



April 2023

Expert study on the state of finished vehicle logistics in Europe

Including insights on role shifts, market dynamics
and business models with a focus on rail

MANAGEMENT SUMMARY.

The automotive industry and particularly the finished vehicle logistics (FVL) market is in upheaval. Growing transport volumes and an intensifying focus on sustainability promise great potentials, but players are facing unknown structural changes that demand action. Changing consumer demand as well as the severe lack of capacity and drivers across all transport modes emphasise the dual role of logistics as pivotal success factor and predominant bottleneck.

To successfully navigate through times of change and to unlock new potentials, market players need to reevaluate their roles in the ecosystem and increase their flexibility by balancing asset strategies with a focus on hybrid business models. Evolving strategies focus on selectively increasing the level of control by leveraging emerging asset and resource pools, along with strategic partnerships and new IT-solutions.

In terms of transportation modes, rail proves to be the most promising transport mode solely offering both great mass performance and suitable responses to sustainability trends. However, intensive investments are needed that cannot be covered by the existing landscape of players. Thus, new (investment) partnerships and neutral resource pool models will gain importance in the FVL ecosystem.

Action fields

1. Rail seems to become the growing transport mode and stakeholders should foster their level of engagement in FVL rail to increase and secure critical capacities
2. Neutral asset and resource pools will evolve with new investment partners to provide assets with more flexibility and additional service options
3. Three to four powerful pan-European FVL-networks will be able to provide higher volume and more flexible services accompanied by focused FVL-segment champions
4. Strategic partnerships and alliances become important to ensure the necessary flexibility for offerings that complements the players' own core service portfolios
5. Infrastructure access and dedicated asset capacity will become more relevant elements of future FVL solutions
6. Modular flexible IT solutions and data hubs will increasingly be established to connect and optimize finished vehicle logistics in distribution networks

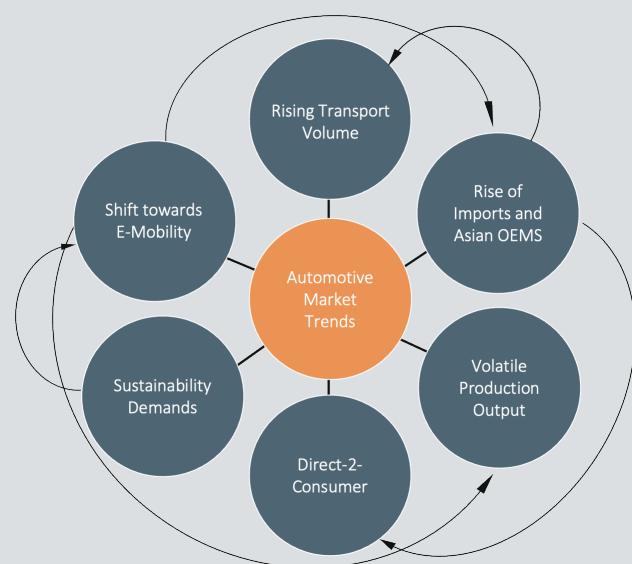
STATE AND TRENDS IN THE AUTOMOTIVE MARKET.

Success in the automotive industry increasingly depends on the performance of outbound logistics

The automotive industry, a core industry in Europe due to its value creation and interdependencies with other sectors, is undergoing a profound transformation process. Dynamics are particularly evident in the areas of supply, production and distribution systems. In addition to the CASE-Paradigm (Connected-Autonomous-Shared-Electric), changes are attributable to an intensifying focus on supply chain bottlenecks as a reaction to the more frequent disruptions and the transition to a direct-to-consumer sales approach. All trends push distribution chain management to higher importance.

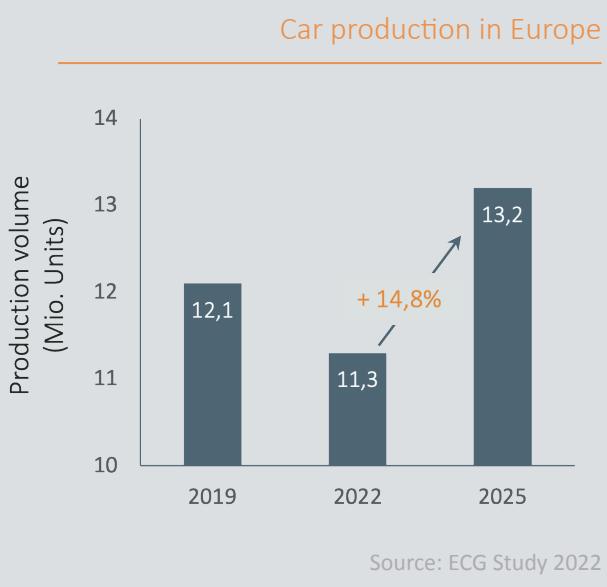
Consequently, the perception of logistics changes fundamentally. Logistics is increasingly viewed as a critical enabler for customer satisfaction and value creation. Thus, OEMs revise their strategies and evaluate their control of the value chain, asset strategies and pilot new models of collaboration.

Trends in the automotive market



Source: Infront industry experience

These structural changes disrupt the entire automotive supply chain and leave incumbents insecure about investment risks, while also unlocking business opportunities for new players and innovators.



Production volume in Europe will recover to pre-pandemic levels and require higher transport volumes

In recent years, the automotive market has seen a decline in volume in both production and sales. Despite some sceptical views most indicators are positive that the transport volume for finished vehicles will recover to pre-pandemic levels until 2025. Finished vehicle logistics will thus face an increasing demand in the mid- and long-term.

Production output by country (in units)

6.000.000

5.000.000

4.000.000

3.000.000

2.000.000

1.000.000



■ Production output 2022

■ Production forecast 2025

Source: ECG Study 2022

Rising imports enable balanced flows from ports to hinterland

Automotive imports to the EU grew by 4% to 3.5 mio. cars in 2021, mainly driven by a substantial increase in imports from China. These imports further increase demand for finished vehicle transport. Logistics chains that manage the highly fluctuating port and hinterland flows will gain a competitive edge.



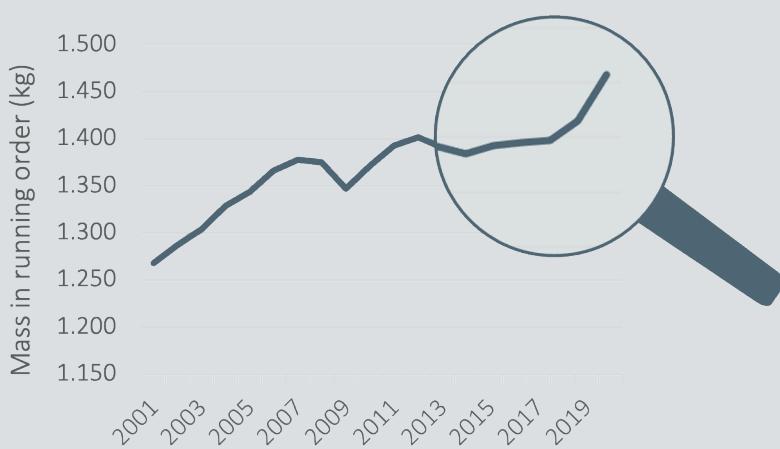
Import volumes of Chinese OEMs are relatively small today, but are likely to join the battle for limited transport capacity in the future

New flexible assets are needed as electric vehicles drive car weight

Average car weight skyrocketed in the past years as SUVs and electric vehicles gained popularity and viability in the market. Electric vehicles currently make up 12% of new registrations in Europe with an expected increase to 21% by 2027, 56% by 2030 and 80% by 2035.

Due to the rapid increase in heavy electric cars, new logistics assets are needed. Especially on rail, older wagons are not sufficient for the heavier weight and larger dimensions of electric SUVs.

Average car weight in Europe



Source: ACEA, Dataforce 2022, ICCT Pocketbook 2022

Volatile production output requires flexible outbound logistics networks

Electric vehicle production will change the plant network of the automotive industry in Europe only slightly, thus most transport flows will stay on known lanes. The observed disruption is the new need for flexibility. Volumes, destinations and type of car to be transported will change more quickly. This increasing volatile production output requires logistics chains to adapt and to become more flexible.

OEMs engage in D2C business in order to save costs and increase control

OEMs' endeavours to engage in direct-to-consumer sales is gaining momentum. This model allows OEMs to exercise greater control over the customer experience and brand image, while also cutting costs and gathering valuable customer data. Tesla is a major player in this trend, having famously eschewed the traditional dealership model. European OEMs, such as Volkswagen and BMW, also started exploring D2C business opportunities. While the trend is still in early stages, it has the potential to disrupt the traditional dealership model and transform the way consumers buy cars with significant impact on distribution logistics.

Bottom line

To cope with the increasing transport demand and changing requirements regarding weight and flexibility new outbound logistics solutions are needed.

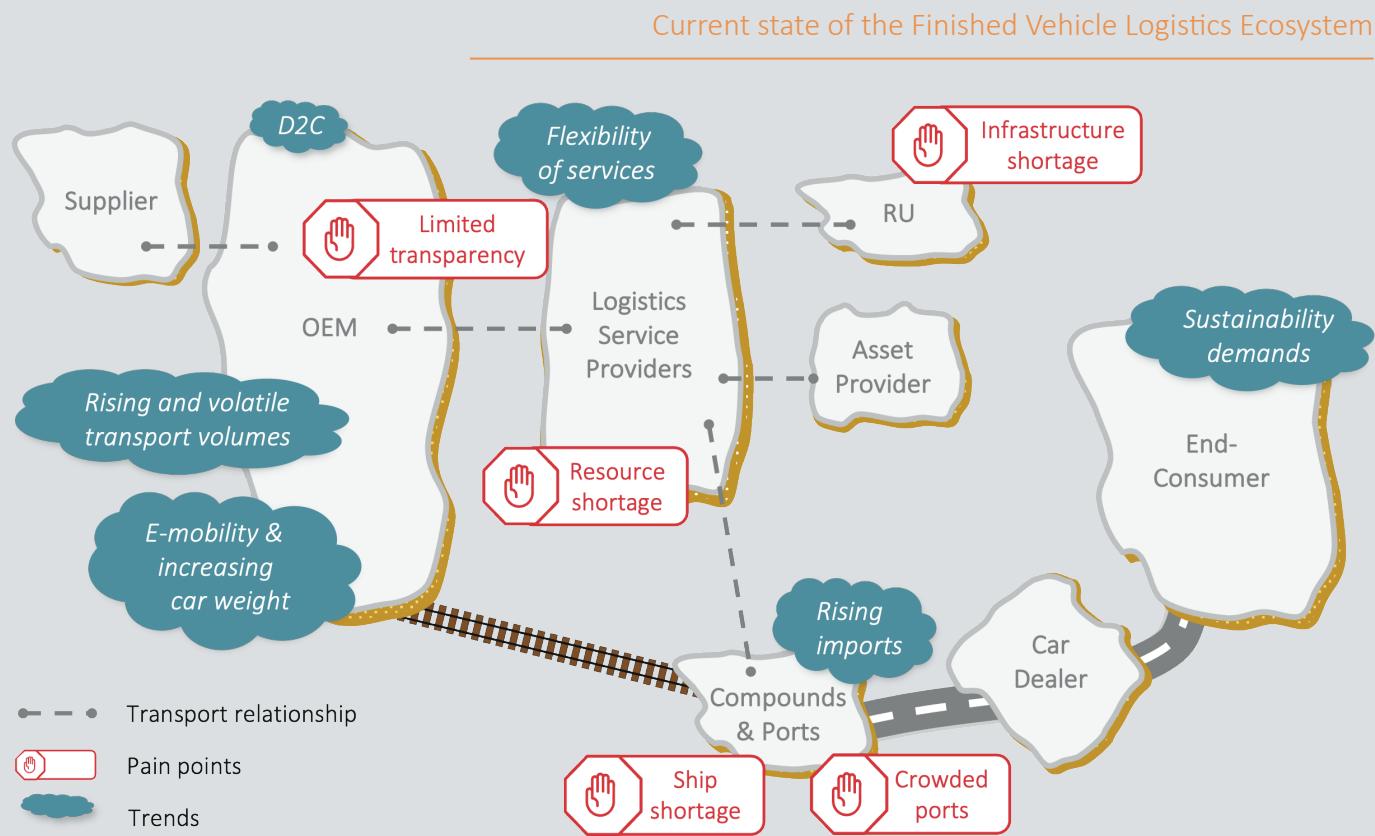
THE FINISHED VEHICLE LOGISTICS ECOSYSTEM.

Logistics Service Providers are the champions of outbound logistics

The illustration below offers a simplified overview of the finished vehicle logistics (FVL) ecosystem with the relevant players and their relations. The key market players visualized with the largest continents are Original Equipment Manufacturers (OEMs), specialized Logistics Service Providers (LSPs) and End-Consumers. Historically, OEMs and LSPs have a close relation. LSPs act as orchestrators, organizing the entire distribution chain across transport modes. Car dealers act as sales agents in the transfer of ownership, offer financing and provide after-sales services, such as maintenance. Asset Providers, Compound Operators and Railway Undertakings (RU) play a role in logistics fulfilment with limited interface to OEMs and End-Consumers. Compounds are important for storage, as delivery hubs and to perform value added services for OEMs.

Capacity shortages across all modes intensify the pressure for change

An increase in finished vehicle transport demand and changing asset requirements result in a demand surplus that cannot be met with current equipment and infrastructure, which is already fully utilized. Hence, the finished vehicle market today is challenged by capacity shortages across all transport modes leading to unpredictable service levels and a willingness to pay unseen high prices. Investments and capacity enlargements have not been implemented due to unstable expectations of future developments and limited financial capabilities, resulting in a critical state of continuous bottlenecks.



A severe shortage of ships and unpredictable arrivals stress port throughput and disrupts logistics

Shipping capacities have been reduced in response to the pandemic and the associated decline in transport volumes. The existing capacities cannot cope with the recovered transport volume. Experts estimate a 25% shortfall in capacity. Furthermore, due to macroeconomic influences and inefficiencies, ships arrive delayed and unpredicted, resulting in congested ports and massive productivity losses in hinterland chains. Unfortunately, future seems of no relief. The ships currently under construction are significantly larger and will thus operate at lower frequencies but with higher load volumes. This requires more capacity and better process performance at ports. OEMs look for alternative routes and sourcing alternatives, showing an increased interest in nearshoring strategies.



The market faces a 25% capacity shortage of RoRo-ships and ports are congested with no relief in sight

OEMs engage in port logistics optimization

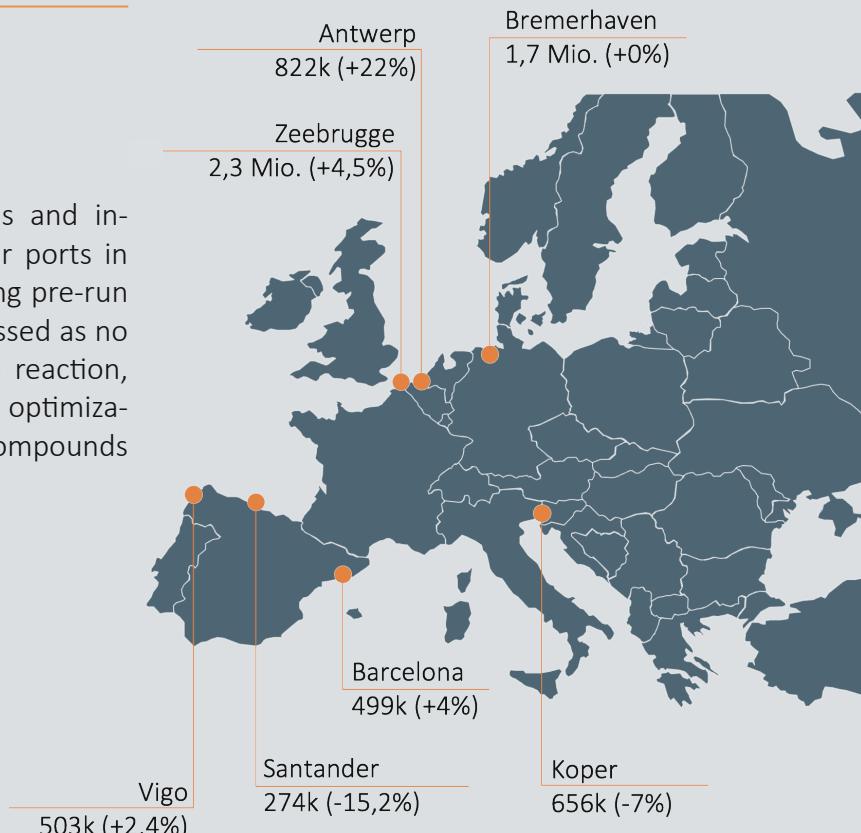
As a result of lacking ship capacities and increasing transport demand, the major ports in Europe are heavily congested. Incoming pre-run transports for exports had to be dismissed as no space was available at the port. As a reaction, OEMs engage in process and logistics optimization at ports and utilize alternative compounds outside port areas.

The market lacks trucks and drivers

The situation on the streets is no better with a shortage of trucks and drivers leading to a 25% reduction in truck transport capacity compared to pre-pandemic levels. Experts agree that this trend will continue to worsen as a result of demographic change, i.e. the retirement of baby boomers. Current recruiting efforts cannot close this gap, which is in particular due to the relative unattractiveness of car transports (additional handling, liability) compared to driving other goods.

The truck shortage is leading to a war for capacity. In response, OEMs resort to measures that undermine market optimization. For instance, the share of charter trucks increased (e.g. Tesla secured 800 charter trucks for 2023), worsening the capacity supply and regional optimization. Market prices for truck transports fluctuate tremendously between 1.500€ to 6.000€ for a single long haul car transport.

Major ports (yearly throughput 2021)



Source: Statista, Agora Verkehrswende, Bremenports

Due to construction sites and deprioritization, 30% more assets need to be deployed

Construction sites heavily effect the feasibility of optimized circular runs and the political deprioritization of automotive and other transports in favour of e.g. energy or military related transports pressures rail capacity. As a result, logistics providers need to invest 30% more capacity to provide similar service levels compared to the pre-pandemic period. However, when these capacities are not available OEMs reduce their rail volume and move it to truck transports.

The market needs more wagons, infrastructure and traction services

To cope with the increasing demand for rail transport, more investments in wagon and traction capacities are needed. The rising share of electric vehicles drives the demand for flexible wagons. Only 30% of today's wagons are future-proof and the market is lacking by roughly 6.000 flexible rail wagons. The current wagon-fleet suffers a large maintenance backlog.

Rail has to grow and support new strategies like hub and spoke

Besides locomotives, wagons and ships, investments must also be made in rail-bound logistics concepts and compounds of the future (longhaul by rail, shortlines by truck, cross-OEM, pick-up stations). The biggest challenge is to find space and to connect to longhaul transport networks.

Rail becomes inevitable

Even though severe shortages can be observed across all transport modes, future perspectives clearly favour rail as the only transport mode offering both great mass performance and suitable responses to sustainability trends. Today truck transport may occasionally still be favoured due to higher flexibility and simplicity. In order to exploit the rail potential, investments must be made in infrastructure and equipment to fill the supply gap. Public funds are currently inefficient and limited and therefore need to be supported by private investments in assets, infrastructure and digitalisation.



OEMs and Logistics Service Providers search for answers to bottlenecks and challenges and drive structural changes in the FVL ecosystem

OEM DYNAMICS.

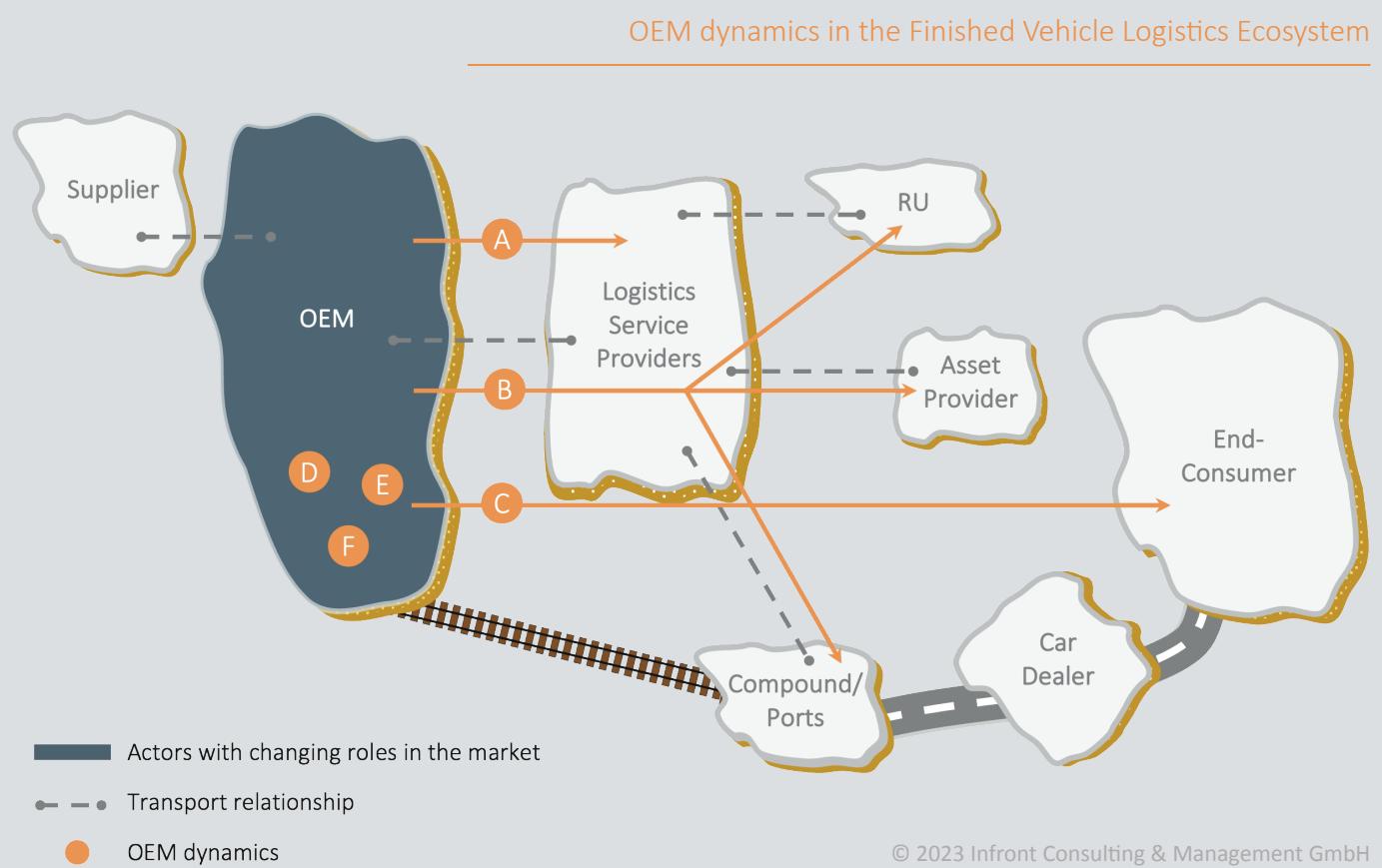
OEMs' focus moves from part assembly to logistics mastery

OEMs realize a massive capacity shortage all over the distribution logistics chain and seek for sustainable solutions in the short term, which include new collaboration models to secure capacities and regain control. The focus of OEMs moves from parts supply and assembly to procurement and logistics, as they become critical value drivers and bottlenecks in the next decades.

The illustration below offers a simplified visualisation of the dynamics in the Finished Vehicle Logistics Ecosystem resulting from changing OEM behaviour.

OEM dynamics

- A | Safeguard critical distribution capacities
- B | OEMs aim to increase their level of control
- C | Disintermediation of car dealers
- D | OEMs opt for more flexible production plants and nearshoring
- E | Intensify supply chain steering & transparency through flexible IT systems
- F | Engage in supply chain optimization



A | Safeguard critical distribution capacities

Changing buying patterns

In response to the current intense shortages, capacity and availability replace price as the most important criteria for OEMs purchasing decisions. As long as these factors shape purchasing behaviour, sustainability efforts do not yet play the dominant role they will in the long term.

Direct configuration of service

To secure availability of assets and infrastructure, OEMs have now taken creative measures and test direct configuration of service solutions. This results in bypassing LSPs and engaging in direct configurations of service solutions with RUs and Asset Providers. Examples are independent leasing of entire truck fleets (e.g. Tesla) or buying capacities on the spot market, which drive up prices and increase the capacity shortage.

New contractual models

Most OEMs also rethink their negotiating behaviour. BMW and Toyota, in particular, recognised the challenges early on and are embracing new contractual models, such as longer contract terms or long-term capacity bands with bi-yearly call-of-orders.

B | OEMs aim to increase their level of control

In order to gain more control, OEMs explore ownership options in contrast to solely engaging in purchasing capacities. Together with their logistics entity, they investigate potentials of building own rail operating business models. This could be interesting as OEMs have a unique starting point because they can profitably utilize their own capacities and extend their offering to third parties in order to not only decrease own cost, but also secure additional revenue.

Aggregated results of the assigned relevance to OEM purchasing criteria



Source: Infront Expert Interviews

C | Disintermediation of car dealers

OEMs increasingly foster direct-2-consumer models, skipping retailers in the transfer of ownership and moving retailer's role from sales channel to delivery platforms. Simultaneously, the role of compounds becomes increasingly important as they transform to pick-up stations. However, the D2C models require new integrated "omnichannel" logistics networks combining all transport modes and compounds.

D | OEMs opt for more flexible production plants and nearshoring

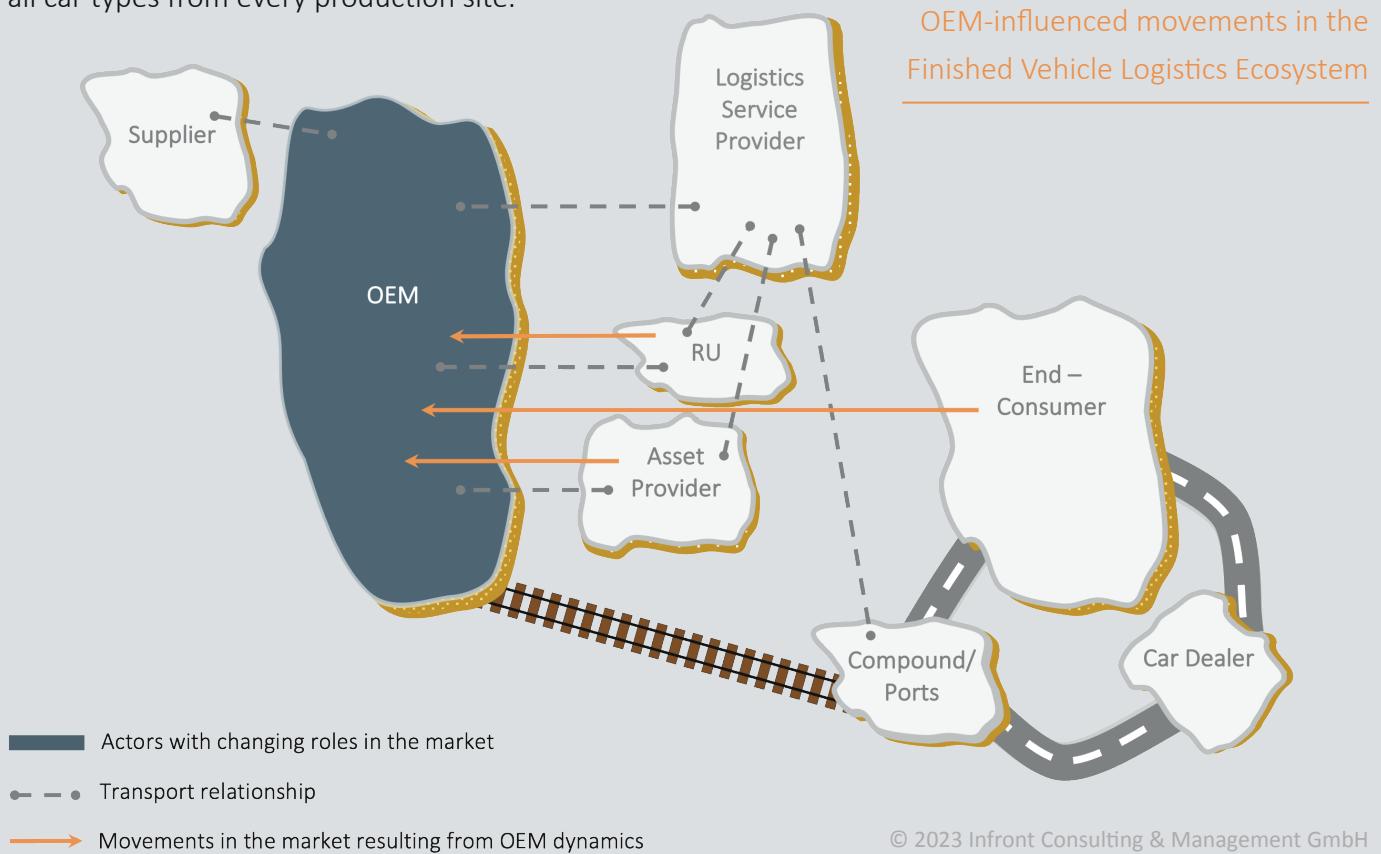
Most OEMs will keep their production plant locations across Europe or engage in nearshoring strategies to increasingly move production to Europe. Thus, outbound transport routes stay constant and/or extend. Additionally, production strategies will change towards flexible plants that can switch the type of produced vehicle. This will drive OEMs' requirements towards logistics services. Consequently, LSPs will have to offer more flexible solutions and equipment that can absorb all car types from every production site.

E | Intensify supply chain steering & transparency through flexible IT-systems

OEM strategies include leveraging technological advancements through IT-systems in order to foster interconnectivity of all supply chain elements and therefore enhance both steering and customer centricity. To reach this goal, investments in secure data transfer and industry wide modular solutions are essential. BMW acts as one frontrunner. The vision of end-consumer-oriented supply chain steering and visibility will reach a new level if the communication capabilities of the cars (e.g. GPS) are included.

F | Engage in supply chain optimization

Supply chain concepts and utilization risk will develop towards hub and spoke frameworks with road for short lines and rail for long haul. Cross-company platforms for freight capacity brokerage and sharing could enable new industry-wide collaboration in selected areas.



SERVICE PROVIDER DYNAMICS.

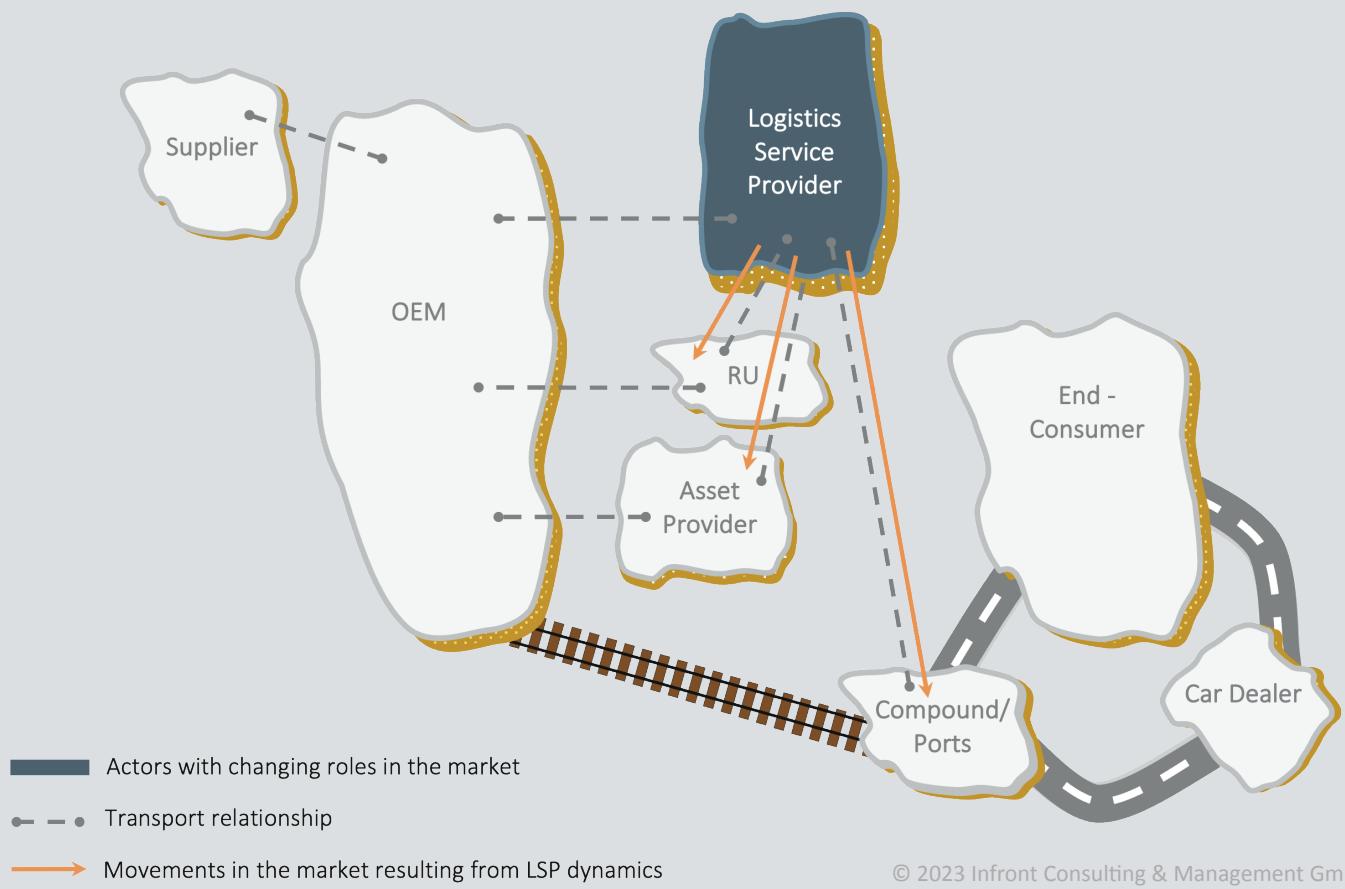
Logistics Service Provider trends

LSPs are under pressure to create new capacities to satisfy future market demand while balancing financial performance. At the same time, OEMs will look for capacities and solutions by themselves and test new operating models. Sustainable capacity creation needs to focus on rail and benefit from its advantages in mass performance and low carbon emissions. LSPs need to evolve their business models and resource ownership concepts to create more flexibility.

New asset pools will emerge

The opportunity of neutral pools has not been exhausted in the rail segment although it could be a solution to solve capacity shortages. Similar to the existing asset pools for locomotives, neutral pools for wagons and other resources such as drivers will evolve, increasing overall utilization and reducing investment responsibility. Having access to asset pools allows Logistics Service Providers to react to peaks in demand and to get access to specific wagon types they might need (e.g. flexible wagons). A neutral wagon pool enables global optimization and reduces individual financial risks. It also enables actors without own wagon fleets to participate in the market: Railways, OEMs, Car Dealers, Compound Operators and Shipping Lines gain an option to engage directly in the rail forwarding role for finished vehicles.

LSP dynamics in the Finished Vehicle Logistics Ecosystem



Starting position impacts LSPs future roles

The Logistics Service Providers will benefit from new asset and resource pools differently based on their starting position. Resulting roles will increase the FVL offering options in the market and enable new collaboration models.

Rail Newcomer

Logistics Providers with strengths in other transport modes, e.g. Milsped and Sesé (both trucks) or GLOVIS (ships), can enter new segments and expand their portfolio through access to rail assets via neutral asset pools.

Segment Champions

Those who operate yet relatively small rail fleets can increase their volumes without investing in own assets.

Network Orchestrators

LSPs with large wagon fleets will also benefit substantially from asset pools as they enable them to react to peaks in demand and to optimize their large existing networks.

Question Marks

Future roles of CAT and CEVA are difficult to determine, because their priority on FVL is not yet readable. Historically and through specific OEM relations they have a large operating platform and could use the asset pools for their next growth cycle.

Wagon fleet access of LSPs (examples)



Source: Infront industry experience

Service Providers will adapt their business models and roles in the ecosystem

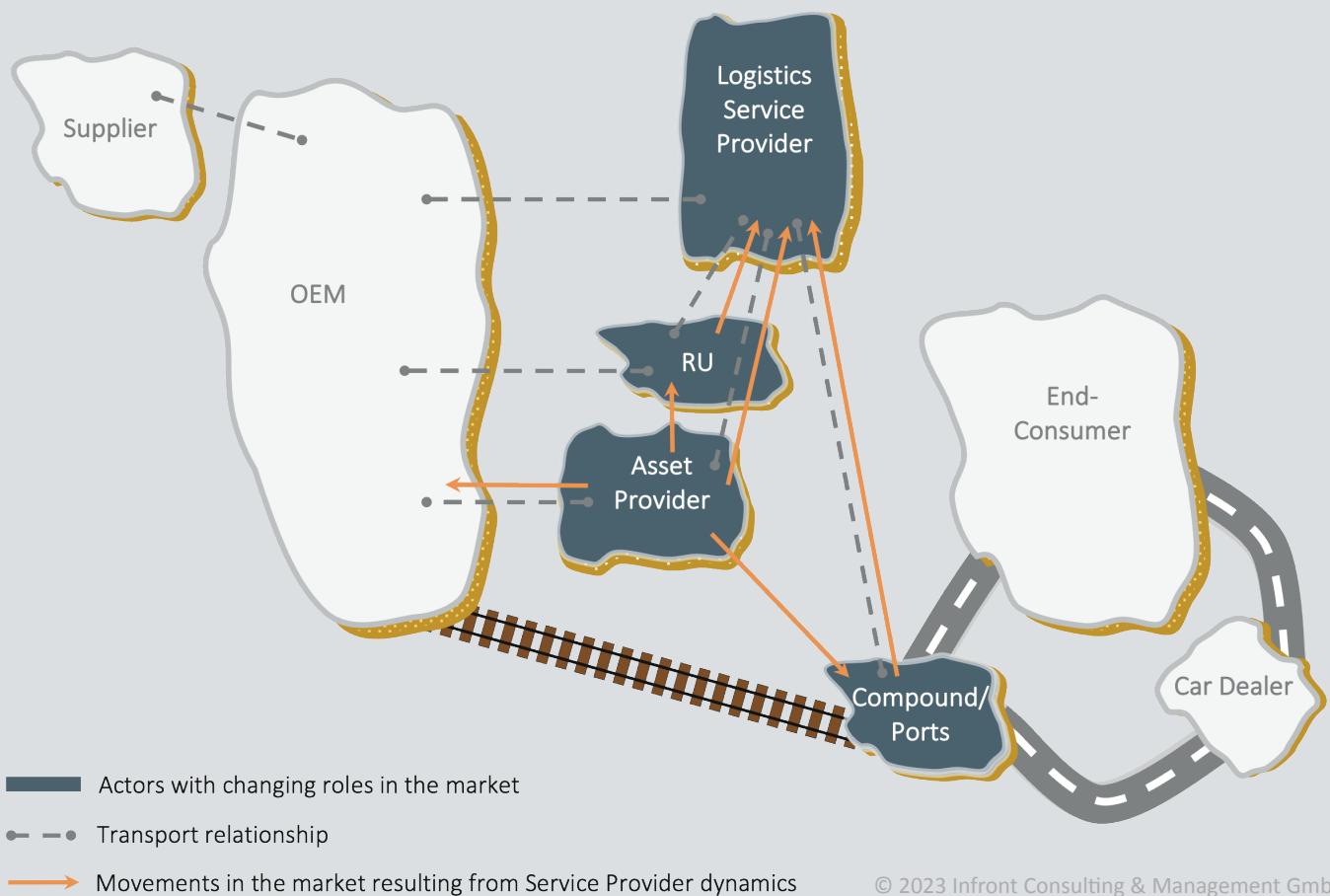
Role shifts and developments in the market impact all Service Providers. These changes can balance relevance and value creation in the ecosystem as players expand into new business options.

Railway Undertakings and Asset Providers are increasingly being approached by OEMs, resulting in a direct customer access, previously solely reserved for LSPs. This development could be leveraged to widen the portfolio by renting wagons, offering a one-stop-shop solution or engaging in freight forwarding.

Service Provider Dynamics

- A | New asset strategies & business models
- B | New collaborations
- C | Engage in supply chain optimization
- D | IT & digitization

Service Provider-influenced movements in the Finished Vehicle Logistics Ecosystem



A | New asset strategies & business models

LSPs move from ownership and dedicated contracts to flexible supply networks utilizing neutral asset and resource pools.

RUs could use asset pools to widen their portfolio by renting wagons and offering a one-stop-shop solution to OEMs. First examples of RUs expanding their business operations to direct contracting with OEMs can be seen in some regional markets.

Current asset owners also show interest in moving towards more asset flexible business models. By selling their fleet to a neutral Asset Provider they reduce their asset risk while being able to secure assets via sale & lease back deals or long-term leasing contracts.

B | New collaborations

New players such as Asset Providers who are likely to enter the segment will facilitate the necessary investments to address the equipment and infrastructure deficit. A neutral wagon pool based on investment partnerships could raise more capital to fill the gap of flexible wagons. This will create new options for collaboration between all players.

New entrants and investment partnerships will occur as experts expect little investment from incumbents due the current volatile market situation and limited financial resources.

The market insiders expect to see more M&A activities, bundling existing capabilities to benefit from network advantages.

C | Engage in supply chain optimization

The market is required to look beyond the obvious such as partnerships for investments and M&A activities to increase capacities. Creative network solutions with capacity sharing models need to be considered to increase capacity.

— BB —
Wagon lease could be a necessary option

— 99 — FVL Provider

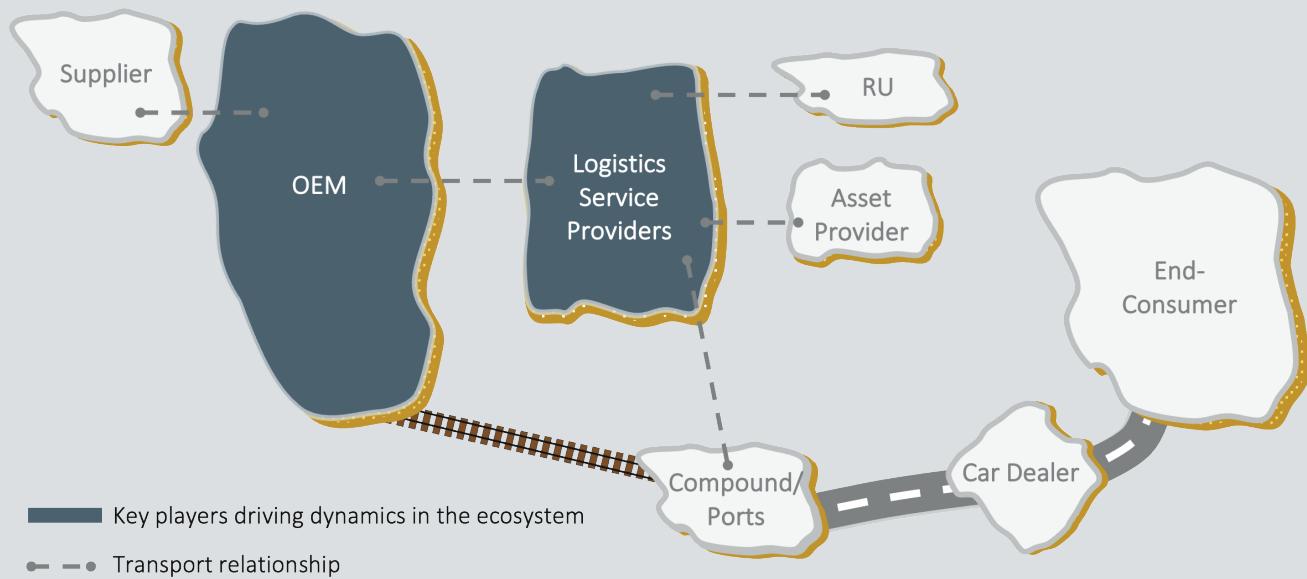
D | IT & digitization

Flexible and modular IT-solutions enable new offerings such as cross-company-wide marketplaces for freight capacity brokerage and sharing. Platforms will also foster industry-wide collaboration in selected areas.

Flexible and modular IT-Solutions which enable data aggregation will increase efficiencies within and across logistics networks.

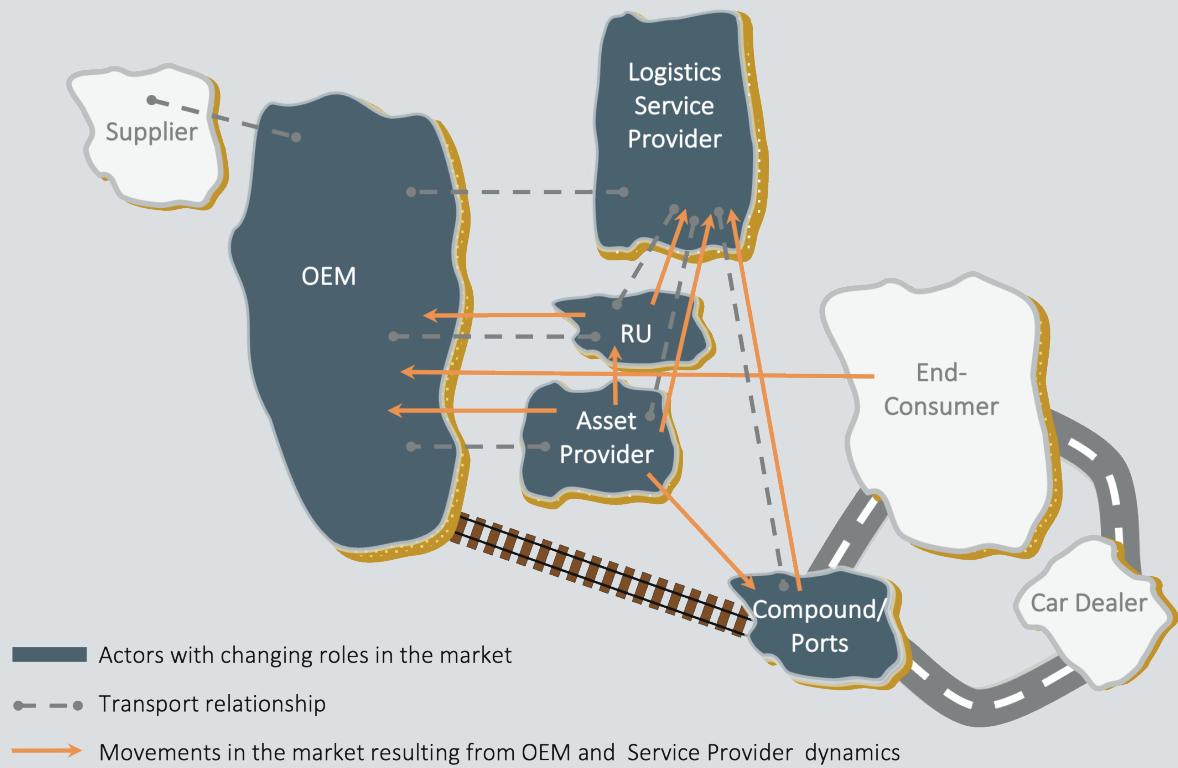
OVERVIEW OF ECOSYSTEM MOVEMENTS.

Current state of the Finished Vehicle Logistics Ecosystem



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Potential future Finished Vehicle Logistics Ecosystem resulting from OEM and Service Provider dynamics



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ACTION FIELDS FOR FINISHED VEHICLE LOGISTICS.

01

Rail will become the growing transport mode and stakeholders should consider to increase their level of engagement in rail logistics. Besides developing own business models, additional investments in assets and infrastructure are necessary to strengthen the entire rail freight system.

02

Neutral asset and resource pools (e.g. locos, wagons, trucks) will evolve with new investment partners to provide assets with more flexibility and additional service options. Incumbents and new market players will leverage these opportunities to expand and optimize their portfolio, explore new business potentials and secure capacities beyond asset ownership.

03

Current network orchestrators will leverage opportunities and expand their activities, resulting in three to four powerful pan-European FVL-networks, providing higher volume and more flexible services. Complementary services will be offered by specialized segment champions.

04

Market players have to reevaluate the strategic partnerships and alliances as they become more important to assure the required flexibility and to offer supplementary services. Market players should engage in long-term (investment) partnerships and joint product and business development.

05

Infrastructure and dedicated asset capacity will become more relevant elements of future FVL solutions. Railway Undertakings, Compound Operators and Asset Providers will therefore become increasingly critical market players, emphasising both the need for investments as well as the potential of strengthening their market position.

06

Modular and flexible IT-solutions and data hubs will be increasingly established to leverage the potentials of digitalization and data exchange to enable finished vehicle logistics networks (incl. digital data, product platforms and hubs, source-to-deliver models, open-neutral-interface systems and integrated control towers).

STUDY SUMMARY

Study objective. Mapping the market situation of finished vehicle logistics and identifying market dynamics and trends as input for strategies and business model developments.

Method. We combined our own market knowledge and desk research with perspectives of leading players in the finished vehicle logistics segment in order to create a comprehensive picture.

Results. The study shows that finished vehicle distribution faces a switching point due to expected capacity shortages and other structural changes, which will disrupt the market heavily. As a reaction, players adopt new strategies that will lead to growth and opportunities, especially in the rail sector. We identified fields of action to be considered.

Study background & objective

Automotive outbound logistics is disrupted like never before. Car producers have increasingly volatile production outputs due to supply shortages of critical parts and the transition to heavier electric vehicles. On the logistics side we observe reduced capacities across all transport modes as an outcome of the past crises and a shortfall of supply. The market and its players react with role changes and new business models.

66

The market disruption we see today is stronger than anything I've seen in over 20 years in this industry.

99

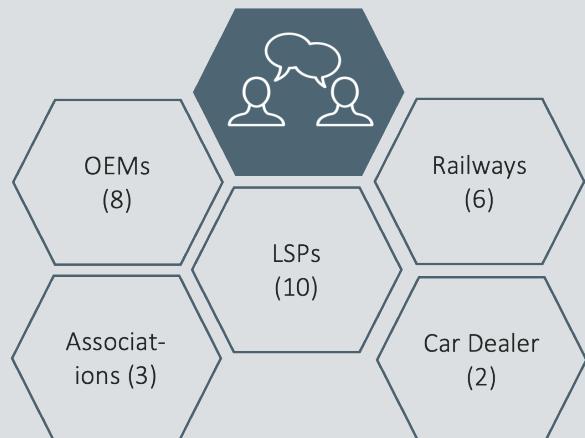
OEM

The aim of this study is to aggregate expert views on the trends, challenges and solutions that affect every player in the ecosystem. For this we interviewed executives and conducted extensive research to compile the current state of finished vehicle logistics and developed a glimpse into the changes and disruptions to come. The study results provide action field patterns to navigate through these uncertain times.

Study structure & participants

The study is structured in three parts, starting with the developments in the automotive market and factors influencing outbound logistics. In the second part we take a closer look at the trends and barriers in the Finished Vehicle Logistics Ecosystem with a focus on rail in order to evaluate opportunities for investors, followed by a section on the resulting dynamics and role shifts from OEMs and service providers. Throughout the study we combine insights from our extensive industry-wide expert interviews with desk research to provide you with the most comprehensive market picture possible. The study concludes with condensed action fields as an orientation for future priorities.

Study participants



THANK YOU!

We would like to take this opportunity to thank all our interviewees. We enjoyed the conversations with you very much. Thank you for your time and intriguing insights. We are looking forward to your feedback on the study at any time.

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WE ARE LOOKING FORWARD TO YOUR FEEDBACK!

We condensed all analyzed information into a few pages – yet there is much more to talk about. As challenges in the market tend to be individual, we are curious about your perspectives and thoughts. Please feel free to contact us at any time.

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