Truck Transportation 2030

Impacting the commercial vehicle industry (Short version)

June 2012
Development of the global transportation industry (e.g. changing logistics business models) will have a strong influence on the truck market over the next 20 years. The industry will have to adapt to changes in people's behavior, global economic megatrends and new mobility concepts, all of which will lead to new requirements for truck OEMs and their products. At the same time, challenges within the truck industry such as increasing competition will force OEMs to adjust their business models.

In our "Truck Transportation 2030" study, we shed light on the most crucial developments in the truck transportation industry. Together with key decision makers at international logistics providers, commercial vehicle manufacturers and related organizations, we have discussed the long-term impact of these developments on industry players.

Our analysis of developments in the road transport industry together with expert interviews led to the hypothesis that the changes the industry is undergoing can be summarized under:

**SIX DISTINCT MEGATRENDS**

1. Demographic change & urbanization
2. Highly efficient, silent, and emission-free trucks
3. Total fleet transparency
4. Tolls and regulation
5. Accident-free transportation
6. Increasing competition
Global population is growing at a rapid pace, shifting global population distribution further from Western countries toward emerging economies and particularly from the countryside to cities.

This growth results not only in increasing transportation flows, but also in changes in modes of transportation – The rise of megacities could lead to specific transport demands and thus to specific product requirements (e.g. new vehicle categories bridging the increasing distances between urban logistics hubs and the city/urban centers).

Changes in national regulations will force manufacturers in key markets to further reduce CO₂ and other emissions. Regarding fuel consumption, reduction targets of up to 30% can be expected, depending on vehicle segment and region. On a local level, an increasing number of cities will have low or even zero-emission regulations, which will require appropriate vehicle concepts (e.g. hybrids, fully electric vehicles).

Logistics companies and their customers will strengthen their focus on decreasing their fleet emissions and establishing "green fleets" to stand out from the competition in the eyes of the consumer.

Full transparency regarding the truck, traffic, route and driver will achieve greater traffic safety and efficiency. Trucks could be seamlessly integrated into vehicle-to-vehicle communication as an integral part of continuous traffic monitoring. Within the next decade, logistics headquarters will then be able to track real-time truck status, leading to greater efficiency, fewer empty runs and therefore to reduced costs.

Source: Roland Berger
The share of regulatory fees and tolls in total transport costs is expected to further increase (up from approx. 10% today to an average of 15-25%), due to an expansion of inner-city toll systems (incl. congestion charges) and road regulation. This reinforces a stronger focus on other ways to cut costs, e.g. improving vehicle efficiency and reducing fleet operating costs.

On the demand side, mega-logistics providers are expected to dominate the scene, offering fixed capacity, employing subcontractors and outsourcing peak loads to smaller transportation providers. Overall, competition in on-road transport is expected to increase further, as is the pressure on margins along the logistics value chain.

On the supply side, truck manufacturers will have to realize that competition from emerging market OEMs will play a more and more significant role in the global transportation business. The successful introduction of global vehicle concepts in multinational transportation fleets, for instance, could certainly reshape the truck industry in the currently "premium-dominated" triad markets.

Most regions will see stricter safety regulations. This means that over the next few decades, active and passive safety is expected to become more important. All available automotive technologies will be used, ranging from stability modules and traffic sign recognition to "all-round protection". On the other hand, the potential for increasing safety through traffic management systems (e.g. electronically coupled, or automated truck platoons) sees major challenges and limitations, especially due to unresolved insurance issues.

Source: Roland Berger
Our study compiles the results from 50 interviews with industry experts located in Europe, North America and Asia.

Study participants by geographical distribution

SUM: 50 INTERVIEWS

- USA: #6
- EUROPE: #22
- JAPAN: #9
- CHINA: #7
- INDIA: #6

50 senior managers and industry experts interviewed

Decision makers from OEMs, suppliers and logistics providers contacted

Interviewees from 12 countries included in the study

Source: Roland Berger
MEGATRENDS: Analysis of six megatrends and impacts on the truck industry
All megatrends were supported by the participants of the study – Efficient, emission-free and silent trucks deemed most important

### Most influential megatrends through 2030 [%]

<table>
<thead>
<tr>
<th>Trend</th>
<th>Important Trend</th>
<th>Very Important Trend</th>
<th>Source: Interviews; Roland Berger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic change and urbanization</td>
<td>33%</td>
<td>49%</td>
<td>82%</td>
</tr>
<tr>
<td>&quot;In terms of urbanization, you can definitely see the need for more specialized vehicles, so in that respect, it's important&quot;</td>
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<tr>
<td>Highly efficient, emission-free and silent trucks</td>
<td>37%</td>
<td>53%</td>
<td>90%</td>
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<tr>
<td>&quot;Green policies are often used as part of the marketing strategies of big companies&quot;</td>
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<tr>
<td>&quot;That's absolutely critical&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total fleet transparency</td>
<td>37%</td>
<td>28%</td>
<td>65%</td>
</tr>
<tr>
<td>&quot;That's what [our company] has been built on. Inform, track and trace: information is just as important as the product itself&quot;</td>
<td></td>
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<tr>
<td>Tolls and regulations</td>
<td>44%</td>
<td>23%</td>
<td>67%</td>
</tr>
<tr>
<td>&quot;Tolls and regulations are more of a big trend in European countries than in emerging markets. In the EU, however, [...] it is definitely a key trend&quot;</td>
<td></td>
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<tr>
<td>Accident-free transportation</td>
<td>56%</td>
<td>28%</td>
<td>84%</td>
</tr>
<tr>
<td>&quot;Accident-free transportation is definitely an important trend in the European market, and will also increase in the future&quot;</td>
<td></td>
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<td></td>
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<tr>
<td>Increasing competition</td>
<td>49%</td>
<td>19%</td>
<td>68%</td>
</tr>
<tr>
<td>&quot;[...] it is clear that Asian manufacturers are growing, but it will take a while before they reach the level of European markets&quot;</td>
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</table>
The global population will grow to 8.3 bn in 2030 – An increase in logistics is required to handle world trade

Worldwide population growth rates, 2010-2030 [% p.a.]

The global population will increase 20% by 2030, ballooning to 8.3 bn

Developed countries will see population growth of 0.2% p.a. over the next 20 years, compared with 0.4% in the past 20 years

By 2030, 85% of the world's population, or 7.0 bn people, will live in developing countries (CAGR 1.1%)

The global need for transportation will keep pace, and will thus see a significant rise

There is a global trend toward urbanization – the share of population in urban areas will grow 8.5% by 2030

Source: United Nations; Roland Berger
Across several regions, and especially in China, demographic change and urbanization are considered the most important trend.

**Demographic change and urbanization**

**EUROPE / NORTH AMERICA**

- Not important: 13%
- Important or very important: 87%

"Demographic changes will have a big impact especially in the Far East, while the situation will remain more stable in the Western world".

**CHINA**

- Not important: 0%
- Important or very important: 100%

"In China, demographic change and urbanization is one of the most important considerations at present"

"With China growing so rapidly, urbanization will be one of the most important factors".

**JAPAN**

- Not important: 44%
- Important or very important: 56%

"The Japanese population is declining. [...] Lower population means fewer customers and thus smaller fleets".

**INDIA**

- Not important: 20%
- Important or very important: 80%

"For developing countries such as China and India, it is extremely important"

Demographic change will have the biggest impact in rapidly growing and urbanizing countries such as China and India. Even though demographics are stable in Europe and North America, the development is considered important there, too.

The demographic shift toward large cities will lead to strong demand for highly specialized vehicles.
CO₂ emissions targets will require a significant reduction of emissions from the transportation industry

CO₂ emissions targets

"A main priority for the commercial vehicle manufacturers remains the further improvement of fuel and energy efficiency in order to contribute to global CO₂ emission reduction objectives. The industry, in particular, supports the European Commission’s efforts in establishing an accurate methodology for measuring full-vehicle CO₂ emissions to underpin subsequent reduction policy tools. The European commercial vehicle manufacturers have cut the fuel consumption of their products by more than a third since the 1970s and committed to a further 20% improvement in fuel efficiency by 2020 (compared to 2005 levels) despite the reverse pressure on fuel economy caused by parallel steps to reduce pollutant emissions."

International Fleet World, January 11, 2012

"By the year 2020, greenhouse gas emissions from Canada’s heavy-duty vehicles will be reduced by 3 million tonnes per year. […] It is expected that manufacturers will meet the targets mainly through cab design (aerodynamics), engine modifications and low-rolling-resistance tires. By model year 2018, the goal is that GHG emissions from new heavy trucks will be 20% less than 2010 models."

cpatrucking, April 17, 2012

"Greenhouse gas emissions from medium-duty and heavy-duty trucks and buses will be regulated by the federal government for the first time beginning in model year 2014 under an official Memorandum issued today by President Barack Obama. “We estimate,” said Obama, “that we can increase fuel economy by as much as 25% in tractor trailers using technologies that already exist today.”

Environment News Service, May 21, 2010

The transportation sector accounts for >20% of total CO₂ emissions – growth of absolute emissions expected, esp. due to development in non-OECD countries

In order to reduce CO₂ emissions, the medium/ heavy truck sector will have to contribute – Reduction requirements of up to 30% expected¹ until 2020

The US and Japan have already communicated reduction targets. EU is expected to follow soon – a methodology for measuring heavy duty truck fuel consumption has already been developed as a basis for legislation²

CO₂ emissions targets are expected to be in place for most of the major truck markets by as early as 2020

¹) Depending on region and application segment
²) Pilot phase to start in 2012; source: lastauto omnibus 5/2012

Source: IEA; Roland Berger; press
Various concept vehicles already indicate what OEMs expect highly efficient trucks to look like in the future.

**FUTURE TRUCK CONCEPTS**

- **Iveco Glider** (2010)
- **Volvo Concept 2020** (2010)
- **MAN Concept S** (2010)
- **Freightliner Revolution** (2012)

**FUTURE TRUCK CONCEPTS**

- **Efficiency** (aerodynamics – integrated trucks with specific truck trailer concepts – e.g. MAN Concept S ($c_D$ value of ~0.3) with modified semi-trailer achieves a 25% fuel consumption reduction vs. conventionally equipped 40t long-haul trucks; increased space through bigger trucks and higher tonnage through weight reduction)

- **Reduced environmental impact** (minimum air resistance to decrease CO$_2$ emissions, from hybrid to zero-emission vehicles)

- **Driver comfort and safety** (e.g. touchscreen-controlled panel, Volvo collision protection)

- **Improved perception of transport** (e.g. tires with low noise emission, better engine casings)

Source: Company information; Roland Berger
Higher efficiency and lower fuel consumption/emissions can be achieved through hybridization and electrification – Still, no positive business case expected

**ELECTRIFICATION**

and **HYBRIDIZATION**

impact efficiency and permission issues

**HIGHER EFFICIENCY**

> Hybrid/electric engines are particularly efficient in start/stop traffic and traffic jams – especially with increasing overall traffic

> Still, the savings potential of hybrid/electric engines can be utilized in long-haul trucks due to the long distances covered

**CITY-ENTRY REGULATIONS**

> Inner-city areas with zero-emission requirements expected to be common by 2030

> Meeting access restrictions can be achieved using hybrid and electric engines

Mostly political reasons for electrification – E.g. higher efficiency for long-haul and city entry permission for delivery vehicles

Impact on efficiency and permission issues

**EXAMPLES**

- Long-haul trucks
- Vans

Source: Press research; expert interviews; Roland Berger
Total transparency in transportation is created by developing technological capabilities and integrating them into system solutions.

**Total transparency**

1. **TECHNOLOGICAL CAPABILITIES**

   Technological advancements find application in the automotive and truck industries, for example:
   - Real-time traffic monitoring and vehicle/load tracking
   - Recording of road and vehicle conditions
   - Interfaces of vehicle data with infrastructure and business systems
   - High connectivity, data collection and transmission via vehicle-to-vehicle and vehicle-to-environment communication
   - Evaluation/prediction mechanism, controllability across all vehicle parameters

2. **INTEGRATED SYSTEMS**

   a. **SAFETY**

      Improved vehicle-to-vehicle communication
      Lower accident rate and fewer casualties

   b. **EFFICIENCY**

      Increase in fleet controllability
      Improvement of logistics operation
      Minimization of operational costs

Source: Press research; expert interviews; Roland Berger
The greatest possible transparency is an essential feature primarily for logistics providers.

**Total fleet transparency**

**OEMs**

<table>
<thead>
<tr>
<th>Agreement Level</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Do not agree at all</td>
<td>0%</td>
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<tr>
<td>Do not agree</td>
<td>4%</td>
</tr>
<tr>
<td>Neutral</td>
<td>26%</td>
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<tr>
<td>Agree</td>
<td>26%</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>52%</td>
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"We already have a certain level of vehicle visibility today"

"Total transparency of information flow between headquarters and trucks is already a very big trend today, and this will be increasing in the future"

**Logistics Providers**

<table>
<thead>
<tr>
<th>Agreement Level</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Do not agree at all</td>
<td>7%</td>
</tr>
<tr>
<td>Do not agree</td>
<td>0%</td>
</tr>
<tr>
<td>Neutral</td>
<td>13%</td>
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<tr>
<td>Agree</td>
<td>47%</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>33%</td>
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"Transparency has a direct impact on productivity"

"That's what [our company] has been built on. Inform, track and trace: information is just as important as the product itself"

**Suppliers**

<table>
<thead>
<tr>
<th>Agreement Level</th>
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<tbody>
<tr>
<td>Do not agree at all</td>
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<tr>
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<tr>
<td>Agree</td>
<td>33%</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>66%</td>
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</table>

"Suppliers will support global transparency with open systems and app-based solutions"

**Transparency is essential** for logistics providers with regard to both customer service and controlling fleet efficiency.

OEMs will have to adapt to increasing demands for transparency within the next 5 years.

Although **suppliers** already have some feel for the trend, the growth potential has not been tapped on a large scale.

Source: Interviews; Roland Berger
Tolls and traffic regulations are currently an issue mainly in Western countries – The future is uncertain

Tolls and regulations

Road tolls are a standard regulatory element in most European and North/South American countries.

Tolls and regulations vary widely from country to country (e.g., time-/distance-based and general or special route road taxes).

Impact on running costs is significant.

Tolls and regulations are more an issue mainly in Western countries, but could rise across regions due to stricter emissions standards.

**EUROPE / NORTH AMERICA**

"Tolls and regulations are more of a big trend in European countries than in emerging markets. However, Euro 5 and Euro 6 initiatives are a key trend."

**ASIA**

"In the next 10 years, I think roads all over the world will be free! In China, the government promised this, but sometimes they break their promises, so it's hard to say."

Source: Interviews; Roland Berger
Across regions and industries, safe and accident-free transportation is considered highly important.

"Accident-free transportation is definitely an important trend in the European market, and it will also increase in the future."

"Years ago, economic profitability was clearly the dominating trend. Now, there are three key elements for the development of all companies: security, quality and environment."

"That's the goal of every carrier, so obviously it's very important."

"There are too many accidents at the moment."

"Safety is a concern [...] not only for the driver, but also for the precious cargo within."
Alliances between OEMs and suppliers will continue to rise in efforts to reduce investments and cope with tougher competition.

**Expected future focus of alliances in the truck industry**

**TRIAD MARKETS**
- Component supply
- Shared investment in new technologies/component development
- Alliances in complete vehicle development
- Production licensing of products
- Sales collaborations
- Primarily sourcing of components
- Collaboration in (high-value) component development (e.g. transmission)
- Future collaboration in component development

**EMERGING MARKETS**
- Still highly vertically integrated
- Pure component supply

Alliances are expected to rise further, e.g.:
- To counteract increasing competitive pressure
- To share/reduce investments required in the industry

The number of collaborations with a focus on emerging markets is expected to increase further, with moves to emerging countries to counteract the stagnating triad market.

Source: Company information; interviews; Roland Berger
Competition is already high in mature markets – And it is steadily increasing in emerging countries

**Increasing competition**

**Importance of increasing competition as a future trend (overall)**

- **Very important**: 68%
- **Important**: 49%
- **Neutral**: 23%
- **Not so important**: 19%
- **Not at all important**: 2%

**MATURE MARKETS (Europe, North America, Japan)**

- Very important: 19%
- Important: 63%
- Neutral: 18%
- Not so important: 3%
- Not at all important: 2%

"There have always been different and powerful competitors"

"The impact of competition on the market is very important, but competition has not increased in recent years"

"Always important – it drives quality and price on the market"

**EMERGING MARKETS (India, China)**

- Very important: 36%
- Important: 36%
- Neutral: 18%
- Not so important: 9%
- Not at all important: 0%

"Definitely more competition is coming, with alliances and joint ventures already completed and others under way between Chinese and foreign companies"

"It is very hard to judge, because when you watch the market, you can see that Asian manufacturers are growing, but it will take a while before they reach the level of European markets"

Source: Interviews; Roland Berger
Key implications for the road to 2030
(excerpt – truck OEMs)
Truck OEMs will have to take further steps to achieve their global ambitions and respond to new needs in the transportation business.

Transportation 2030 implications for truck OEMs (1/3)

<table>
<thead>
<tr>
<th>GLOBAL STRATEGY</th>
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<tbody>
<tr>
<td>&gt; OEMs have to better utilize their partnerships in emerging countries. They need to expand their emerging markets footprint and integrate with local manufacturers in order to successfully address the local market requirements and leverage the low production costs.</td>
</tr>
<tr>
<td>&gt; Developing global truck concepts will be the key to fulfilling the budget/low-cost customer requirements in emerging as well as in developed markets.</td>
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<td>&gt; …</td>
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<table>
<thead>
<tr>
<th>PRODUCT PORTFOLIO</th>
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<tbody>
<tr>
<td>&gt; Truck OEMs will have to respond to future requirements in transportation – Traditional medium-duty trucks will lose importance compared to heavy- and light-duty trucks – A new class of small long-haul trucks will provide a solution for megacity goods transport.</td>
</tr>
<tr>
<td>&gt; Long-haul and off-road truck concepts will diverge further – High specialization is expected for long-haul trucks that weigh less, as well as for robust cheaper off-road trucks that better fulfill construction work requirements.</td>
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<tr>
<td>&gt; …</td>
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</tbody>
</table>

Source: Roland Berger
Further technological advances will focus on efficiency as well as on safety systems, also in emerging markets.

### Transportation 2030 implications for truck OEMs (2/3)

<table>
<thead>
<tr>
<th>BUSINESS MODEL</th>
<th>TECH-NOLOGY (1/2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; Truck OEMs will have to adapt their business models to the future customer structure – Increased share of (national/international) fleet customers will put pressure on OEM margins.</td>
<td>&gt; Truck OEMs will have to further focus on product and technology development to meet tougher efficiency and safety requirements – Efficiency and ecological topics will remain important, while there is much catching up to do in safety.</td>
</tr>
<tr>
<td>&gt; The rising importance of a few large customers will require OEMs to cover further steps along the value chain (e.g. up to vehicle operation driver service) and extend the service offering to ensure profitability and also differentiate themselves from the competition.</td>
<td>&gt; Politics requires and the economy demands fuel savings – Integrated truck &amp; trailer concepts as well as further lightweight (e.g. reinforced steel) and aerodynamics solutions are needed to achieve that.</td>
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<tr>
<td>&gt; …</td>
<td>&gt; To meet future emission targets and to further decrease fuel consumption, essential improvements to the powertrain are necessary – Alternative powertrain technologies (hybrids, EV) will be required parts of the product portfolio.</td>
</tr>
</tbody>
</table>

Source: Roland Berger
Trend toward total transparency requires truck OEMs to develop technology as a basis for integrated systems

Transportation 2030 implications for truck OEMs (3/3)

TECH-NOLOGY (2/2)

> Safety will become a top priority in the triad markets and is gaining importance in BRIC markets – Truck OEMs will have to intensify their development activities in active and passive safety to meet new regulatory targets

> A vehicle's ability to communicate is an essential requirement for its integration into the general transportation transparency scheme

> OEMs will have to equip various car park vehicles with sophisticated technology so they can interact with intelligent transportation systems – Yet OEMs will only be able to support the hardware, as the software will be flexible and e.g. app-based from external providers

> …
It's character that creates impact.