or exchanging loads in order to reduce empty vehicle kilometers traveled, and have managed to create a culture towards this approach which is evident today. Regardless of the cost-reduction oriented motives of transport companies behind this initiative, there are potentially huge societal benefits included there as well. It is therefore central to create the technological tools, models and platforms that will facilitate this freight transport exchange, ideally utilizing latest technological trends and technologies in real-time and big data, etc.

Statistics produced in EU on the basis of Regulation No. 70/2012 concern the following road freight transport operations by heavy goods vehicles registered in the reporting countries:

- Commercial road freight transport, referred to as 'hire' road freight transport.
- Road freight transport by private vehicles and by vehicles owned by companies classified in other classes than professional road freight transport. This kind of transport is identified as "Own account" road freight and it covers transport operations by manufacturing industry, construction, trade and other companies.
- Operations by small goods vehicles (the definition of "a small goods vehicle" depends on the country) and extra-EEA vehicles are not covered in these statistics [5].

2.2 Age of Vehicle Fleet

A critical issue to be looked at concerns the vehicles that move these goods, and circulate in European highways, regional and urban roads. The share of ton-kilometers travelled by vehicles registered after 2010 (up to year 5) has significantly decreased in 2015 by 16% as compared to 2011 (from 63% to 47% out of the total), although being stable before. The statistics reporting of 2016 will reveal whether this has been an exception to the otherwise hardly changing share (between 2011 and 2014) or if indeed there is a rising issue of an ageing freight transport fleet. In any case, in 2015 only, approx. 54% of the total vehicle-kilometers reported in Europe have been travelled by vehicles that have been registered before the dawn of the decade (prior to 2010), while a remarkable 20% has been travelled by vehicles beginning their lifetime in the late 90s – begin of 00s. The ageing fleet of freight transport vehicles is strongly attributed with the degree and extent to which the sector contributes to pollutant emissions in Europe. There is a direct need for new vehicles and more importantly, new technologies that will address the environmental aspect of goods transport.

2.3 Ton- and Vehicle-Kilometers Travelled, and Distance of Trips

As data shows, there is no sign of decreasing vehicle-kilometers travelled; on the contrary there is an upward trend since to 2012 that will reach the levels of 2009 in the coming 2 years (Fig. 4). A similar trend is also observed for ton-kilometers; however, the latter are constantly higher than vehicle kilometers, revealing the increased load factor of goods vehicles since 2009. Distance class of freight transport operations is also an important indicator for the logistics market in general and road goods transport in specific.

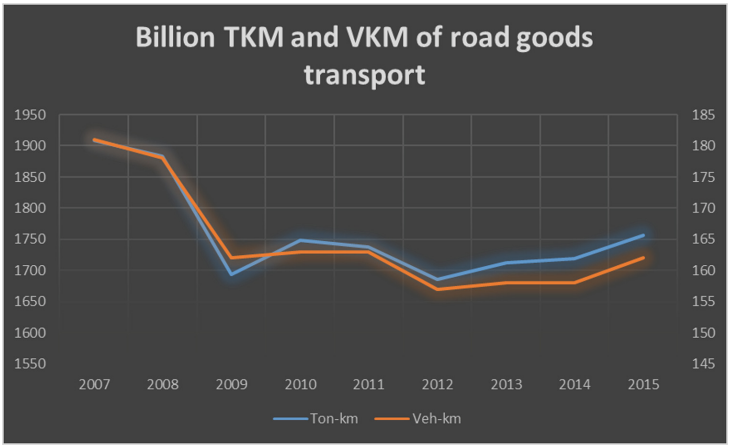

Fig. 4. Billion TKM (ton-km) and VKM (vehicle-km) of road transport of goods in EU28, source: European Commission, 2014.

2.4 Cabotage in Road Freight Transport

In the territoriality concept, 'cabotage' is a form of national transport. It refers to those cases where both loading and unloading take place in the same country but the vehicle used is not registered in that country. For instance, a vehicle registered in Spain loads goods in Barcelona and unloads them in Paris - this is an international journey. If it then loads goods in Paris and unloads these goods in Marseille (France) - this would be a cabotage journey. This same vehicle might then load goods in Lille and unload them in London - another international journey.

3 Findings and Key Messages

Data presented and analyzed in the previous sections are herein translated in key messages for the logistics and road freight transport sector.

World trends: Bidirectional Influence with the Logistics Sector
Globalization, demographic development, sustainability, state intervention, climate change and disruptive technologies are world trends that will influence the way future logistics operations will be conducted. But this is not a one-directional influence; on the contrary, the logistics sector will respectively influence the way and rate of evolvement of these trends as a major.

Drivers for Successful Business Options
There are certain drivers that currently determine the way the European logistics market is shaped and will continue to do so in the next years. These drivers include professionalization and efficiency, focus on core competences and effectiveness, service orientation, innovative technologies and faster ticking clocks, and can be adopted for successful business operations.

Transportation Costs Monopolize Other Logistics Costs as a % of Sales for the Average Company
Logistics costs comprise up to 10% of potential sales of a company, with transportation having a 4.5% share on this. In sheer numbers, for every 45 kg of transported cargo there is a total of 68€ costs for logistics; 31€ of which are transportation costs.

Dominance of Road Transport in Freight Operations – No Sign of Change
Road transport is dominant among all modes of transport when it comes to cargo movement in Europe. Data reveal a modal split share of approx. 75% for road transport, as compared to those of rail (6%), sea (8%) and inland waterway transport (3%). Additionally, there is no reported evidence of change of scenery in the coming years; on the contrary, statistics and trends suggest a minor increase in the coming years for road transportation in the expense of all others (and mainly rail transport).

Safeguard the Little Man – SMEs in Road Transportation
Road transportation of goods is the only business sector in the field that can facilitate the existence and operation of SMEs. In comparison to all other modes, where investment and operational costs make it hardly possible for any other stakeholder (rather than public ones or joint endeavors of big business players) to enter the market, road transportation allows by nature smaller enterprises to join in. This inherently creates a necessity to safeguard such initiatives as drivers of employment, innovation and technology driven productivity, as they are most likely the main players to experience market fluctuations and potential shrinks. In turn, this has several messages at several levels: from policy and decision makers on a higher, strategic level, to AEOLIX itself on an operational level.

Amount of goods transported increasing – amount of transport operations stable. A hint for freight exchange needs?
Although there is a marginal upward trend in the amount of goods transported since 2012 (with all transport modes), transport operations for the actual transportation of these goods has remained stable. This might be a hint for an already cultivated culture among transport operators towards freight transport exchange; technological solutions

and innovation efforts should be therefore directed to this end. Additionally, the multimodality of freight exchange.

An Ageing Road Goods Transport Vehicle Fleet: Apparent Need to Renew After Investigating Potential Collateral Impacts

In 2015, about 20% of the vehicle-kilometers travelled in Europe for goods transports were conducted by Heavy Goods Vehicles (HGVs) that were either registered between 2000 and 2005 (15%) or prior to 2000 (5%). These figures are cause for environmental pollution concern; the older the vehicles, the less clean they are; the more these vehicles travel, the more they pollute. What is alarming, but not yet conclusive due to lack of the 2016 respective figures, is that this share has risen in 2015 by 16%. In other words, vehicles up to 5 years of age, have significantly decreased their vehicle-kilometer share over the total from 63% to 47% from 2011. As apparent the need for renewal of the vehicle fleet might be, there needs to be a closer look at potential collateral impacts of these choices. How can this renewal occur and who will bear the expenses of it? State-aid is prohibited in the EU regarding purchase of freight transport vehicles – therefore there is no direct relieve of purchase costs. Other types of incentives could be looked at, for instance through tolling older, more pollutant vehicles. But then a possible shift to e.g. EURO6 combustion engines for HGVs would mean considerably lower income for infrastructure operators and managers, which in turn creates the question of who will bear these costs? For sure though, fuel consumption reduction for Heavy Goods Vehicle should be prioritized for manufacturers as this is hardly at the crux of their agenda (as opposed to passenger vehicles).

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