Autonomous mobility is coming. Not even the coronavirus can stop it.

Automotive Disruption Radar #8

Roland Berger

The coronavirus crisis hit the automotive industry hard but also accelerated the shift towards autonomous mobility, the latest edition of the Automotive Disruption Radar has found.
All indicators in the twice-yearly report and survey suggest disruption is still coming to the sector, despite the pandemic-induced downturn and changes in mobility habits.

The eighth edition of the ADR, which tracks 26 indicators in 18 global markets, found that Covid-19 stimulated technology players while hitting traditional OEMs hard. Overall, country scores were the highest on record, with smaller countries closing the gap on bigger markets.
The Netherlands ranked number one, as it did in ADR7, followed by Singapore, leaving former frontrunner China in joint third with South Korea.

The survey results also highlighted a growing interest in electric vehicles and soaring EV sales. For example, 50% of all potential car buyers say they are now considering a battery EV – compared with 35% in ADR1 (Jan 2017).
Interest in private vehicle ownership also rose, and R&D activity hit a record high.

In this booklet, we take a closer look at these figures and analyze four real-life developments that underscore the shift to autonomous mobility: Commercialization of autonomous mobility services; growing competition in the EV market; OEMs fall behind as new players enter software market; and the rise and rise of Tesla.

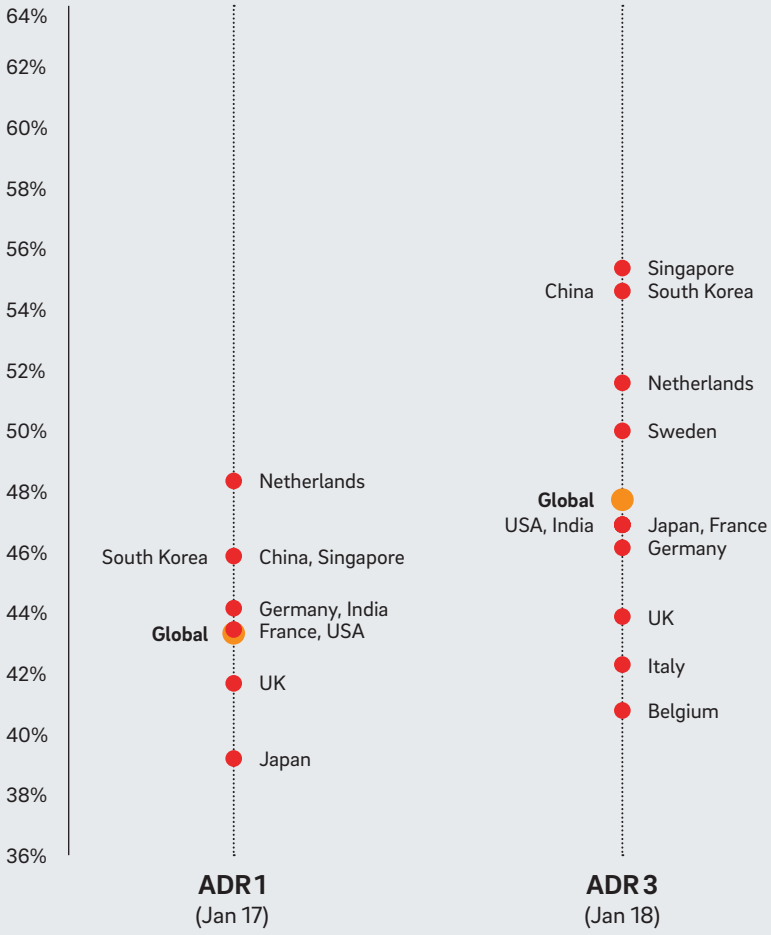
Cover photo Michael Hitoshi/Getty Images

Under the hood: Key report findings

The first ADR since the outbreak of the coronavirus pandemic shows that the transformation of the global automotive industry to autonomous mobility continues unabated despite the crisis. This was the case across all five ADR dimensions (customer interest, regulation, technology, infrastructure and industry activity) and their 26 indicators. These measure

Growing up: Evolution of ADR country scores since the first edition in 2017

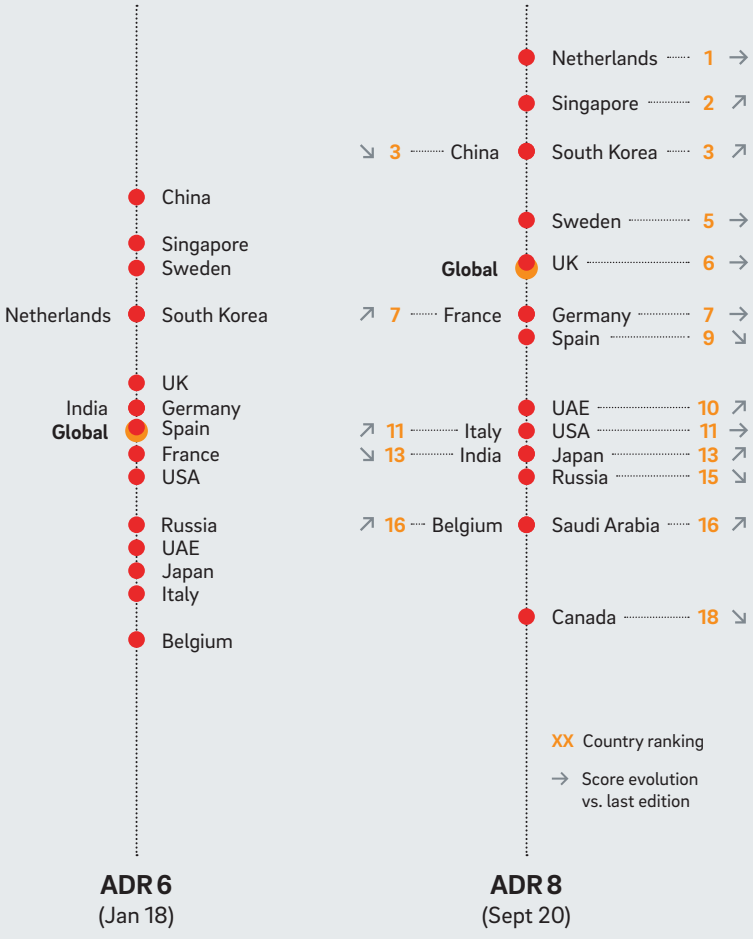
Overall score as percentage of maximum score



Source: Roland Berger

factors from mobility behavior and vehicle sales to CO_2 regulations, 5G mobile network coverage and research and development. Countries are awarded scores according to their performance in each of the 26 indicators.

Overall scores among the 18 surveyed nations were the highest since the ADR began in 2017, and the top four countries all achieved totals higher than any previous top-ranked country. The average score also jumped, from around 50% of the maximum achievable score in ADR7 (January 2020) to 55%. Only one country – Canada – performed worse than in ADR7.



Small but mighty

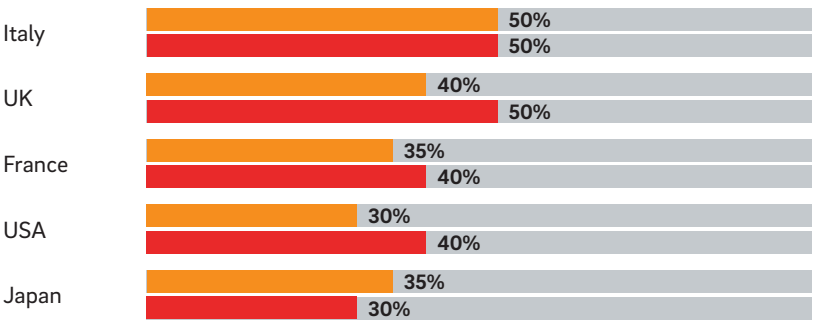
The performance of smaller markets was particularly impressive – the Netherlands recorded the highest score ever, while China was the only automotive "superpower" to make the top 5. Results from the survey component of the report (which account for a third of the total score) were a key driver here, with customers in countries that have little or no automotive industry much more enthusiastic about new mobility concepts.

Down with cars: Most countries show an increased level of interest in mobility concepts since the outbreak of the Covid-19 pandemic

"How many people do you know who don't or did not want to buy a car because they exclusively use other mobility concepts?"

Most enthusiastic countries about the use of mobility concepts

Less enthusiastic countries about the use of mobility concepts



ADR7 (Jan 2020) ADR8 (Sept 2020)

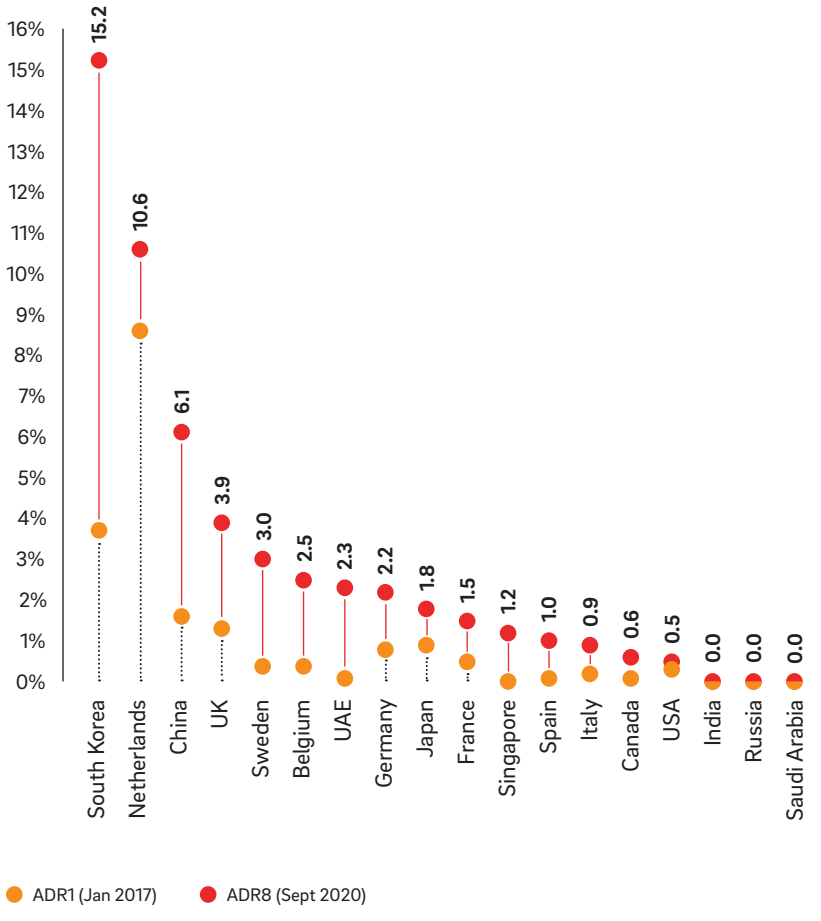
Source: Roland Berger Automotive Disruption Radar online survey

EVs charge ahead

Several specific developments caught the eye. Most notable was a big jump in interest in EVs, with 50% of potential car buyers now considering an EV, against 40% in ADR7 in early 2020. Some of the biggest individual jumps came in China (80% vs. 60%), the Netherlands (45% vs. 30%) and Germany (40% vs. 25%). People living in city centers are most keen on EVs, with 60% of potential car buyers living in cities considering one. The rise in interest may be attributable to the massive Covid-related government stimulus packages currently being rolled out, many of which include generous EV subsidies.

Leading the charge: South Korea and China have rapidly expanded their electric vehicle charging networks in 2020

Number of charging locations per 100 km of roadway



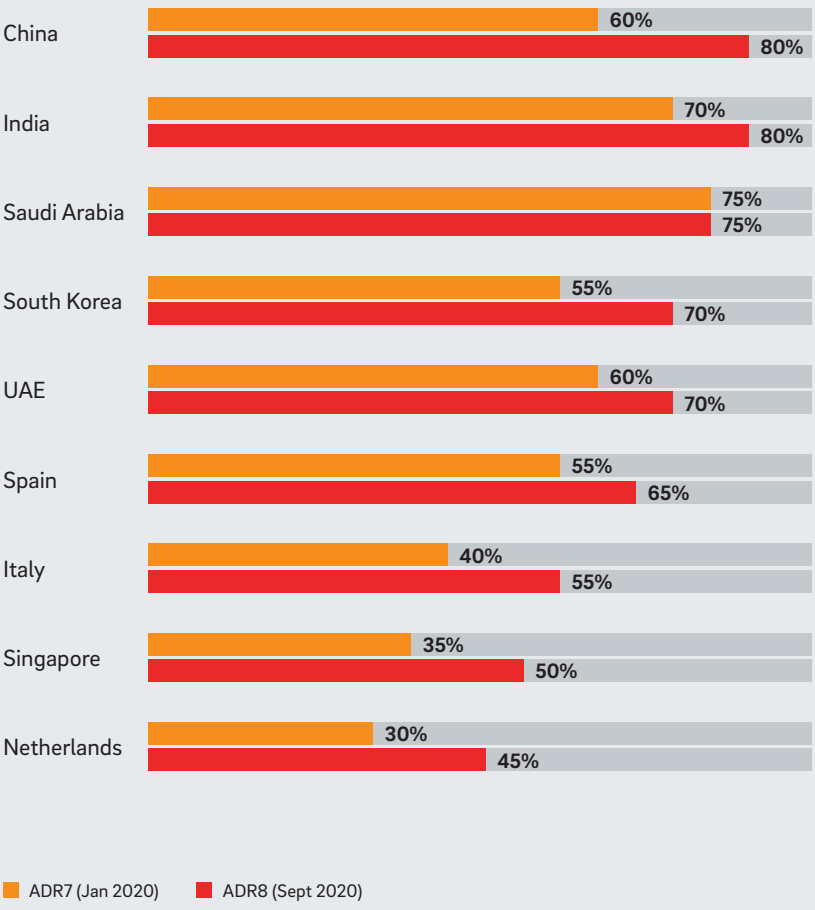
Source: EV Volumes, desk research, Roland Berger

This shift in buying intention has translated into an increase in EV sales, particularly in northern hemisphere markets. In Sweden, for example, almost a quarter of all vehicles sold are now fully electric or plug-in hybrid models. And compared to the first half of 2018, the number of EVs sold as a percentage of the total number of vehicles sold leapt in France (7.8% vs. 1.8%), Germany (7.2% vs. 1.8%) and the UK (6.9% vs. 2.0%). Subsidies no doubt again played a part.

An electric market: More people are now interested in buying an EV than they were at the start of 2020

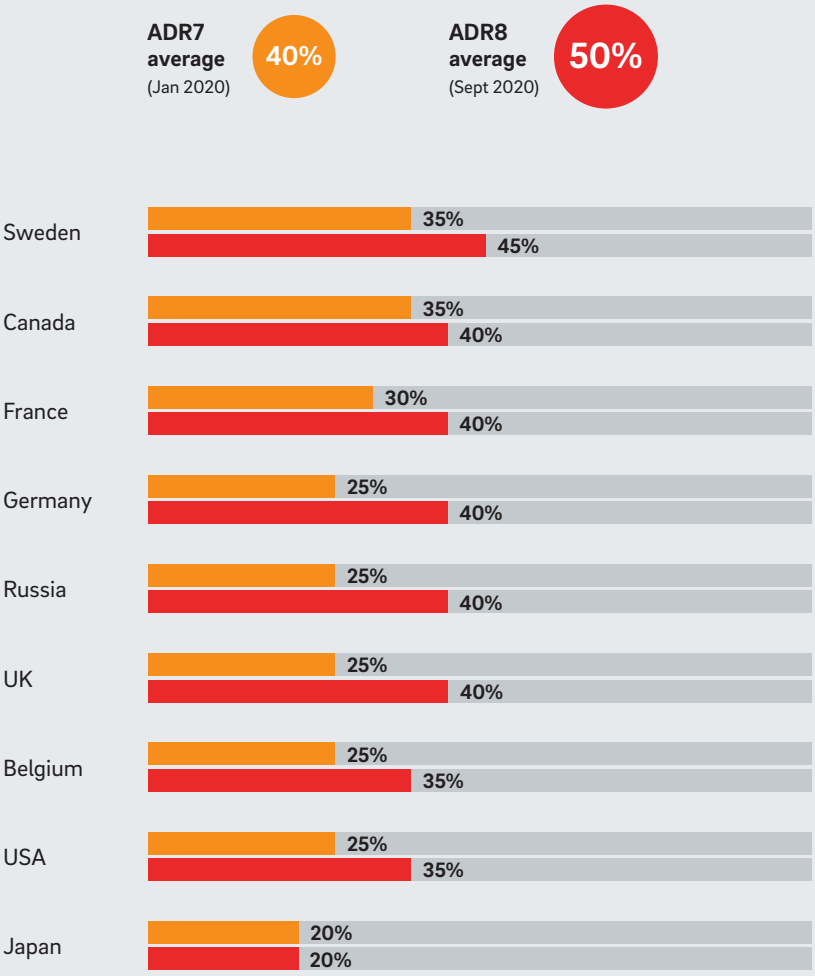
Percentage of potential car buyers

"Are you considering buying a battery electric vehicle as your next car?"



Source: Roland Berger Automotive Disruption Radar online survey

Tesla remains the dominant EV seller, with its models featuring heavily in lists of the top 5 manufacturers by EV sales in each country. Its Model 3 saloon is particularly prevalent, with sales in the US and China alone in the first half of 2020 reaching almost 90,000. Sales by traditional OEMs are also picking up, with Renault's Zoe performing well in European markets, for example. Chinese producers, such as BYD and GAC, are largely confined to the top 5 of the Chinese market.



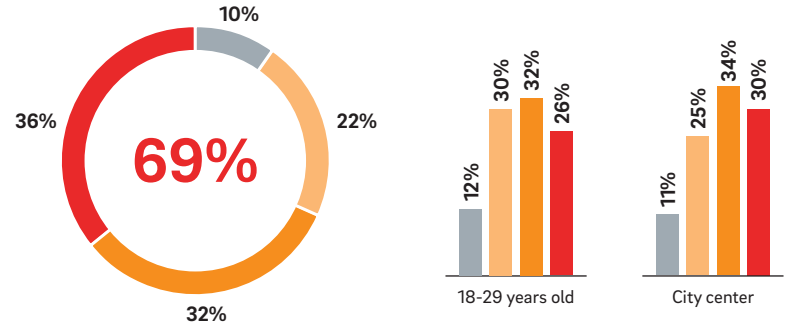
Robotaxis good, private cars better

As in previous editions, ADR8 measured mobility preferences, where Covid-19 also made its presence felt. Unsurprisingly, the desire to travel by private car has increased since the pandemic, with the importance of having access to a private vehicle rising from 69% to 76% overall. The increase was greatest among young people and city center dwellers.

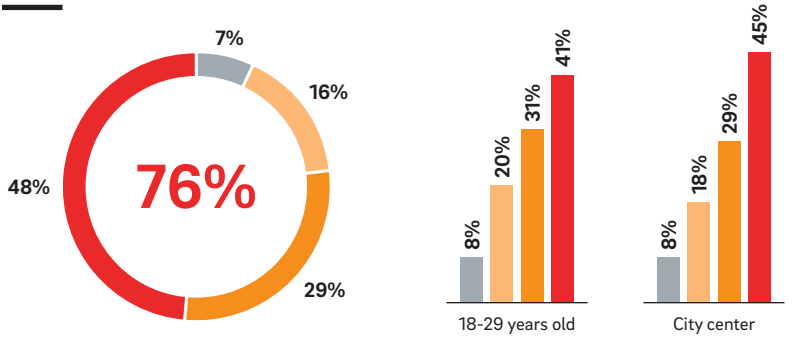
Private preferred: Access to a private car has grown in importance since the Covid-19 pandemic

Global average and selected demographic groups

"Before the Covid crisis started, how important was it for you to have access to a private vehicle?"



"Today, how important is it for you to have access to a private vehicle?"



Not important | Slightly important | Important | Very important

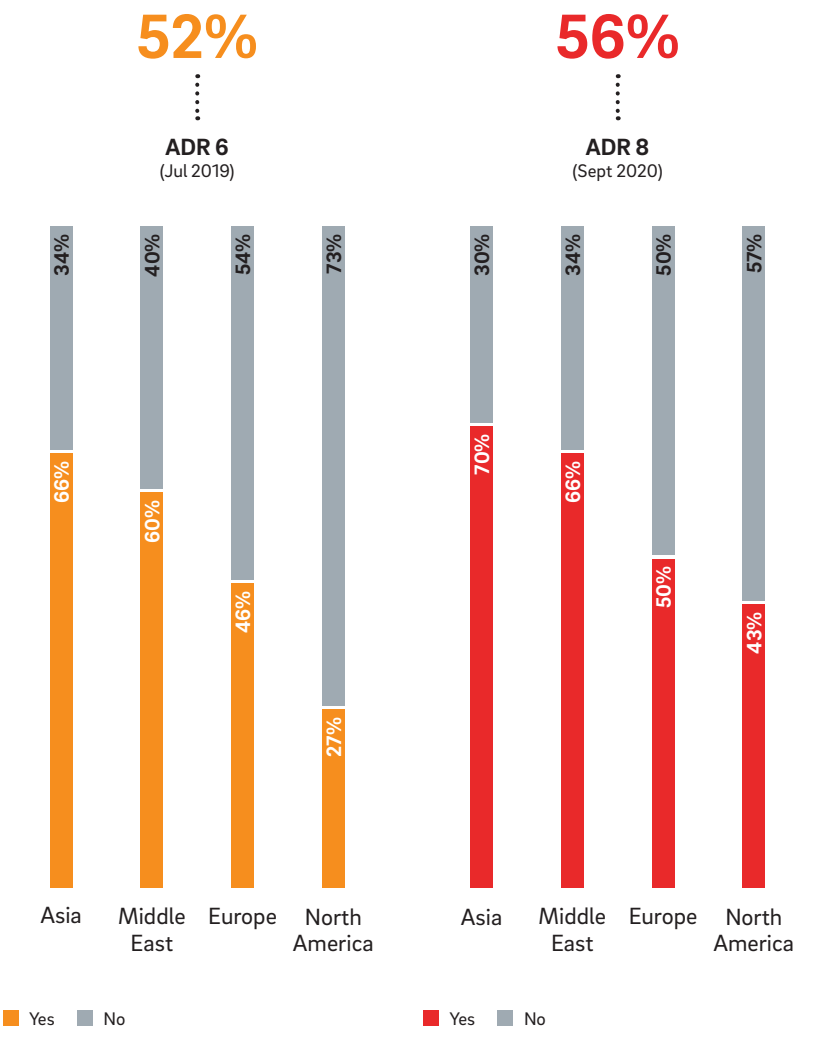
Source: Roland Berger online survey September 2020: 17,202 participants – Participants by country: Belgium 1,009; Canada 1,002; China 1,005; France 1,008; Germany 1,008; India 1,013; Italy 1,022; Japan 1,014; Netherlands 1,008; Russia 1,005; Saudi Arabia 527; Singapore 1,010; South Korea 1,010; Spain 1,013; Sweden 1,011; UAE 503; UK 1,015; USA 1,019

Despite this, autonomous mobility services don't seem to have suffered at the hands of Covid-19 – willingness to use autonomous robocabs rose to 56% overall from 52% in ADR6 (July 2019). Results were particularly high in Asia and the Middle East. So, respondents seem to want autonomous cars, but they are not giving up private vehicles.

Rise of the robocabs: Enthusiasm for robotaxi services has risen in the past year, particularly in North America

Global average and by continent

"Would you use a mobility service based on a fully autonomous robocab?[1]"



1 Autonomous driving taxis without a driver in the vehicle

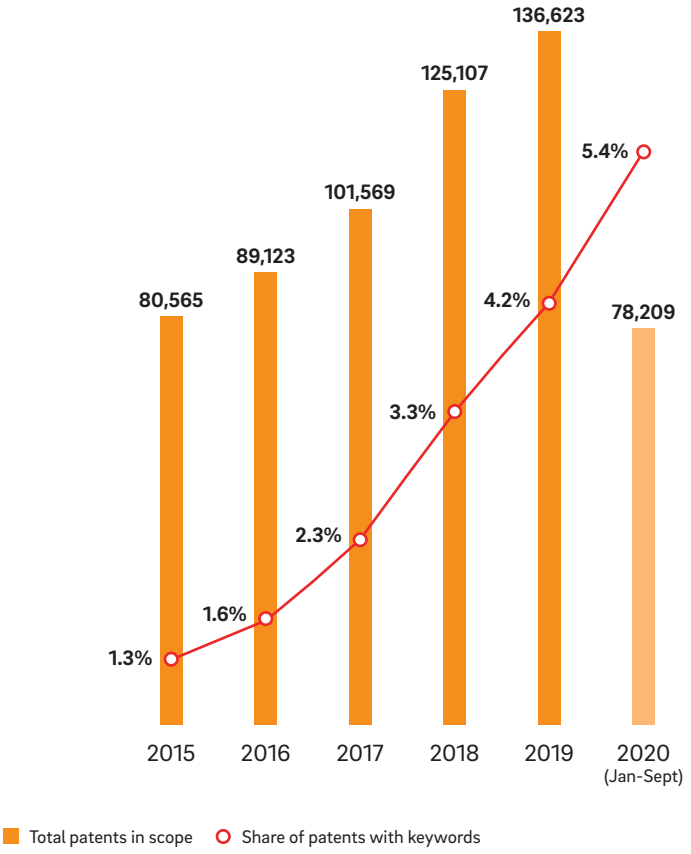
Source: Roland Berger Automotive Disruption Radar online surveys

Research & Development keeps on developing

Covid-19 also failed to dent autonomous mobility R&D activities. The number of full-time equivalent employees working in R&D jobs in the sector and listed on LinkedIn increased by 8% to 147,000 between the first and third quarter of 2020. Additionally, the number of registered patents related to autonomous vehicles/functions as a percentage of all registered driving technology patents reached an all-time high of 5.4%. It has risen in all eight ADR editions.

Patent pattern: The number of autonomous driving-related registered patents has grown every year since the ADR began

Autonomous driving-related patents as a share of all driving technology patents



Source: Patentinspiration, Roland Berger

How the industry is changing: Four real-life examples

While the ADR indicators and survey results suggest that Covid-19 has failed to halt the charge of autonomous mobility, it is real-life developments that prove it in practice, as demonstrated in our four examples.

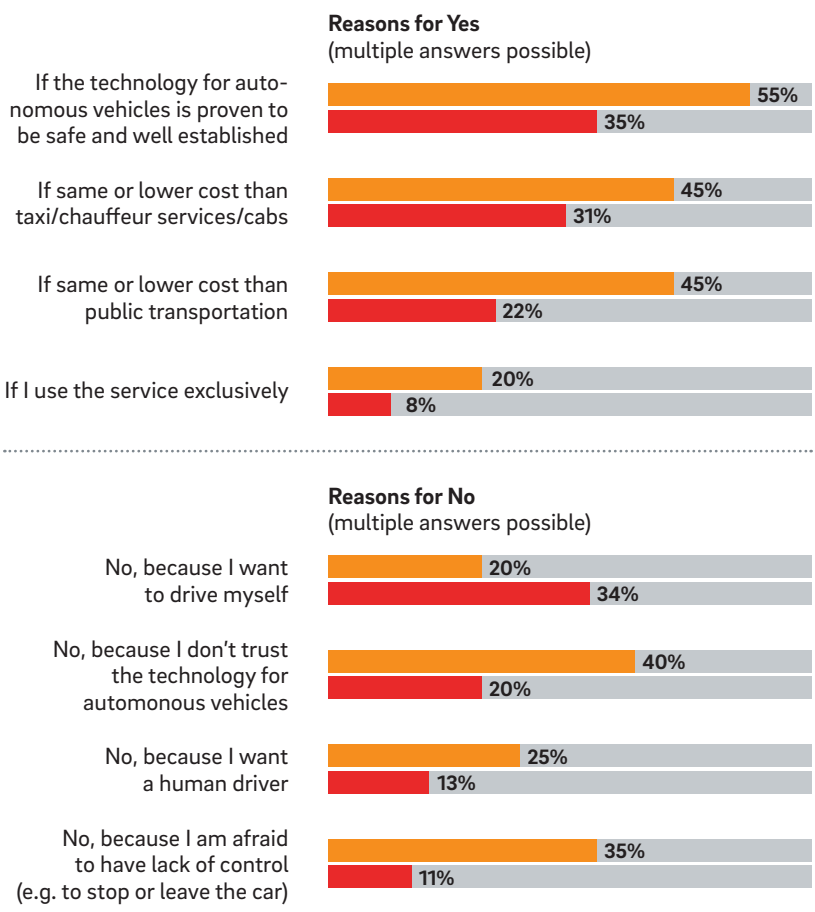
- **Commercialization of autonomous mobility services**
- **OEMs fall behind as new players enter software market**
- **Growing competition in the EV market**
- **The rise and rise of Tesla**

Commercialization of autonomous mobility services

After much trailing and hype, robotaxis are finally here. The Alphabet-owned autonomous driving technology firm Waymo, oft-mentioned in previous ADR editions, has launched a fully driverless service in the US, albeit almost 18 months later than promised. In October 2020, Waymo told Ars Technika, a technology magazine, that its vehicles are initially operating

For and against: Reasons for adopting or not adopting autonomous mobility have changed considerably in the past three years

Percentage of survey respondents



Source: Roland Berger Automotive Disruption Radar online survey

in a 50-square mile area covering four suburbs in Phoenix, Arizona, alongside a fleet of self-driving cars that have a safety driver. A spokesman said that before the pandemic, the company was providing "1,000 to 2,000 weekly rides in total, five to ten percent of which were fully driverless." The firm added that it expects to return to that volume by the end of 2020, and grow from there. It will now be interesting to see if Waymo can establish and sustain a viable business model. If it can, the firm will not only be a leader in autonomous driving technology, but also the commercial leader in the sector.

OEMs fall behind as new players enter software market

Big-name technology players are not only diving into the EV market – they are increasingly entering the OEM software market as well. In the biggest recent development, the US chip manufacturer Nvidia announced a partnership with Daimler, the manufacturer of Mercedes-Benz cars, to produce a software architecture for autonomous driving.

A key feature of the new platform will be its ability to update battery and driving software via the internet. For example, data for new features or regulations, such as autonomous parking or updated self-driving rules, can be downloaded via mobile networks as they become available and for the entire vehicle lifecycle. Previously, Mercedes updates were largely limited to infotainment apps.

The architecture is based on Nvidia's AI-based Drive platform. As with similar products, it offers a range of autonomous driving software, including a central computer to control sensors and AI functions, and reference architecture. Like Foxconn's platform, it is also open source. Drive should be available across Daimler's range of brands from 2024.

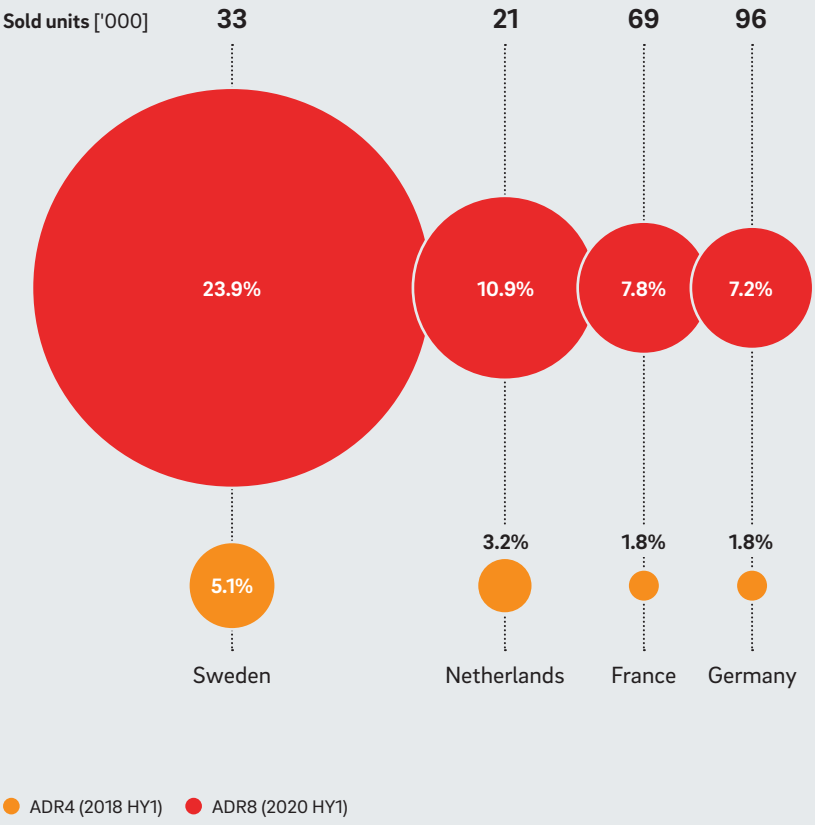
Daimler has said it aims to develop the most advanced architecture in the automotive industry. However, its new partnership shows that OEMs are having difficulties building in-house software competencies. This is allowing new players into the space, players that can better differentiate and therefore be more profitable than mere hardware manufacturers. OEMs will have to take measures to address this risk and defend margins.

Growing competition in the EV market

The EV market has seen a flurry of activity recently with the entrance of several new players. Most notable is that of Foxconn, the Taiwanese firm best known for making Apple iPhones. In October 2020, it unveiled its MIH Open Platform, an architecture consisting of EV hardware and software. But it has one major difference to typical closed EV systems, such as those used by Tesla. Foxconn will grant open-source access to third party developers and car companies to develop the platform, with the hope of making it the "Android of EVs".

Powering up: Electric vehicle sales have ballooned in most ADR countries since 2018, with Sweden way out in front

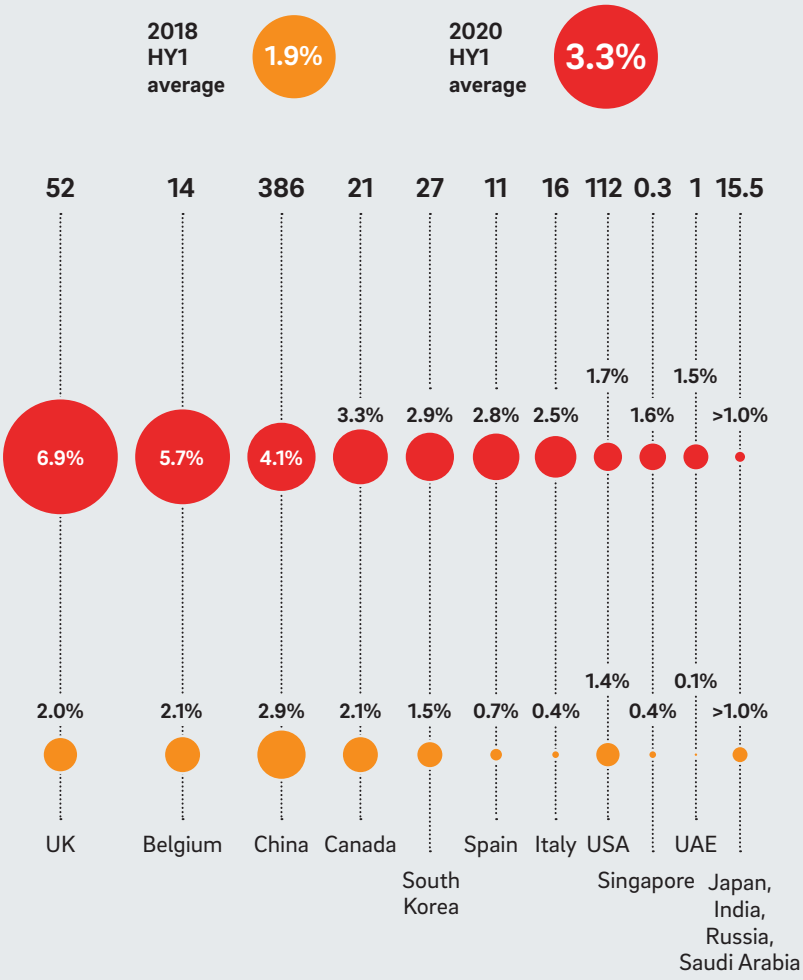
EV/PHEV/FCEV sales as percentage of total vehicle sales



Source: EV volumes, IHS, Roland Berger

Foxconn hopes this strategy will quickly lead to new functionalities, such as range improvements. It will layer and separate software and hardware so they can be developed independently and costs kept down. The firm will build EVs for others rather than produce its own EVs, with platforms developed for several models from minis to powerful AWDs. Foxconn is also partnering with several firms, including CATL and SES, to develop solid-state batteries by 2024.

As Foxconn already produces autonomous driving technology, the MIH Open Platform development marks the entrance of a major new industry player. It remains to be seen how established OEMs will react, especially in Asian markets.



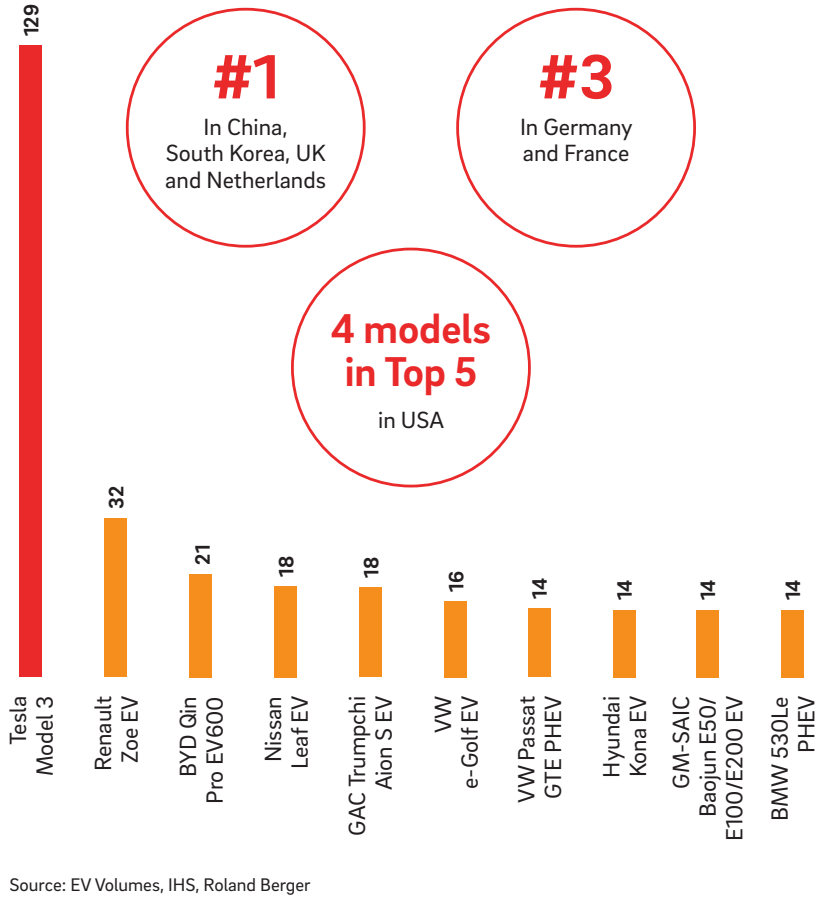
The rise and rise of Tesla

Investors love Tesla, and it seems that currently companies with a comparable business model can profit simply by being a "kind of Tesla". The valuations of EV makers NIO, XPeng and Li Auto, for example, exploded this fall on the back of strong delivery news. Other OEMs are now trying to piggyback on the US firm's success by copying its solutions. There are several reasons for this.

Tesla is primarily a technology company. It therefore views its business as much more than selling cars, and as such operates in other areas such as CO_2 emissions trading, data services, recycling, energy and even mining.

Top of the range: Tesla dominates sales of electric vehicles in the 18 ADR countries, but traditional OEMs and Chinese brands are catching up

Top 10 EV models sold sold in the 18 ADR countries from January to June 2020
(in thousand units)



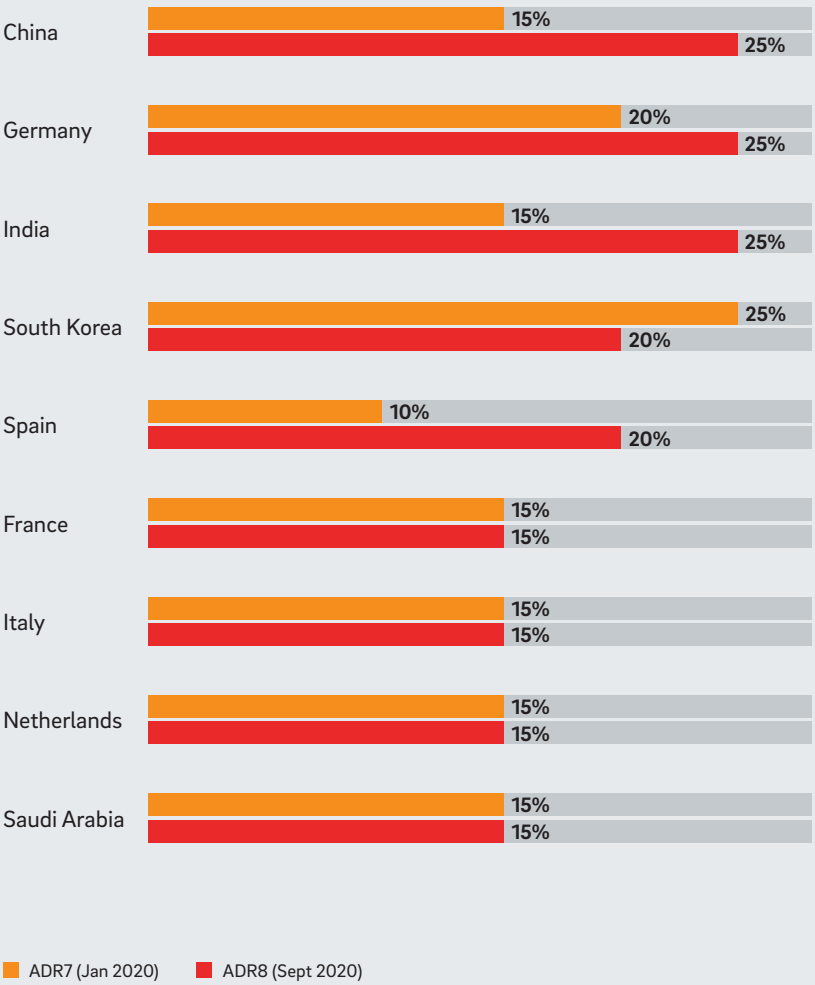
Source: EV Volumes, IHS, Roland Berger

But its cars are its stars, and by building its own EV platform and software it can offer unique services and features. In addition, vertical integration of key differentiating technology, especially around batteries and its e-powertrain, gives Tesla a competitive advantage in energy efficiency.

The company's unique manufacturing approach that focuses heavily on innovation also gives it an edge. For example, it uses die-cast vehicle

Digital growth: The number of cars bought through online sales channels increased across the board during 2020

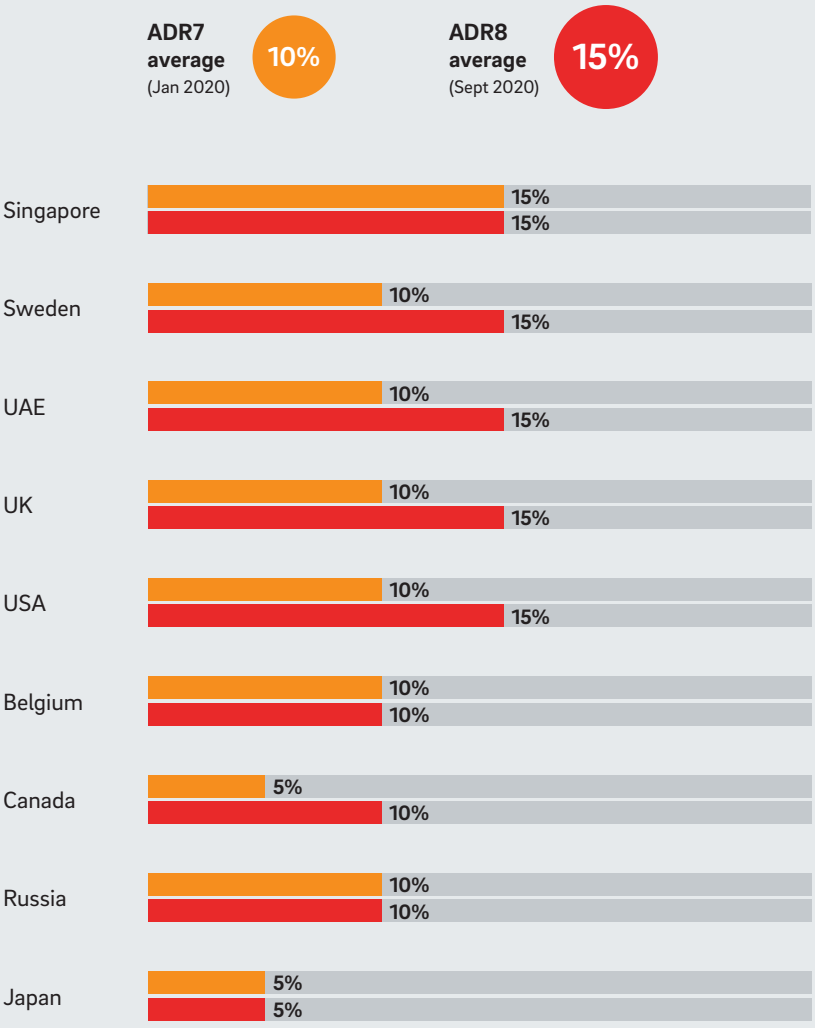
Percentage of sales completed online



Source: Roland Berger Automotive Disruption Radar online survey

body parts rather than spray-painting individual components to save time and money.

Lastly, its lean online-based sales network has been a boon during the pandemic, when dealerships were forced to close or wind down operations. This has made its lack of physical dealers a competitive advantage. As a result, more and more OEMs are likely to jump on the Tesla bandwagon.



It's clear from the ADR indicators and survey that the future of the automotive industry is (still) autonomous mobility. This is worrying for traditionalists, who know that none of the current major OEMs are technology leaders. It's even worse for pessimists, who can see that even premium OEMs, with their huge R&D budgets, are struggling to organically meet the required future competency levels. The likes of Foxconn moving into OEMs' core business of vehicle manufacturing is a further blow for the automotive establishment.

But on the positive side, these are companies well known for their manufacturing excellence and cost effectiveness. So it will be interesting to see how the major automotive firms defend themselves from this disruptor attack and ensure they are still producing competitive vehicles in the future.

To help companies adjust to the new normal in the automotive industry, including post-Covid strategies, disruptor threats and maintaining a competitive advantage, Roland Berger has developed its Automotive Triple Transformation framework. It aims to help senior automotive executives bring order to the complexity and equip their businesses for the challenges of the coming decade.

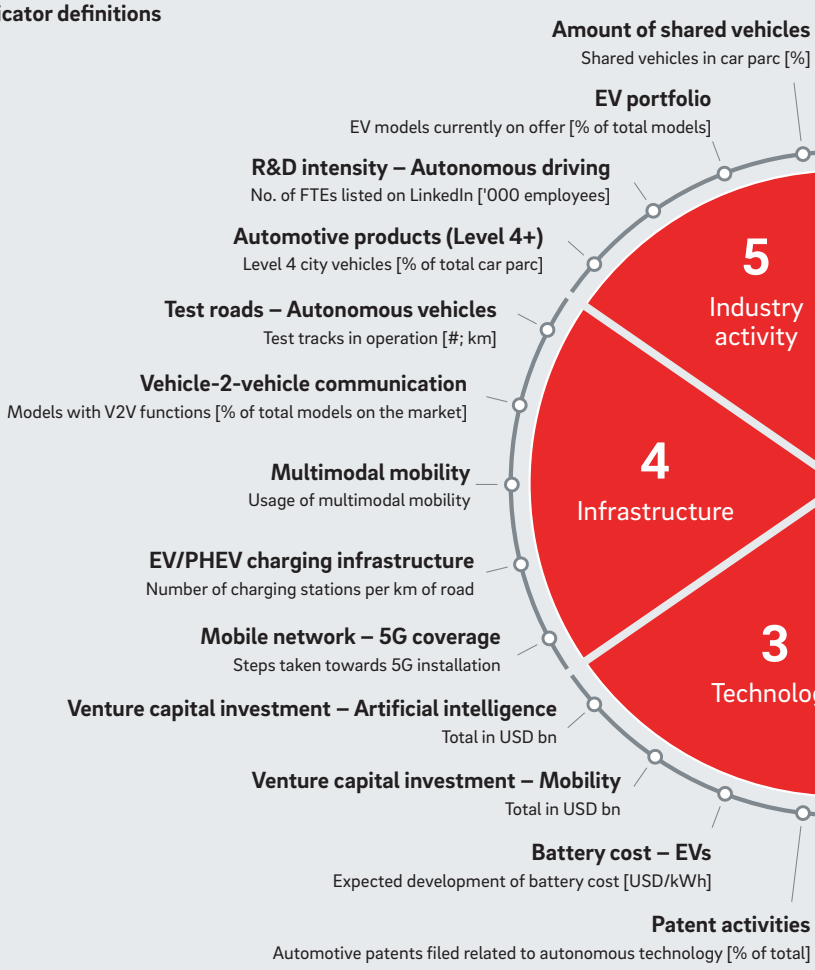
Photo tampatra/Getty Images

What is the Automotive Disruption Radar?

The Automotive Disruption Radar is a biannual analysis of market trends related to disruption in the global automotive industry. Its latest findings are based on field research and a survey of 17,000+ car users across 18 markets (Belgium, Canada, China, France, Germany, India, Italy, Japan, the Netherlands, Russia, Saudi Arabia, Singapore, South Korea, Spain, Sweden,

360-degree coverage: The Automotive Disruption Radar is based on the permanent screening of 26 indicators along five dimensions

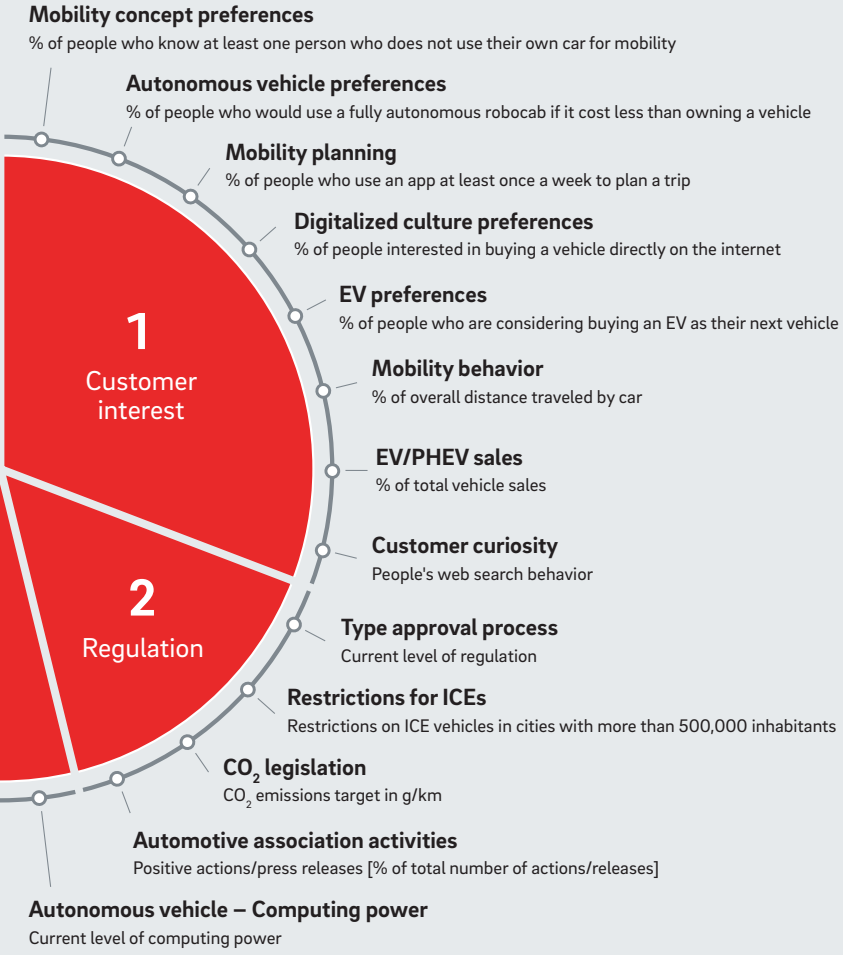
Indicator definitions



Source: Roland Berger

UAE, UK, USA). information is also drawn from external sources such as leading mobility experts and major industry reports. Each nation is scored along 26 indicators, grouped into five dimensions

The ADR aims to answer key questions such as: which factors are driving change in automotive ecosystems; how do these factors evolve over time; and what can decision makers do to best manage disruption? Ultimately, the ADR is a go-to decision-making tool for senior executives in the mobility sector.



Your contatcs

Dr. Wolfgang Bernhart
Senior Partner
Löffelstraße 46
70597 Stuttgart
Wolfgang.Bernhart@rolandberger.com
+49 711 3275-7421

Stefan Riederle
Principal
Sederanger 1
80538 München
Stefan.Riederle@rolandberger.com
+49 89 9230-8169

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Computer on Wheels series
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Turning OEMs into software-enabled companies

→ Automotive Triple Transformation framework

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Automotive Disruption MADE by RB
We believe that the combination of 4 dimensions (Mobility, Autonomous driving, Digitalization and Electrification) is likely to trigger a major disruption in the automotive industry over the next 15 years. Since 2016, we have been bringing together our experts from all around the world to try to make this new future and its implications more concrete, and to best support the key decision makers of the automotive industry.

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Roland Berger GmbH
Sederanger 1
80538 Munich
Germany
+49 89 9230-0

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