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# Global and China Purpose Built Vehicle (PBV) and Robocar Report, 2022

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# PBV and Its Unique Features

Purpose built vehicle (PBV) refers to special purpose vehicles based on small/medium-sized van or multi-box van. PBV suppliers adopt the approach of independent development of upper and lower vehicle bodies, and derive various vehicle types on the same chassis platform, meeting customization needs. Compared with conventional integrated vehicle development, such a development method has unique features below:

- *Short development cycle and low cost*
- *Diversified PBV product forms*
- *Diversified PBV profit models*



Source: PIX Moving



Source: Hyundai Motor Group

examples



KIA bodystyles enabled by Canoo's modular skateboard platform

# Short Development Cycle and Low Cost

PBVs built on the same chassis don't need repeated development, which shortens the start-of-production and time-to-market of new models. The standardized chassis components can also be reused, reducing manufacturing costs.

For example, the use of "UP Super Board" developed by Shanghai U Power Technology Co., Ltd. cuts down the original 2 or 3 years of vehicle R&D cycle to 12 months, and the R&D costs by up to 60%.



## PBV Development Cycle of U Power



Source: U Power

# Diversified PBV Product Forms

The flexible and changeable upper space of PBV allows a variety of product forms. For example, a PBV can be a logistics vehicle, a retail vehicle, a car, a bus, a sanitation vehicle, and so forth.

From the product layout of PBV suppliers, it can be seen that the product forms of PBV are led by three vehicle types: van, pickup and sedan. Wherein, PIX Moving enjoys the broadest range of product forms, involving four fields: passenger car, commercial vehicle, freight vehicle and special vehicle; U Power boasts the most abundant PBV product lineups and deploys five vehicle types, covering three fields: passenger car, commercial vehicle, and freight vehicle; with single PBV product form, Didi has only one product, D1, a customized car for the online ride-hailing mobility scenario. Didi plans to iterate a version every 18 months, to D3 in 2025 when 1 million units will be launched; and to remove the cockpit and realize autonomous driving in 2030.

**Product Layout of PBV Suppliers**

	Passenger Cars				Commercial Vehicles				Freight Vehicles				Special Vehicles	
	Sedan	SUV	MPV	Sports Car	Ride-hailing Vehicle	Bus	Pickup	Coach	Truck	Van	Last-mile Delivery Vehicle	Autonomous Retail Vehicle	Sanitation Vehicle	Patrol Car
<b>PIX Moving</b>	✓					✓		✓					✓	
<b>Didi</b>					✓									
<b>Arrival</b>					✓	✓				✓				
<b>Rivian</b>		✓					✓			✓				
<b>Canoo</b>	✓			✓			✓				✓			
<b>U Power</b>	✓	✓	✓				✓			✓				

Source: ResearchInChina



# Diversified PBV Profit Models

Through the lens of business models, PBV suppliers often apply the To B model. Among them, PIX Moving, Arrival and Rivian employ both To B and To C models. For instance, PIX Moving starts with Robobus at the business end in a bid for quick commercialization, and will build a complete marketing system after launching consumer products.

As for manufacturing, all suppliers except for Didi have their own production bases. Didi partners with BYD to produce D1 at BYD's base in Changsha city. In June 2021, Canoo started building a production line in Oklahoma, the US, and ceased the outsourcing contract with VDL Nedcar, opting to build cars by itself.

There are mainly three profit models: vehicle sales, rental, and software subscription & other value-added services. Didi and Arrival apply the rental model, but their rental schemes are different. Didi offers two rental schemes that target Didi drivers: half-year rental, with a monthly rent of RMB4,399; one-year rental, RMB4,299 per month. Arrival, however, aims at third-party lessors such as LeasePlan (in 2021, Arrival and LeasePlan signed a sales cooperation agreement for 3,000 vans). For profits, the supplier Canoo has begun to take into account both the subscription and vehicle sales models.



# Is Robocar the Ultimate Form of PBV Products?

The new idea of building brick cars gives birth to diversified vehicle forms, including Robocar, a robot that looks like a vehicle, can move freely and is capable of L4 autonomous driving. The product forms of Robocars are led by Robotaxi and Robobus. At present, Robotaxies built by Baidu, Pony.ai, QCRAFT and the like have begun to run. In the future, Robocars will also be upgraded to L5 autonomy, competent enough to self-learn, make decisions independently, and adapt to a variety of complex scenarios and inclement weather like rain and fog, and they will completely replace humans by then.

**Operation of Robotaxi**

Company	Start Time of Operation	Operating Area	Number of Launched Vehicles	Ride-hailing Mode	Operation
Baidu	Apr. 2020	Changsha Xiangjiang Area New	45 units	Baidu APP, Map Apollo GoAPP	As of June 2021, Baidu Apollo self-driving mobility service has served more than 400,000 passengers, with over 14 million km test mileage and more than 2,900 autonomous driving patents.
	Aug. 2020	Cangzhou	30 units		
	Sept. 2020	Beijing	40 units		
	Jul. 2021	Guangzhou	-		
	Aug. 2021	Shanghai	>200 units		
Pony.ai	Dec. 2018	Nansha District, Guangzhou	-	PonyPilot+APP	As of 2021, Pony.ai's mobility service has provided about 600,000 rides for users.
	Oct. 2019	Irvine, California	10 units	BotRideAPP	
	Feb. 2020	Fremont, California	-	PonyPilot+APP	
	May 2021	Yizhuang, Beijing	30 units		
	Jul. 2021	Jiading District, Shanghai	-		
WeRide	Nov. 2019	Within the designated areas in Huangpu District, Guangzhou and Guangzhou Economic and Technological Development District	40 units (2020)	WeRide Go APP	As of January 2022, the company has operated safely for more than 2 years, fulfilled 307,363 orders with total mileage of 1.5 million kilometers, providing autonomous mobility services for more than 180,000 passengers.
UISEE	Feb. 2021	Wuhan Economic & Technological Development Zone	42 units (An increase to 50 units as planned)	DF-GO APP	In February 2022, UISEE provided services for the Beijing Winter Olympics.
Idriverplus	2019	--	>100 units (2021)	--	--

Source: ResearchInChina

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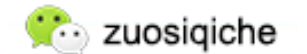
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