European Foundation for the Improvement of Living and Working Conditions

Trends and drivers of change in the EU transport and logistics sector: Scenarios

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Introduction

This report sets out four different scenarios for the European transport and logistics sector. Scenarios depict plausible hypotheses about the future; thus, they are useful tools for forecasting, analysing and formulating policy, as well as for strategic planning in private companies and among the social partners. In a rapidly changing and complex world – where demand and supply change equally fast – planning for the future cannot rely on simple projections of past trends. Alternative views of the future can help to broaden the understanding of issues that need to be addressed today. Scenario methodology provides such alternative views by embracing the uncertainty inherent in the future.

A scenario is a coherent description of possible outcomes of the drivers, trends and events that may influence and change the shape of analysis over a given period of time. Scenario analyses and exercises do not aim to predict the future but rather to describe possible alternative future outcomes. Given the uncertainty of the future, it should be clearly stated that any scenario is only a possibility, as likely or unlikely as many others.

Tensions between short-term considerations and long-term visions and strategies often affect policymaking. Scenarios are a way of developing more robust, innovative and future-oriented good practices for particular future outcomes. Although scenarios are often set in a 10 to 15-year perspective, they can act as a navigation tool and early warning system for current realities. Scenario building can also point to ideas and methods for putting into operation knowledge generated from case studies and market studies. While scenario-analysis may be a valuable tool for insight and future literacy, as well as a catalyst for strategic discussion, it should not be regarded as an end in itself.

This outline of four scenarios represents realistic, internally consistent, and plausible pictures of alternative futures for the transport and logistics sector.

- Scenario 1: Take the A-train
- Scenario 2: I’m in love with my car
- Scenario 3: Riding the rainbow
- Scenario 4: Moonlight ride in a diesel

Scenario development process

Methodology

In principle, a scenario is an influential tool for policy analysis and strategic analysis to describe a possible future outcome. As such, a scenario should fulfil the following criteria:

- it should be plausible, but does not have to be the most probable outcome;
- it should be internally consistent in order to be plausible and to enable a coherent discussion;
- it should project backwards from the posited future to the present, so that participants can better understand how that future might arise;
- it should contain sufficient information to identify the role of the subject organisation.

In this case, the scenario-building has been designed as a two-stage process.

Stage 1 is devoted to developing exploratory (not normative) scenarios. These are partially based on existing work, but are mainly based on desk research by the scenario team without direct involvement of external sector experts. At this stage, the main macro drivers and important dimensions of change are examined to determine the most important elements of the future. Once these drivers and dimensions have been identified, they are 'fleshed out' into plausible and concrete scenarios.

Stage 2 examines the plausible implications that different configurations of the macro drivers might have on companies and on those issues that companies must address in the future. This investigation work was carried out partly through desk research and partly through drawing on strategic discussions that took place between scenario experts, sector experts and company managers when the case studies were produced.

Construction of scenarios

The construction of the scenarios employs a conceptual framework designed to capture changes in the external environment of service provision by means of five types of drivers and trends:

- socio-cultural;
- technical;
- economic;
- ecological;
- political or regulatory.

The scenario team collated opinions on the major trends and drivers of these categories over a 10-year period in relation to factors that will have a significant impact on the transport and logistics sector. The team used assessments of a number of trends and drivers to identify a range of dimensions on which the scenarios could be built. These dimensions were then consolidated and assessed within the team according to two criteria:

- importance – low, medium or high;
- uncertainty – low, medium or high.

Six uncertain drivers with a high influence on the transport and logistics sector were singled out as the most important:

- economic growth;
- priority of sustainability in public regulation;
- investments in infrastructure;
- liberalisation and harmonisation of the transport and logistics sector;
- technological development;
- energy prices.

Main drivers of change

Economic growth

Transport and logistics are the life-blood of societies and hence a strong association exists between growth in overall economic activity and developments in transport. This association reflects a two-way process: without access to cheap transport of goods between continents, the level of global trade would be lower, and without an increase in global trade, the demand for transport would be lower. Economic growth generates wealth, which individuals invest in cars, airline flights and travelling. Economic wealth provides for improvements in infrastructure, which increases the mobility of people and economic growth. Therefore, it is clear that economic growth has a very direct effect on the demand for transport and logistics services.

Priority of sustainability in public policies

Climate change, greenhouse gas emissions, traffic congestion and improved safety are issues related to transport. The transport sector contributes substantially to the continuing rise in carbon dioxide (CO_2) emissions in the EU. However, continued growth in CO_2 emissions is considered unsustainable for the climate. In recent decades, the imbalance between the various modes of transport has been increasing, and thus the use of road transport has almost tripled. Solutions to these issues are largely dependent on public policies, as such policies can have a large impact on the demand for transport, as well as on the balance between transport modes and sustainability.

Investments in infrastructure

It is clear that investments in infrastructure – such as motorways, railways, terminals, ports, bridges and airports – and the physical conditions for mobility have a large impact on businesses in the transport sector, as well as on the behaviour of individuals. Clusters of transport companies are often found around transport hubs connecting the sea with land, terminals with cities or rails with roads. Furthermore, the infrastructure has an impact on each individual's choice of modes of transportation. For example, a high-speed train might be more attractive than an airplane in terms of journey time, ticket price and convenience. Thus, private or public investments in the overall infrastructure – to create more intelligent or advanced infrastructure – have an impact on the transport and logistics sector. Three of the vital challenges for the sector are traffic congestion in cities and on major roads, the harmonisation of the European railway systems, and the development of the European transport corridors through the Trans-European Network for Transport (TEN-T) programme.

Liberalisation of transport and logistics sector

The European transportation and logistics sector has been liberalised in a number of areas, in particular road transport, but challenges for completing a single market for transportation and logistics remain. Such challenges include issues like cabotage, licensing schemes for railway operators, cross-border recognition of airline pilots' certificates, and compatibility of standards in the railway sector. Liberalisation is closely linked with increased competition, and therefore more liberalisation will force transport and logistics companies to focus on competitiveness in terms of price, quality and services offered. This will in turn have an impact on the structure of the labour force within transport and logistics companies and the organisation of companies. Both employees and employers will have to become more flexible and adaptable to constant change. Further liberalisation mainly depends on political motivation.

Technology

A number of technologies are emerging to support operations in the transport and logistics sector. Some of these technologies are more developed than others – for example, the European Rail Traffic Management System (ERMTS), intelligent highways, Galileo satellite navigation, radio-frequency identification (RFID), super buses, new fuels, the Rapid Urban Flexible (RUF) system, Maglev or magnetically levitating super trains and dual-mode transport systems – and some evolve in combination with emerging technologies in other areas of business operations, such as communications or materials; the possibilities in this regard are endless. Exploitation and uptake of these emerging technologies will depend on a combination of market demand and investment in research.

Energy prices

The costs involved and hence the prices charged for the transportation of people and goods depend on fluctuations in energy prices. High energy prices are most likely to result in lower demand for various forms of transportation, particularly leisure travel and travel by energy-intensive modes of transport – mainly airplane but also car. The main component of energy prices is the fuel price. However, the final energy prices also depend on the technology used to produce the power and human ability to utilise the energy.

Overview of the scenarios

Combinations of the six uncertain drivers give rise (by way of combination) to 26–64 possible scenarios. However, some of these are very similar, while others turn out to be implausible.

For this study, the combinations have been compared and four have been selected which differ considerably but can still be deemed plausible. Ideally, the scenarios should be visualised in a six-dimensional volume, but as this is technically impossible, their position is presented in two dimensions defined by two of the drivers; in other words, they can be visualised against each other using only two dimensions, namely economic growth and globalisation, and the priority of sustainability in public regulation (Figures 1 and 2).

Figure 1: *Four scenarios for the European transport and logistics sector in 2017*

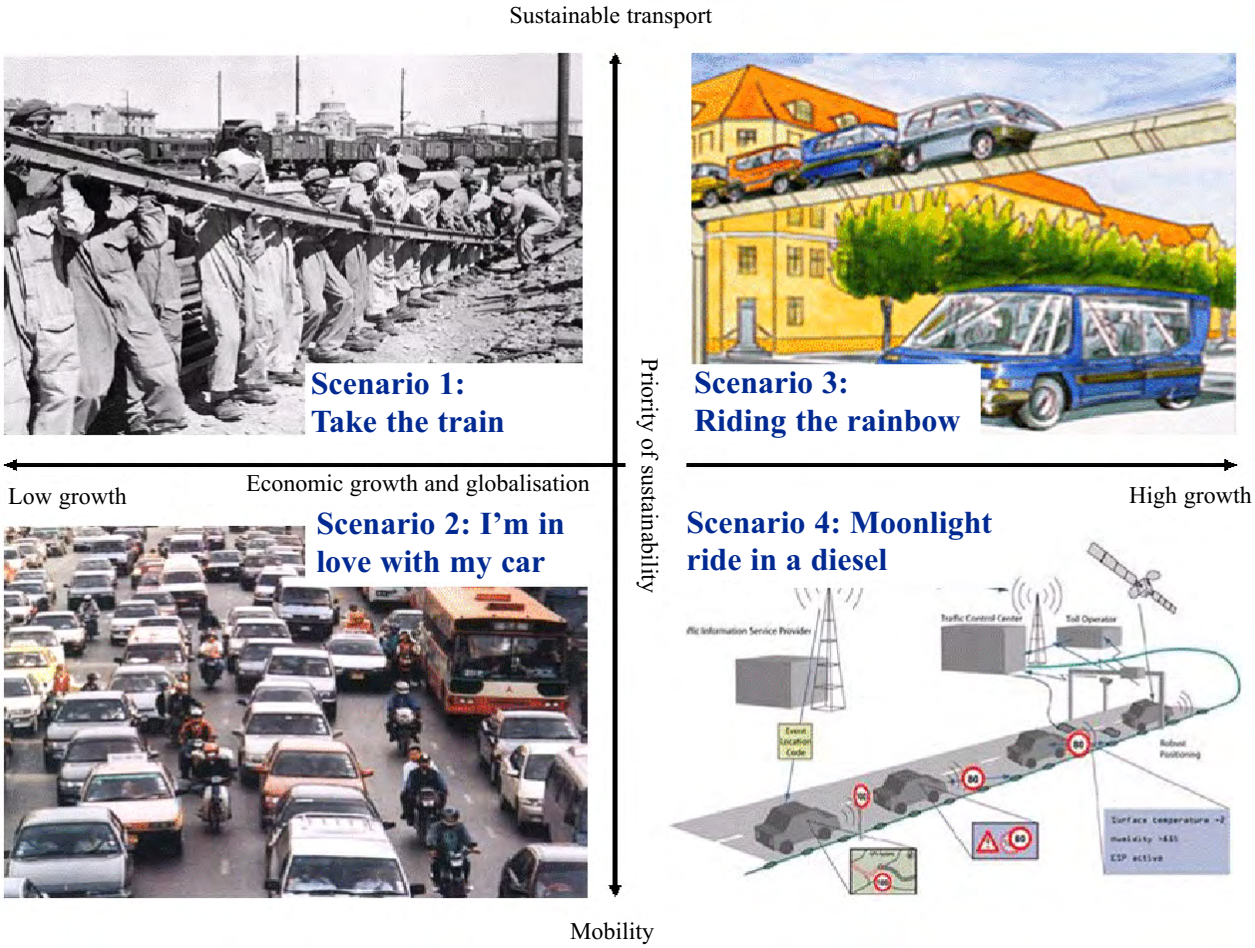
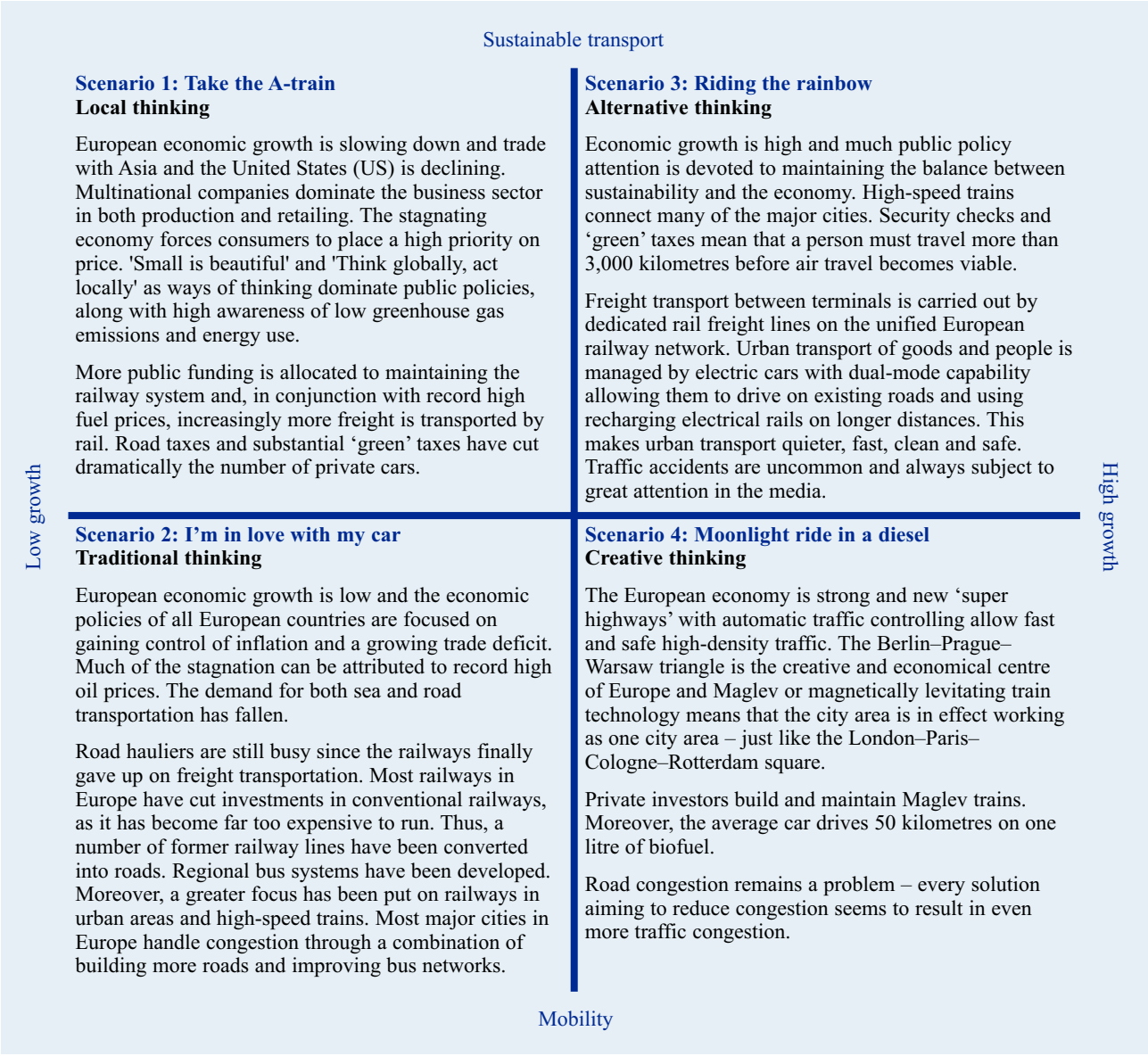


Figure 2: *Overview of four scenarios*



Scenario 1: Take the A-train

Table 1 presents an overview of the first scenario – Take the A-train – in terms of the six main drivers of change with a high influence on the transport and logistics sector. It also compares the outcomes for each driver across all four scenarios.

Table 1: *Scenario 1 – Take the A-train*

Uncertain drivers with high impact	Take the A-train	I'm in love with my car	Riding the rainbow	Moonlight ride in a diesel
Economic growth	**Stagnating**	Stagnating	Positive	Positive
Priority of sustainability	**High priority of low gas emissions**	No change	High priority of sustainability	No change
Investments in infrastructure	**Slow – focus on maintenance**	Priority on roads	Priority on mass transportation	Priority on mobility and individual transport
Liberalisation and harmonisation	**More regulation**	No change	Other regulation	No limits
Development of technology	**Small changes**	Small changes	New technologies – public support	New technologies – private investment
Energy prices	**Higher**	Higher	Low. Alternative fuels breakthrough	Higher

Economy

Economic growth has stagnated since the most recent energy crisis hit Europe. Governments, businesses and consumers are struggling to cope financially from day to day. The disaster in Saudi Arabia's deserts seven years ago followed by the fall of the House of Saud – the Sunni Muslim royal family of the Kingdom of Saudi Arabia – destroyed many oilfields and oil prices seem to have stabilised at USD 260 (about €166 as at 29 April 2008) a barrel. As a result of the knock-on effects of this hike in oil prices, many people are having difficulties paying mortgages and house prices are dropping fast. People are saving their money for fear of what the future will bring, consumer spending has declined and with that demand for new products.

Air travel was once a popular option for business and tourism. Today, however, people prefer to stay at home and visit local attractions than to go abroad. This has left a number of airlines in a difficult position since not all of them were ready to accept rising oil prices and the sharp decline in demand for their services after several years of strong price competition.

Freight operators in the shipping industry and road hauliers are also feeling the effects of the drop in consumer spending. The demand for transportation of goods has declined and, as a result, some restructuring is also taking place in this industry due the rising oil prices. In addition, companies today have to adhere to strict environmental regulations.

Driving a private car has become even more expensive and demand for mass transportation has increased rapidly. Many families do not own a car anymore, choosing to use bicycles instead. In this case, traffic congestion has not been a major issue for a number of years.

Policy

Soaring energy prices have forced governments to act together, making the European Commission stronger than ever. The Directorate General for Energy and Transport is considered to be one of the most influential of the Commission's directorates. One of the biggest successes has been the speedy implementation of the standardisation and harmonisation

of European railways into a single market for railway operators. The single railway market was declared fully open in 2012.

Train efficiency has improved significantly as a result of free competition on the European standardised rail network. The number of railway passengers has increased considerably. Nevertheless, most investments in infrastructure have consisted of upgrading and maintaining the existing system rather than building new high-speed lines, since no European government can afford large-scale public investments due to the current budget deficits.

The public railway system has also revitalised railway freight transportation. The so-called 'just-in-time' deliveries at the turn of the century have now progressed into day-to-day and door-to-door deliveries. This change has encouraged thousands of truck drivers to be retrained as train drivers and railway staff as their international experience and ability to work away from home for a few days at a time was a perfect match for the railways' workforce requirements.

In order to save energy, driving on Sundays has been disallowed.

Society and culture

'Lean, mean fitness machine' is a fitting description of the general population. High energy prices and a poor economy have given most families a preference for living an active life at home and in their local neighbourhood. People travel abroad less often and prefer to camp, cycle or sail in their own region as it is cheaper, more fun and involves less energy consumption. In general, the phrase 'You are what you think' is appropriate in the sense that philosophy and religion play important roles in peoples' lives.

Expensive animal products and other energy-consuming foods have spurred people to eat more locally grown vegetables and fruits. The need to focus on energy savings has encouraged the population to adopt a healthier lifestyle and thus public spending on healthcare has declined. Television programmes on how to save energy and energy saving contests are becoming increasingly popular.

Business environment

Table 2 presents a summary of the transport and logistics sector in relation to the business environment for each mode of transport.

Table 2: *Business environment – Transport and logistics at a glance*

Transport mode	Business environment
Road	Long-distance, international freight transport is uncommon and almost 95% of road transportation is carried out from regional distribution centres at rail or harbour terminals to local distribution centres. Bus and coach transport is very popular. Some motorways have been closed and redeveloped as freight railways.
Railways	Railways are the dominating mode of long-distance transport over land of both freight and passengers. Competition between companies is strong and many transport operators provide logistics services from door to door.
Airways	Most intercontinental flights are still operated by super jets, which carry more than 1,000 passengers at a time. Several times a week, airplanes connect major European cities. However, with high-priced tickets, most children of today may never experience air travel.
Sea transport	Sea transport is still a highly important form of freight transportation. World Meteorological Organisation (WMO) environmental rules have to be obeyed and sea transport is now considered one of the cleanest forms of transport.

Developments in the value chain

In general, most people buy goods on the internet or in local stores. Since many families do not own a car, daily goods are distributed by trucks regionally from the rail terminals of the transportation centres. Overall, 90% of consumers shop locally within walking distance of the home or on the internet. Many of the shopping centres on the outskirts of European cities struggle to make profits while inner city shops are experiencing a revival.

Most food transportation takes place within the region of local farmers. Many industry products are produced in Asia and Africa and are transported by ship to European countries, but lower consumption has created surplus capacity of these products in the shipping industry.

Localisation decisions

It is important for transport companies to be located at central distribution terminals and hubs. Smaller companies must be ready to pack up an order and go out to deliver it almost immediately in local areas. Large companies are very often integrated with their customers in order to handle the logistics of transport from the planning stage. Most distribution terminal and storage work is automated and handled by technology and RFID. Automation is an important part of keeping up the required efficiency of operations at rail terminals.

Product and process innovation

Airlines that remain in the industry are still struggling to redefine their business, and according to most business analysts and commentators only very few airlines will survive in business over the next five years.

Railways, on the other hand, are experiencing good times. In 1920, the number of cars on the roads surpassed the number of trains; however, almost a hundred years later, cars are being squeezed out again. Bus and coach companies also recognise the declining demand for private cars and most road traffic now consists of buses. Indeed, some innovative former haulier companies have restructured their business organisation and are now operating as bus companies.

The majority of companies in the freight business have been through a difficult procedure of process innovation to match the delivery demands of the e-shops or online shops.

Labour market, skills and competencies

Employment in the transport and logistics sector is much lower than it has been previously. High wages and shortages of workers have forced the industry to consider alternative solutions. Significant staff reductions have been reached due to increased automation in storage and warehousing and the number of trucks on the roads has dropped dramatically. All of the occupations in the sector require high skill levels in working with information and communication technologies (ICT), as these have become an integrated part of all services, although the use of technology itself is automated. The restructuring process has generated a new private training industry in some countries, but the most common model is that training and retraining are handled by the regular, national vocational education system in each country.

Main challenge for transport and logistics companies

The main challenge for companies in the sector is to stay in business in view of the strong competition, strict regulations and stagnating consumer demand. Airlines are struggling to survive, road hauliers are restructuring or going out of business, and railways have to handle a great market demand, along with infrastructure expansion, while keeping costs under control. For instance, the extension of the high-speed railway network is much in demand throughout Europe.

Scenario 2 – I'm in love with my car

Table 3 presents an overview of the second scenario – I'm in love with my car – in terms of the six main drivers of change with a high influence on the transport and logistics sector. It also compares the outcomes for each driver across all four scenarios.

Table 3: *Scenario 2 – I'm in love with my car*

Uncertain drivers with high impact	Take the A-train	I'm in love with my car	Riding the rainbow	Moonlight ride in a diesel
Economic growth	Stagnating	**Stagnating**	Positive	Positive
Priority of sustainability	High priority of low gas emissions	**No change**	High priority of sustainability	No change
Investments in infrastructure	Slow – focus on maintenance	**Priority on roads**	Priority on mass transportation	Priority on mobility and individual transport
Liberalisation and harmonisation	More regulation	**No change**	Other regulation	No limits
Development of technology	Small changes	**Small changes**	New technologies – public support	New technologies – private investment
Energy prices	Higher	**Higher**	Low. Alternative fuels breakthrough	Higher

Economy

The world economy is moving at a slower pace due to high oil prices. Prices per barrel have peaked at USD 130 (€83) after the Iranian oil embargo. Most of the European industry and consumption levels are highly dependent on oil prices. As a result, governments and the European Central Bank (ECB) struggle to keep inflation and a growing trade deficit under control. Economic policies are challenged by increasing wages in both the public and private sectors due to labour shortages resulting from an ageing society. With most of Europe's population being too old to work, European companies have a difficult time competing with their Asian competitors due to the infinite labour pools and low labour costs in those countries. Hence, Europe is now experiencing a new situation where European brands are being taken over by Asian corporations. For example, it is surprising to think that Scandinavian Airlines System (SAS) based in Stockholm in Sweden would ever have a Pakistani board of directors or that the German car corporation DaimlerChrysler would be taken over by Chinese investors.

In the transport and logistics sector, it has been impossible to create an economically sustainable railway sector. More than 20 different railway infrastructure systems throughout Europe significantly slowed down the competition between railway operators. The general opinion on most of the European railways is that they were impressive in 1860, but have become 'too expensive, too slow and too complicated for 2020'. High-speed trains and metros in city areas continue to run efficiently and are now very popular although they have to compete for sales with airlines offering low-fare or almost free flights between major European cities.

Road transport has expanded significantly in terms of the number of trucks on the roads and freight carried, which has inevitably led to more traffic congestion on roads. The overall growth rate has slowed down due to the general economic landscape, and road congestion problems have only recently started to disappear from daily news headlines.

Policy

Politicians and decision-makers are facing dissatisfaction with congestion and traffic safety. New public investments in infrastructure have placed a focus on reducing congestion and increasing security. One good example of this type of initiative is the new freight-only four-lane motorway from Hamburg in northern Germany to Milan in northern Italy. Such a move promotes road safety as the average speed of the trucks is relatively high with all trucks driving at 90 or 120 kilometres an hour. Public transport, including buses and extended metro systems, aims to reduce traffic congestion.

Economic incentives are used to reduce congestion. A European system of road pricing was introduced in 2015, an initiative launched by the European Commission and the European Space Agency. Using the Galileo satellite radio navigation system will make it possible to monitor the position of all cars wherever they travel and thus to charge their owners directly. It will be mandatory for all cars to have a Galileo system installed just as all cars must have a licence plate. The device shows updated maps, route planning, traffic information and route prices, and road tolls are charged automatically to the owners of the cars. The Galileo system has influenced peoples' decisions to use public transport in urban areas and most trucks are now delivering goods at night as it is cheaper. In the future, the system will be integrated into the onboard computer of all new vehicles.

The Automatic Speed Control (ASC) system was launched a few years ago by the Indian conglomerate Tata Corporation. ASC is an onboard computer calculating and automatically maintaining optimal, legal speed at the given traffic density and road condition. The system reduces congestion and results in a better average speed. It will be mandatory in all European cars from 2019.

Society and culture

The concept of 'a euro saved is a euro earned' and the economic stagnation has created a continent of supersavers and 'do-it-yourself' (DIY) people. People often define themselves in terms of their skills and what they can do on their own, which highlights the idea that 'you are what you make'.

Toyota Home headquartered in Japan and Tata Corporation are typical big brand names in symbolising that everything is possible at low prices. Toyota is the world leader in delivering prefabricated housing produced in Brazil, Indonesia and South Africa. Most people move into their new house four weeks after placing an order with Toyota.

Although energy prices are high, cars are cheap and the average car runs 20 kilometres on one litre of petrol. Ownership of private cars is extremely high and many families have two cars. Tata Corporation took over most of the German car industry in 2015 and their Tata-Wagan model is a very popular second choice of vehicle at just €2,000. Flexibility, individuality and mobility are expected by everyone; hence, a recent estimate revealed twice as many cars as drivers.

The availability of cheap transport and roads solely for freight transport has encouraged Europeans to travel more than ever before. Fuel prices are high, but this is largely compensated for by cheap car prices.

Business environment

Table 4 presents a summary of the transport and logistics sector in relation to the business environment for each mode of transport.

Table 4: *Business environment – transport and logistics at a glance*

Transport mode	Business environment
Road	Road hauliers are the indispensable connection of modern society. Energy prices are high but no discernible effect has been seen on the demand side. Most operators have more than 1,000 trucks and small and medium-sized enterprises (SME) in transport operations are uncommon unless they are highly specialised on a particular client or product.
Railways	Railways have almost disappeared as a general means of transport. Notable exceptions include the high-speed train lines between European cities, and train or metro systems in urban areas.
Airways	Low-cost airlines dominate the skies both nationally, internationally and on intercontinental routes. The demand for cheap flights seems to increase continuously.
Sea transport	Sea transport is still a very important form of freight transport with many production facilities placed outside Europe; even in times of a stagnating economy, container ships transporting 10,000–15,000 containers at any one time dominate the market. Short sea shipping and barges play an important role.

Developments in the value chain

Many consumers are buying what they need on the internet and in mega shopping malls. Most standardised non-food products are produced in China or Africa and are shipped directly through various distribution terminals to the consumer within a few days. The main focus for consumers is the price of products.

Trade on the internet has become a major business, as has the mega shopping malls built near cities. City centres are becoming increasingly unattractive and more run down. People are beginning to feel less safe in city centres and cameras are used to help patrol the streets. Most people consider shopping in the city centre to be too much hassle, while the wide roads and convenient parking around mega shopping malls are attractive for both daily shopping and a family outing. Competition to create the biggest shopping mall is constant, but Europe still lags behind both the US and Asia in this regard.

Many Asian-based multinational companies dominate the retail sector and control production. In order to match these companies as clients, transport companies have grown through mergers and acquisitions into transport giants with more than 10,000 employees and covering both sea and land transportation.

Mega shopping malls have reduced the need for distribution in cities and most city distribution is handled by small trucks during the night. Just-in-time delivery systems are being perfected on an ongoing basis.

Localisation decisions

Distribution terminals with advanced storage facilities are opened close to traffic hubs. One new variation of traffic hubs are the mega malls which often operate their own distribution terminals.

Labour market, skills and competencies

Employment in the transport and logistics sector is much lower than it was in the past. High wages and labour shortages forced the industry to consider alternative solutions. Huge reductions in the workforce have occurred as a result of automated processes in storage and warehousing. The restructuring process after the closing of various railways provided more workers for the road haulage business, and this has reduced wage expectations to a certain extent.

All occupations in the sector require a high level of ICT skills. Moreover, to maintain extensive cross-border interaction, language skills are required in many job functions – except for jobs in local transport. The restructuring process has led to the creation of a new private training industry in some countries, but the most common model is that training and retraining are conducted by the regular, national vocational system in each country.

Main challenge for transport and logistics companies

Health problems due to increased emissions in urban areas, traffic congestion and road safety are major problems caused by the transport and logistics sector, but a reduction in transport activities would also mean reduced economic activity. This leads to a catch-22 situation, and decision-makers back away from taking initiatives. One option would be to consider the alternatives to having a car.

Scenario 3 – Riding the rainbow

Table 5 presents an overview of the third scenario – Riding the rainbow – in terms of the six main drivers of change with a high influence on the transport and logistics sector. It also compares the outcomes for each driver across all four scenarios.

Table 5: *Scenario 3 – Riding the rainbow*

Uncertain drivers with high impact	Take the A-train	I'm in love with my car	Riding the rainbow	Moonlight ride in a diesel
Economic growth	Stagnating	Stagnating	**Positive**	Positive
Priority of sustainability	High priority of low gas emissions	No change	**High priority of sustainability**	No change
Investments in infrastructure	Slow – focus on maintenance	Priority on roads	**Priority on mass transportation**	Priority on mobility and individual transport
Liberalisation and harmonisation	More regulation	No change	**Other regulation**	No limits
Development of technology	Small changes	Small changes	**New technologies – public support**	New technologies – private investment
Energy prices	Higher	Higher	**Low. Alternative fuels breakthrough**	Higher

Economy

The European economy is booming, making Europe the most competitive region in the world. Thorough reforms of the competitive framework in large European companies have turned Europe into a thriving economic locomotive of the world economy. Oil and gas prices are high, but cheap energy alternatives mean that most sectors are not reliant on oil. European companies and households are turning towards alternative renewable energy sources such as wind, solar, wave and to some extent nuclear energy. Oil and gas cover 20% of energy demand.

Policy

Diseases triggered by exposure to hazardous materials, congestion in cities and not least the very hot climate have pushed energy sustainability high on the political agenda. The climate is still hot, and even with a stagnating economy and low greenhouse gas emissions, looking after the climate is the number one policy priority. The global 2009 'Clean the world' programme is fully implemented by now and the effects of it have been dramatic. The programme was adopted by world leaders as a result of climate change after nature for the first time missed a season and autumn virtually turned directly into spring, followed by a very hot summer. This demonstration of climate change also changed public mood and all scepticism vaporised in the warm weather. The main sources of climate change identified include transport, food production, as well as heating and cooling of buildings. Since then, European wealth has been invested in new infrastructure, more energy-effective farming and low-energy housing. The programme involved sizeable investments in public transportation systems and taxation of private transportation.

Many people living in a city can no longer afford to have a private car because of green taxation – in fact, this has removed the problem of congestion in cities and vastly improved air quality and reduced noise pollution. Pedestrians, bicycles, taxis, buses and trams now fill city streets and metros are popular. Delivery trucks run mostly at night, when coming in from the various supply terminals to local distribution centres.

Substantial investments in infrastructure went into new railways; as a result, the introduction of high-speed trains between major cities has seen passenger numbers boom. Dedicated long-distance, high-speed freight railways are

currently being introduced. Railways across Europe are now fully standardised and harmonised making rail transport a very competitive alternative to trucks. Road pricing and expensive truck licences have made long-distance hauling a very expensive business in the long run – it may even be impossible to accommodate by 2030.

In urban areas in the most advanced cities, dual-mode transport systems have been introduced with electrical cars travelling up to 200 kilometres an hour on rails designed for long-distance travel, while leaving the rails for short, local trips as they are. These dual-mode electrical cars are popular among users as they help their owners to avoid congestion and to travel at high speeds in urban areas. One rail has the capacity of a four-lane highway. Within a decade or two, it is expected that more cities will be interconnected by dual-mode transport systems. The rails have proven effective for the distribution of goods in urban areas and for public transport.

Driving a private, conventional car is expensive and is banned in most cities. With improved public transport, an increasing amount of people are deciding to leave their car at home or to buy a new dual-mode electrical car. Significant public investments have gone into European universities and technological institutes dedicated to research in the areas of alternative fuels and fuel cells, biofuels and efficient motors.

Society and culture

The idea to 'think globally and act locally' is back in the public mind and most people focus more on their local neighbourhood. The internet and fast video communication means that many people work from home to avoid daily commuting – this has given rise to the idea that 'you are what you say'. By using four or five large screens, it is easy to work and talk with colleagues, monitor your children in the garden and watch the news all at the same time. Most shopping is completed over the internet and collected nearby at the local distribution centre. In most places, the local distribution centre is open 24 hours and automatically run. The European Wireless Access Network (EWAN) provides a 10 gigabyte (GB) wireless internet access to all Europeans in all places at all times. In many ways, work, family and spare time are integrated in a particular time and space, just as on a small family farm 200 years ago.

Business environment

Table 6 presents a summary of the transport and logistics sector in relation to the business environment for each mode of transport.

Table 6: *Business environment – Transport and logistics at a glance*

Transport mode	Business environment
Road	City roads are busy and most of the traffic consists of dual-mode electrical cars – both private and public transport. Buses in rural areas run on biofuel. Driving a conventional car is expensive. Long-distance truck driving has disappeared – but regional and local distribution is an important business area.
Railways	All long-distance freight is transported by rail and passengers crowd the high-speed trains. Railways are handling the bulk of mass transportation; but due to communication technologies, demand has somewhat declined. Dual-mode transport systems are popular in urban areas.
Airways	Only a few airlines operate internally in Europe on distances below 1,000 kilometres. Airlines cannot compete with high-speed trains on ticket costs, time, frequency and convenience. Zeppelins (rigid airships) are becoming popular as a clean and convenient, although slow, way to travel long distances or for transporting large objects.
Sea transport	Strict fuel emission control is enforced on ships all over the world. Nevertheless, world trade is busy. For new ships, size and energy efficiency is of high priority. Some shipping companies have just introduced huge wind ships. Short sea shipping and barges on European rivers have boomed as the most sustainable form of transport.

Developments in the value chain

Many consumers are buying everything they need in e-stores on the internet as they want to buy goods as cheap as possible. Internet shopping is dominated by 10 European websites providing consumers with 80% of their needs: 'We have almost everything for almost everybody'.

The procurement power of e-stores means that no one can beat their prices. Moreover, communication technology means that many products are customised and produced to order. Food is mostly grown and consumed regionally and as a result of heavy environmental taxation on animal products, consuming five pieces of fruit and vegetables a day is no longer a problem for consumers.

The local supermarkets are acting as the last hub for buying and selling products. Many are open 24 hours and most people are used to picking up the goods they bought on the internet at their local supermarket.

Communication technology has replaced or reduced the need for transportation technology for many people – for example, people once had to travel from one place to another in order to communicate with other people. Now, direct communication is easier and business travel is quickly becoming a thing of the past along with cigarettes, fax machines, parking lots, compact discs (CDs), liquid crystal display (LCD) screens and cable television (TV).

Localisation decisions

All railway-to-road hubs have small truck operators distributing goods to supermarkets by electrical hubs. Conventional trucks weighing less than 12 tonnes are not allowed in urban areas – larger ones require a licence. Many planning and logistics companies operate from the internet and many companies no longer have the traditional headquarters.

Product and process innovation

The use of communication technologies has revolutionised the way freight is shipped. Freight forwarders are rarely used anymore since the client simply orders the required transportation on the internet – in this regard, the intelligent logistics systems can take control. RFID tagging has made containers easily identifiable, thus facilitating a smooth delivery system. The Automated Container Handling Database (ACHAD) means that storage facilities, trains and containers communicate information before the goods have even left the production site. For companies attached to the ACHAD system, this involves checking the goods into the system at one end and checking them out of the system at end delivery.

Labour market, skills and competencies

Extensive public interest in transport and logistics – especially in railways – has made this sector attractive to workers and labour shortages seldom occur in the sector. Computer programmers and other workers in the field have largely replaced the freight forwarders and automation has reduced the need for a big workforce in warehousing and storage. High-quality service and communication skills are vital components in the profile of employees in the transport sector as customers are becoming increasingly demanding in terms of quality, safety and environmental rules.

Main challenge for transport and logistics companies

Although railways are fast, flexible and reliable, more mobility for products is necessary. In the future, combinations of railway and dual-mode transport systems may be considered. Energy resources are not completely renewable. As the initial shock of climate change wears off, it might be difficult to sustain public support for huge infrastructure investments. Research into 'self-maintaining infrastructure systems' is popular.

Scenario 4 – Moonlight ride in a diesel

Table 7 presents an overview of the fourth scenario – Moonlight ride in a diesel – in terms of the six main drivers of change with a high influence on the transport and logistics sector. It also compares the outcomes for each driver across all four scenarios.

Table 7: *Scenario 4 – Moonlight ride in a diesel*

Uncertain drivers with high impact	Take the A-train	I'm in love with my car	Riding the rainbow	Moonlight ride in a diesel
Economic growth	Stagnating	Stagnating	Positive	**Positive**
Priority of sustainability	High priority of low gas emissions	No change	High priority of sustainability	**No change**
Investments in infrastructure	Slow – focus on maintenance	Priority on roads	Priority on mass transportation	**Priority on mobility and individual transport**
Liberalisation and harmonisation	More regulation	No change	Other regulation	**No limits**
Development of technology	Small changes	Small changes	New technologies – public support	**New technologies – private investment**
Energy prices	Higher	Higher	Low. Alternative fuels breakthrough	**Higher**

Economy

In terms of the economy, the question arises as to whether development will ever stop. From Riga in Latvia to Rome in Italy, from Bucharest in Hungary to Berlin in Germany, the economy is booming. Most people have a job and a career, and everyone is richer than ever before in world history. Although energy prices are rising, it is without consequence in a very affluent economy.

Policy

European politicians are dedicated to the development of a world-class workforce and infrastructure to give business ventures the best framework conditions. Most infrastructure investments are made by private investors in cooperation with governments. Three prominent examples are the Maglev rail system, city tunnels and automated highways which help to reduce congestion and improve mobility.

Trains on the Maglev lines are running at a speed of almost 400 kilometres an hour. One of the most significant lines is that connecting the Berlin–Prague–Warsaw (BePraWar) triangle, which makes it the creative and economical centre of Europe. BePraWar is in effect working as one interconnected city cluster. Another important cluster is the London–Paris–Cologne–Rotterdam (LoPaCoRo) square. Every five minutes, a train departs from all stations in both directions. The Maglev trains are built and maintained by private investors and the lines are supplied by the governments involved, with financial support from the EU. High-speed trains operate in all of Europe's main transport corridors, but buses have often replaced regional trains.

Road congestion is a major problem of concern. Very often, initiatives which aim to reduce congestion have failed because more cars generally come on stream. Taking Berlin as an example, most European cities have developed complex systems of road tunnels on a 'third level' usually beneath cities and the existing metro systems. Investment is this infrastructure was vast. However, on the ground, city speed limits are still often seven kilometres an hour, which is only slightly faster than walking.

Most motorways in Europe are automated with cars travelling at an average speed of 160 kilometres an hour and only cars classified for that speed are allowed on the motorways. Drivers check in for travelling on the motorway at the highway toll station and the highway takes over the control of navigation, driving and speed until the driver checks out again at the destination toll station.

Energy prices have made car energy efficiency a serious business. The average car drives 50 kilometres per litre of biofuel. Thus, the high road efficiency has rendered railway freight unprofitable.

Society and culture

People in Europe generally have the attitude of 'I can have it all', and so far not much has contradicted this attitude. Living in green areas outside cities is very popular, while most jobs are located in city centres. The tunnel and metro systems make this feasible in most places, as technology will always provide a possibility.

The most common tendency is the desire to define oneself. In a global world where most people travel to far corners of the world and the internet gives instant access to everyone, the most important person in the world becomes oneself – hence introducing the concept of 'you are what you buy'.

Business environment

Table 2 presents a summary of the transport and logistics sector in relation to the business environment for each mode of transport.

Table 8: *Business environment – Transport and logistics at a glance*

Transport mode	Business environment
Road	Major investments in an effective road infrastructure with extended automation have reduced the problem of traffic congestion. Product demand is particularly high and this makes truck companies very busy.
Railways	Railways have upgraded to high-speed trains, and Maglev trains will be extended to all parts of Europe and perhaps Asia in the next 50 years. Regional and conventional trains have disappeared, as have freight trains. Trains that travel at an average speed below 180 kilometres an hour have stopped running.
Airways	Affluence among Europeans means that people are travelling all over the world – except on a regional level. The hassle of checking in at airports and security checks makes high-speed trains a much better travel alternative. Flight distances below 1,000 kilometres are usually free.
Sea transport	Increased world trade makes sea transport more lucrative and busier than ever. Priorities for new ships are speed and operational efficiency. Most shipping is organised in cooperation with Asian companies as they have the required workforce and are building the ships anyway.

Developments in the value chain

Consumption of goods occurs everywhere – on the internet, in supermarkets and in city centre shops and markets. Consumption is important and consumers are constantly looking for individually-designed products. Uniqueness and creativity are more important than price and the internet means that consumers are able to purchase directly from manufacturers all over the world.

Speed is an important factor for shoppers. Consumers expect fresh foods from all over the world to be delivered in high quality on a daily basis to local supermarkets. Moreover, consumers expect that all information regarding the producer, production, transportation, working conditions, environment and nutritional value are instantly available on product labels.

Customisation is expected in relation to most products. Dairy farms experiment with the customisation of the fat content and nutritional value of dairy products. In many cases, consumers can almost plan the production and follow the logistics of the delivery in detail on the internet. All products are delivered everywhere. Just-in-time concepts are extended to 'where you are'.

Localisation decisions

Transport companies are operating on an international scale in order to match their clients' profiles and needs: international procurers in retail and international producers. They often have both shipping, short sea and trucking capabilities, in addition to warehouse and storage facilities. A high degree of flexibility is necessary and thus smaller transport companies are often hired as subcontractors at the regional level.

Product and process innovation

The demand for customisation means that many products produced in large scale are destined for just one consumer. Years ago, a truck driver just loaded the container; but today everything is tagged electronically, and packed and stacked automatically in containers already at the production site to match the logistics.

For example, in a factory in Angola in south-central Africa, a computer can record that the striped table is going to a certain Mr Smith in Norwich in the southeast of the UK and the blue table is going to a Ms Kazmirec in Warsaw in Poland; thus, the containers are loaded accordingly. At the port terminal, the containers are repacked according to destination, which occurs again at the arrival terminal and then finally at the regional distribution centre. Ms Kazmirec and Mr Smith can follow the transportation of their items regularly on the satellite operated by Google Live Earth Map. The tables will be delivered with a receipt for the ecological footprint of the tables, which is important in most countries for tax reasons.

Labour market, skills and competencies

Automation and computers have replaced many workers in the transport sector, and many of the remaining jobs require medium-level computer skills. Railways are recruiting highly-skilled workers to run the advanced train systems and a constant shortage of truck drivers is emerging. Being a truck driver is not a particularly attractive job in the long term; therefore, this type of work mostly attracts young people who want to earn money easily to work in the business. Some airlines are experimenting with the possibility of automating flights to reduce the demand for pilots and to increase safety – but many passengers object to this idea.

Main challenge for transport and logistics companies

Keeping up with demand is one of the main challenges for the transport sector in the future – many processes are already automated, but it may be possible to produce and consume more than the transport sector can actually accommodate. This is considered to be one of the limits to growth in the future. Road congestion problems have to be resolved, as simply making roads wider or tunnels deeper has not alleviated the situation substantially. Congestion is predicted to be the main barrier to a free market in the near future – high-speed trains and Maglev trains could be the solution.

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EF/08/40/EN

