What's ahead for fully autonomous driving
Consumer opinions on advanced vehicle technology
Perspectives from Deloitte's Global Automotive Consumer Study
On the road with consumers worldwide

Consumers are at the heart of the extended automotive value chain, which generates trillions of dollars for auto manufacturers, suppliers, dealers, financial institutions, oil companies and a host of other organizations.¹

Many companies that are part of this value chain are undergoing massive change in response to new technologies and new models for mobility that are coming to market at an exponentially faster pace and fundamentally transforming the movement of people and goods unlike anything seen since the dawn of the 20th century.

Consumers will ultimately choose the winners and losers among the companies and brands vying to deliver convenient, low-cost and customized mobility solutions. Consumers have the power to fall in love with innovations that are more economical or make their lives easier or safer, and then propel the brands that create those innovations to globally iconic levels. They can become lifelong loyal customers, and they can just as easily turn their backs on products, services and companies they’ve trusted for decades. And that can happen faster and faster in this rapidly changing environment.

Deloitte’s Global Automotive Consumer Study builds on automotive consumer research Deloitte’s Automotive practice has been conducting since 2009. Informed by a continual outreach to global consumers through focused modules that survey consumers multiple times a year, Deloitte’s Global Automotive Consumer Study delves into topics like consumers’ interest in vehicle technologies, mobility choices, willingness to pay and customer digital engagement. Our research platform also allows for the rapid fielding of modules to test themes and trends that may emerge at different points in time, while maintaining a core of longitudinal data for comparisons over time. The result is a constant stream of data that helps deliver insight into consumers’ mobility choices, and the factors that influence those decisions.

The following pages explore consumer interest in advanced vehicle technologies, including self-driving technology, advanced safety and powertrain systems, cockpit technologies and more. We highlight which technologies consumers’ desire most, how much they are willing to pay for those features, their trust (or lack thereof) in full self-driving technologies, and who they trust to bring those technologies to market. We focus on six countries – the United States, Germany, Japan, South Korea, China and India in this report, and compare and contrast consumer sentiment in these markets – as a proxy for consumers worldwide – while 17 countries and over 20,000 consumers participated in the overall study.

Our hope is that you find these latest insights exploring consumers’ technology preferences useful, and continue to look to Deloitte’s Global Automotive Consumer Study, and our global Automotive practice for the latest perspectives on how consumers worldwide are approaching their mobility choices.

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What’s ahead for autonomous vehicles?

Today, there is a lack of consensus among consumers and their most preferred advanced vehicle technologies, and ...  

Interest in different levels of autonomous vehicle technology varies across global markets. Consumers in China and India appear most interested – perhaps due, in part, to the high number of accidents and road fatalities caused by human error.

There is significant opportunity for automakers to capitalize on the success of individual self-driving features such as self-parking and lane control.
... enthusiasm for fully autonomous vehicles has flattened and even declined in several markets

Although interest in full self-driving capabilities has risen in both China and the US since 2014, the same cannot be said for other global markets, where interest has remained flat or declined, according to our survey.

Gen Y/Z consumers are generally more interested in fully autonomous vehicles

Consumer interest in fully autonomous vehicles, by generation

Source: Deloitte Global Automotive Consumer Study
Many consumers remain skeptical about a self-driving car’s safety

Despite consumer interest today in fully autonomous vehicles, they have concerns with safety. And ...

While preference today for full self-driving vehicles varies, consumers at present appear consistent in their concerns regarding the safety of fully autonomous vehicles.

**Percentage of consumers who feel full self-driving vehicles will not be safe**

South Korea: 81%
Japan: 79%
US: 74%
Germany: 72%
India: 64%
China: 62%

Source: Deloitte Global Automotive Consumer Study
... consumer opinion appears to diverge on whom to trust to bring self-driving cars to market

In several global markets, opinions diverge between auto and tech companies in terms of who people trust the most to make fully self-driving cars a reality of everyday life.

In some of the largest automotive markets, consumers appear to trust tech companies more than (or as much as) they trust automotive companies to bring fully autonomous technologies to market.

Types of companies consumers trust most to bring fully autonomous vehicles to market

<table>
<thead>
<tr>
<th>Country</th>
<th>Traditional car manufacturer</th>
<th>New autonomous company</th>
<th>Existing tech company</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>76%</td>
<td>16%</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>51%</td>
<td>26%</td>
<td>20%</td>
<td>3%</td>
</tr>
<tr>
<td>US</td>
<td>47%</td>
<td>27%</td>
<td>20%</td>
<td>6%</td>
</tr>
<tr>
<td>South Korea</td>
<td>44%</td>
<td>48%</td>
<td>7%</td>
<td>1%</td>
</tr>
<tr>
<td>India</td>
<td>34%</td>
<td>29%</td>
<td>36%</td>
<td>1%</td>
</tr>
<tr>
<td>China</td>
<td>27%</td>
<td>58%</td>
<td>15%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Deloitte Global Automotive Consumer Study
More experience and successful examples would help build consumer trust

Having an established track record of fully self-driving vehicles operating safely on public roads is an important factor that could encourage consumer support for autonomous vehicles.

Percentage of consumers who feel an established track record of fully autonomous cars being safely used would make them more likely to ride in one

- China: 81%
- India: 74%
- South Korea: 70%
- US: 68%
- Japan: 59%
- Germany: 47%

Source: Deloitte Global Automotive Consumer Study
Percentage of consumers who feel they would be more likely to ride in a fully autonomous vehicle if it were offered by a brand they trust

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>79%</td>
</tr>
<tr>
<td>China</td>
<td>77%</td>
</tr>
<tr>
<td>South Korea</td>
<td>54%</td>
</tr>
<tr>
<td>US</td>
<td>54%</td>
</tr>
<tr>
<td>Japan</td>
<td>46%</td>
</tr>
<tr>
<td>Germany</td>
<td>34%</td>
</tr>
</tbody>
</table>

Source: Deloitte Global Automotive Consumer Study
On the road to a fully autonomous future

**Consumer preferences indicate that the road to self-driving must be paved with safety**

Across the six focus countries, four technologies delivering advanced, predictive safety capabilities were consistently ranked as the most preferred when compared to a variety of advanced technology features.

Also noteworthy is what is not useful. For example, features that provide customized entertainment, notification of places of interest and technologies that manage daily activities are universally viewed as least useful – an important finding for manufacturers considering investing resources to offer these features in future vehicles.
**Advanced technology features that consumer say are most and least useful**

<table>
<thead>
<tr>
<th>Technology feature</th>
<th>Category</th>
<th>US</th>
<th>Germany</th>
<th>Japan</th>
<th>South Korea</th>
<th>China</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognizes objects on road and avoids collision</td>
<td>Safety</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Informs driver of dangerous driving situations</td>
<td>Safety</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Blocks driver from dangerous driving situations</td>
<td>Safety</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Takes steps in medical emergency or accident</td>
<td>Safety</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Diagnoses and sends maintenance notifications</td>
<td>Connectivity</td>
<td>5</td>
<td>14</td>
<td>12</td>
<td>5</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Enables remote shutdown of stolen vehicle</td>
<td>Cyber security</td>
<td>6</td>
<td>13</td>
<td>8</td>
<td>14</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Helps enhance fuel efficiency</td>
<td>Fuel efficiency</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>11</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Enables vehicles-to-vehicle and road communication</td>
<td>Connectivity</td>
<td>8</td>
<td>10</td>
<td>5</td>
<td>9</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Prevents hacking into vehicle systems</td>
<td>Cyber security</td>
<td>9</td>
<td>15</td>
<td>19</td>
<td>17</td>
<td>22</td>
<td>13</td>
</tr>
<tr>
<td>Prevents theft by restricting unauthorized access</td>
<td>Cyber security</td>
<td>10</td>
<td>7</td>
<td>16</td>
<td>20</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Enables use of advanced lightweight materials</td>
<td>Fuel efficiency</td>
<td>11</td>
<td>11</td>
<td>14</td>
<td>12</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Enables interactive vehicle operational information</td>
<td>Convenience</td>
<td>12</td>
<td>16</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>Enables usage of alternative fuels</td>
<td>Environment</td>
<td>13</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Automates tasks for comfort and convenience</td>
<td>Convenience</td>
<td>14</td>
<td>12</td>
<td>10</td>
<td>7</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Lowers the impact on the environment</td>
<td>Environment</td>
<td>15</td>
<td>8</td>
<td>15</td>
<td>13</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>Enables hands-free interior controls</td>
<td>Convenience</td>
<td>16</td>
<td>23</td>
<td>26</td>
<td>30</td>
<td>29</td>
<td>24</td>
</tr>
<tr>
<td>Monitors the physical health of the driver</td>
<td>Safety</td>
<td>17</td>
<td>9</td>
<td>13</td>
<td>16</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Enables high-speed, long-distance, highway &quot;auto-pilot&quot; mode</td>
<td>Self-drive</td>
<td>18</td>
<td>17</td>
<td>11</td>
<td>8</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>Enables remote/automatic software updates of the vehicle</td>
<td>Connectivity</td>
<td>19</td>
<td>25</td>
<td>24</td>
<td>21</td>
<td>31</td>
<td>22</td>
</tr>
<tr>
<td>Allows use of smartphone applications through the vehicle dashboard</td>
<td>Connectivity</td>
<td>20</td>
<td>28</td>
<td>32</td>
<td>29</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>Enables full self-driving capabilities</td>
<td>Self-drive</td>
<td>21</td>
<td>20</td>
<td>7</td>
<td>10</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>Coaches the driver to drive safely</td>
<td>Cost efficiency</td>
<td>22</td>
<td>18</td>
<td>17</td>
<td>18</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>Makes available adjustable settings to enhance vehicle performance</td>
<td>Performance</td>
<td>23</td>
<td>21</td>
<td>20</td>
<td>15</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td>Assists in locating, reserving, and navigating to a parking space</td>
<td>Service enabler</td>
<td>24</td>
<td>19</td>
<td>25</td>
<td>25</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>Enables the use of self-healing paint</td>
<td>Miscellaneous</td>
<td>25</td>
<td>24</td>
<td>23</td>
<td>27</td>
<td>25</td>
<td>32</td>
</tr>
<tr>
<td>Provides passengers with customized entertainment while driving</td>
<td>Convenience</td>
<td>26</td>
<td>32</td>
<td>30</td>
<td>28</td>
<td>30</td>
<td>28</td>
</tr>
<tr>
<td>Provides notifications when places of interest are near</td>
<td>Service enabler</td>
<td>27</td>
<td>26</td>
<td>31</td>
<td>31</td>
<td>26</td>
<td>23</td>
</tr>
<tr>
<td>Automatically pays parking and toll fees</td>
<td>Service enabler</td>
<td>28</td>
<td>27</td>
<td>22</td>
<td>26</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>Empowers customer to personalize vehicles</td>
<td>Miscellaneous</td>
<td>29</td>
<td>30</td>
<td>28</td>
<td>22</td>
<td>28</td>
<td>27</td>
</tr>
<tr>
<td>Allows the driver to control automated home systems</td>
<td>Service enabler</td>
<td>30</td>
<td>29</td>
<td>29</td>
<td>24</td>
<td>24</td>
<td>29</td>
</tr>
<tr>
<td>Enables low-speed urban &quot;auto pilot&quot; mode</td>
<td>Self-drive</td>
<td>31</td>
<td>22</td>
<td>21</td>
<td>23</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>Helps manage daily activities</td>
<td>Convenience</td>
<td>32</td>
<td>31</td>
<td>27</td>
<td>32</td>
<td>32</td>
<td>31</td>
</tr>
</tbody>
</table>

Source: Deloitte Global Automotive Consumer Study
Are people willing to pay for advanced technology?

Generally, consumers are willing to pay a little extra for access to advanced technology features, but …

Percentage of consumers who are NOT willing to pay more than $500 for various advanced vehicle technologies

Automakers in Japan are under growing pressure from regulators to standardize more advanced safety features, rather than leveraging them for extra profit.
... the amount consumers are willing to pay has declined significantly since 2014

Since 2014, there has been a considerable decline in stated willingness to pay. Even Japan, where consumers tend to pay for new technologies, posted a 48 percent drop in the average amount consumers are willing to pay for advanced automotive technologies.

*Overall expected price which consumers are willing to pay for advanced automotive technologies (2014 and 2016)*

Consumers expect advanced technology features that were once considered premium options to become standard features that do not increase the price of the vehicle.

* The dollar value for each country represents the average of overall weighted prices across the five technology categories (safety, connectivity, cockpit/convenience, self-drive, and alternative powertrain). The non-USD currency has been converted into USD by using the average exchange rates in 2016.
Honk for hybrids and alternative powertrains

Global demand for hybrid vehicles could rise significantly in the next three to five years

Consumer interest in alternative powertrain technologies could signal an opportunity for automakers, particularly in Asian markets like China, Japan and South Korea where consumers are significantly more interested in an alternative powertrain for their next vehicle.

Consumer preference for various powertrain technologies in their next vehicle

Source: Deloitte Global Automotive Consumer Study
Percentage of consumers, by generation, who would prefer an alternative powertrain in their next vehicle

- **China**: Pre/Boomers (55%), Gen X (51%), Gen Y/Z (53%)
- **South Korea**: Pre/Boomers (47%), Gen X (44%), Gen Y/Z (36%)
- **Japan**: Pre/Boomers (37%), Gen X (39%), Gen Y/Z (29%)
- **Germany**: Pre/Boomers (29%), Gen X (25%), Gen Y/Z (29%)
- **India**: Pre/Boomers (26%), Gen X (30%), Gen Y/Z (26%)
- **US**: Pre/Boomers (20%), Gen X (26%), Gen Y/Z (26%)

Source: Deloitte Global Automotive Consumer Study
Do consumers prefer to ride or drive?

Plenty of room for mobility services to grow and disrupt traditional notions of car ownership ...

Ride-hailing services are not heavily used yet in many markets (particularly in Japan, where the regulatory environment discourages use of mobility services). Use of these services in India and China far outpace other global markets. In fact, almost half of consumers in emerging markets like China and India use ride-hailing services at least once a week, eclipsing the US and South Korea, and well ahead of Germany.

Percentage of consumers who use ride-hailing services, by frequency

China has the largest share of total worldwide ride-on-demand downloads at 43 percent of the global total in 2016.
... but the adoption of ride-hailing services in urban and non-urban settings varies between countries

**Percentage of consumers who use ride-hailing services, by frequency and area**

<table>
<thead>
<tr>
<th></th>
<th>Japan</th>
<th>Germany</th>
<th>South Korea</th>
<th>United States</th>
<th>China</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never</td>
<td>Rarely</td>
<td>At least once a week</td>
<td>Never</td>
<td>Rarely</td>
<td>At least once a week</td>
</tr>
<tr>
<td>Urban</td>
<td>6%</td>
<td>24%</td>
<td>9%</td>
<td>43%</td>
<td>44%</td>
<td>47%</td>
</tr>
<tr>
<td>Non-urban</td>
<td>10%</td>
<td>15%</td>
<td>6%</td>
<td>10%</td>
<td>35%</td>
<td>46%</td>
</tr>
<tr>
<td>Urban</td>
<td>3%</td>
<td>15%</td>
<td>6%</td>
<td>21%</td>
<td>32%</td>
<td>38%</td>
</tr>
<tr>
<td>Non-urban</td>
<td>7%</td>
<td>31%</td>
<td>15%</td>
<td>67%</td>
<td>34%</td>
<td>39%</td>
</tr>
</tbody>
</table>

Note: Ride-hailing (or ride-sharing as it’s better known in some global markets) is defined in this study as mobility services wherein consumers hire a car/driver via their mobile device.
Gen Y/Z consumers are more inclined to use mobility services, and ...

Perhaps unsurprisingly, younger Gen Y/Z consumers in most global markets are more likely to use ride-hailing services as compared to older consumers.

**Percentage of consumers who use ride-hailing services at least once a week, by generation**

Ride-on-demand, folded more broadly into shared mobility and transportation services, will disrupt car ownership, especially in India.

Source: Deloitte Global Automotive Consumer Study
... those young consumers who regularly use ride-hailing are also more likely to question their need to own a vehicle than older consumers

Percentage of consumers who use ride-hailing services that question whether they need to own a vehicle in the future, by generation

Source: Deloitte Global Automotive Consumer Study
About the Global Automotive Consumer Study

The Global Automotive Consumer Study surveyed over 22,000 consumers in 17 countries around the world.

All the data included in this report has been derived from the study unless otherwise noted.
The findings in this report represent male and female consumers across multiple generations living in the United States, Germany, Japan, South Korea, China and India.

Respondents, by generation

Respondents, by gender

Note: Pre/Boomers: Born before 1965; Gen X: Born between 1965-1976; Gen Y/Z: Born after 1976 (sample excludes consumers under 16 years of age)
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Endnotes

4 Ibid.