

22nd Annual Global Automotive Executive Survey

Industry leaders foresee dramatic changes

Where the opportunities may lie

home.kpmg/automotive



Foreword

The KPMG 2021 Global Automotive Executive Survey provides readers with a distinct perspective of the future of the sector. More than 1,000 executives in 23 countries expect to see a sweeping transformation of the sector in the next 5 to 10 years. The executives offer their insights on the major forces shaping the industry, from supply chain issues and powertrains, to changing consumer behavior and new technology entrants.

Among the big trends is a shift to electric vehicles, which is likely to gather pace as a bevy of new and exciting EVs hit the market. By the end of the decade, EV costs are expected to approach parity with internal combustion-powered vehicles. At the same time, digitization is fundamentally altering the relationship between automakers and their customers as well as suppliers.

Every facet of the automotive industry, from product development to manufacturing and distribution, is likely to undergo profound changes brought on by the convergence of the automotive and technology sectors. New entrants are raising billions with IPOs as they take on the established automakers that are, in turn, making big bets on new powertrains, partnerships, and acquisitions.

Many of the auto executives surveyed are excited about the market opportunities they see on the horizon, but there are wide variations of opinion about what the future will look like, how quickly things will change, and who the key players will be. Readers can go to our <u>website</u> to interact with the data and view graphical results by region, country, company type and size, and respondent title.

While much of the optimism among executives about the future may be well founded, the changes will undoubtedly produce both winners and losers, making executives' choices today even more critical.



Gary Silberg Global Head of Automotive KPMG International

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Executive summary

Car manufacturers have rarely faced such an array of technological and business-model changes since the dawn of the automotive industry 130 years ago. Flying taxis, cars by subscription, ubiquitous and fast EV charging stations, big-tech car entrants – these are some of the developments we can expect in the next 10 years, according to our 2021 annual survey of more than 1,000 executives in the global automotive industry.

Yet there are urgent questions executives need to answer right now: Have they learned recent lessons needed to build more resilient supply chains? How will the industry navigate multiple fundamental changes, ranging from new powertrains and autonomous vehicles to new business models, and do so simultaneously? What impact will the new and well-funded entrants have on the industry? How will the established automakers respond?

These are among the issues laid bare by the findings from the KPMG 22nd Annual Global Automotive Executive Survey. The study looks further into the future than in previous annual reports and reveals that automakers are expecting the remainder of this decade to lead to immense changes in every facet of the industry. The survey also shows that in the near-term, executives are very concerned about issues affecting the supply chain. A summary of the key findings can be found on the following page. We encourage readers to go to our website at <u>experience.kpmg.com/gaes-2021</u> for an interactive experience.



Main findings



The global outlook

- Fifty-three percent of respondents are confident that the auto industry will see more profitable growth in the next five years. This compares with only 38 percent who are concerned about the outlook for profits.
- Executives' confidence is reflected in other areas, such as their ability to withstand the next great disruption.
- Optimism varies by country, with only 49 percent confident in Germany about the prospects for more profitable growth, compared with 66 percent in the U.S..



Future of powertrains

- Executives expect the market share of EVs will grow dramatically by 2030, but there is a very wide range of views and no consensus on the approximate share they will capture.
- Their expectations are based on the view that EVs will reach cost parity with ICE vehicles by 2030.
- They believe EVs can be widely adopted without government subsidies, but the majority still supports such programs.
- The survey finds EV adoption will depend partly on significant investments in DC fast-charging infrastructure, as 77
 percent of executives expect consumers to require charge times under 30 minutes when traveling. The vast majority of
 charging stations in service today take more than three hours.



Digital consumers

- Executives foresee a fundamental change in how vehicles will be purchased. Most respondents expect the majority of vehicles to be sold online by 2030. Three-quarters also predict more than 40 percent of vehicles will be sold directly by automakers, bypassing dealers.
- They expect a seamless purchase and ownership experience will be even more important than vehicle performance in consumers' buying decisions.
- Automobiles will likely generate vast amounts of data that automakers may be able to monetize. Forty-three percent of
 executives expect automakers to sell data to auto insurance companies.



New technologies and new entrants

- The technology and automotive industries are converging, leading to new alliances and new entrants. Startups are
 raising billions, and executives believe tech companies such as Google, Apple, Amazon, and Huawei will enter the
 market.
- Many automakers and suppliers will divest nonstrategic assets, raising cash to invest in new technology, talent and new business models.

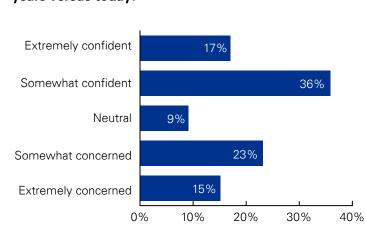


Vulnerable supply chains

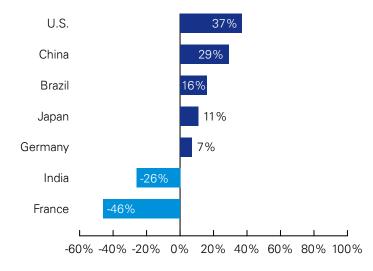
- Executives are worried by a range of issues affecting the supply chain, including the price and availability of semiconductors, steel, rare earth elements, and other exotic materials.
- Fifty-five percent of executives are very or extremely concerned about labor shortages.



Respondents' long-term expectations are fueled by bullish views about the future, buoyed by their ability to withstand the whiplash effects of the pandemic. The global car industry has managed to weather the crisis without a major bankruptcy. As the world economy continues to recover, albeit haltingly, from the COVID-induced downturn, a majority of car executives believes corporate fortunes will improve.



How confident or concerned are you that the industry will achieve more profitable growth over the next five years versus today?



Source: GAES 2021, KPMG International

Note: In some charts, totals do not add up to 100 percent, due to rounding

*Number confident minus number concerned

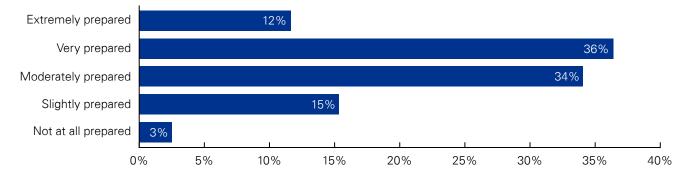
Net sentiment* by country

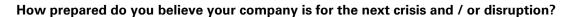
More than half (53 percent) of respondents are somewhat or extremely confident that the industry will achieve more profitable growth over the next five years than today. This compares with only 38 percent who are somewhat or extremely concerned about the prospects for profitable growth, 15 percentage points less.

Beneath the bullishness, however, there are regional disparities in the level of confidence. Executives in the U.S. are more confident about the future and Europeans somewhat less, with Asian sentiment in between. In the U.S., 66 percent expressed confidence, compared with only 49 percent in Germany and 55 percent in China. At the opposite extreme, 70 percent of executives in France are somewhat or extremely concerned about the prospects for profitable growth.

There are also significant differences within segments. Tier 1 suppliers are less bullish than automakers and Tier 2 suppliers are more optimistic than either.

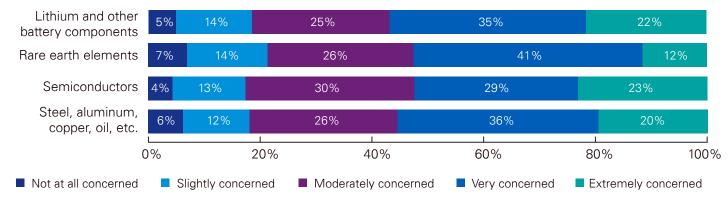
In Europe, the political pressure from ESG challenges and the race to a low-carbon economy are straining business models, but also offer fantastic opportunities to test new mobility offerings. OEMs seem to have lost control of their technological agendas, and they need to rebuild their competitive advantages. Yet Europe is a fascinating laboratory for new mobility, and success here means securing the future of these innovations. – Laurent Des Places, Partner, KPMG in France In line with the general optimism, nearly half (48 percent) say they're very or extremely well prepared for the next disruption, whatever it may be. This compares with only 18 percent who are not at all or only slightly well prepared. The U.S. is particularly confident, with a 58-point disparity between those who are well prepared and those who are not. This is almost double the percentage gap in Japan. In China, the pessimists and optimists are almost equal in number.





Source: GAES 2021, KPMG International

Amid the high confidence in the industry's prospects, there is considerable anxiety about key aspects of operations, both short and long term. More than half of respondents are very or extremely concerned about supplies of key elements—not just exotic commodities, such as rare earth elements and lithium, used in batteries, but also steel, aluminum, and copper. In addition, executives express a high degree of concern about labor shortages, especially in the U.S. These topics are covered in more detail in the following supply chain section.



How concerned are you about supply continuity for the following commodities / components?

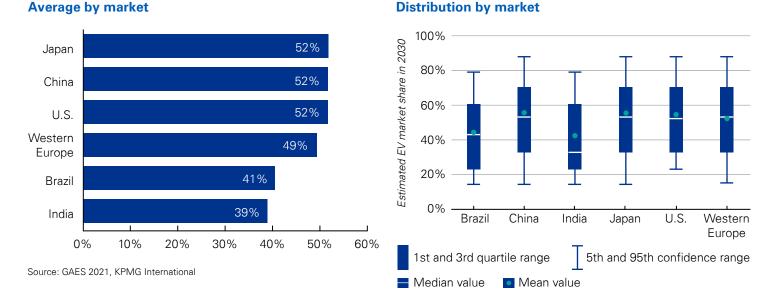




Auto executives believe that by 2030 EVs will achieve widespread adoption, but there is no consensus on what share of the market they will capture. Overall, though, the survey aligns with the many recent OEM commitments to EVs. When asked, executives are willing to make further investments in EV powertrains, if offered additional R&D funding.

On average, executives say they expect that EVs will take half the auto market in Japan, China, the U.S. and Western Europe by 2030 and around 40 percent in Brazil and India. However, a closer look at the data reveals a large spread in estimates for the future EV share in each market.

By 2030, what percentage of new vehicles sales do you believe will be battery powered (excluding hybrids) within each market?



Perspectives from around the globe

GG We see enormous automaker .

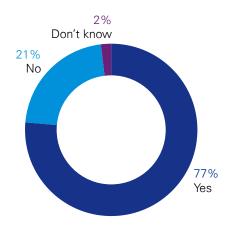
We see enormous automaker investments in new battery production capacity. Some automakers are still working with JV partners, but others now have enough expertise to build and run the plants on their own. – Andreas Ries, Partner, KPMG in Germany

Among other factors, EV adoption in many markets has been constrained by the limited number of models available, especially in the larger vehicle segments. The strong pipeline of new EV model launches in the next 24 months will create more options for consumers.

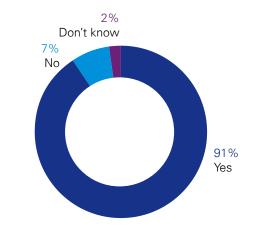
- Megumu Komikado, Partner, KPMG in Japan

There are important economic assumptions behind these EV adoption expectations. Almost three-quarters (73 percent) of respondents expect that EVs will have reached cost parity with ICE vehicles by 2030. Seventy-seven percent of respondents believe that EVs will achieve widespread adoption without government subsidies. However, 91 percent support such subsidies.

Do you believe battery electric vehicles can achieve widespread adoption in the next 10 years without government intervention?



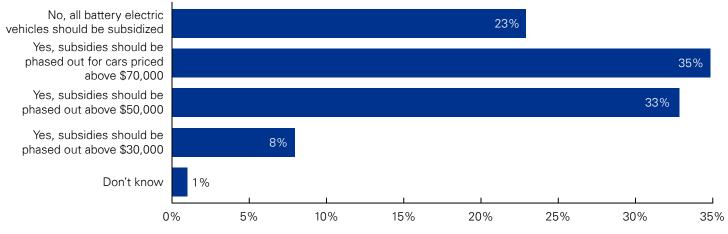
Some governments are providing direct consumer subsidies for battery electric vehicles. Do you agree with this policy?



Source: GAES 2021, KPMG International

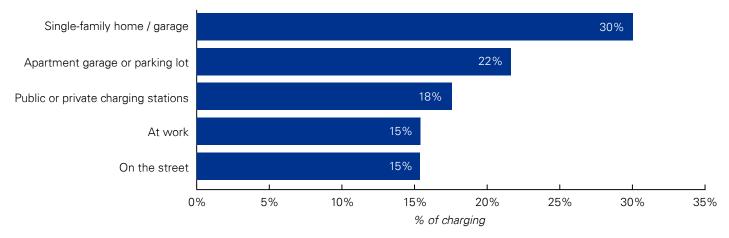
Even those respondents who support subsidies believe there should be limits on government largesse. Sixty-eight percent of those in favor of government support believe it should be phased out for cars priced over \$50,000.

If yes, should the subsidies be phased out for vehicles above a certain vehicle price?





Infrastructure remains a major challenge for EVs. Respondents expect only slightly more than half of charging to take place at home. This implies a significant need for other charging options.

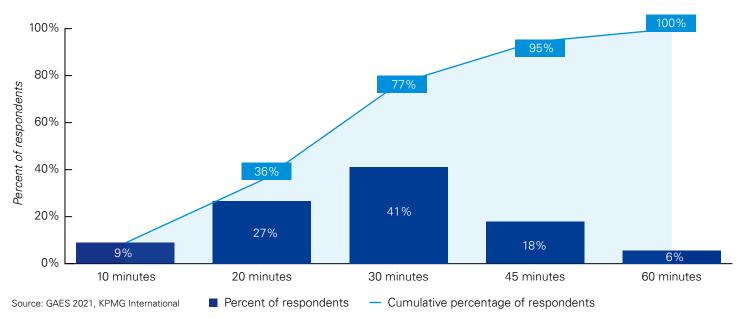


In your home country, where will owners charge their battery electric vehicles? (allocate 100%)

Source: GAES 2021, KPMG International

When asked how long they think consumers would be willing to wait for an 80 percent recharge, more than threequarters (77 percent) of respondents say no more than 30 minutes.

While traveling and running low on battery charge, how long will the typical consumer be willing to wait for an 80 percent or greater recharge?



This requires DC fast-charging stations, which cost about \$100,000 each. In the U.S., less than 20 percent of existing public EV charge points are DC fast chargers, and many of them are still not fast enough to achieve an 80 percent recharge in 30 minutes.

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Availability of charging infrastructure will likely be critical for widespread EV adoption, especially in densely populated cities. – Seung-Hoon Wi, Partner, KPMG in Korea

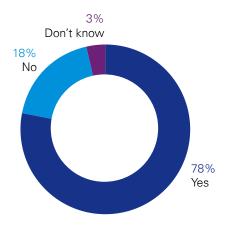


Car sales

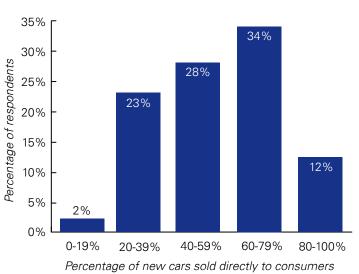
Auto executives are boldly predicting massive changes in the way that cars are purchased.

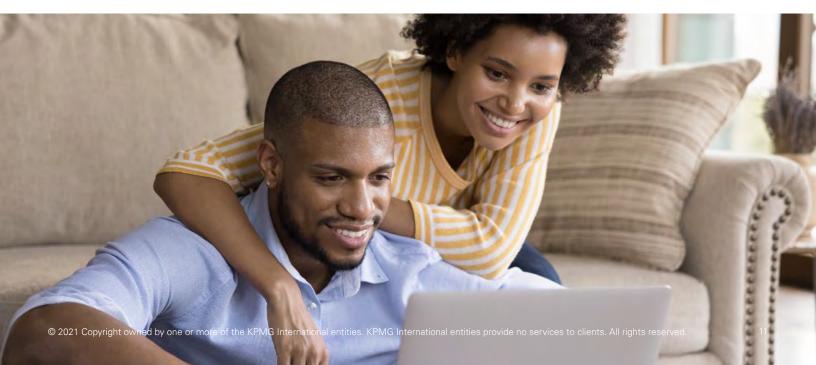
More than three quarters of respondents (78 percent) think that most new cars will be purchased online by 2030. Further, almost half (47 percent) believe that at least 60 percent of new cars will be sold directly by automakers to consumers by 2030. The shift toward an automaker-led online sales model will have widespread implications for the automotive sector.

By 2030, do you believe the majority of new vehicle purchases will be completed online? (Excluding test drive)



By 2030, what proportion of new cars will be sold directly to consumers by automakers in your home market?

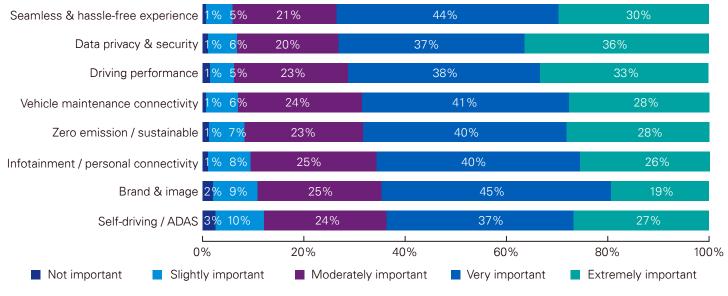




The reduced volumes through traditional dealers may require significant restructuring of dealer networks, which are already facing long-term challenges to their profitability. For the automakers, direct sales will require significant new capabilities in digital sales, marketing, pricing, and transaction processing.¹

Further emphasizing the importance of this shift, executives believe that a "seamless and hassle-free experience" will be an even more import factor in consumer purchasing decisions than vehicle performance.

How important do you think the following features will be for consumers when deciding to purchase a car in the next 5 years?

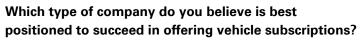


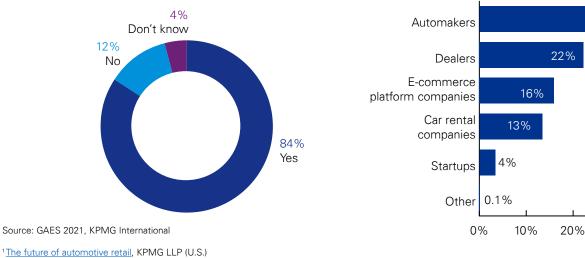
Source: GAES 2021, KPMG International

New business models

Executives expect big changes in modes of vehicle ownership. Eighty-four percent think car subscriptions will compete with sales and leases by 2030.

By 2030, do you think vehicle subscriptions will be a competitive offering to traditional purchases and leases?





Automakors 45%

50%

40%

30%

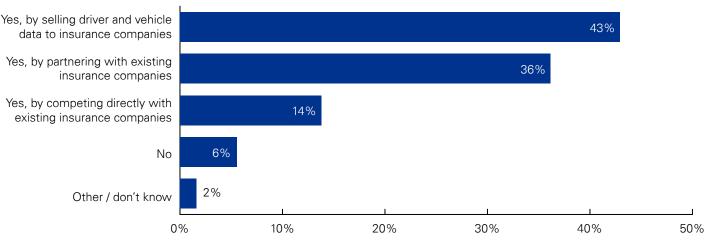
This is likely to provide another business opportunity to automakers: Almost half (45 percent) say auto manufacturers, rather than dealers or other players, will be best positioned to make a success of subscriptions. Sixty percent of automakers agree. By 2030, individual customers may be paying a subscription to an automaker that would enable them to switch periodically from one model to another in the product line-up.

Automakers are still trying to develop viable subscription models. It is difficult, as they need to balance customer needs for flexibility and convenience against profitable fleet economics. – Richard Peberdy, Partner, KPMG in the U.K.

🔎 Car data

Automobiles will generate vast amounts of data that automakers may be able to monetize, especially related to car insurance. When asked how auto makers expect to participate in the insurance market, 43 percent say that car companies will sell driver and vehicle data to insurers.

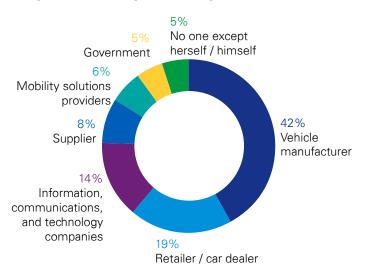
Do you think automakers will successfully participate in the insurance market? If so, how?



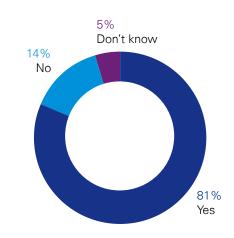


Given the sensitivity of car data, which type of organization will be most trusted to safeguard it? Vehicle makers again come out on top (42 percent say so). In addition, 81 percent are confident automakers have adequate cyber security and data privacy protections.

Whom do you think a consumer would trust most to safeguard the data generated by the vehicle?



Do you believe automakers have adequate cyber security and customer data privacy protection in place?



Source: GAES 2021, KPMG International

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To become the custodians of automotive data, automakers will need to ensure that consumers' trust in data privacy won't be abused. This is an opportunity to create a new relationship with customers based on trust, by being careful guardians of their data. – Vinodkumar Ramachandran, Partner, KPMG in India

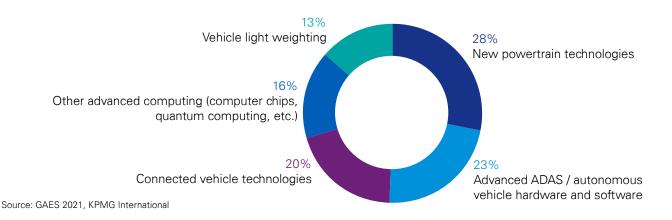
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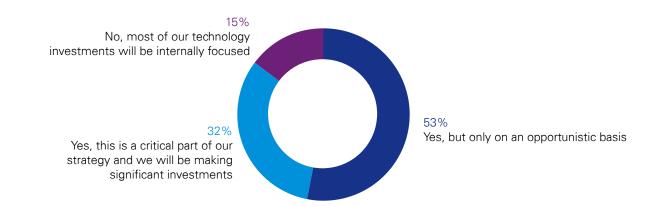
As auto executives look toward the future, they face critical decisions on where and how to place their bets. When asked how they would allocate a doubling of their company's R&D budget, executives split their investments relatively evenly across a variety of technologies, with a moderate bias toward new powertrain technologies.

If you were given approval to double your existing R&D investment, how would you allocate the additional funding among the following technologies? (Allocate 100 percent)



Many automakers and suppliers say their companies will divest nonstrategic assets, raising cash to invest in new technology. Eighty-five percent of respondents are considering new investments, acquisitions and partnerships in new technology companies in the coming years. To generate cash, 75 percent say they are at least moderately likely to divest nonstrategic parts of their businesses in the next several years.

Are you considering making investments / acquisitions / partnerships in new technology companies in the next several years?



Looking at the convergence of technology-driven disruption, the current supply and demand impact of the pandemic, and capital markets spending power, we expect to see unprecedented M&A activity in the next three years.

- Per Edin, Principal, KPMG in the U.S.

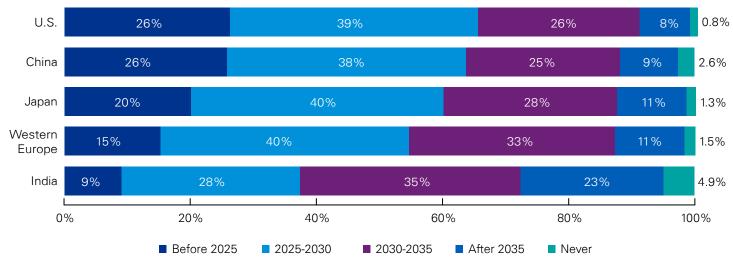
11% Extremely likely 34% Very likely 30% Moderately likely 21% Slightly likely Not likely at all 4% 0% 5% 10% 15% 20% 25% 30% 35% Source: GAES 2021, KPMG International "

How likely are you to divest nonstrategic parts of your businesses in the next several years?

Companies often wait too long to sell a business and value declines in the interim. Auto companies with legacy technologies should quickly come to a decision to hold or sell. – Todd Dubner, Principal, KPMG in the U.S.

Autonomous vehicles are likely to enter the market in the coming decade in the form of ride-hailing or delivery cars and vans. A majority of automotive executives predict that they will be available within major cities in the U.S., China, Japan, and Western Europe by 2030.

When do you believe autonomous ride hailing and / or delivery will be commercially available within major cities in the following markets?

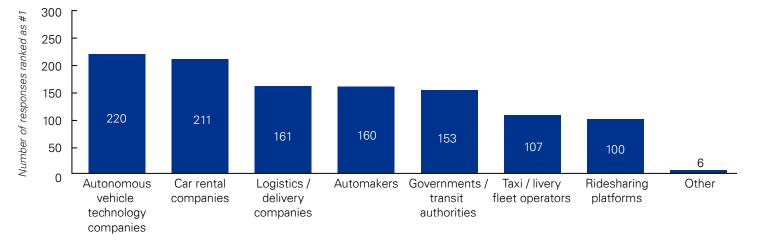


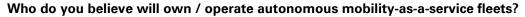
Source: GAES 2021, KPMG International

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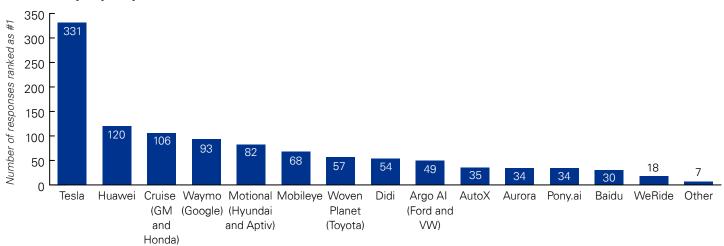
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However, executives have differing views on what type of companies are most likely to operate these fleets. While AV tech companies were the most common answer, automakers, car rental companies, logistics / delivery companies, and public transit authorities all received a significant number of responses. This appears to be a market that is wide open.





When asked which company will lead in autonomous vehicles, Tesla is viewed as the leader and Huawei is second, but the picture varies by geographical area.



Which company do you think will be the leader in autonomous vehicle solutions?

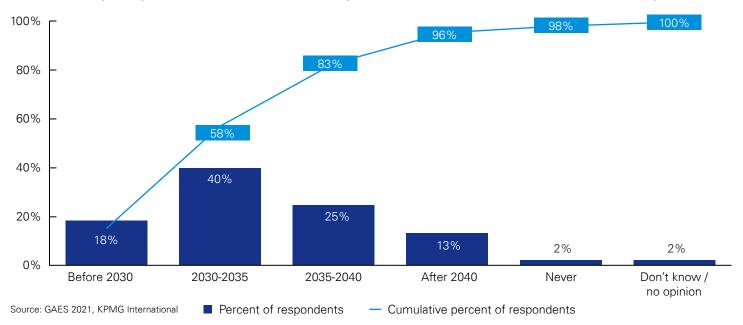
Source: GAES 2021, KPMG International

Ranking by respondent location

Ra	nk	All Respondents	U.S.	China	Europe	Japan	
1		Tesla	Tesla	Huawei	Tesla	Waymo (Google)	
2	2	Huawei	Cruise (GM and Honda)	Tie: Tesla,	Waymo (Google)	Tesla	
	3	Cruise (GM and Honda)	Woven Planet (Toyota)	Cruise (GM and Honda)	Huawei	Woven Planet (Toyota)	

Source: GAES 2021, KPMG International

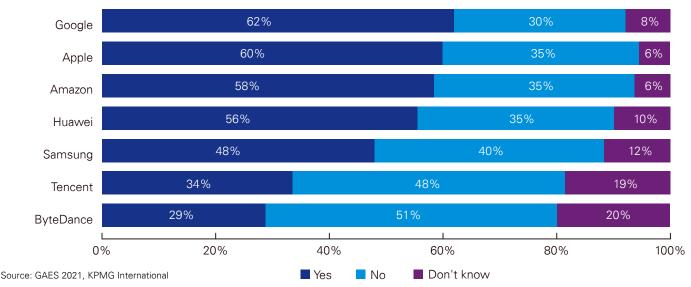
The survey did not focus solely on terrestrial vehicles. Flying cars, known as electrical vertical takeoff and landing aircraft, have received significant investments by automakers and start-ups. More than half (58 percent) of executives expect they will be available in most major cities by 2035.



Flying cars, known as electric vertical takeoff and landing aircraft (eVTOLs), have received significant investments by many automakers. When, if ever, do you believe eVTOLS will be available in most major cities?

There has been much discussion about tech giants entering the auto industry. A majority of executives in the survey expect Google, Apple, Amazon and Huawei to enter the car market.





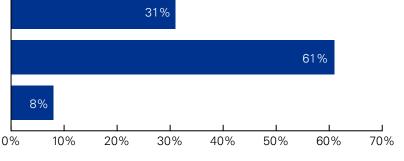
Well-capitalized start-ups are continuing to enter the auto market. When asked how they will affect the industry, 61 percent say start-ups will have a moderate impact in the next 10 years; 31 percent say they'll have a major impact. The start-ups themselves are cautiously optimistic. Seventy-three percent of mobility start-ups say they will make a moderate impact and only 20 percent say the impact will be significant.

In the last several years, there has been significant investment in auto start-ups. In the next 10 years, what do you think the impact of these companies will be?

Major impact – One or more will take significant market share, causing a reordering of the industry

Moderate impact – A few will find some success, but will be eventually bought out by established automakers or will remain niche players

No impact - Most, if not all, will fail

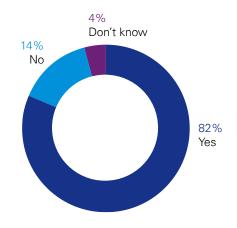


Source: GAES 2021, KPMG International

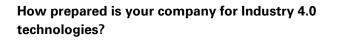
Many new entrants fail to capture sufficient funding or market share to ensure survival, as the overall vehicle sales in China have peaked. However, the leading new EV companies will have a major impact on the industry overall, while some of the current OEMs will perish if they fail to innovate beyond the powertrain. As a result the overall landscape of auto brands may look quite different in five years, as the transformation to a smart mobility environment continues.
 Norbert Meyring, Partner, KPMG in China

New entrants are taking a fresh approach to the value chain. For example, some new automakers are using third parties to manufacture their vehicles. Eighty-two percent of respondents overall believe these entrants will make a success of contract manufacturing.

Many new automakers are pursuing "asset-light" strategies using third parties to manufacture their vehicle. Do you believe automakers can succeed using contract manufacturing?



Advanced manufacturing is a critical capability for most automakers, and they emphasize the importance of hiring skilled workers in advanced manufacturing. Sixty percent of industry executives say they are very or extremely well prepared for Industry 4.0 technologies, such as artificial intelligence.



12%

10%

27%

22%

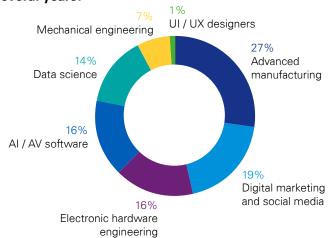
20%

38%

30%

2%

Which of the following jobs / skills do you believe is the most important to your business in the next several years?



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Source: GAES 2021, KPMG International

0%

Not prepared

Slightly prepared

Very prepared

Moderately prepared

Extremely prepared

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Advanced manufacturing that leverages machine learning and other forms of AI will create competitive advantages from an output and quality perspective. – Fabrizio Ricci, Partner, KPMG in Italy

40%

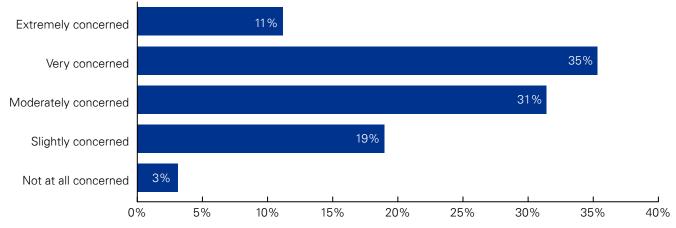




The area of greatest anxiety for executives is the supply chain. They expressed high levels of concern about the near-term availability and price of both commodities and labor. This worry can be seen in answers to the following four questions:

Almost half (46 percent) are very or extremely concerned about the impact of the recent commodity-price volatility on their business in the next year.

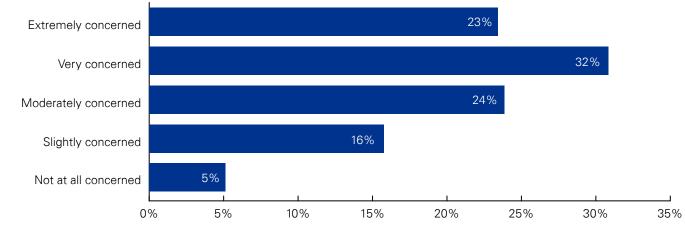
How concerned are you that the recent volatility in commodity prices will adversely impact your business in the next 12 months?



Source: GAES 2021, KPMG International

Fifty-five percent of executives are very or extremely concerned about labor shortages. In the U.S., they are even more concerned, comprising more than 70 percent of the sample. This is consistent with data from the U.S. Bureau of Labor Statistics that suggests there were over half a million unfilled job openings in U.S. durable goods manufacturing in September 2021.²

How concerned are you that labor shortages or wage increases will adversely impact your business in the next 12 months?



Source: GAES 2021, KPMG International

² Source: U.S. BLS

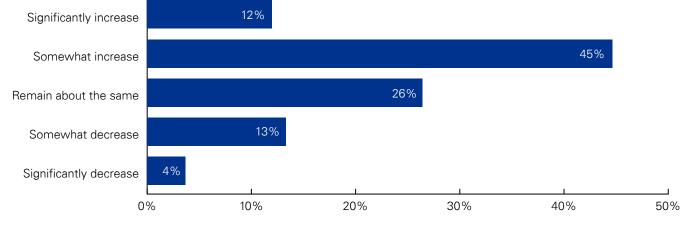


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Companies are going to extraordinary lengths to recruit and retain talent. Some companies are thinking outside the box and leveraging the kind of analytics that have traditionally been used in consumer marketing. – James Walker, Principal, KPMG in U.S.

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Executives are also concerned about the regulatory environment for trade. Fifty-seven percent say the cost and complexity of trade rules and tariffs will increase over the next five years.



Do you believe the cost and complexity of tariffs, trade rules, and regulations will increase in the next five years?

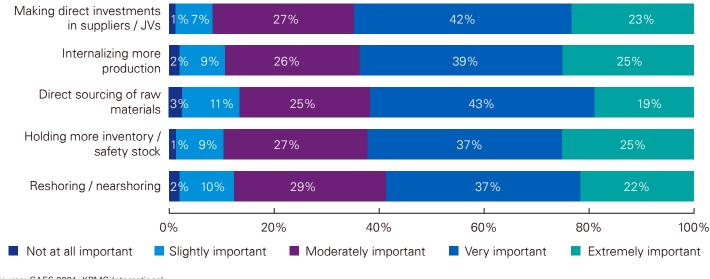
Source: GAES 2021, KPMG International

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Companies need to carefully consider any changes in tax laws as they redesign their value chains. The transition to new business models will also create further tax complexity for automakers. – Flavia Spadafora, Partner, KPMG in Brazil

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Most auto executives say they aim to exert more control of the supply chain. Almost two-thirds say it is very or extremely important to make direct investments in suppliers.



How important are each of the following to your future supply chain strategy?

Source: GAES 2021, KPMG International

Given the fact that automakers are competing against high-demand industry sectors like consumer electronics for limited semiconductor fab capacity, a new supplier or even joint venture approach is required to protect future production.

– Goran Mazar, Partner, KPMG in Germany



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Conclusion

Rarely has the automotive sector faced such an array of opportunities and challenges, as the survey shows. Executives predict big changes ahead—new powertrains, relationships with consumers, modes of ownership, manufacturing processes, technologies, and data flows. The next decade is slated to see business model innovation on a global scale. But their existing capabilities are not going to be enough to see them through. They should prepare to be stretched as never before. Here are four implications of our survey to consider:

Prepare for the unexpected

It is clear there are many "known unknowns," but executives should plan for an even wider range of scenarios. There are many strategic questions that need to be asked. How quickly will EVs be adopted? When will autonomous vehicles become ubiquitous? What level of in-vehicle computing power will be required? Will consumers really pay for subscriptions? Leaders must test every assumption, challenge long-held beliefs and develop a culture that rewards this type of thinking.

You can't do it alone

To succeed, companies will need to develop skills outside their current competencies—from software development and software as a service, to artificial intelligence/deep learning algorithms, to customer analytics and massive, new data sets. Some of these capabilities can be developed organically, but others will need to be obtained through alliances, joint ventures and acquisitions.

All about the customer

The auto industry has for too long been distanced from its customers. No more. Digitization offers automakers the opportunity to build direct customer relationships that are deep, long-lasting, and mutually beneficial. Success will likely depend on creating a seamless, yearslong customer experience based on personalization, efficiency and trust, especially over data stewardship.

Speed is of the essence

If executives think events are moving at a breakneck pace, they can expect the Clockspeed of change will go even faster in the coming years. The evolution of the automotive industry is rapidly accelerating, and the winners are likely to be those companies that make better decisions faster than their competitors.

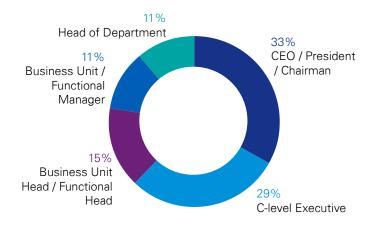
You can be sure that the executives who responded to our survey will be among those shaping the industry over the next decade. The future is in their hands.

Respondent profile

KPMG conducted a global survey of 1,118 executives across the automotive and adjacent industries in August 2021. Almost 372 were CEOs, 325 were other C-level executives, and the rest were heads of business units and departments, as well as 252 managers. Twenty-four percent work for car manufacturers and 13 percent for Tier 1 suppliers. Eleven percent are employed by truck manufacturers. Twenty-seven percent consist of companies with annual revenues of more than \$10 billion in 2020, 35 percent have annual revenues of between \$1 billion and \$10 billion, and 38 percent have revenues less than \$1 billion.

The two countries with the largest number of respondents are China (26 percent) and the U.S. (25 percent). Europe has 25 percent of respondents, with the remainder living in Japan, South Korea, India, Canada, Latin America, Saudi Arabia and South Africa.

Which of the following best describes your job title?

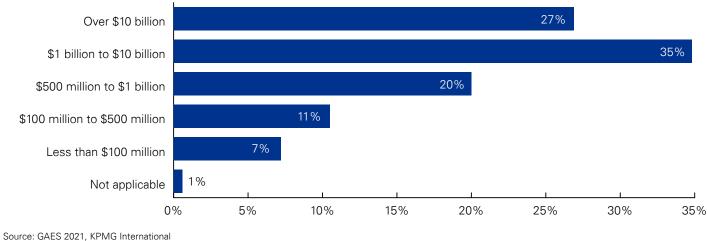


Source: GAES 2021, KPMG International

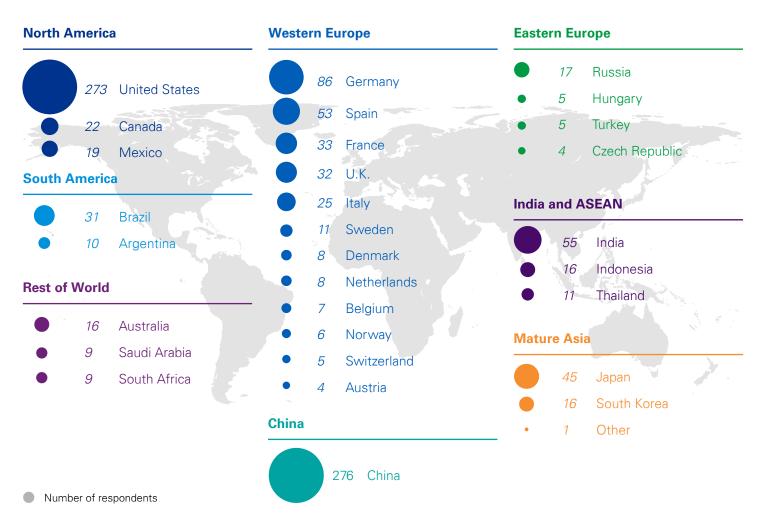
Which of the following best describes your company?

	13% Tier 1 supplier 11% Truck manfacturer	8% Energy supplier/ Charging infrastructure provider 8% Information and communication technology company	7% Mobility solutions provider		6% Independent dealer	
24% OEM/Vehicle manufacturer			5% Technology start-up company	4% Manufac capti deal	turer's ve	4% Captive financial services company
			4% New technology components supplier	3% Transport (gov't) authoritie:	financ	- Tier 2/4 supplier ial 1% Mobility start-up

Which of the following best describes your company's annual revenues in 2020?



In what country, territory, or jurisdiction do you live?



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Designed by DAS Design. DASD-2021-5666

Publication name: Industry leaders foresee dramatic changes Publication date: November 2021