

GAST Automotive Industry & Technology Research Report No. 776_January 14, 2022

Subject: GAST's Forecast of Top 10 Trends of China's Auto Industry in 2022

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GAST's Forecast of Top 10 Trends of China's Automotive Industry in 2022

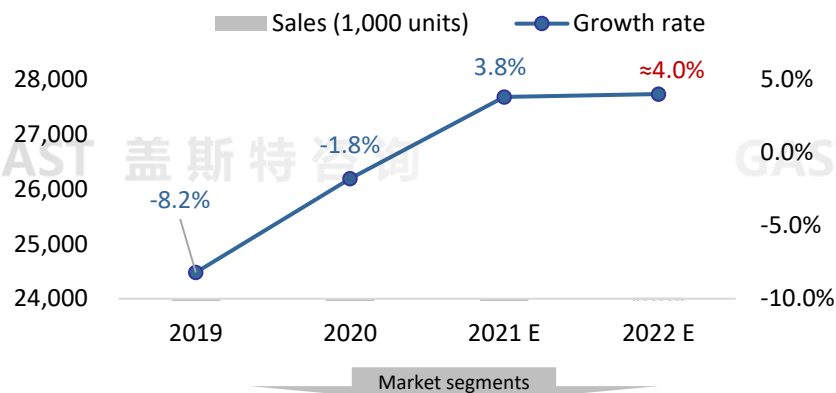
Market	Trend One	The auto market will strive to grow while maintaining stability in 2022
	Trend Two	The NEV market will maintain a momentum of vigorous growth in 2022
Industry	Trend Three	Major joint ventures will take on rivals with NEV products
	Trend Four	The auto market will enter an era of full competition with the cap on foreign ownership removed
	Trend Five	Regionalization of ICVs and New Localization of Foreign Players in China will be Megatrends
NEV	Trend Six	NEV subsidy phase-down and cost increase challenge automakers' cost control capability
	Trend Seven	Battery charging/swapping infrastructure will maintain vigorous growth
ICV	Trend Eight	High-performance intelligent chips will go into large-scale application to vehicles
	Trend Nine	Players tend to forge smart cockpits into the "third space"
	Trend Ten	Ride hailing players will compete for the supremacy in the new round of the game

Trend One: Auto market will Strive to Grow while Maintaining stability

- China's auto market is expected to maintain a momentum of growth in 2022. To be specific, passenger cars are estimated to increase by around 7 percent while commercial vehicles may continue to remain sluggish, suffering a decline of 8 percent year on year

China's auto market in 2022

Forecast of the auto market in China



Forecast of China's auto market by segment (2021-2022)

Type	2021	Growth rate	2022F	Growth rate
Total	26,280,000	3.8%	27,400,000	4.0%
Passenger car	21,480,000	6.5%	23,000,000	7.0%
Commercial vehicle	4,790,000	-6.6%	4,400,000	-8.0%

Factors to influence the auto market in China in 2022

Positive factors

- The central government continues to encourage spendings on automobiles → more relaxed control of funds
- Automakers will pay more attention to strengthening their local supply chains in China in 2022
- Short-cycle fluctuations in auto consumption is coming to an end, facilitating the increase in demand in 2022

Negative factors

- The international trade friction and the economy downswing will persist
- COVID-19 pandemic control will become a normal, denting the demand for travel
- Chip shortage will continue to exist during some periods

Forecast of growth characteristics of China's auto market in 2022

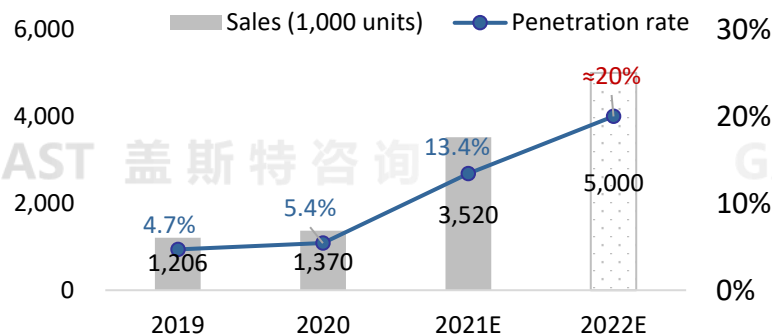
- The total auto sales are estimated to increase by around 4 percent in 2022, approaching 27,500,000 units
- **Passenger cars: to increase by 7 percent in 2022**
 - New energy passenger cars will become an important pillar, with Chinese homegrown brands continuing to move upwards
 - The proportion of repurchase and trade-in will continue to increase (≈50%), with Post-80s and Post-90s consumers accounting for a larger proportion (> 70%)
- **Commercial vehicles: to remain sluggish in 2022**
 - Around 1.3 million medium- and heavy-duty trucks are estimated to be sold, with tractors continuing to be the key contributor to the commercial vehicle market
 - Impact of the regulations for light-duty trucks with blue license plates → light-duty trucks may suffer a slight sales decline

Trend Two: NEV market will Maintain a Momentum of Vigorous Growth

- Driven by a raft of positive factors such as the continuous launch of quality products, the introduction of incentive policies, and the increasingly mature consumer mentality, the NEV market will maintain stability and continue vigorous growth in 2022

China's NEV market in 2022

Forecast of the NEV market in China



Market segments

Forecast of China's NEV market by segment (2021-2022)

Type	2021	Growth rate	2022F	Growth rate
Total	3,521,000	157.5%	5,000,000	42.0%
Passenger car	3,334,000	167.5%	4,800,000	44.0%
Commercial vehicle	186,000	54.0%	200,000	8.0%

Factors to influence the NEV market in China in 2022

Positive factors

- Continuous effect of star products + rapid launch of new quality products → the NEV acceptance will further increase
- NEV subsidy phase-down and overall stable technical indicators + extended NEV purchase tax → policies will still be favorable for NEVs

Negative factors

- Subsidy phase-down + continuous increase in the cost of raw materials + overall increase in the insurance premium for NEVs → consumers will face a higher comprehensive purchase cost; it is hard to remove the impact of chip shortage in a short time

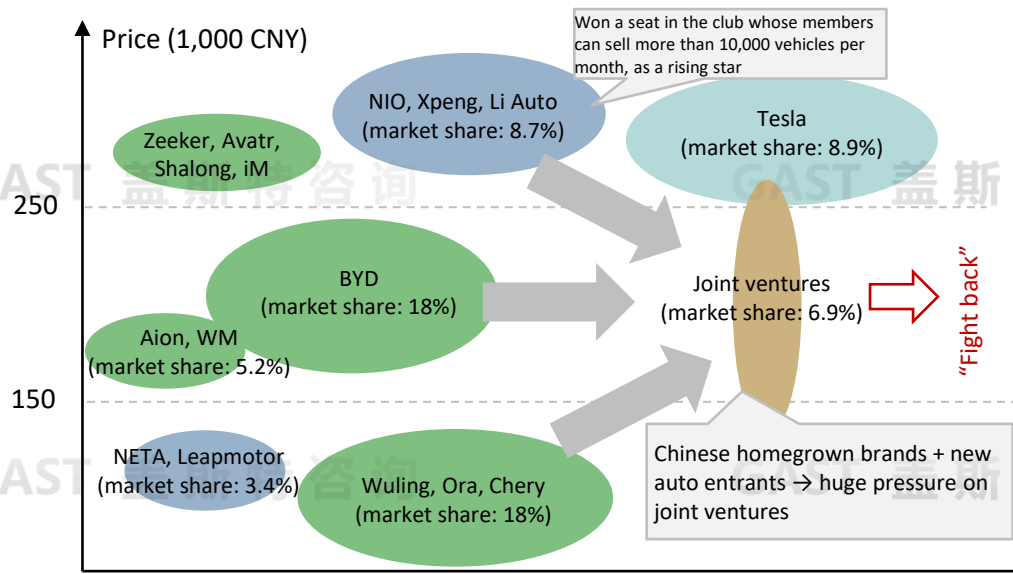
Forecast of growth characteristics of China's NEV market in 2022

- The NEV penetration rate is estimated to approach 20 percent by 2022, topping 5 million units
- **Passenger car: high-quality micro vehicles will further increase and the demand for economy cars will embrace significant improvement**
 - High-quality micro vehicles: to approach 1.5 million units (to increase by more than 600,000 units)
 - Major products priced between 100,000 and 200,000 CNY: to exceed 2.2 million units (to increase by about 1.5 million units); the mid- and high-end products will maintain a steady increase
- **Commercial vehicle: continue to develop with a small scale, but some segments will embrace improvement**
 - New energy refrigerator cars, sanitation vehicles, electric medium- and heavy-duty trucks for specific use cases will usher in good development

Trend Three: Major Joint Ventures will Take on Rivals with NEV products

- Facing better-than-expected development of NEVs and the first-move advantages of Chinese homegrown brands, joint ventures will launch “counterattacks” in a centralized manner in the NEV race in 2022, who are expected to further accelerate the introduction of BEV models and the building of industrial chains in China

Competitive landscape in the NEV market in China in 2021



Joint ventures speed up electrification transformation

Accelerate the launch of BEV products

- After Volkswagen, other major joint ventures will also launch their BEV products at a faster pace in 2022, such as Mercedes-Benz, Toyota (built by itself + with BYD), Honda, Hyundai, General Motors, etc.

Make faster deployment in the upstream and downstream

- Strengthen cooperation with battery companies and accelerate the construction of fast charging infrastructure (by themselves or via cooperation) → get ready for scaling up NEV business

Explore new retail models

- Develop innovative sales models and reshape the relationship with users, including opening direct-sale stores and experience stores; pay more attention to user operation

- Chinese homegrown brands are snatching more ground in the NEV market and continuously moving their brands upwards in the new race → joint ventures will “strike back” on all fronts, such as product, industrial chain, and business model

Trend Four: The Auto Market Will Enter an Era of Full Competition with the Cap on Foreign Ownership Removed

- After the cap on foreign ownership of passenger car enterprises get removed by the end of 2022, the auto market will see freer and stiffer competition, with both Chinese homegrown brands and foreign second- and third-tie brands to face huge challenges

Factors influencing the adjustment of foreign ownership and forecast of changes in foreign ownership in 2022

Adjusting foreign ownership should align with the requirements set forth in agreements

Support from local governments and multiple incentive policies may change with the changed attributes of joint ventures

Adjusting foreign ownership will require time-consuming negotiation and cost a large amount of money

Since NEV is defined as a development direction, joint ventures should focus on transformation when gasoline-powered vehicles are still running on roads

→ Except the joint ventures listed for adjusting foreign ownership that have been suffering continuous loss, such as Dongfeng withdrew Dongfeng Yueda Kia, there will be no more great changes and passenger car joint ventures will maintain the existing share structure through 2022

Some joint ventures are poised to incubate or discuss new forms of joint ventures or new ways of cooperation in a new period at the beginning of 2022

- ✓ The joint ventures composed of two players whose strengths vary greatly or luxury vehicle joint ventures are likely to see the adjustment of ownership
- ✓ To develop EV business, foreign automakers boost the transformation of themselves via joint ventures (e.g., capacity transformation) or new partners

- ❑ **Removing the cap on foreign ownership will create more space for new models of cooperation between Chinese and foreign automakers, bolster the development of local brands and localization of foreign brands, but will also place stress on traditional automakers. Comparatively speaking, NEV manufacturers will take a lighter hit**

Trend Five: Regionalization of ICVs and New Localization of Foreign Players in China will be Megatrends

- With the competition in intelligence coming into a new stage, more foreign firms will localize initiatives in China in 2022

Cars of future: intelligent, personalized, service-oriented, and self-evolving products based on data, scenario, and ecosystem

ICVs → feature the characteristics of a region

- Data: a new means of production → directly related to the characteristics of application environments, use cases, ecosystems, and consumers → **the government is recently tightening the control**
- Use cases: vary greatly by culture (country) and region
- Ecosystems: man-car external ecosystems + service ecosystems + development ecosystems more feature the characteristics of a region

Foreign players will faster accommodate new localization in China in 2022

Product development based on use cases in China	Product development/iteration driven by local data	Ecosystem construction based on Chinese suppliers/partners	Localized service and user operation
<ul style="list-style-type: none"> ✓ Tesla/Mercedes-Benz built/expanded R&D centers in China 	<ul style="list-style-type: none"> ✓ Tesla, Ford, Daimler, and BMW set up their data centers in China 	<ul style="list-style-type: none"> ✓ Battery: Volkswagen + Guoxuan High-Tech ✓ Charging: BMW + State Grid; Volkswagen + StarCharge ✓ ICV: Audi + Alibaba (connect); Ford + Baidu (SYNC+ system) 	<ul style="list-style-type: none"> ✓ Tesla promotes its direct-sale model in China → driving the localization of services

- **In 2022, foreign players will develop localized R&D, data, ecosystem, and service operational systems in China based on specific use cases, data, and their local suppliers' capabilities**

Trend Six: NEV Subsidy Phase-Down and Cost Increase Challenge Automakers' Cost Control Capability

- Due to NEV subsidy phase-down and cost increase, automakers face pressure on increasing the prices of NEVs, to which automakers will respond by better controlling cost, enhancing product competitiveness, optimizing user experience, etc.

30% cut in NEV subsidies in 2022	✓ Cut subsidies by 3,900~5,400 CNY per BEV (with an electric range of >300 km) and 2,000 CNY per PHEV (including REV)*	→ Pressure on automakers to rise the prices of NEVs
Increase in battery prices in 2022	✓ Battery prices are expected to rise by about 15 percent. For an NEV with a battery capacity of 50kWh, the cost of automakers will increase by about 7,000 CNY	

Judgment on the pressure: premium vehicles and a handful of highly recognized products will face limited pressure; small vehicles and some price-sensitive vehicles from second- and third-tier brands will encounter high pressure

Judgment on the possibility: as the NEV market grows rapidly, automakers prioritize the tasks of snatching more market share and meeting the NEV & CAFC credit requirements + without substantial improvement of purchasing power, consumers are less acceptable to price rise → OEMs, such as Tesla and Xpeng Motors, have raised prices. **Some will follow suit in 2022, but most will not make the same decision indiscreetly**

OEMs' strategies

Cut overall costs by controlling the cost of other links	Improve product competitiveness and acceptance	Optimize user experience
<ul style="list-style-type: none"> ✓ Strengthen the control over the supply chain to well respond to price rise of parts and components ✓ Dilute costs and expenses through economies of scale 	<ul style="list-style-type: none"> ✓ Ramp up R&D to launch more quality vehicle models ✓ Accelerate the upgrade and iteration of intelligent and other forward-looking technologies 	<ul style="list-style-type: none"> ✓ Improve after-sales service ✓ OTA updates (potential source of revenue) ✓ Stepwise improve charging infrastructure

Note: BEV, PHEV, and REV all refer to passenger cars, and the electric range of a PHEV (including REV) under the NEDC standards shall exceed 50km

- In a short term, the pressure from raising the prices of NEVs may trigger market fluctuations. However, as NEVs are already in the track of market-based development, cutting the price and improving the quality will be the megatrends in the long term**

Trend Seven: Battery Charging/Swapping Infrastructure Will Maintain Vigorous Growth

- The rapid development of NEVs has stimulated the market demand for battery charging/swapping infrastructure. Driven by policy and supply, the prospects of battery charging/swapping facilities are promising in general, but will vary by the facility type

Large gap between supply and demand	More refined policies	OEMs' intensified efforts in the second half
<ul style="list-style-type: none"> ✓ The existing ratio between EV and charging pile is 3 to 1, far from the ideal ratio of 1 to 1 ✓ The rapid roll-out of NEVs are spurring an increase in the demand 	<ul style="list-style-type: none"> ✓ Release policies to address issues of infrastructure construction in urban residential areas and urban public areas, as well as along highways ✓ Expand the quota and scope of subsidies 	<ul style="list-style-type: none"> ✓ More OEMs recognize that not only products but also services should be packaged into their offerings; battery charging/swapping services are part of products ✓ Build battery charging/swapping facilities on demand

In 2022, charging facilities will continue to grow vigorously, with the ownership of battery charging/swapping facilities expected to reach 3.5 million units with a growth rate of more than 40 percent

Battery charging/swapping facilities vary by type, thus suitable for different use cases → different development space and pace

Forecast of the prospects of battery charging/swapping facilities of different types in 2022

OEMs			Operators
	<ul style="list-style-type: none"> ✓ Public areas: accelerate the installation of high-voltage fast-charging piles ✓ Commercial vehicle manufacturers and passenger cars providers (for business purposes) will join the battery swapping game or intensity their incumbent initiatives 	<ul style="list-style-type: none"> ✓ Speed up the installation of slow-charging piles in residential areas → the proportion of private charging piles is expected to increase ✓ Develop orderly charging to mitigate heavier power load after improving the availability of charging service ✓ Install more fast-charging piles and explore integrated stations (storage + charging) 	

- ❑ In terms of battery charging, high-power fast charging is a hot spot and orderly charging is becoming more and more necessary. As for battery swapping, an ecosystem has taken shape and there will be space for further development of the battery swapping market

Trend Eight: High-Performance Intelligent Chips Will Go into Large-Scale Application to Vehicles

- Compared with smart cockpit, intelligent driving requires chips with higher computing power. Looking at recently launched vehicle models, they tend to feature a higher level of intelligent driving, which will increase the demand for higher computing power → 100+ TOPS automotive-grade computing chips will be adopted by production vehicles in 2022

Computing power	200+ TOPS		~500 TOPS					1,000+ TOPS	
Vehicle model in 2022	AION LX PLUS	Neta S	iM L7	ArcFox αS	Saloon Mecha Dragon	Xpeng G9	Li X01	WM M7	NIO ET7
Intelligent driving level	L2+						L4	L2+	
Computing platform	Huawei MDC 610*1 200 TOPS	Huawei MDC 610*1 200 TOPS	NVIDIA Xavier (500~1000+ TOPS)	Huawei Ascend 610*2 400 TOPS	Huawei MDC 610*2 400 TOPS	NVIDIA Orin-X*2 508 TOPS	NVIDIA Orin-X	NVIDIA Orin-X*4 1,016 TOPS	NVIDIA Orin-X*4 1,016 TOPS
Radar/camera	3L18R12V	2L17R13V	3L17R12V	3L18R13V	4L17R11V	2L17R12V	1L17R12V	3L17R11V	1L17R12V

More sensors and higher intelligent driving levels of production vehicles → more demand for chips with higher computing power → **chip makers** are pushed to develop and produce high-performance chips

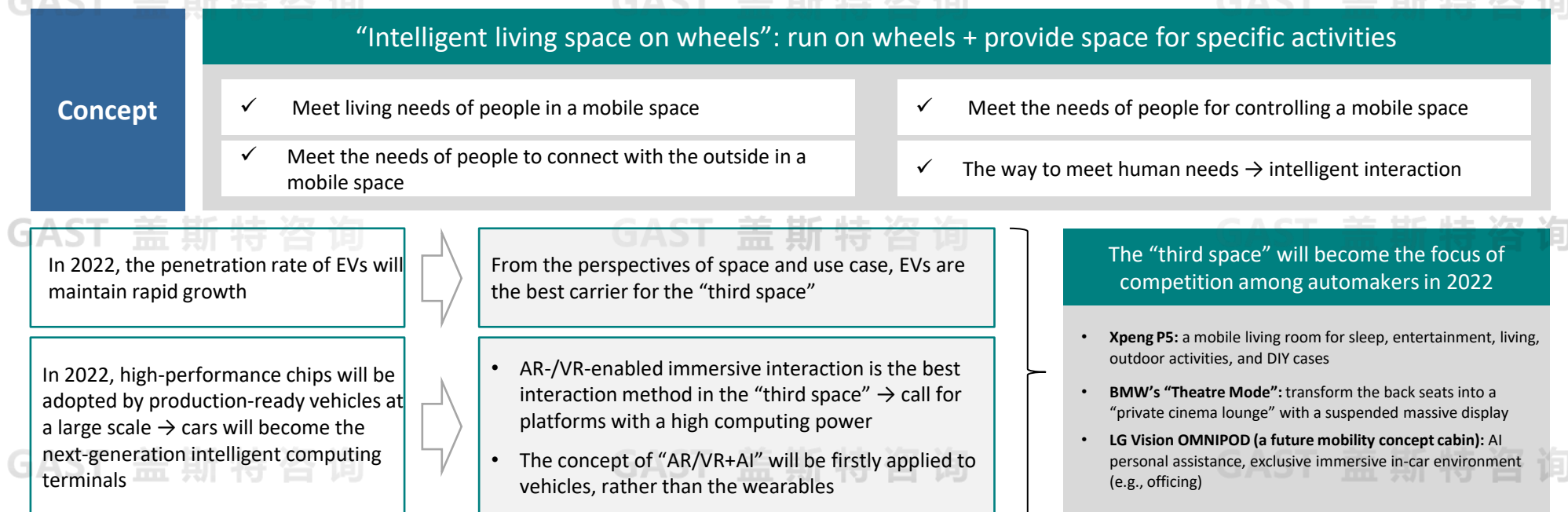
Major chipmakers release their production plans for 2022 in line with automotive OEMs' demand

NVIDIA	Huawei	Horizon Robotics	Black Sesame Technologies
Orin: 7 nm/254 TOPS	Ascend 610: ~200 TOPS	Journey 5: 16 nm/128 TOPS	A1000 Pro: 16 nm/106 TOPS

- As vehicles become more and more intelligent, OEMs enter the arena of computing power. However, purely relying on piling up hardware can not make good intelligent driving experience into a reality → deep integration of software and hardware will be the trump card

Trend Nine: Players Tend to Forge Smart Cockpits Into the “Third Space”

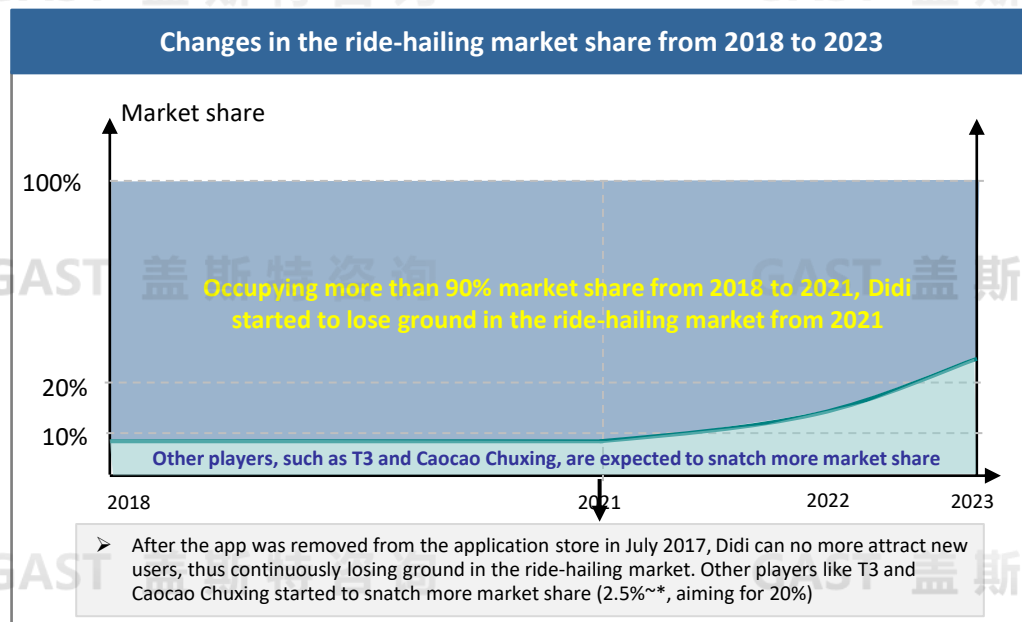
- Human drivers will be gradually free from driving tasks with more developed intelligent driving. With the continuous growth of EVs and the adoption of high-performance chips → the concept of “third space” will draw more attention in 2022



- The “third space” will bring on new application ecosystems (deeply intelligent and digital) and will also disrupt automakers’ business models (e.g., AIoT intelligent hardware ecosystem, software ecosystem, and service ecosystem)**

Trend Ten: Ride-Hailing Players Will Compete for the Supremacy in a New Round of the Game

- Instead of being outperformed by one behemoth, relevant players in the ride-hailing market will show their best to compete with each other → stiffer competition will be on the horizon



Customized vehicles will become a key factor for mobility platforms to forge their differentiators

- Didi + BYD → BYD D1; I-T Box focuses on developing dedicated vehicles for the shared mobility service → BM-400

Autonomous driving will reshape the mobility market landscape

- Regulatory restrictions will be further loosened in 2022
- Intelligent infrastructure will be built in first-tier cities and new first-tier cities with the availability exceeding 90%, and 70% in second-tier cities



Speed up the application of autonomous driving into mobility service

- Rapidly commercialize the AV-enabled main-line logistics, robo-bus, intra-city freight, etc.
- **New form of ride-hailing service:** joint operation of robo-taxis (in the designated areas) and traditional ride-hailing, such as T3 + IDRIVERPLUS, SAIC Mobility + SAIC + Momena, ONTIME + GAC + WeRide

- ❑ **With tightening regulations, there will be both challenges and opportunities (more opportunities on the whole). Players will face stiff competition in products, services, business models, etc. while going compliant with regulatory requirements → high-quality development**



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Company Profile

Setting its foothold in China automotive industry, GAST Strategy Consulting, LLC is oriented to the globe to focus on the ecosystem of the whole automotive industry and starts from three dimensions (industry, enterprise and technology) to carry out in-depth study on strategy design, business positioning, management improvement, system building, business process reengineering, product planning, technology choices and business models. It is dedicated to providing governments at all levels with decision-making support and implementation advice and enterprises in the automotive industry chain and relevant industries with all-dimensional high-level professional consulting services in strategies, management and technologies. Since the establishment, GAST is dedicated to becoming a world top auto think tank as the vision and sharing wisdom as the mission. Adhering to creating value for clients and focusing on actual effects, GAST commits itself to forging long-term partnership and providing guidance service. It has fostered strategic partnership with and is providing services for nearly 100 domestic and international enterprises, organizations in the automotive industry and governments at all levels by virtue of comprehensive, systematic, advanced and pragmatic consulting methods.

Range of Service

Provide diversified and open services and flexible ways of cooperation for customers, including but not limited to:

- Executive-oriented strategy, management and technology consulting services
- All-round and customized special project research: covering macro strategy, industrial development, interpretation of policies and regulations, the internet, business models, corporate strategy and management, auto market, product research, product design methodology, research on auto shows, interpretation of forums, energy conservation and emission reduction, new energy vehicles, intelligent vehicles and comprehensive automotive technologies
- Serve as reliable resource that can win customers' long-term dependence and provide open cooperation that can meet customers' specific requirements at any time
- Provide a high-end sharing platform (CAIT) for industrial communication, exchange and in-depth research
- The company provides nearly 1,000 research reports in Chinese, English and Japanese at present

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