

AUTOMOTIVE
DISRUPTION
RADAR
#3

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Mobility services **move up a gear**

March 2018

Roland
Berger 

Mobility services move up a gear

THE TOP SPECS: REPORT SUMMARY

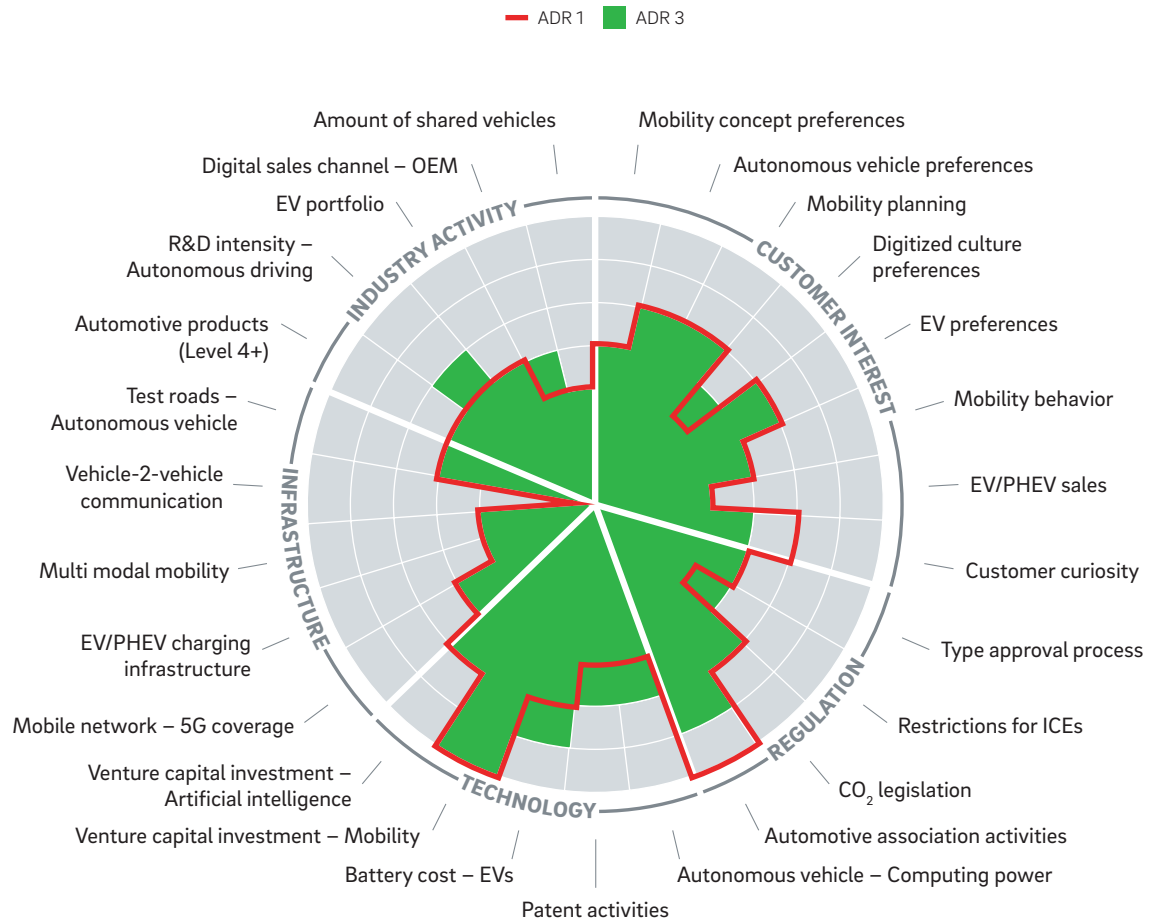
The global automotive industry has become all too used to shocks in the past couple of years. And now it needs to gear up for another one – the speed of change towards new "disruptive" mobility services such as autonomous driving and car sharing.

The third edition of the Automotive Disruption Radar (ADR), a twice-yearly report on mobility in 13 countries from the US to Japan, shows an unprecedented shift to the new technologies, one that has surprised even industry analysts.

In the 12 months since the first edition (ADR1) was published, customer interest in new mobility services has jumped: the number of US city center dwellers who would switch from car ownership to autonomous car services if they cost less rose by a tenth to 40%, for example, while the same figure for young Chinese leapt by more than half to 26%. On average, the figure was 45%.

AUTOMOTIVE DISRUPTION RADAR – ISSUE #3

GLOBAL AVERAGE



Source: Roland Berger

In addition, the share of Germans that they use car-sharing, ride-hailing or taxi services has doubled to 3.7%, and the corresponding figure leapt by more than a third to 6.1% in the US. In a new question, a global majority – 55% – said they would be happy to use robocabs.

ADR3's technology-related indicators underscore the change of focus from an industry perspective. They show that the number of people working in the mobility R&D sector as listed on LinkedIn increased by almost a quarter to 51,000 between 2016 and 2017.

And venture capital in mobility received a huge boost: it went from USD 9.3 billion to USD 21.4 billion in the same period – a whopping 130% increase.

The pace of change in regulations – the key enabler of mobility services – is more modest, but still significant. For example, since ADR2 was published in September 2017, the number of countries having completed the necessary regulatory groundwork to allow the public and commercial testing of autonomous vehicles has risen to four of the 13.

When it comes to concrete action, the past six months have shown that driverless mobility has gone from dream to reality. Since ADR2, Google's autonomous car company Waymo has announced plans to launch the world's first driverless ride-hailing service in spring 2018, for example, and General Motors announced plans to introduce autonomous cars from 2019.

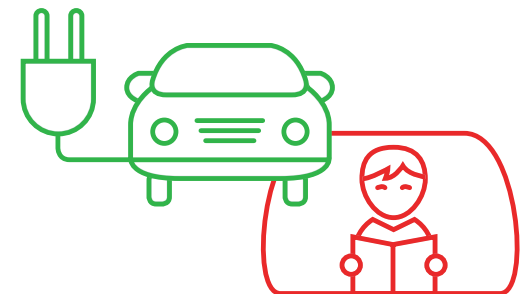
Global figures in ADR3 also shine a light on electric vehicle global adoption progress: from the survey, we find that 40% of people from the 13 countries are considering buying an electric vehicle as their next car and the number of EV models available has risen from 8% of the total a year ago to 10%. Overall, Asian countries lead the rankings: China again finished top, closely followed by South Korea and Singapore, while next came the Netherlands and then Sweden.

In summary, mobility is upwardly mobile, with the autonomous driving juggernaut moving at full speed. While Asian countries are leading the way in opening their roads to self-driving vehicles, again scoring highest in ADR3, it is expected that mature markets will host the first commercial service. The race is on.

UNDER THE HOOD: DETAILED REPORT FINDINGS

ADR3 builds on the two previous editions, which were carried out in 11 countries. One key finding of ADR2 was that Asian countries were taking a lead in autonomous driving while mature markets were distracted by the fallout from the Dieselgate emissions-rigging scandal. ADR3 suggests this trend is continuing, but that European countries in particular are fighting back.

As with all ADRs, countries were scored on 27 indicators covering the five dimensions. Final rankings are shown on page 8. The key finding, however, is the startlingly rapid shift towards new mobility services since ADR1 in March 2017, especially in the dimensions of Customer interest, Technology and Regulatory.



CUSTOMER INTEREST

This is the key indicator for deciphering mobility trends. Asked for the first time in an ADR if they would use robocabs, a global majority (55%) said yes, with China at 80%. Only four countries (USA, UK, Netherlands and Japan) have a majority against. The most important condition for using a robocab is the proven safety of the technologies used (55%). The main reason for not using them was the pleasure of driving (35%). On average, men would be more willing to use robocabs than women, by 58% to 52%.

Besides this, we now have a majority of people in the Netherlands, France, Japan and South Korea who would rather switch from car ownership to using fully autonomous robocabs if they were cheaper. The inclination to give up on cars in favor of robocabs was higher among rural dwellers (50%) and older people (50% of 50-69-year-olds). However, growth in the past 12 months was biggest among the key target groups of young people and city center dwellers.

ADR3 also shows that average levels of interest in new mobility services – measured by the number of people who know at least one person who switched from private cars to a new mobility concept – remain largely unchanged from ADR1 at 55%. The US registered the biggest increases, but overall, Asian customers are still more open to MADE (mobility, autonomous, digitalized, electrified) trends.

Indicator 2:

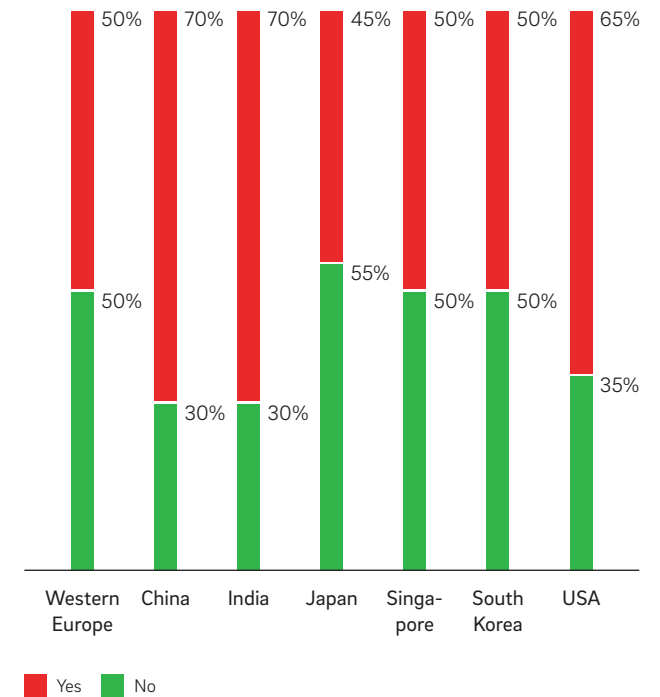
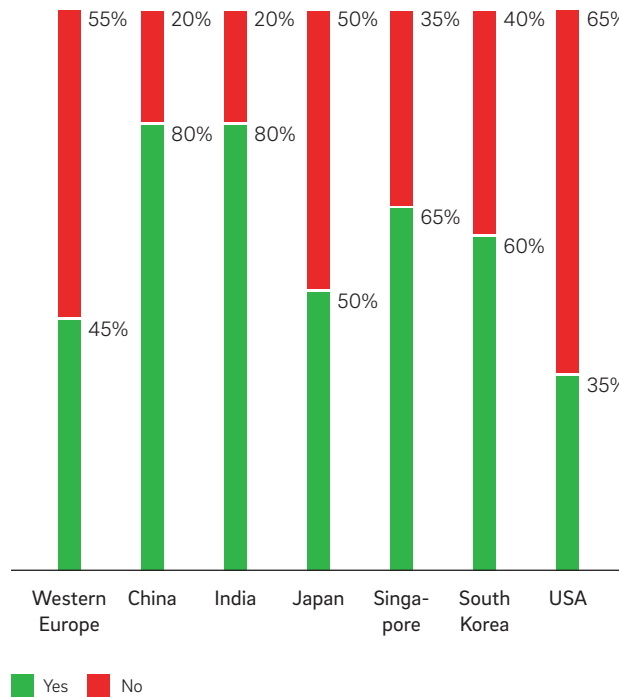
Autonomous vehicle preferences

Share of potential robocab¹ users

Asia shows highest interest in robocab services

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

"Would you still buy a car again if fully autonomous robocabs could be used at a lower cost per trip than your own car?"



¹ Autonomous driving taxis without a driver in the vehicle

Source: ADR survey, Roland Berger

When it comes to the share of people recently having used car-sharing, ride-hailing or taxi services, key target groups also saw a jump. In addition to the headline figures above, usage among US city center dwellers jumped from 8.9% in ADR1 to 13%, and the same figure for Germany almost doubled from 2.7% to 5.1%. The overall figure for China rose from 16.1% to 18.3%.

The bad news for mobility service providers is that using one's own car/traveling in a friend's car remains the dominant form of transportation, with a 55% share (others include public transport and new mobility services). In the US the figure is 80%, and all other Western countries are above 50%. But the good news is that the share is below 50% in all Asian countries.

Other customer interest results show lower but equally surprising interest in new mobility services. A global average of 15% of people are willing to buy a car online, up from 10% a year ago, and 40% would consider buying an electric vehicle as their next car, as against 35% in ADR1. Price remains the main obstacle.

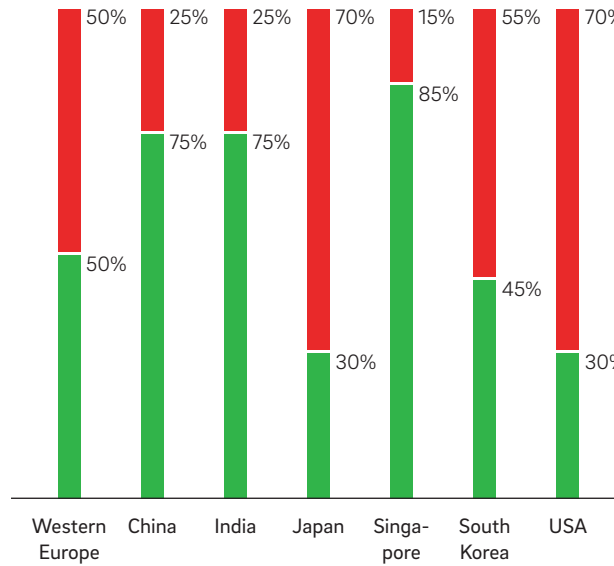
Indicator 1:

Mobility concept preferences

Share of people knowing at least one person who gave up on cars

Singapore, China and India show most interest in other mobility concepts

"How many people do you know who did not and don't want to buy a car because they exclusively use other mobility concepts (e.g. car sharing, public transport, taxi, etc.)?"



Legend: At least one (green), None (red)

Source: ADR survey, Roland Berger

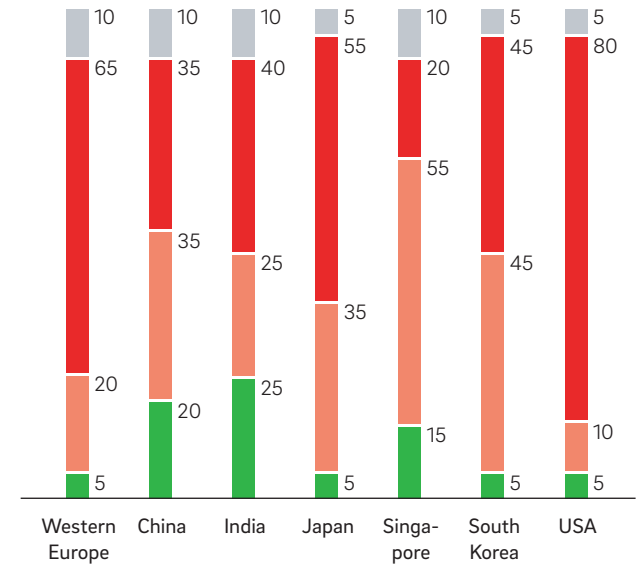
Indicator 6:

Mobility behavior

Share of car driving vs. other modes

US mobility is dominated by car driving – Asian countries clearly below Western regions

"Thinking about the last couple of weeks, what % of distance (miles or kilometers) driven did you use which modes of transport for?"



Legend: Other (grey), Car (red), Public transportation (orange), Demand-driven modes (like car sharing, ride hailing, taxi) (green)

REGULATION

A country's regulatory framework is currently the key factor in the success or failure of its mobility services. To date, only the US has given the full regulatory go-ahead for autonomous driving, with all other countries having some form of restrictions. However, ADR3 shows clear overall progress in this area in the past 12 and even six months.

There is also a slow but sure trend towards tighter restrictions on ICE vehicles. Several major cities, including Paris, announced plans in the past six months to phase them out, while German cities are expected to react to the recent German court decision banning diesel vehicles from city centers. Also, Singapore announced plans to stop registering any new private cars in February 2018. China, meanwhile, introduced an e-mobility quota, with car makers expected to produce a 10% share of electric vehicles in 2019 and 12% in 2020.

TECHNOLOGY

Technology is the key factor in developing new mobility services. In addition to a 22.5% rise in R&D personnel, ADR3 shows there has also been good progress in increasing autonomous vehicle computing power, for instance. This includes the recent announcement of NVIDIA's Drive PX Pegasus system, the world's first artificial intelligence computer designed to operate all aspects of a self-driving car.

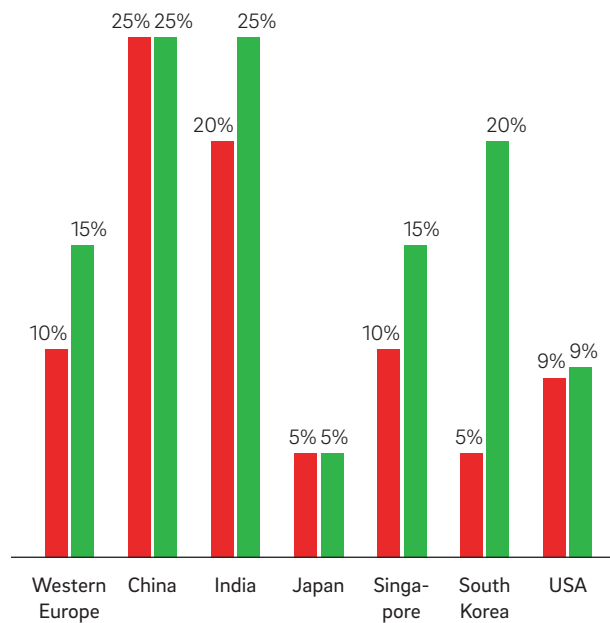
Indicator 4

Digitalized culture preferences

Share of people willing to buy their car online

General increase over the last 12 months in interest in buying cars online

"During your vehicle purchasing journey, will you use the internet to buy a car?"



■ Yes, ADR 1 ■ Yes, ADR 3

1 Electric vehicle

Source: ADR survey, Roland Berger

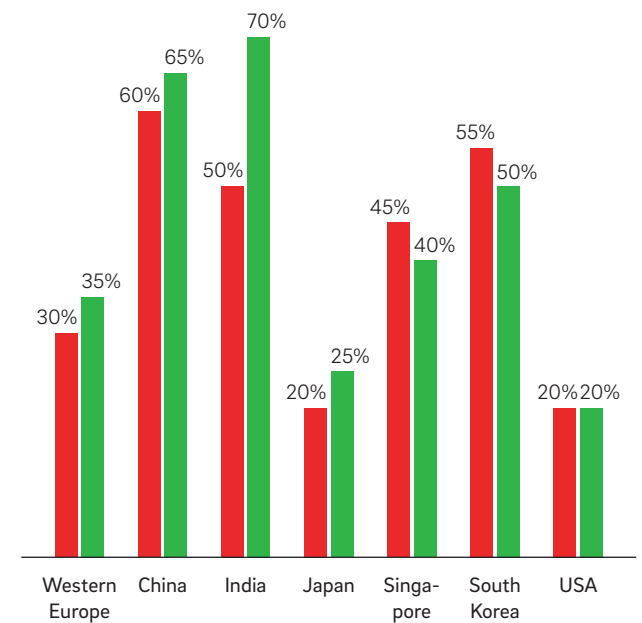
Indicator 5

EV¹ preferences

Share of potential EV buyers

Clear increasing interest in buying an EV globally, albeit to differing degrees – top reasons for not considering EV remain high price and insufficient infrastructure

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



■ Yes, ADR 1 ■ Yes, ADR 3

1 Electric vehicle

Source: ADR survey, Roland Berger

The money to fund such technologies and mobility services continues to pour in. As mentioned in the headline figures, venture capital funding rose to USD 21.4 in 2017. The biggest recipient, receiving a total of USD 9.5 billion, was Chinese ride-sharing service Didi, followed by US ride-hailing firm Lyft at USD 2.1 billion and Singapore-based counterpart Grab at USD 2 billion.

Artificial intelligence firms also benefited, with investments jumping 107% to USD 3.2 billion between 2016 and 2017. Chinese object-recognition specialist SenseTime received almost USD 700 million.

INDUSTRY ACTIVITY

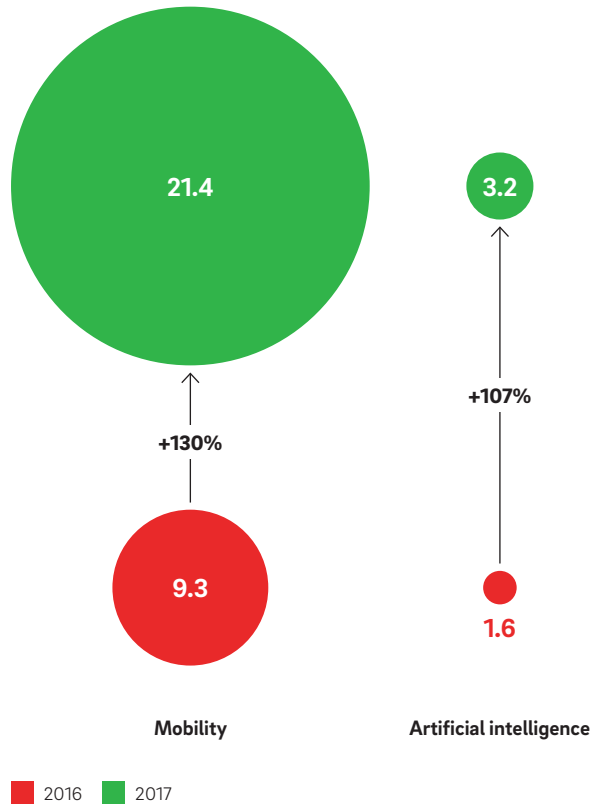
Industry activity determines what actually happens in the mobility sector. However, ADR3 shows limited movement in this dimension.

Indicators demonstrate that MADE trends are continuing to influence manufacturers, who are pushed to adopt new models by regulation and changing fashions. But little changed from ADR2. Except for the increase in R&D personnel and electric vehicle models mentioned in the headline figures, and a modest development in online sales techniques developed, for example through partnerships like that between Fiat and Amazon, most other indicators – such as changes in shared vehicle fleets – stagnated.

Indicator 16 & 17 Venture capital investment

USD billions in mobility & artificial intelligence¹

Venture capital in our MADE dimensions has more than doubled in one year



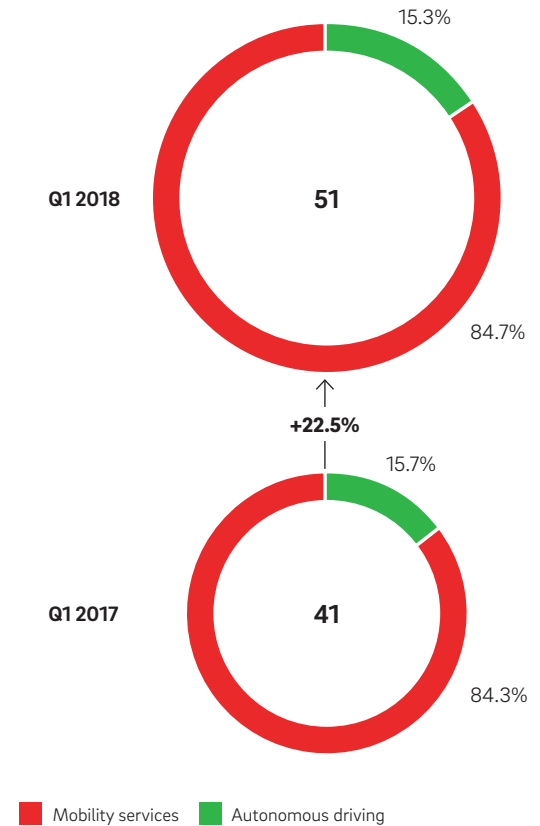
¹ Including investments in smart cars, AI in transportation and autonomous vehicles technologies, and AI infrastructures (natural language processing, computer vision, etc.)

Source: Tracxn, Roland Berger

Indicator 24 R&D intensity

Number of employees listed in LinkedIn (thousands)

Continuous increase of R&D resources working on mobility services and autonomous driving



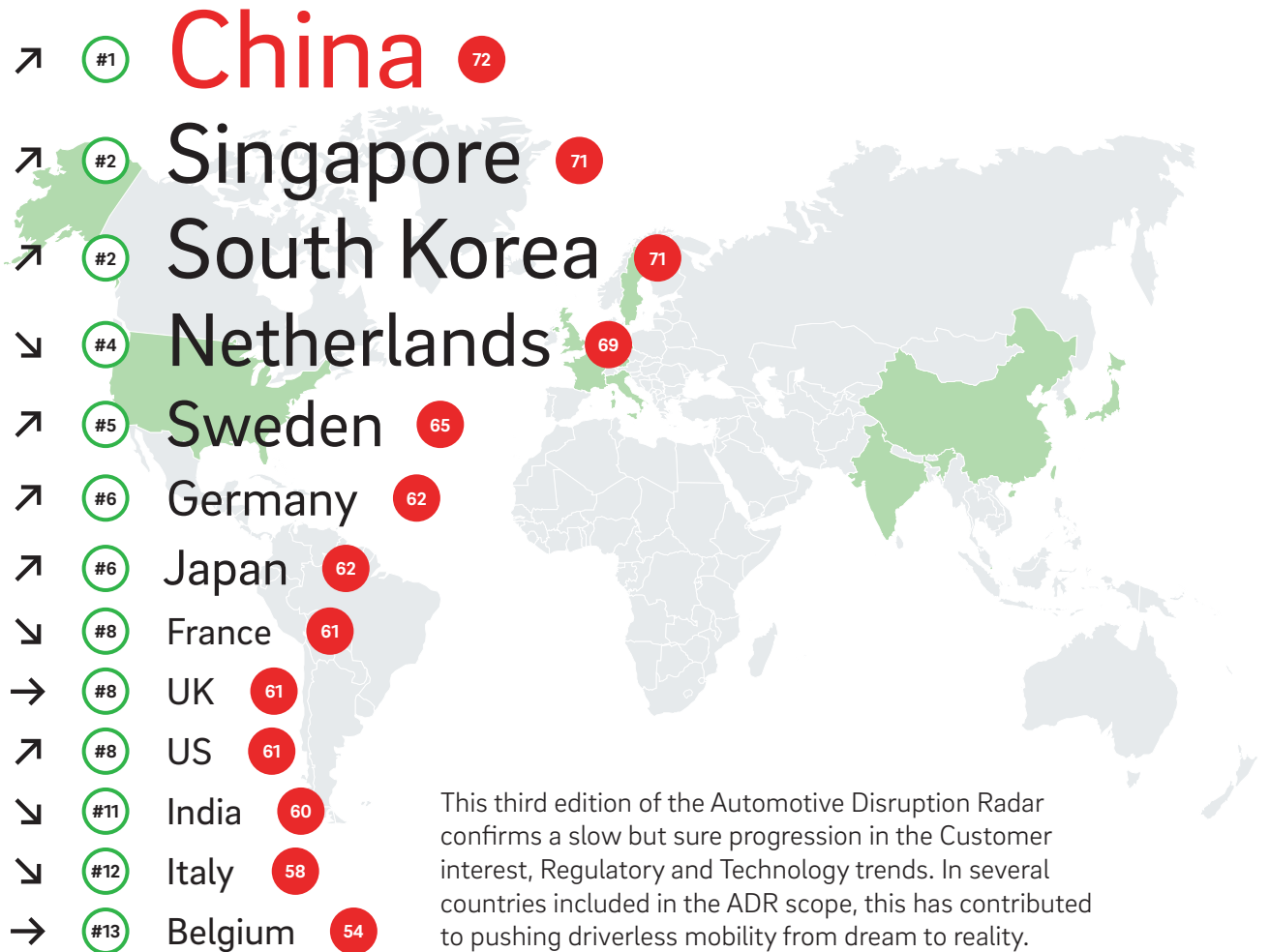
Source: LinkedIn, Roland Berger

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 findings are based, among other sources, on a survey of 13,000 car users in 13 countries (Belgium, China, France, Germany, India, Italy, Japan, Netherlands, Singapore, South Korea, Sweden, UK, USA). The ADR 27 indicators are grouped into five dimensions:

- **Customer interest:** Do people want autonomous vehicles and to what extent?
- **Regulation:** What are the regulatory conditions?
- **Infrastructure:** How developed is the infrastructure for autonomous vehicles?
- **Technology:** How far advanced is the technology for autonomous driving?
- **Industry activities:** Which solutions have been announced or already exist?

Country ranking



This third edition of the Automotive Disruption Radar confirms a slow but sure progression in the Customer interest, Regulatory and Technology trends. In several countries included in the ADR scope, this has contributed to pushing driverless mobility from dream to reality.

→ Trend vs. last issue ○ Rank ● Score

Source: Roland Berger

Automotive Disruption Radar provides guidance

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? Beyond the survey, information is also drawn from external sources such as leading mobility experts and major industry reports. Ultimately, the ADR is a go-to decision-making tool for senior executives in the mobility sector.

Each nation is scored along the 27 indicators. This framework allows us to conduct a fact-based measurement to try to determine which nation is most likely to introduce autonomous mobility first.

Spot facts by country



CHINA

#1

- Electric vehicle sales in China have gone from 1.3% to 2.1% in one year, while the EV charging station network has doubled since July, making it the only ADR country with a sustained upward trend
- China leads with Singapore in relative size of the shared vehicles fleet, with the share having risen from 8.3% to 10.3% in the past year



SINGAPORE

#2

- Singapore shows the highest level of buy-in to new mobility services, this mode of transport accounting for 20% of total journeys
- Singapore has the highest proportion of shared vehicles, at more than 11%



SOUTH KOREA

#2

- While no South Korean cities planned to implement ICE restrictions six months ago, ten will do so from January 2018
- South Korea is still the leading country in offering test tracks for autonomous vehicles



NETHERLANDS

#4

- After topping the rankings in ADR2, the Netherlands stagnated in ADR3 and has been overtaken by several Asian countries – it is still the most advanced ADR country when it comes to type approval for autonomous vehicles
- EV sales in the Netherlands have risen to 2% of total vehicle sales even though subsidies fell



SWEDEN

#5

- Sweden had the highest number of people who know at least one person who switched from private cars to a new mobility concept, at 80%
- Sweden has the highest share of EV sales among the 13 ADR countries, reaching 4.7% in 2017



GERMANY

#6

- Despite strong interest from customers in new mobility services (60% of people know at least one person willing to give up cars in favor of them), Germany still has a very limited proportion of shared vehicles, currently below 1%
- Germany has just a 1.6% sales rate of electric vehicles despite having one of the highest numbers of EV models (13.3%) and rate of charging stations (3.8 per 100km) in the ADR

Spot facts by country

 **JAPAN**

#6

- Japan has shown an impressive increase in autonomous vehicle testing in the past year, particularly in pilots for rural areas
- Despite a high level of activity in autonomous driving, Japan has shown no signs of introducing ICE restrictions

 **FRANCE**

#8

- Only 30% of French people are interested in buying an electric vehicle as their next car despite the country having one of the highest numbers of EV models in the ADR
- More than 11 test tracks were opened in France in the second half of 2016

 **UK**

#8

- The UK leads the way in online car sales, with an increasing number of manufacturers offering the service
- People in the UK are not convinced by electric vehicles: only 20% say they are considering buying one

 **USA**

#8

- Despite being home to Tesla, the US has a very limited charging network, with just 0.3 charging stations per 100km
- The number of people living in US city centers who know at least one person who gave up their car for another mode of mobility is up to 50% from 35% a year ago

 **INDIA**

#11

- Despite high-profile government policies, India has a decreasing number of electric vehicle models and infrastructure
- Some 65% of Indian car users use a mobility app at least once a week

 **ITALY**

#12

- Italians are among the most curious about new mobility trends, recording high numbers of web searches on the subject
- However, the country offers insufficient conditions for enabling autonomous mobility business models by comparison with other countries

 **BELGIUM**

#13

- About 7 in 10 Belgian car users said they did not have a choice of transportation mode for more than 40% of their journeys
- Belgium is one of only three countries with no public test tracks for autonomous vehicles

List of all indicators and measures



○ Indicators ○ Measures

Authors

Dr. Wolfgang Bernhart

Senior Partner

+49 711 3275-7421

Wolfgang.Bernhart@rolandberger.com

Stefan Riederle

Senior Project Manager

+49 89 9230-8169

Stefan.Riederle@rolandberger.com

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Roland Berger has been helping its clients to manage change for half a century. Looking forward to the next 50 years, we are committed to supporting our clients as they face the next frontier. To us, this means navigating the complexities that define our times. We help our clients devise and implement responsive strategies essential to lasting success.

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PUBLISHER

ROLAND BERGER GMBH

Sederanger 1

80538 Munich

Germany

+49 89 9230-0

www.rolandberger.com



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. In 2018, we are 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.