



**23rd Annual Global Automotive
Executive Survey**

Auto leaders tread with confidence and cautious optimism

A European Perspective



kpmg.com/automotive

Foreword

The 23rd edition of KPMG's Global Automotive Executive Survey provides readers with a distinct perspective on the many forces shaping the future of automotive industry. More than 900 executives in 30 countries expect to see a sweeping transformation of the sector in the next 5 to 10 years. Business optimism remains high regarding profitable growth compared to last year, as COVID-19 and semiconductor shortage issues have somewhat eased. However, concerns remain in the form of high interest rates, energy prices and inflation rates, that can affect vehicle demand adversely.

Among the biggest trends relevant to Europe, is the compliance with evolving emissions regulations and ESG legislations – given EU's net zero ambition to be achieved by 2050, and the ban on petrol and diesel vehicles by 2035. In line with this, launching more electric vehicles (EVs) along with a supporting EV charging infrastructure network remains the most straightforward option for automakers. However, global executives believe that by 2030, the share of Battery Electric Vehicles (BEVs) in Europe will be 24 percent (as percent of new vehicle sales) – a major dip from the sentiment displayed in 2021 which betrays a hint of realism. The good news is most global and European executives (and a higher percentage than that in 2021) believe in widespread adoption of BEVs without government intervention – exhibiting immense confidence in their own capabilities and consumer demand to ride the vehicle electrification wave. But the jury is still out on the insufficient and unevenly distributed EV charging infrastructure which can support such high growth of EVs within Europe.

Most European and Global executives also foresee that a majority of new vehicle purchases will be completed online by 2030, but the percent of new cars sold directly to end-consumers is expected to be evenly split between Automakers (D2C), Auto dealerships and Digital retail platforms. These vehicle purchase decisions will be highly influenced by "Brand & image," "Data privacy & security" and "Driving performance" rather than "Seamless & hassle-free experience". Especially w.r.t "Data privacy & security," 40 percent of European executives believe that consumers will trust automotive OEMs the most to safeguard their vehicle data. Automakers are also focusing on subscription services and 62 percent of executives are confident that consumers would be willing to pay for these monthly subscriptions.

More than half of European (and global) executives are also concerned about a range of issues affecting the supply chain, including the price volatility and availability of semiconductors, steel, rare earth metals and other specialty materials. Enabling "Circular Economy" for both EVs and EV batteries can, to a certain extent, resolve this supply chain issue related to critical materials.

A higher percentage of executives (than that in 2021) also believe that cost and complexity of tariffs, trade rules and regulations will significantly increase in the next 5 years. To tackle these issues, a majority of executives believe in "Financial hedging," "Direct investments in suppliers/JVs," "Direct sourcing of raw materials," and "Internalizing more production" as the top solutions, though close to two-thirds of them also believe in "Re-shoring" or "Dual-sourcing" to make supply chains less vulnerable.

KPMG continues to foresee intense competition and cooperation between traditional automotive players and new entrants as well as higher investments in the areas of new powertrains, advanced batteries, new digital technologies, battery reuse/recycle, and autonomous/connected vehicles. Given this impending disruption from new automakers and start-ups, how will traditional OEMs and suppliers compete? KPMG believes that many automakers and suppliers will divest non-strategic assets, do more M&A activities, tie-up with tech companies/start-ups, focus on contract manufacturing, and raise cash to invest in new technologies.

As the powerful convergence between automotive and technology sectors unfolds and pounds on the doors of automakers and suppliers, every facet of automotive— from product development, to manufacturing, to supply chains and the customer experience – will undergo profound changes. But there will always be regional or country-level variations in terms of the intensity and timing of these impacts. For a more detailed view, we would advise readers to visit our [website](#) to interact with the data and view graphical results by region, country, company type and size, and respondent title.

Finally, the profound changes in the macroeconomic factors and geopolitical front continue to force automakers and suppliers globally to make their business strategies and business models more flexible and agile. And Europe is no exception to this. While there are no clear, sure-shot answers to the many dilemmas that automakers are facing today, we believe that the insights presented in this study can at least serve as a ready reckoner and eye-opener for all.



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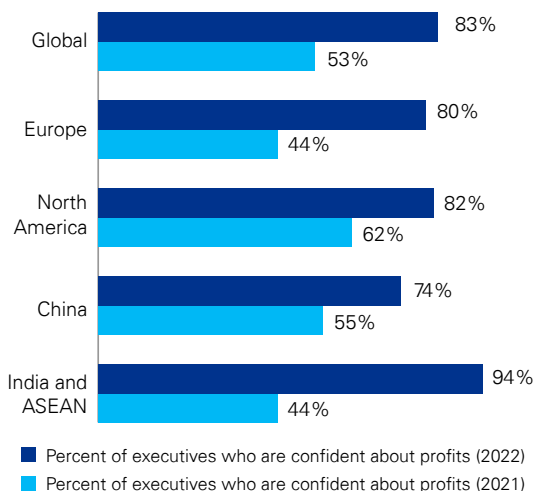
Main findings



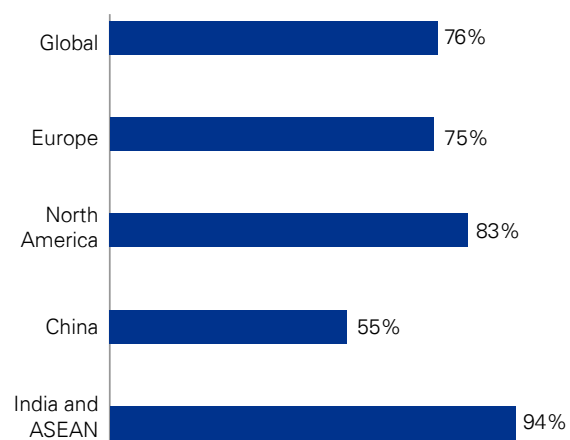
The global outlook

- 83 percent of global respondents in 2022 (vs. 53% in 2021) are confident that the auto industry will witness more profitable growth in the next five years.
- We see the most optimism in profitable growth from India & ASEAN (94%) and the least optimism from China (74%).
- Overall, at both the global and regional levels, the net sentiment regarding profitable growth over the next 5 years is very positive (and represents a stark contrast from 2021), given that COVID-19 situation has eased, the semiconductor crisis is being somehow managed, and vehicle demand is picking up.
- This is in line with what most auto analysts are also predicting. For example, while Moody's expects the 2022 global light vehicle sales to be flat (vs. 2021), the sales will grow by ~6% in 2023.¹
- However, concerns remain in the form of broader macroeconomic factors. Most automotive executives globally (76%) are concerned that high interest rates, energy prices and inflation rates will adversely affect their business in 2023.
- This isn't surprising as higher interest rates and high inflation will likely make consumers rethink about buying or leasing new vehicles, thus serving as a demand dampener. Hence, even if the production or supply situation of new vehicles is sorted, demand risks from a macroeconomic point-of-view remain.
- Over the last one year, the automotive OEMs and suppliers have rejiggered their vehicle portfolios, invested in making their supply chains more resilient and streamlined, and redirected their investments to areas like vehicle electrification which promise great returns in the long run.
- KPMG continues to believe that while automakers need to rebuild their competitive advantages in areas of digital customer transformation, supply chain, sustainability, and autonomous/connected vehicles, their business models should be agile and flexible enough to not get too much adversely affected by the looming macroeconomic or geopolitical situations.
- The European story continues to dazzle with its inadvertent focus on producing more electric vehicles, installing more charging infrastructure, and giving a boost to circular economy for End-of-Life vehicles and batteries. Automakers from other regions can continue to take a cue from European automakers on how they are adapting to the tougher legislations and making the latest and greatest technological strides in the process.

Percent of executives who are confident that the industry will achieve more profitable growth over the next 5 years vs. today



Percent of executives who are concerned that interest rates, energy prices and overall inflation rates will adversely affect their business in 2023



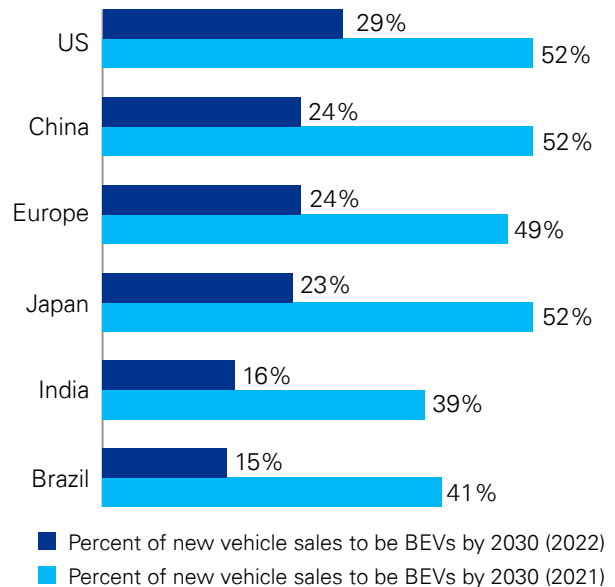
¹ <https://auto.economictimes.indiatimes.com/news/industry/moodys-global-auto-outlook-goes-negative-on-weakening-demand-diminishing-margins/94535426>



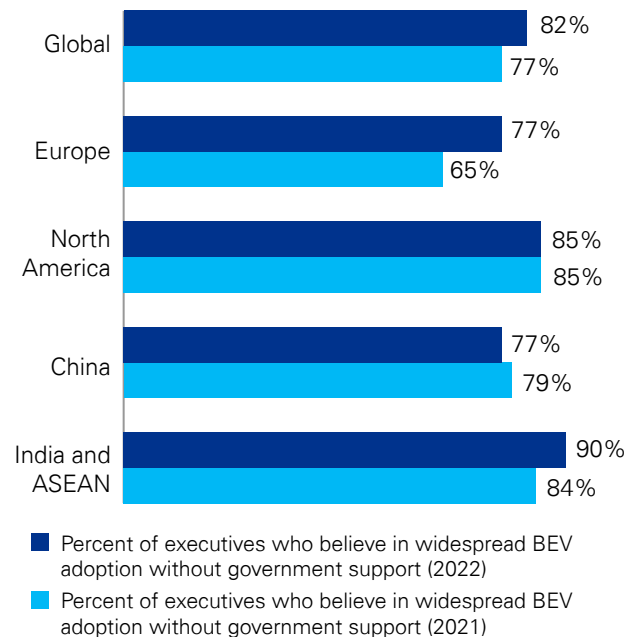
Future of powertrains

- Global executives expect more than 20 percent of new vehicle sales in the US, China, Europe and Japan to be battery electric vehicles (BEVs) by 2030. Across regions, this expected percentage of BEVs in new vehicles sales by 2030, according to executives, has dipped considerably compared to last year. This is even though global new BEV sales rose to 4.7 million in 2021 – more than doubling from 2020 – representing almost 6 percent share of all new vehicle sales globally.
- More than 80 percent (82% in 2022 vs. 77% in 2021) of global executives believe that BEVs can be widely adopted without government subsidies. At the same time, while 91 percent of executives agreed with governments providing direct consumer subsidy for BEVs in 2021, this percentage has dipped to 75 percent globally in 2022.
- This displays immense confidence of automakers and other players in manufacturing, distributing, and marketing BEVs, by taking support from the evolving EV ecosystem through strategic partnerships, rather than depending entirely upon national governments. This is also backed by the insight that 70 percent of global executives believe in zero emissions/ sustainable mobility as very or extremely important for purchasing a car in the next 5 years.
- The tussle between traditional automakers and tech companies to grab additional market share in the high-growth EV market remains strong. For example, in this year's survey, while Tesla and BMW continue to be perceived as market leaders in BEVs by 2030, Apple has emerged as the new tech player which can dominate the future of BEVs. In fact, recently, the company has scaled back on its ambitious self-driving vehicle project, and diverted funds and resources for its future electric vehicle.
- Giving boost to the EV industry remains a high priority in Europe through various incentives and policy measures. Especially concerning for Europe is the status of publicly available charging infrastructure, which is deemed insufficient and unevenly distributed, adding to the range anxiety among consumers.
- 65 percent of European executives in 2022 (vs. 82% in 2021) expect consumers to require charge times under 30 minutes when traveling. Even as the world is moving towards more fast-charging options (to avoid long queues), Europe's publicly available fast-charging infrastructure has hardly grown in 2021 (vs. 2020).
- As to who will own and operate these public EV charging stations, there is no clear consensus among automotive industry executives. Executives believe the leading contenders are Electric utilities, Charging networks, Oil companies (and their fuel stations), and Automakers (and their dealers), but the race remains on.

Percent of new vehicles sales to be battery-electric (excluding hybrids) by 2030 in each key market (global average based on survey responses)



Percent of executives who believe in widespread adoption of BEVs without government intervention



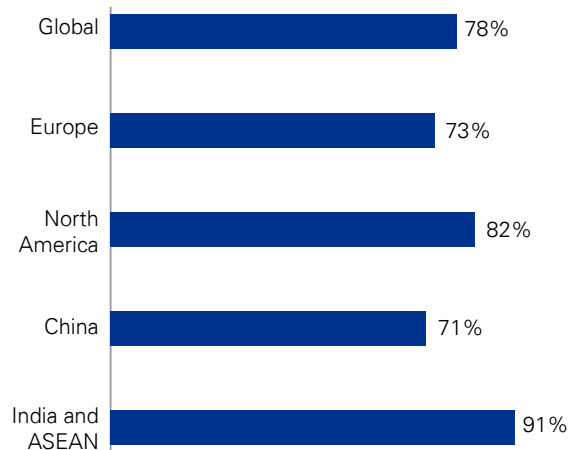


Digital consumers

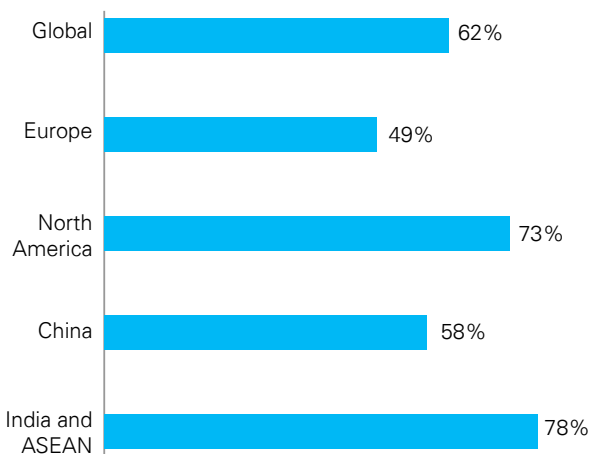
- Most Global and European executives (> 70%) foresee that by 2030, a majority of new vehicle purchases will be completed online. However, according to both Global and European executives, the percent of new cars sold directly to end-consumers is evenly split between Automakers (D2C), Auto dealerships and Digital retail platforms.
- Executives in 2022 believe “Brand & image”, “Data privacy & security” and “Driving performance” to be more important than “Seamless & hassle-free experience” in consumers’ vehicle buying decisions.
- However, executives also believe that a wide range of software options pushed through a monthly subscription model, can be a key differentiator among automakers. In fact, 62 percent of executives are very or extremely confident that consumers would be willing to pay for these monthly subscriptions. This can be expected as more automakers enable functions- or features-on-demand in their new vehicle models, but enough caution should be maintained in making consumers aware of the ‘terms & conditions’ for enabling these features.
- As automakers look forward to participating in the auto insurance market, executives in 2022 believe that this can be done successfully by partnering with existing insurance companies, rather than selling them the driver and vehicle data (which was a prevailing thought in 2021).

- With new vehicle subscriptions, online sales and insurance, automobiles are likely generating vast amounts of data that automakers may be able to monetize. 2 in 5 European executives (vs. less than 1 in 3 executives in China, India & ASEAN) believe that consumers will trust automotive OEMs the most to safeguard their vehicle data.
- This raises expectations for automotive OEMs to institute robust and resilient cybersecurity systems in their vehicles to protect against hackers and cyber breach incidents.

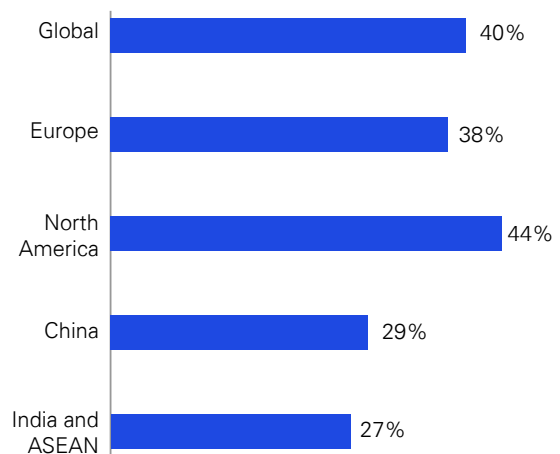
Percent of executives who believe that majority of new vehicle purchases will be completed online by 2030



Percent of executives who are very or extremely confident about consumers paying for monthly subscription services



Percent of executives who think that consumers will trust OEMs the most to safeguard their vehicle data

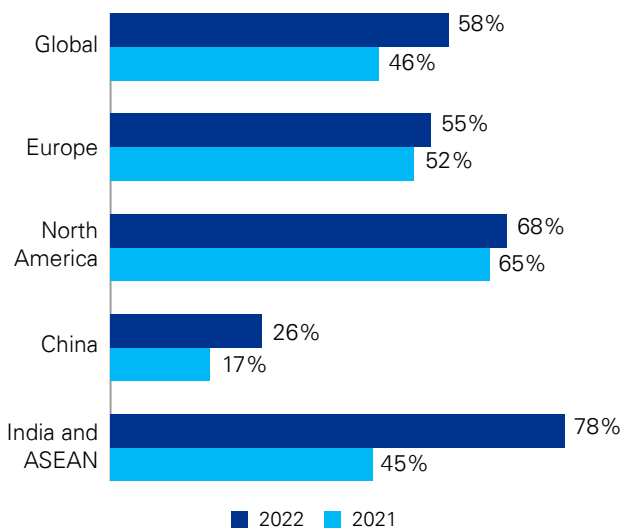




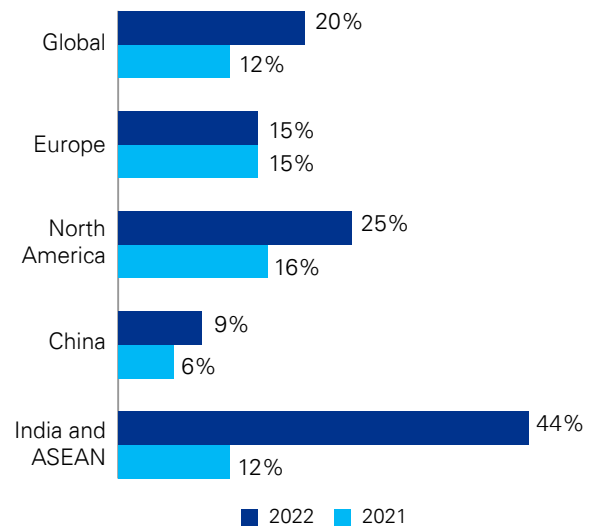
Vulnerable supply chains

- More than half of Global and European executives are very or extremely worried about a range of issues affecting the supply chain, including the price volatility and availability of semiconductors, steel, rare earth metals and other specialty materials. This percentage is higher than that in 2021 indicating a growing concern about the supply chain issues.
- About 1 in 5 Global executives believe that cost and complexity of tariffs, trade rules and regulations will significantly increase in the next 5 years. Percent of executives exhibiting this concern is higher than that in 2021, across regions (except Europe) – especially in India & ASEAN.
- Apart from the semiconductor chip and electrical steel shortage, price volatility and supply of basic commodities have also become an issue due to the ongoing Russia-Ukraine conflict. Especially due to semiconductor shortage, automakers globally were forced to cut new vehicle production by 10.5 million units in 2021, and another 3.6 million units in 2022.
- The supply chain recovery in automotive sector is going to take another three to five years as automakers and suppliers take the necessary steps, build capacities, and invest in making their supply chains more resilient. In this year's survey, more than 6 in 10 global executives believe that "Financial hedging", "Direct investments in suppliers/JVs", "Direct sourcing of raw materials", and "Internalizing more production" are very or extremely important for the future of supply chain. At the same time, close to two-thirds of them also believe in "Re-shoring or Near-shoring" and "Dual sourcing" as very or extremely important in making their supply chains less vulnerable.

Percent of executives who are very or extremely concerned about recent commodity price volatility adversely impacting their business in next 12 months



Percent of executives who believe that cost and complexity of tariffs, trade rules and regulations will significantly increase in the next 5 years

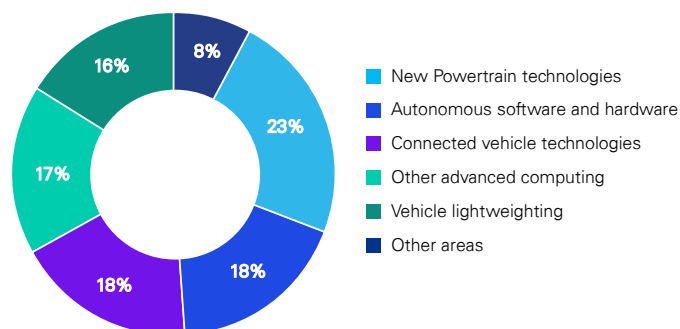




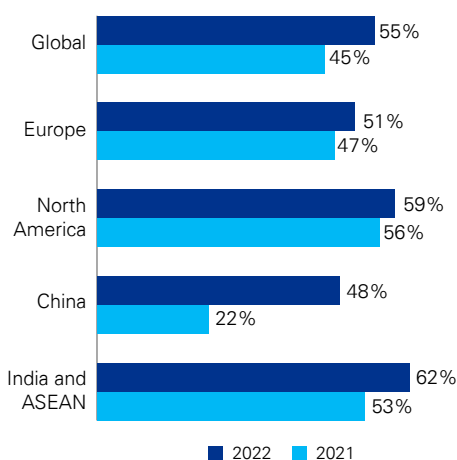
New technologies and new entrants

- When asked about deploying additional R&D funding, Global and European executives agreed that while they will deploy more than 20% of this additional funding in “New powertrain technologies”, more than a third of this R&D funding will be diverted to autonomous hardware & software and connected vehicle technologies. We see the potential of autonomous and connected vehicle technologies as a key differentiating factor among automakers, however, in recent years, most OEMs have diverted these funds to “New powertrain technologies” to ride on the wave of vehicle electrification. In fact, divesting non-strategic parts of business to free up funds, is a primary theme as 55 percent of global executives concur in 2022 – higher than that in 2021.
- Among sub-areas of powertrain technologies in which automakers would like to double their R&D investment, “Advanced batteries (including Li-ion)” and “Hydrogen Fuel cells” top the list. We believe that the focus of these R&D investments will not only be in new battery chemistries (including design, manufacturing, and assembly), but also in the re-use and recycle of EV batteries, given EU’s new battery directive.
- Executives are also aware that when it comes to these investments and development projects, they can’t do it alone. More than a third of these global executives (34%) concur that making investments, acquisitions, and partnerships with new technology companies is a critical part of their strategy. However, more than half (52%) of executives consider making these investments, acquisitions, and partnerships with new technology companies, only on an opportunistic basis.
- More than 3 in 4 global executives believe that new automakers can succeed in pursuing asset-light strategies through contract manufacturing. However, we believe that it’s simply not a matter of manufacturing vehicles through third parties – these new automakers will have to build an entire after-market sales organization and structure to be successful.
- 59 percent of European executives (vs. 63% global executives) state that their companies are very or extremely prepared for Industry 4.0 technologies. European and global executives would like to deploy more than 15% of the additional R&D funding in advanced computing technologies. Advanced manufacturing that leverages machine learning and other forms of AI will create competitive advantages from an output and quality perspective.
- Given this impending disruption from new automakers and technology companies, how will traditional OEMs and suppliers compete? We believe that many automakers and suppliers will divest non-strategic assets, do more M&A activities, tie-up with tech companies/start-ups, focus on contract manufacturing, and raise cash to invest in new technologies.

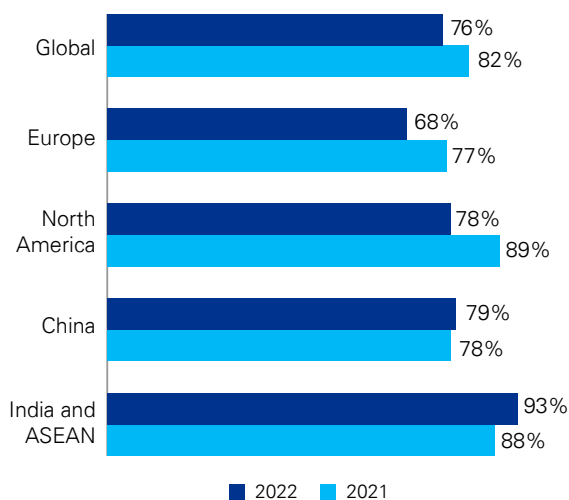
Allocation of additional R&D funding in the vehicle technologies (global average based on survey responses)



Percent of executives who are very or extremely likely to divest non-strategic parts of their business in the next several years



Percent of executives who believe that automakers can succeed in using contract manufacturing to make their vehicles



The global outlook

Auto executives are very optimistic that the billions spent on investments in new factories and powertrains are going to yield big dividends. Eighty-three percent are confident that the industry will achieve more profitable growth over the next five years versus today. In 2021, only 53 percent were as confident.

Now car companies have to deliver on the promise, and executives know they will face multiple challenges. Obstacles include skills shortages, uncertain supplies of materials and components, a troubled geopolitical picture, and tough macroeconomic conditions. Seventy-six percent of respondents are concerned that inflation and high interest rates will adversely affect their business in 2023, compared with only 14 percent who are not.

There are significant differences in expectations. In the near term, net sentiment (those concerned/optimistic minus those who aren't) varies from 18 percent at one extreme to 93 percent at the other. Executives in China are the least concerned, while the rest of Asia and North America are more concerned, by a large margin.

Interact with the data

To see how expectations differ from one market to the next: [Explore now](#)

“ If the workforce in the tech industry continues to shrink, this is a golden opportunity for auto-makers to acquire skills in crucial areas, such as development of future connectivity, including transport data, end-to-end user experience and secure mobile communications.”

—James Walker, Automotive Principal, KPMG in the US



Future of powertrains

In just one year, the outlook has changed appreciably. The survey in 2021 showed that auto executives were very optimistic about the prospects for global EV sales. They estimated that EVs could capture as much as 70 percent of the market share by 2030. Since then, the top estimates have fallen to around 40 percent, which still indicates confidence. The range of forecasts has narrowed, too.

The decline in the estimate of EV penetration was particularly noticeable in India, Brazil, and Japan. India's infrastructure challenges mean that EV demand is likely to be much lower for cars than for two- and three-wheeled vehicles, which are not part of the survey. Brazil may focus less on electrification and more on alternative fuel, such as ethanol. And Japan's leading car manufacturers are likely to continue emphasizing hybrid vehicles and other potential energy sources such as hydrogen.

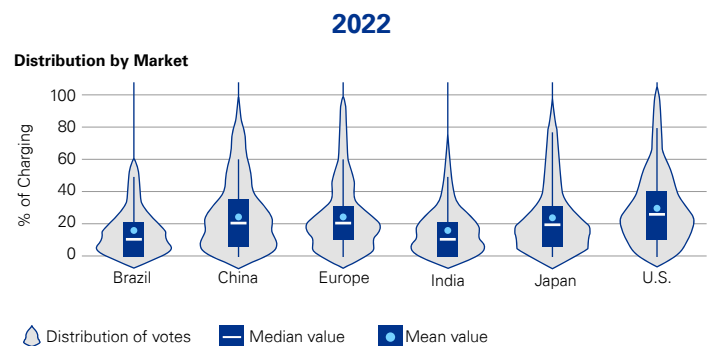
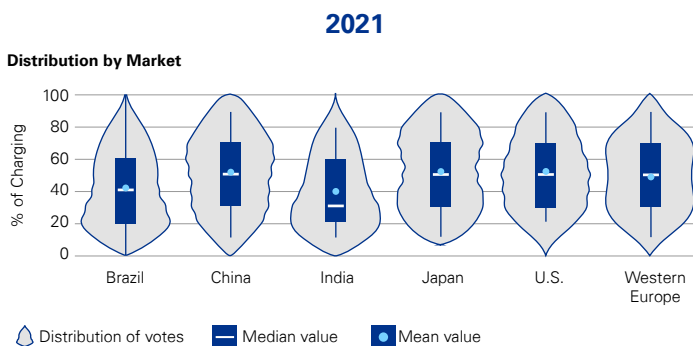
“The automotive industry faces challenges with high energy prices alongside a potential economic slowdown. There will be pressure to postpone investments that would reduce carbon footprint, but automakers need to stay focused on the importance of a long-term carbon-free future and make strategic investments in these new technologies.”

—Laurent Des Places, Partner, Head of Automotive, KPMG in France

The closer the expert is to the customer, the lower the EV share expectations seem to be. For example, US executives say car dealers expect EVs to capture 22 percent of the market by 2030, eight percentage points less than OEMs predict.

One reason for the overall reassessment is that automakers are confronting the sheer complexity of shifting the industry from internal combustion engines to batteries. It will affect every facet of the value chain, not just the sourcing of raw materials. It will change every step of the product lifecycle: the way the cars are made, how they are distributed, fueled (recharged), and serviced.

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



Source: KPMG International

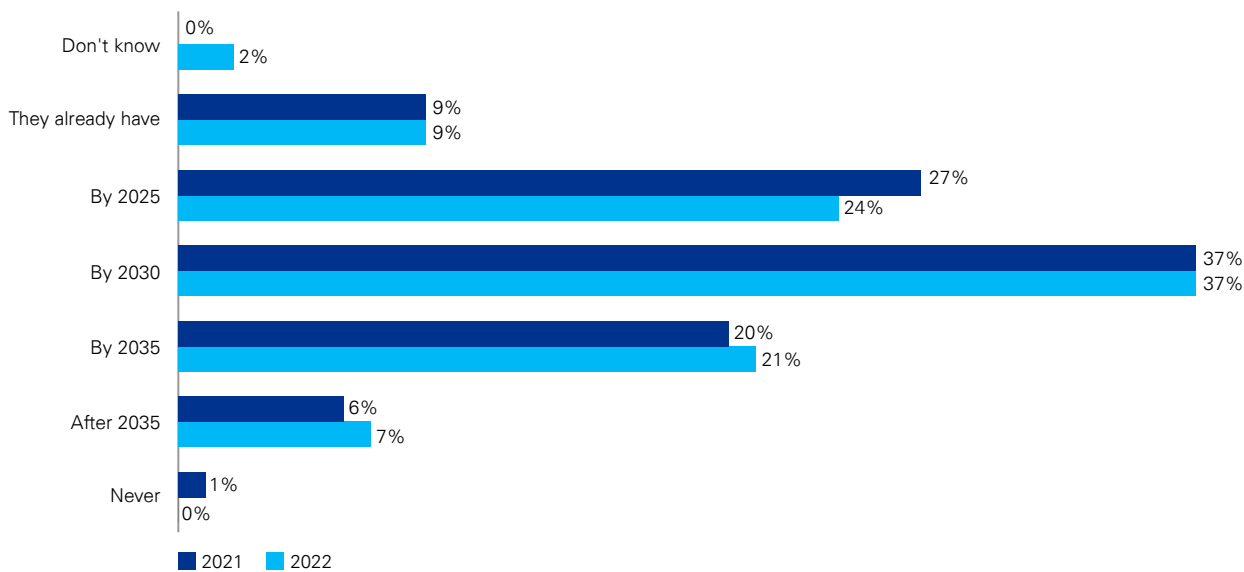
Underlying these EV sales expectations are some key predictions based on a growing confidence among manufacturers in the economics of EV car production. This can be attributed in part to the billions of dollars that have been invested in new plants and R&D. As EV output expands, costs are expected to fall due to economies of scale. Seventy percent of respondents expect that EVs will reach cost parity with ICE vehicles by 2030 without subsidies.

More than 80 percent of executives surveyed believe that EVs will achieve widespread adoption without government subsidies in the next 10 years. And the proportion in 2021 or respondents who do not agree that governments should provide direct consumer subsidies for EVs was 21 percent, three times the share in 2021. Such subsidies often distort markets and tend to complicate international trade. Some 78 percent say subsidies should be phased out at car prices ranging from \$30,000-plus to \$70,000-plus.

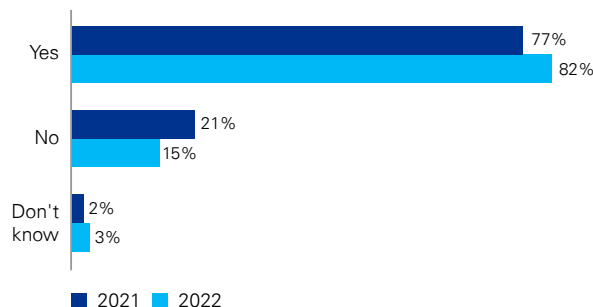
“With automakers placing huge bets on the future of EVs, they have to make them pay off. With this transformation, they must transition their workforce skills to align with the new direction and collaborate closely with partners to maximize the benefits for their ecosystem.”

–Andreas Ries, Automotive Partner, KPMG in Germany

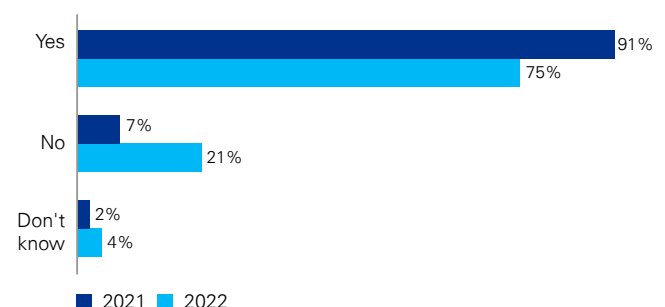
When do you believe battery electric vehicles will reach cost/affordability parity with ICE without any subsidies?



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

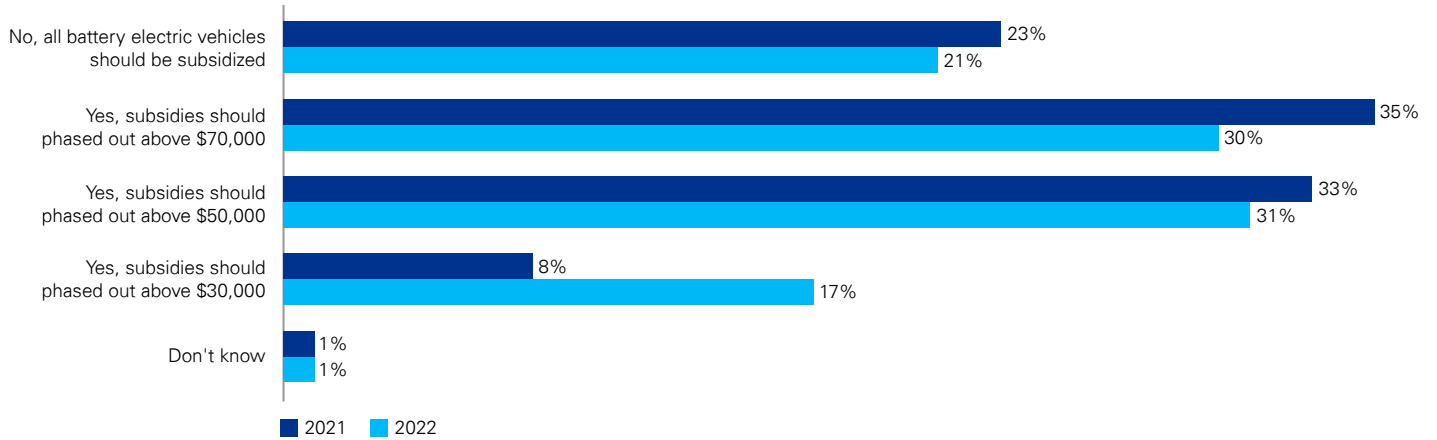


Some governments are providing direct consumer subsidies for battery-electric vehicles. Do you agree with this policy?



Source: KPMG International

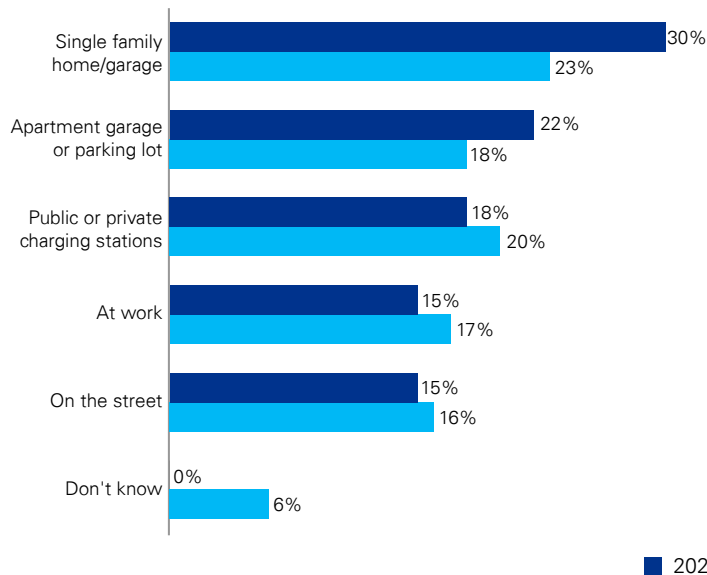
If yes, should the subsidies be phased out for vehicles above a certain vehicle price?



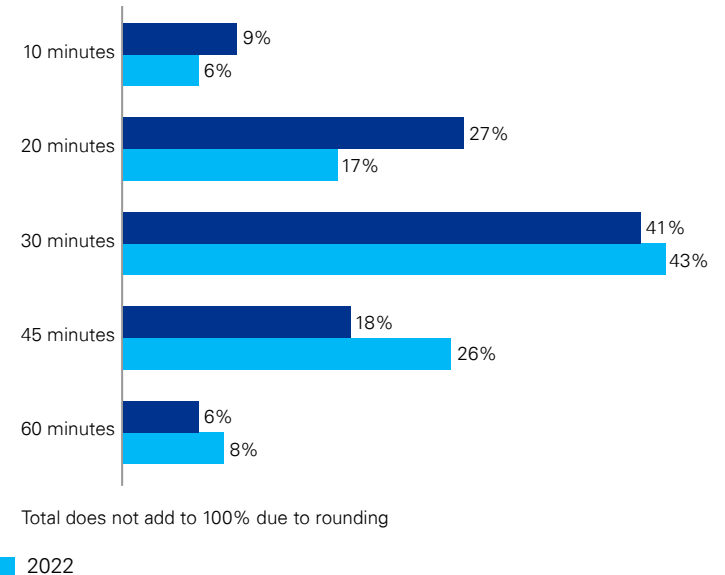
Perceptions of the infrastructure challenge are also shifting, as more government money is allocated for charging stations. While executives still think most charging will take place at consumer homes, a rising proportion of executives say owners will park at public charging stations, at work, or on the street.

There is more clarity about what the charging technology can do. More executives in 2022 expected consumers to wait longer for an 80 percent recharge than in 2021. Also, 26 percent say consumers would be willing to wait 45 minutes, eight percentage points more than in 2021. The proportion who believe consumers will only accept a 20-minute wait fell from 27 percent to 17 percent.

In your home country, where will owners charge their battery- electric vehicles?



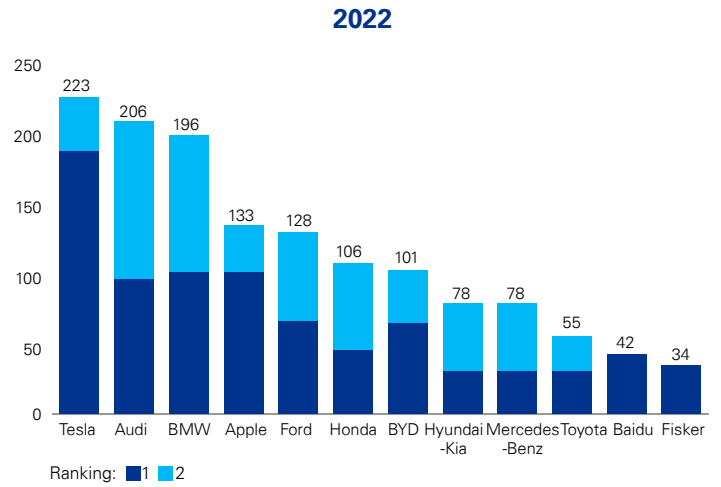
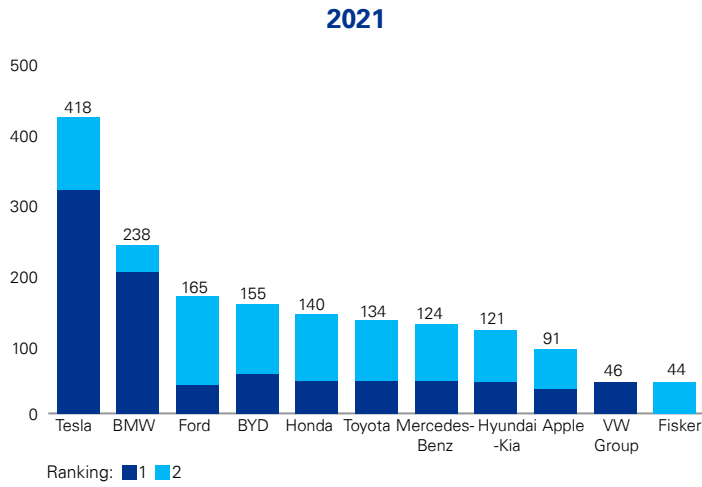
While traveling and running low on battery charge, how long will the typical consumer be willing to wait for an 80 percent or greater charge?



Auto executives still expect Tesla will be the market leader in battery-powered vehicles in 2030, the same as in 2021, but by a much narrower margin. One interesting change: Apple is now in fourth place, having risen from ninth position in 2021,

even though it has not yet produced or even announced a single car. BYD of China looks to be another strong contender. Auto executives will be watching closely for new entrants, because the field remains wide open.

Looking out to 2030, which of the following companies do you think will be the market leaders in electric vehicles?



Source: KPMG International

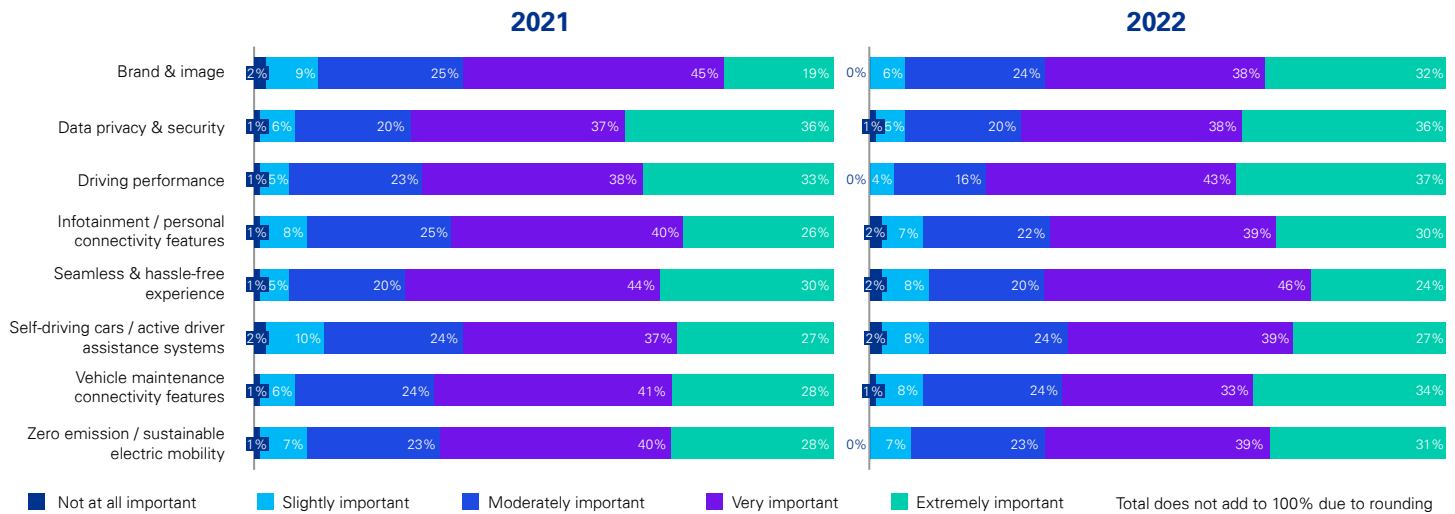
Digital consumers

Car buyers have an unprecedented array of choices for EVs. Auto makers have announced investments of more than \$500 billion in EV programs and 160 new EV models are slated for the global market in the next four years. More than 50 new manufacturers are jostling for market share. Company names like Rivian, Lucid, BYD, Xpeng, Nio, Fisker, and Vinfast have emerged in only the past few years.

The explosion of new auto manufacturers is driving significant changes in consumer car tastes, especially in terms of performance and branding. When executives are asked which factor is most important in the next five years when consumers buy a car, 80 percent, the highest number, focus on driving performance, a nine-percentage-point increase over the previous year. Given the range of options, consumers see automotive performance as a more critical differentiator than before, when performance was generally perceived as similar.

Branding is also a key differentiator. The survey shows a six-point increase in the importance of brand and image. With prices rising sharply, car buyers are raising their expectations. Also, with so many new models to choose from, branding becomes more important. In the field of EVs, the new brands may possibly have a “cool” cachet that consumers gravitate towards, and this is a critical trend to watch.

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

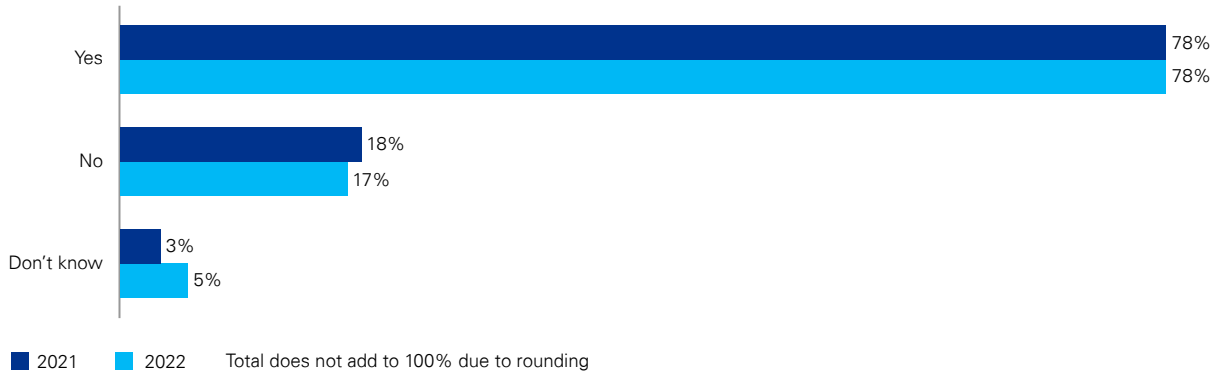


Source: KPMG International

Executives expect consumers to swing decisively to online: 78 percent predict that most vehicle purchases will be completed digitally by 2030. Within the same timeframe, auto executives expect 34 percent of new cars will be sold directly

to consumers by car manufacturers and the same proportion by dealers. In addition, traditional e-commerce platforms will be key players, along with new companies that specialize in online car sales.

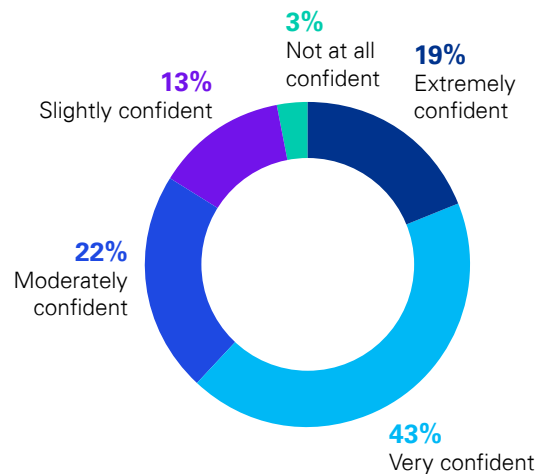
By 2030, do you believe the majority of new vehicle purchases will be completed online? (Excluding test drive)



Performance and image are not the only ways in which automakers expect to separate themselves from the pack. They also offer a wide range of software options that can create a different driving experience. Digitization will extend well beyond the point of sale to the entire functional and experiential life of the car, executives believe. Sixty-two percent say they are very confident that consumers will be willing to pay monthly subscription fees for such things as software services and advanced driver assistance systems (ADAS).

This revenue model is widely familiar to consumers who buy personal computers and then pay subscriptions for their software or those who buy monthly streaming entertainment services. If this prediction proves correct, such ongoing revenue streams are likely to help fatten automaker profit margins considerably. But given the attractive profits from subscriptions, car dealers are likely to want a share of the revenue, just as they will aim to increase their online car sales.

Many automakers are contemplating selling additional features and services as a monthly subscription (software services, maintenance, charging, advanced driver assistance systems, etc.) How confident are you that consumers would be willing to pay monthly subscription fees for this?



Source: KPMG International

Given the amount of data that will be generated by each car and what it can tell about the driver, it is logical to expect automakers to want to participate in the market for car insurance. Executives think automakers will join forces with insurers, rather than competing against them. Only 7 percent predict that auto companies will compete directly with

insurers, half the level of the previous year. Nearly half (46 percent) expect them to partner with insurance companies and 44 percent expect automakers to sell car and driver data to the insurers. Directly entering the car insurance market appears to be a road that few automakers will follow.

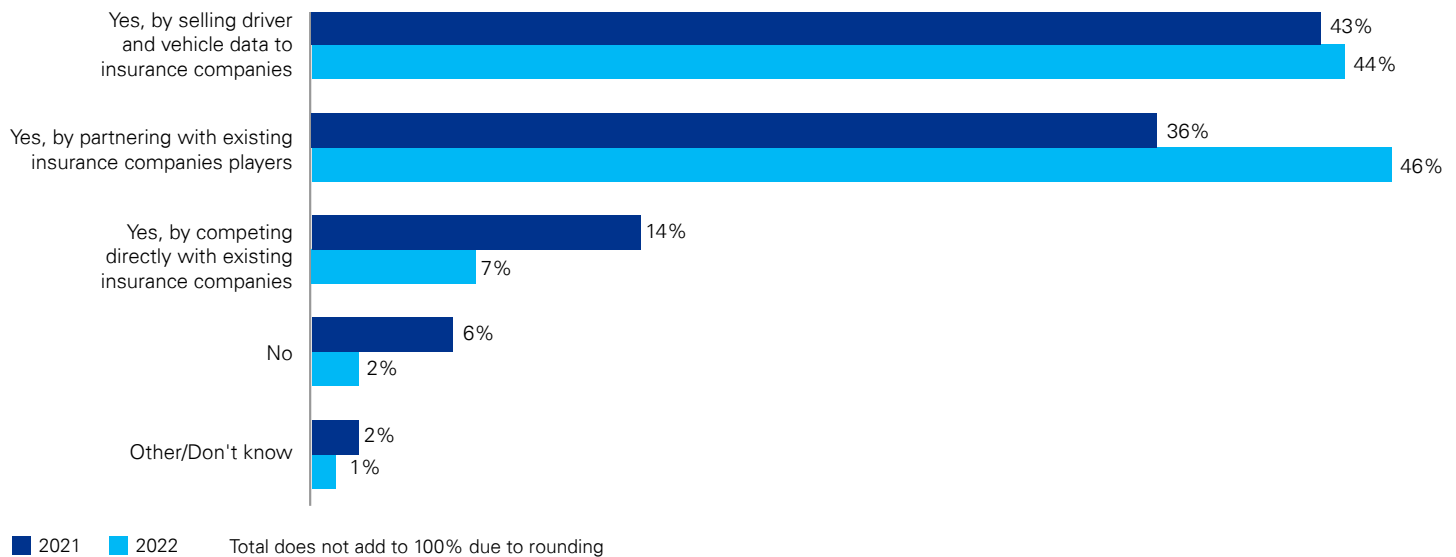
“The market for data knows few bounds; it will be hard for auto manufacturers and dealers to wall off the automobile data market from insurers and technology companies. The rising connectivity of cars will create a rapidly growing market for the data; whichever segment manages the data is likely to win big.”

–Richard Peberdy, Partner, Head of Automotive, KPMG in the UK

“Unfortunately, it would only take one or two highly publicized incidents of cyber breaches for car companies to lose their customers’ trust. To prevent this from happening, the industry needs to make a concerted effort to mitigate and prepare for possible data attacks.”

–Vinodkumar Ramachandran, Partner, Head of Automotive, KPMG in India

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

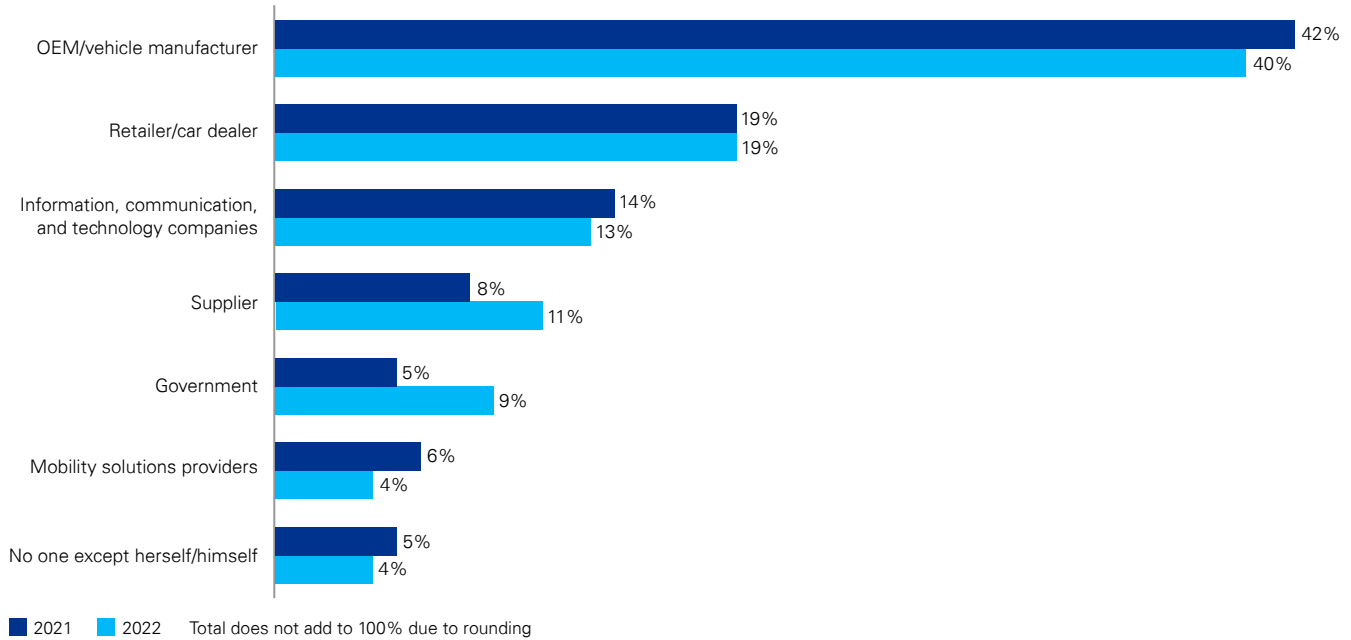


The growing connectivity of cars raises cybersecurity risks that car companies have only recently begun to address. However, executives recognize its significance: 75 percent say it will be a very important factor in purchase decisions in the next five years.

Despite the fact that car makers have little track record in managing digital risks, 40 percent of executives say that

consumers would trust automakers most to safeguard the data, twice as many as car dealers. In fact, 80 percent of respondents say car manufacturers have adequate cyber security and data-privacy protection. These high expectations place the onus on the OEMs to safeguard the trust consumers may have in them; if they fail and hackers are able to exploit weaknesses in the system, that trust may evaporate very quickly.

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



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

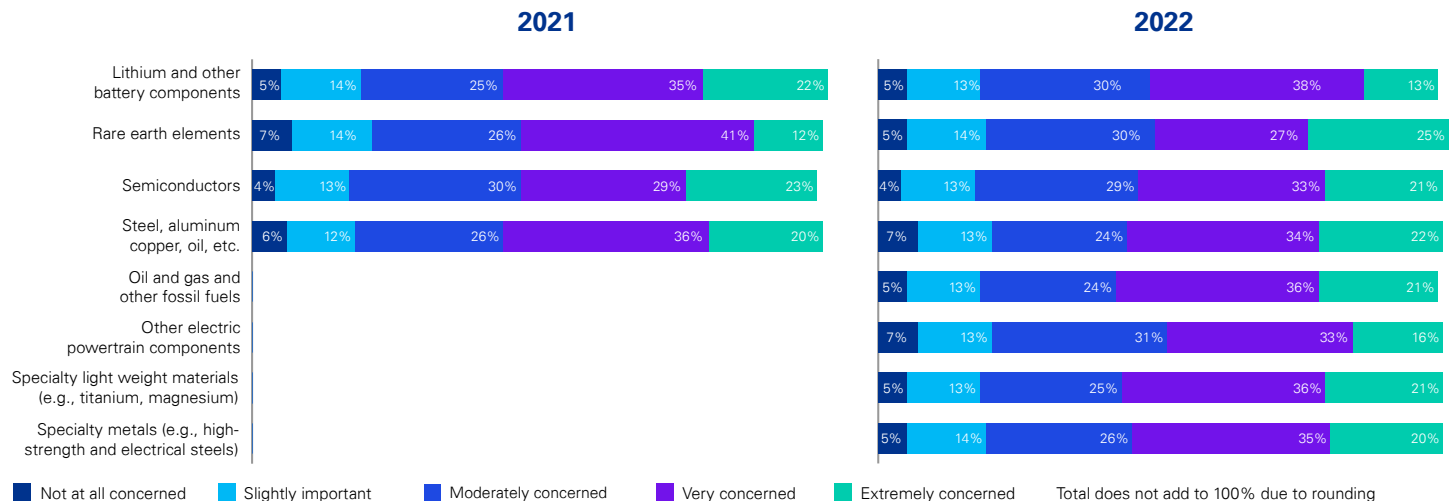


Vulnerable supply chains

The continuity of supplies of components and raw materials remains a source of high anxiety for executives. About half or more of respondents are very or extremely concerned about supplies of all eight commodities or components listed in the survey. Despite big, new investments in semiconductor manufacturing plants, procurement continues to be a near-term worry.

Two other categories should be noted. More than half of executives are very concerned about the supply of specialty metals such as electrical steel, a key component for EVs. A slightly higher number worry about lightweight materials, which are increasingly essential as heavy batteries add greatly to the weight.

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



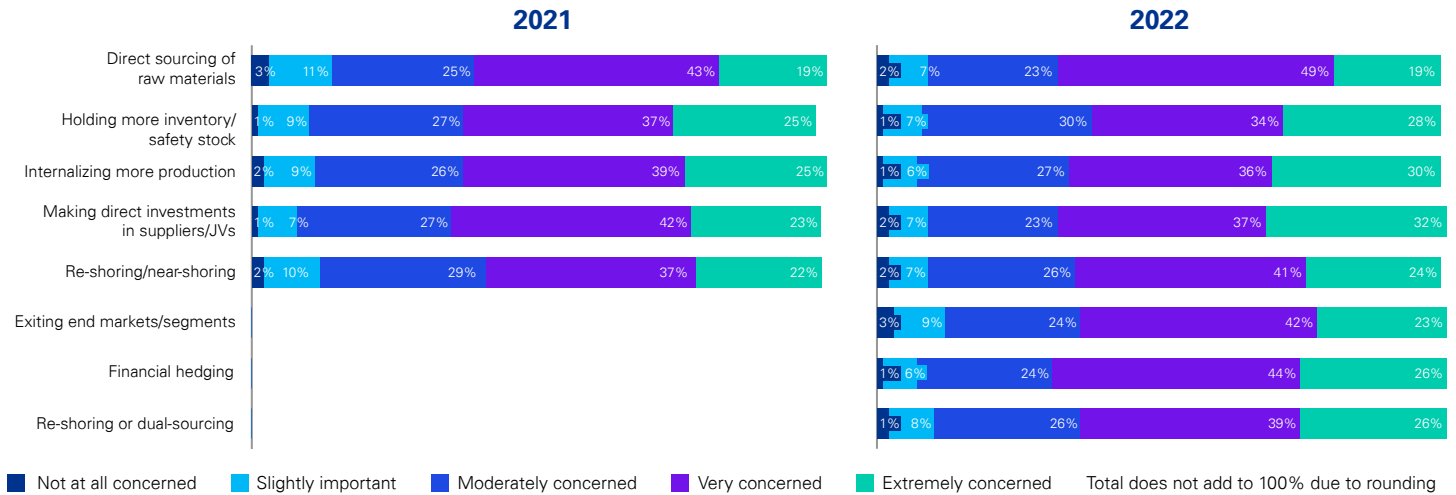
In response to such problems, automakers and their suppliers are making significant changes to their supply chain strategies. There is an increase over 2021 in the number of executives who say that near-shoring and re-shoring are very important, as well as the direct sourcing of raw materials and investments in suppliers. In the US, more than \$40 billion has been invested in 15 factories to make car batteries.

Local sourcing of raw materials, especially for battery components, is a high priority. Right now, much of the mining and processing is done in Asia and in China in particular. The number of new lithium, cobalt, and nickel mines and refineries that will be needed runs into the hundreds and on-shoring will be complex. Many of these must be located in the US and Europe. Expect supply constraints and commodity-price swings to continue.

“Securing supplies of key raw materials and components will remain a consistent concern going forward. For various OEMs, the answer will be taking stakes in sector-specific companies that produce strategic ingredients. For others, it will include global alliances and partnerships at integral points along the supply chain.”

—Goran Mazar, Partner, Head of Automotive and ESG, KPMG EMA and in Germany

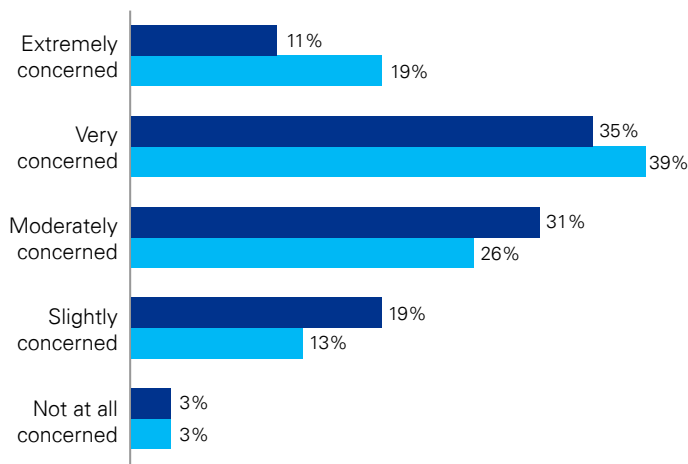
How important are each of the following to your supply chain strategy?



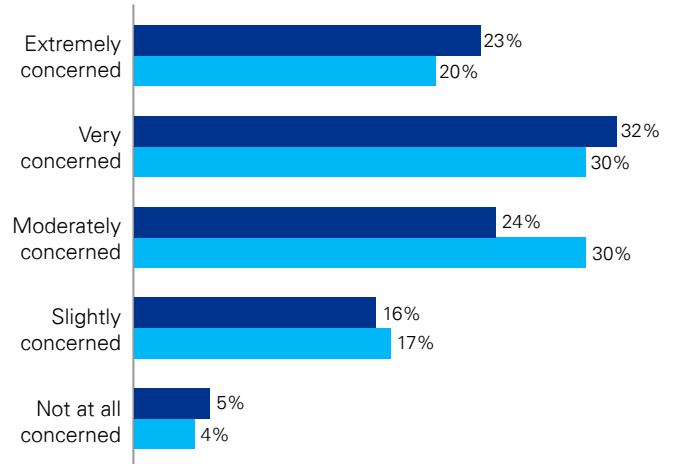
Recent years have highlighted supply chain vulnerabilities. To gain more control and mitigate risk, automakers are using technology to dig deeper into supply chains. They are also forming alliances, joint ventures and taking equity stakes in key suppliers with the goal of efficiency, continuity, and flexibility.”

–Seung-Hoon Wi, Partner, Head of Automotive, KPMG in South Korea

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



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

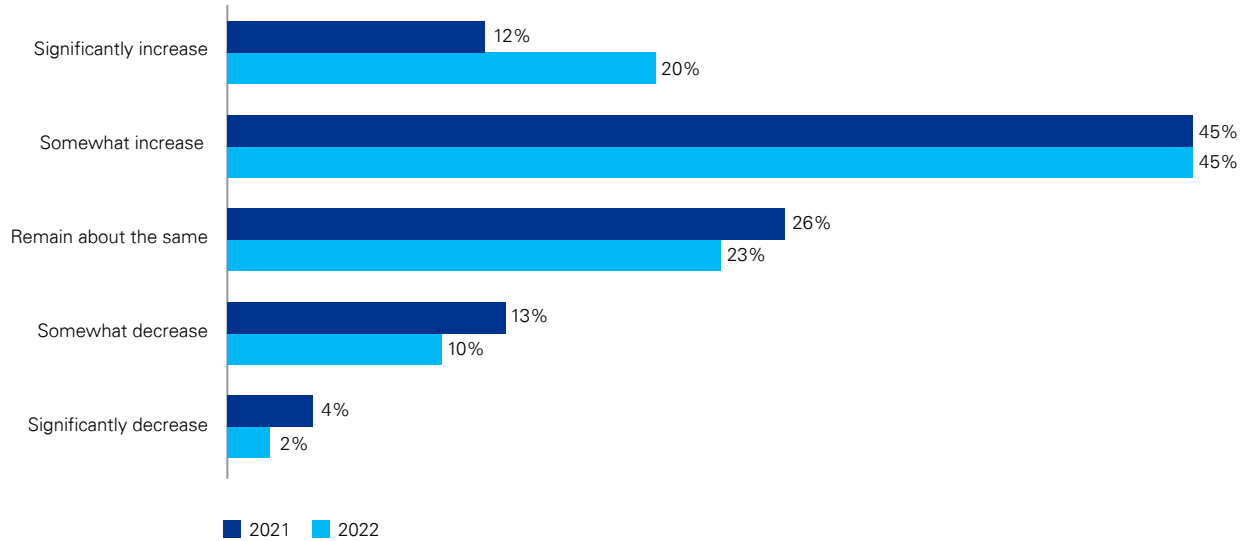


Legend: 2021 (Dark Blue), 2022 (Light Blue). Total does not add to 100% due to rounding.

There is another important reason why sourcing is becoming more difficult: tariffs, trade rules and regulations are more costly and complex than before. The European Union has banned the sale of new gasoline and diesel cars by 2035 and has proposed increases in carbon-dioxide reductions targets for new cars and vans.¹ In China, the government has set a goal that EVs will comprise 40 percent of vehicle sales by

2030 and insists on interoperability for charging systems and infrastructure.² The recently enacted Inflation Reduction Act provides some subsidies for the US EV industry, with specific rules for battery manufacturing, mining, and processing.³ Global car makers will need to navigate these rules very carefully.

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



Source: KPMG International



¹ Source: "EU ban on the sale of new petrol and diesel cars from 2035 explained," European Parliament News, November 3, 2022

² Source: "China is racing to electrify its future," Wired, June 29, 2022

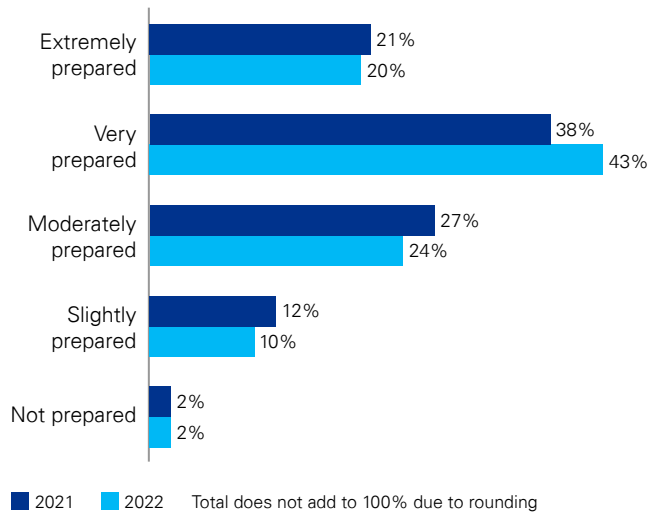
³ Source: "Fact Sheet: Biden-Harris Administration Driving U.S. Battery Manufacturing and Good-Paying Jobs," The White House, October 19, 2022



New technologies and new entrants

Car makers remain very confident in their ability to implement Industry 4.0 technologies, such as machine learning, advanced robotics, and 3D printing. Most auto firms have gone through several stages of transformation and are learning the lessons from each iteration. Keeping up with, or ahead of, changes in manufacturing technology, and to do so at scale, will be a critical cost differentiator.

How prepared is your company for Industry 4.0 technologies (e.g. machine learning, advanced robotics, 3D printing)?

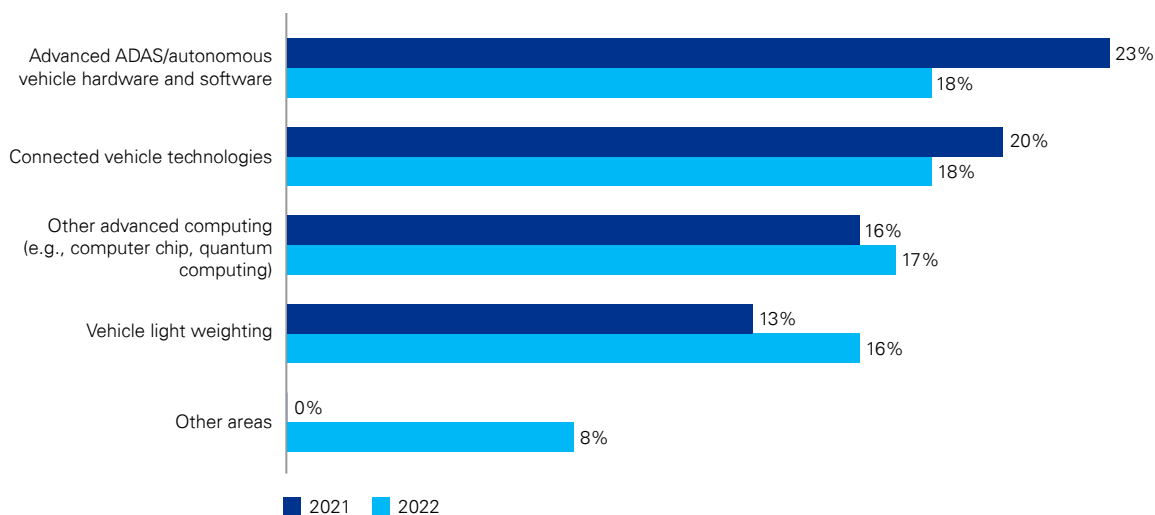


Investments in new powertrain technologies continue to be vital, but executives are also emphasizing advanced computing to enable the car’s electronic systems. They are focusing on technologies to reduce the vehicle’s weight and improve gasoline efficiency and battery range.

“Automakers will need to make better use of technology such as AI, machine e-learning alongside data analytics to gain profound insights into the working of their supply chain. These efforts will help them build more resilient ecosystems.”

—Fabrizio Ricci, Partner, Head of Automotive KPMG in Italy

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



Source: KPMG International

One of the most notable shifts in sentiment between 2021 and 2022 involves portfolio-shaping plans to sharpen their focus. Almost twice as many respondents as in 2021 say they are extremely likely to divest nonstrategic parts of the

business in the next several years. More than one in five executives say they are extremely likely to make such sales, given the massive investments required to compete.

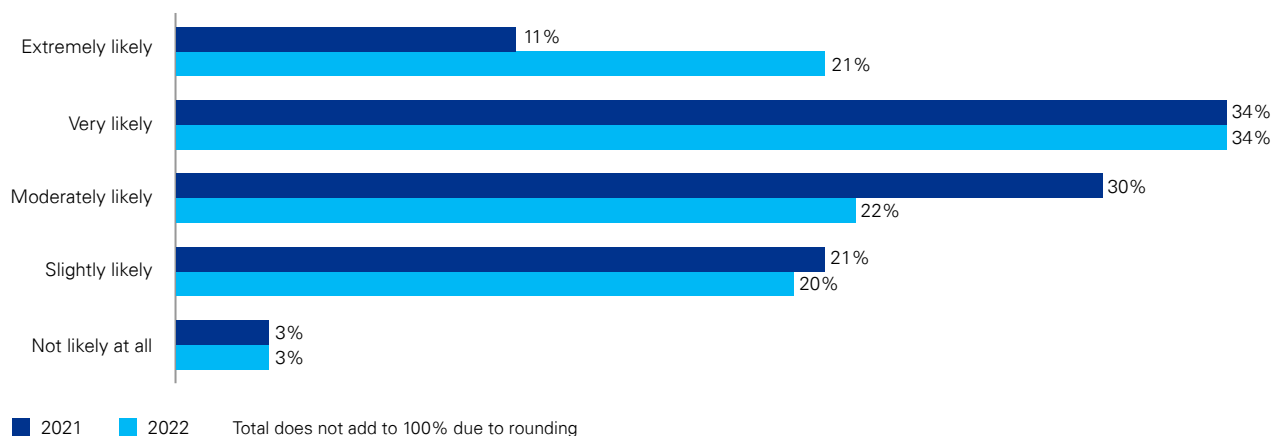
“As automotive companies change their business models, they must investigate the tax implications of divestments, carve-outs, and acquisitions. Each may be able to improve the tax efficiency of separated assets after the deal closes, but these opportunities are likely to be missed if they do not focus on the underlying businesses.”

–Flavia Spadafora, Partner, Head of Automotive, KPMG in Brazil

“M&A is playing a crucial role in helping car companies accelerate their transformation efforts. Executives who can see into both buy and sell sides of the equation are likely to restructure their asset portfolio to grow more profitably.”

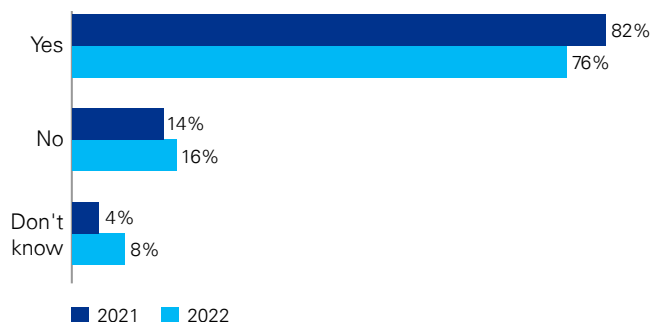
–Lenny LaRocca, Automotive Partner, KPMG in the US

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



Contract manufacturing of vehicles is emerging as a big, growth opportunity, as a result of the large number of new EV automakers entering the market and the billions of dollars required to produce these vehicles at scale. Seventy-six percent believe automakers can succeed if the manufacture is done by a third party. Taiwanese manufacturer Foxconn, which assembles iPhones for Apple, is working to produce EVs for Lordstown Motors and Fisker. In later 2022, Foxconn unveiled two of its own EV vehicle concepts. Elsewhere, Magna Steyr has begun producing the Fisker Ocean model and is working with several other OEMs.

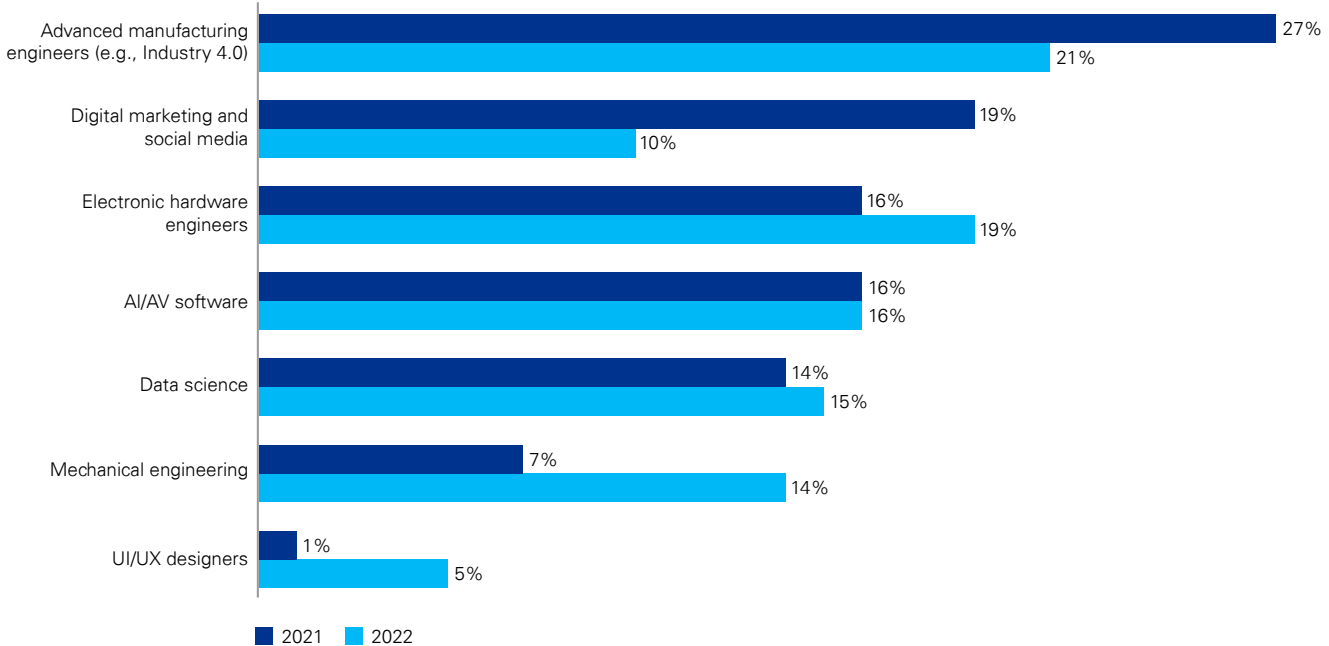
Many new automakers are pursuing “asset-light” strategies using third parties to manufacture their vehicle. Do you believe automakers can succeed using contract manufacturing?



Skills are a critical element in the transformation of the car industry. Workers with knowledge of advanced manufacturing continue to be the most sought after, but the past year has

seen significant increases in demand for skills in the fields of electronics engineering, mechanical engineering, and data science.

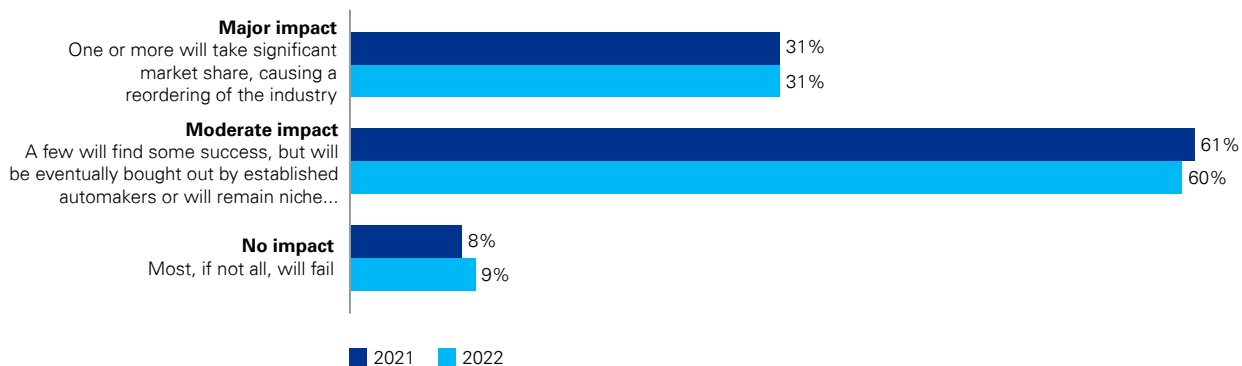
Which of these skills and roles do you believe will be the most important to your business in the next several years?



The large number of automotive start-ups is changing the industry in many ways and executives expect them to have a considerable impact in the future. Nine out of ten executives

say car startups will have a sizeable effect and, of these, three in ten expect them to take a significant market share.

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?



Source: KPMG International

Industry sentiment toward the development of autonomous vehicles (AV), is changing, after the billions spent to bring the technology to market. Executives continue to be positive about the prospects for the technology, but have pushed further into the future the time when they will be available within major cities.

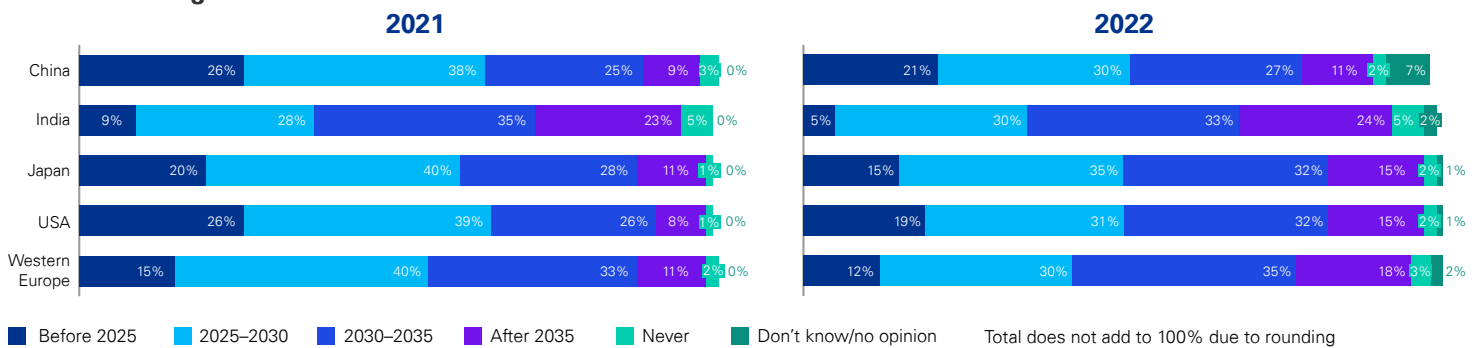
Tesla remains the perceived leader, and by a wider margin than in 2021, since when there has been significant industry consolidation. Lyft sold its AV assets to Toyota (Woven Planet), Uber sold its self-driving unit to Aurora, and Ford and VW have shut down their Argo AI joint venture. These moves are a sign that implementing AV technology is proving more complex

than previously thought. Success will require patience and deep pockets.

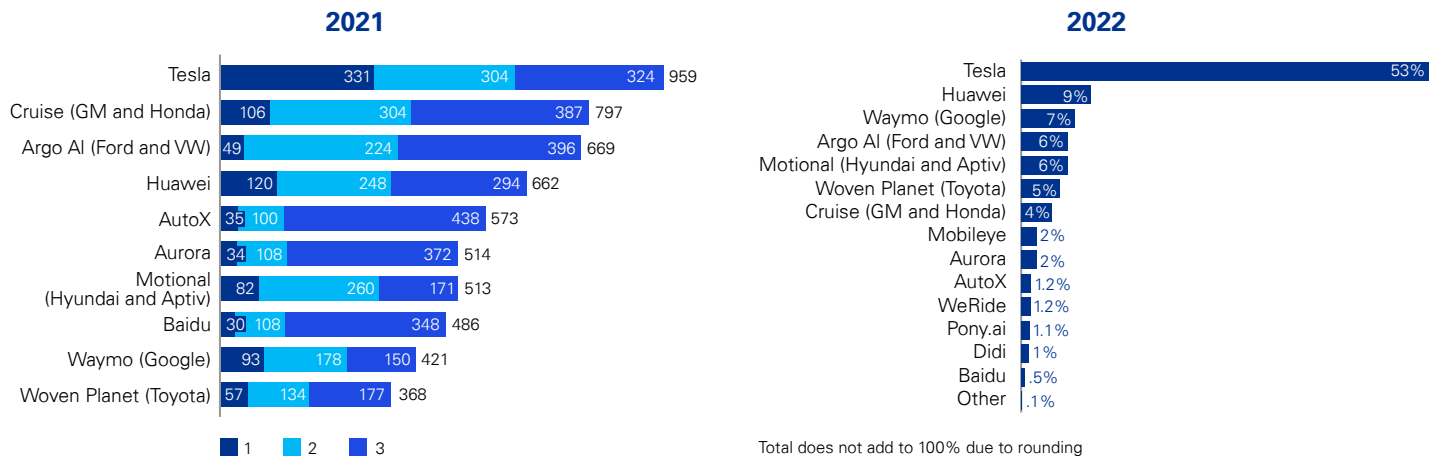
“Several forecasts show a delay in the implementation of autonomous driving systems. However, the economics and potential impact in urban ride-share markets and long-haul trucking remain quite compelling.”

–Megumu Komikado, Partner, Head of Automotive, KPMG in Japan

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



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



More than two-thirds of auto executives expect Apple to enter the car market with their own branded vehicles, a speculation

fuelled in part by the entrance of Foxconn, the iPhone manufacturer, in the auto market.

“Incumbents often underestimate the impact of new entrants, and the auto industry is no exception. With more than 50 new manufacturers, a shakeout is inevitable. Some might succeed in their own right; others will be bought out. There has rarely been a time of such disruption and some of the winners may surprise people.”

–Norbert Meyring, Partner, Head of Automotive, KPMG in China

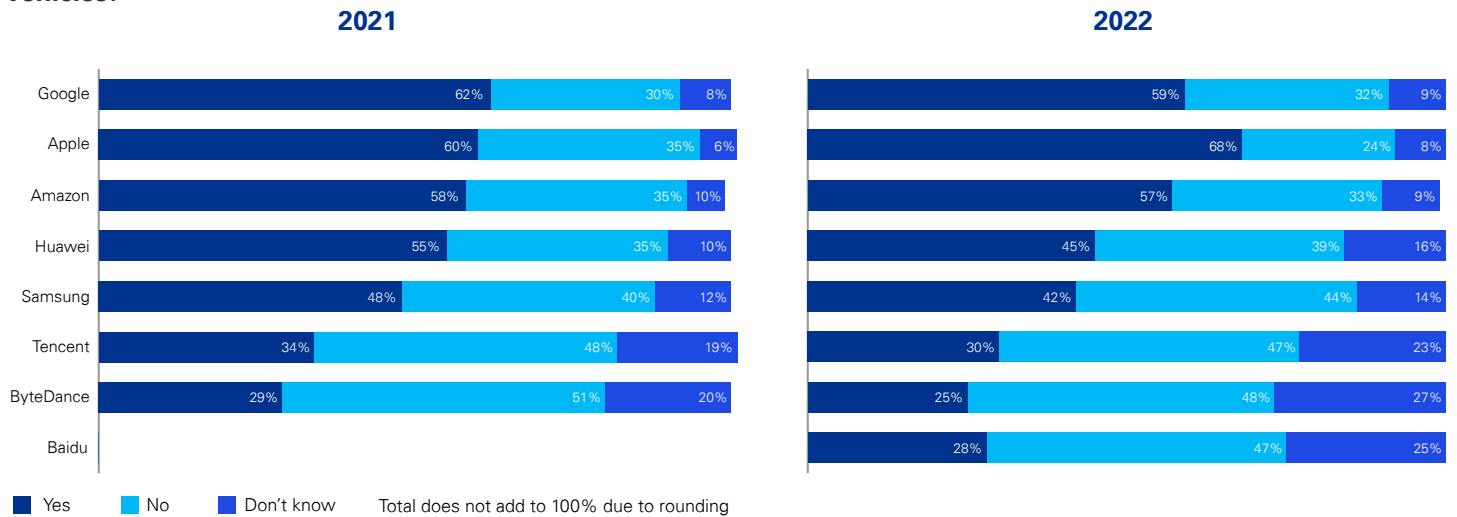
Source: KPMG International



The prediction of auto execs that large technology companies are likely to enter the auto market is a sign that the tech and auto industries are converging. And not just two industries: aerospace companies are competing for a share of the market for air taxis. Tech companies not only have the technologies needed by auto makers; the larger technology firms also have the financial firepower to make a big impact in autos.”

–Per Edin, Automotive Principal, KPMG in the US

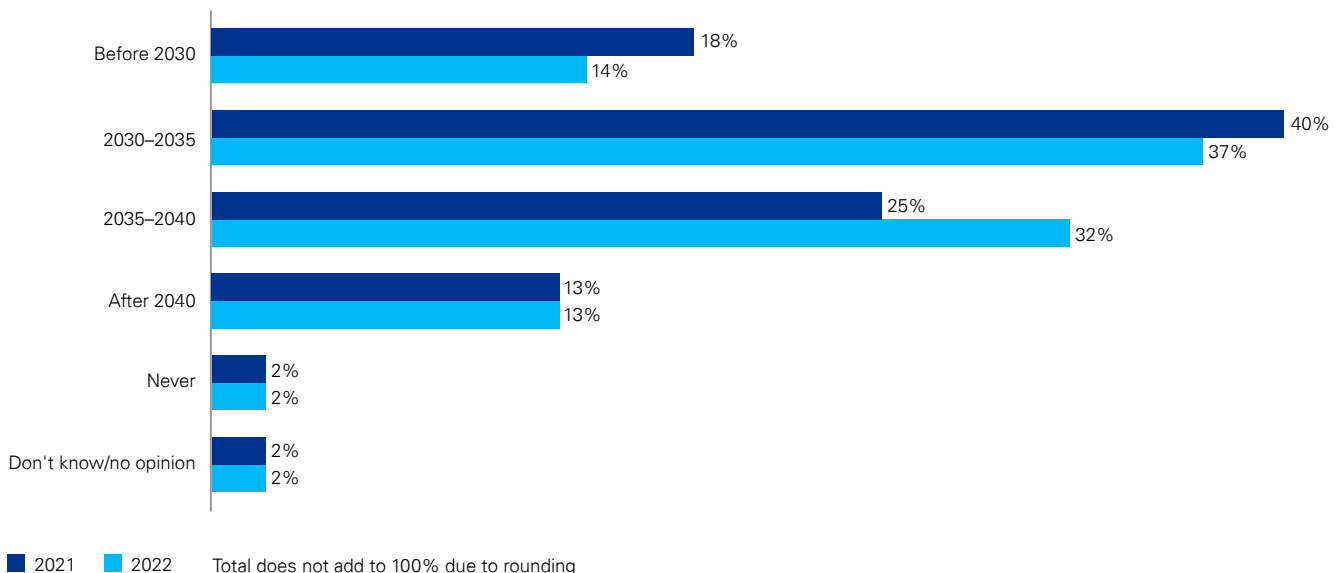
Do you think the following major technology companies will enter the auto market with their own branded vehicles?



Enthusiasm for flying cars, known as electric vertical take-off and landing aircraft (eVTOLs), remains strong, but executives have tempered expectations of when they will be widely

available. Almost seven in 10 now say they will be common sometime in the 2030s.

When, if ever, do you believe eVTOLs will be in most major cities?



Source: KPMG International



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, revenue models, 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. What assets should be divested and which ones acquired? Is it worth continuing to produce gasoline-powered cars? Does it make sense to work with a contract manufacturer? What software development needs to be done in-house? 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, multi-year 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 clock speed 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.

There are many roads that will lead to success and more than a few will end in failure. Now is the time to choose.

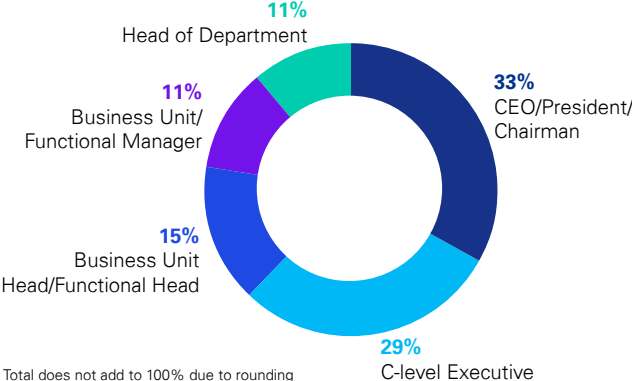


Respondent profile

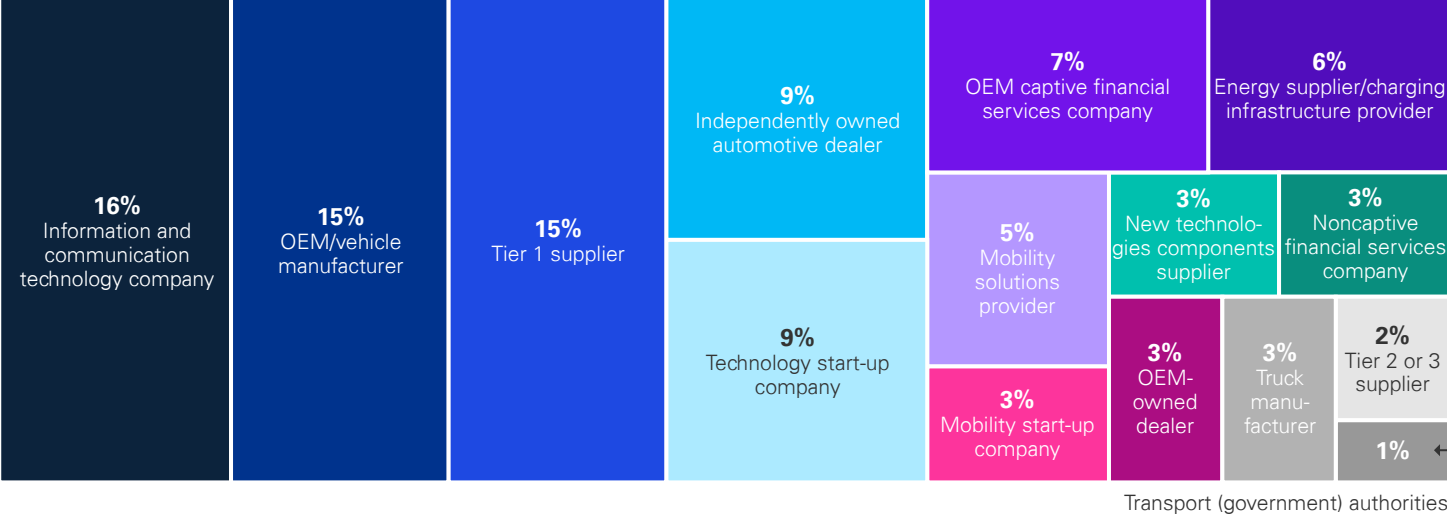
KPMG International conducted a survey of 915 executives across the automotive and adjacent industries in October 2022. Two hundred and seven CEOs responded to the survey, along with 209 other C-level executives, 293 heads of business units and departments, and 205 business unit managers. Of these, 15 percent work for car manufacturers and 15 percent for Tier-1 suppliers; 16 percent are employed by information and communication technology companies.

Among the respondents, 351 work at companies with annual revenue of more than \$1 billion. The two countries with the largest number of responses are the US (28 percent) and China (17 percent). Europe has 29 percent of respondents, with 26 percent located in India, Japan, South Korea, Australia, Thailand, Indonesia, Canada, Latin America, South Africa, and Saudi Arabia.

Which of the following best describes your job title?

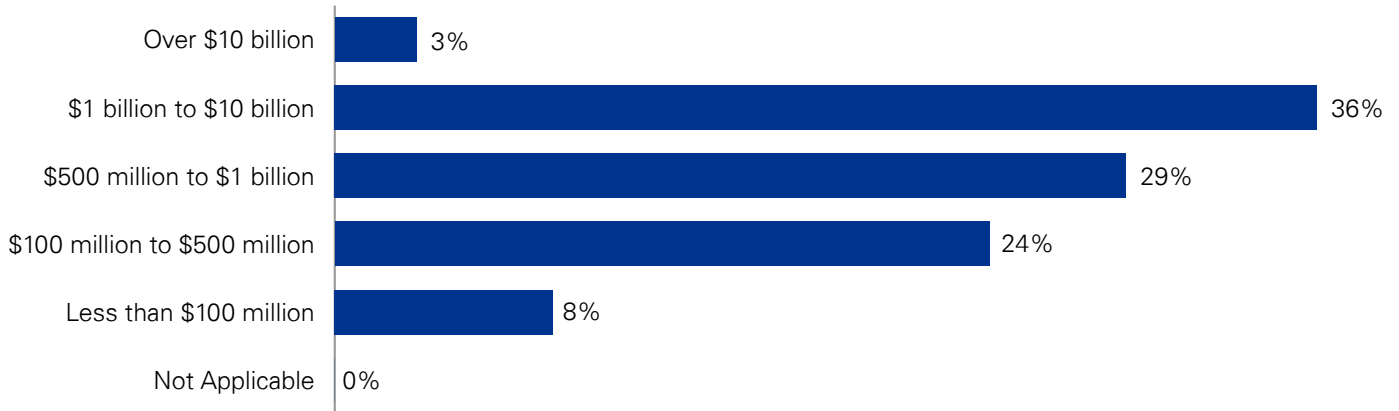


Which of the following best describes your company?



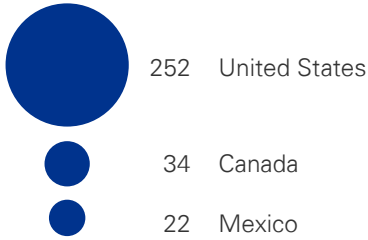
Source: GAES 2022, KPMG International

Which of the following best describes your company's annual revenues in 2022?

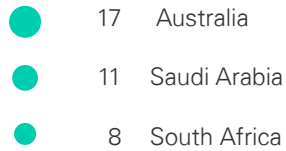


In what country, territory, or jurisdiction do you live?

North America



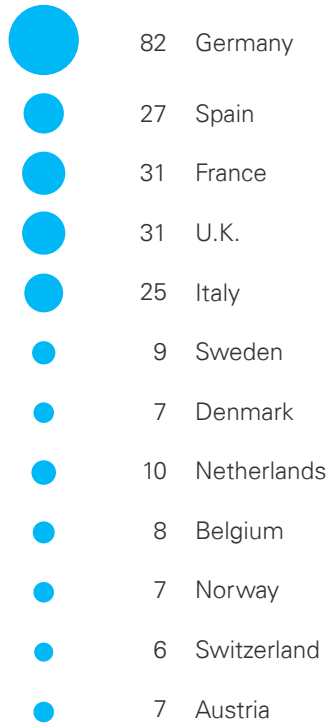
Rest of World



China



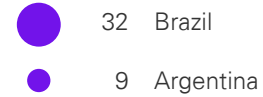
Western Europe



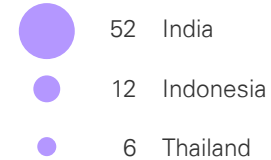
Eastern Europe



South America



India and ASEAN



Mature Asia



● Number of respondents

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