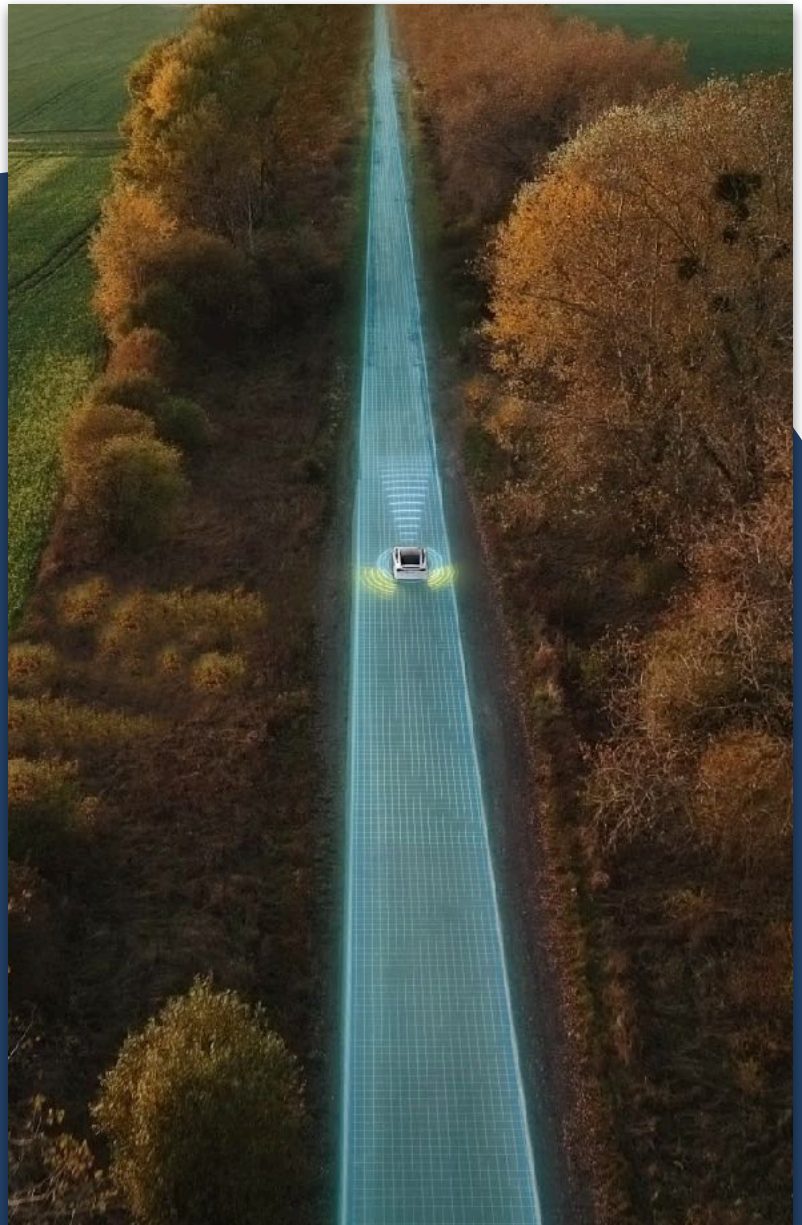# Autonomous vehicle market trends and best practices

The major setbacks faced and the way forward for AVs

by
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Introduction

With the improvement of environmental perception technologies, such as lidars and radars, as well as artificial intelligence, autonomous vehicles (AVs) have gained momentum in recent years. Many start-ups introduced vehicles able to hit the road with no driver behind the wheel. Thus, billions of dollars were invested over the last decade. For instance, Waymo, Alphabet's self-driving technology unit, raised a total of $5.5 billion in funding and Cruise, self-driving car company and subsidiary of GM, raised $15 billion.

Several years later, stakeholders are becoming aware of the complexity of mixing unpredictable human drivers with autonomous vehicles in one road section. Furthermore, the individual autonomous vehicle market has yet to see success. Raising concerns amongst investors and making them cautious about AVs.

Setbacks to the AV Industry

We recently noticed the struggling of some AV start-ups and emerging companies, some are reducing their number of employees and others shutting down their businesses completely. The private individual self-driving car use case seems to still be years ahead.

For instance, the decision of Ford and Volkswagen to stop funding Argo AI, an AV technology company, in November 2022, was a harsh blow for the industry. This year, we have heard that Waymo is planning to reduce its number of employees. Embark Technology, an autonomous truck company, was unable to raise funds and decided to stop its operation.

Reasons for the Setbacks

To explain these changes, we analysed several businesses that are still flourishing and tried to understand the reasons for investors' decisions, and where the industry is heading.

OEMS' CONCERNS

OEMs have been investing in AVs for decades and still AVs have yet to prove the business case, nor generate revenues. But today, the automotive industry is facing other threats and challenges

I.   The **EV transition** is a top priority now. In 2022, EV sales increased by [55%](#) compared to the previous year, and the European Parliament approved a law to ban the sale of new diesel and petrol cars by 2035. Consequently, billions of

dollars were invested by car makers for the development of EVs; Volkswagen for example will invest €15 billion in batteries and raw material.

II. A car today needs more than a 1,000 semiconductor chips to be functional and have all the features related to security, infotainment, etc. And with the chip shortage, OEMs are prioritising important electronic parts to run vehicles and secure them, instead of autonomous driving features.

III. Some car makers are **investing in software** development to differentiate their vehicles from those using software developed by tech giants. They aim to provide unique features and customer experience. For example, Stellantis' CEO Carlos Tavares announced in 2021 their willingness to invest $34 billion to speed up software and electrification development.

IV. OEMs also think that including more **ADAS features** in vehicles can bring more money in the short term and increase vehicles' safety.

LACK OF GOVERNANCE

The technology is almost there, we have seen numerous tests on public roads in the US, China, and other countries where autonomous cars operate in a good manner. But, to make them publicly available for everyone, AVs lack governance in many areas. Stakeholders have concerns about the legacy, infrastructure readiness, security, and many other topics.

- The legal framework needs to be defined at a regional and local level. Today, we observe some countries authorising AVs on open roads, but only for test purposes and with special requirements.

- AVs are raising privacy concerns among users considering the use of location and personal data.

- Road infrastructure is not ready. AVs need perfect and clean roads to operate effectively and securely, they also need a widespread installation of 4G/5G network for communication and software updates.

- Cyber-attacks represent a huge risk for the safety of passengers in an automated machine.

- Ethical dilemmas, public acceptance, standardisation of technologies and infrastructure, insurance and many other topics are still not mature for a real market to be launched.

Where AVs can bring value

Autonomous vehicles could be used in many use cases, from ride-hailing, freight transportation to specific industry usage.

Considering the context of the economy in the last 2 years, investments are moving towards secure business that will generate revenue in the short term. Autonomous ride-hailing is not a soaring use case since it is not yet generating important revenues, and it is still lagging behind in terms of broad roll-out. But **self-driving vehicles** could be profitable in a use case that solves daily issues and that could operate in a secure manner.

- **Truck drivers shortage:** In the last 3 years, the shortage of truck drivers has skyrocketed, and freight companies are struggling to hire drivers. According to the American Trucking Association, the trucking industry lacked about 78,000 drivers in 2022. The same problem persists in Europe. Autonomous trucks may help solve this critical issue. Some companies are already working on

prototypes of pods, able to transport goods on the open road, without the need for a driver. For instance, the Stockholm based company Einride, specialised in autonomous and electric pods used for freight delivery, secured financing of $500 million in late 2022 to continue development of their vehicles and run more tests.

- **TCO (Total Cost of Ownership) efficiency**: Drivers represent about 30% of the TCO for trucks, according to PTOLEMUS' [Commercial Fleet Telematics Report](#). Autonomous trucks can operate 24/7 without the need for rest (except for time for charging). They will increase the number of service hours and prove to be more efficient (more eco-driving and less energy consumption).

TCO per vehicle (for Heavy Good Vehicles) **in the US in 2021**
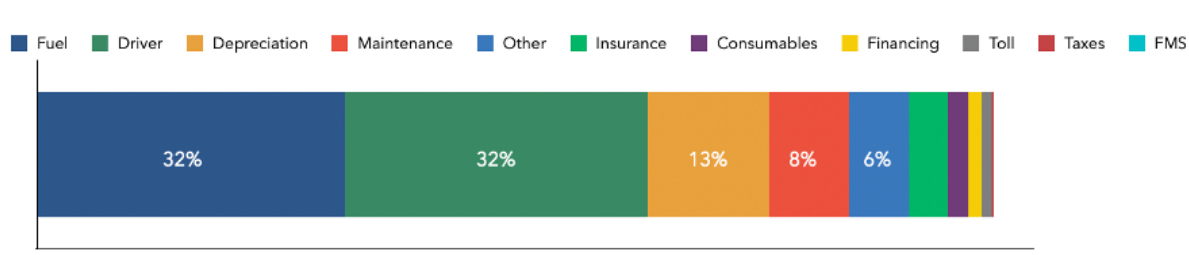
Source: PTOLEMUS CFT Global Study

- **Last mile delivery:** The COVID-19 pandemic has accelerated the development and introduction of self-driving robots for last mile delivery in some regions. Self driving robots can foster social distancing and also increase efficiency and reduce labor cost.

- **Efficiency in different environments:** In construction sites, harbours, airports, warehouses, and other environments. Autonomous trucks can perform well (24/7), requiring less human force and bringing value.

- **Bringing safety in risky environments**: Autonomous trucks are also promising in risky environments such as in military services,

mining, and several industries. For example, Kodiak Robotics was awarded a $50 million contract by the US Department of Defence in late 2022, to automate future ground vehicles designed for reconnaissance, surveillance, and other high-risk missions.

The way forward for AVs

We have identified a few best practices that could determine the success of AV businesses, and the following ones are key:

- **Diversification of use cases:**
  AV is a risky business that still doesn't generate revenue. The future is unclear, and the first flourishing AV use case is yet to be found. That's why companies developing self-driving technology should investigate the different use cases and try to provide solutions for more than one. We believe that diversification of use cases is a must, meaning that AV start-ups should provide driverless vehicles to serve different industries and clients' profiles. We have seen successful businesses following that.

  I.   Aurora, a self-driving vehicle technology company specialised in trucks, has acquired Uber ATG to expand its activities to include ride-hailing.

  II. Waymo is focusing on delivering Level 5 self-driving technology for applications such as ride-hailing as well as last-mile delivery.

  III. Cruise, one of the self-driving technology leaders, owned by General Motors, focuses on ride-hailing, autonomous delivery and last-mile transportation for people and goods.

- **Build successful strategic partnerships:**
  AV start-ups should create partnerships with different industry stakeholders such as OEMs, hardware suppliers and service providers. These partnerships will help access to funding, technology, and expertise. OEMs for example can help in

reaching the market very quickly. Partners will help the AV industry achieve growth and gain reliability.

For example, Uber Freight offers on-demand delivery routes for freight, they don't own vehicles and neither does Waymo, the leading AV software provider. The two companies decided to make a partnership in June 2022 to test fleets using both Waymo's autonomous trucking and Uber Freight. It is a long-term partnership that aims to include both programs in future freights.

The table below shows examples from the leading AV companies and their positioning in the 2 practices:

Use cases and Partnerships of AV industry leaders

	Use Cases	Partners*	
		OEMs	Others
WAYMO	- Ride-hailing - Last mile delivery	Volvo, Jaguar FCA, Daimler Trucks, Geely	Magna, AutoNation, Intel, Lyft, Avis
cruise	- Ride-hailing - Autonomous delivery - Last mile delivery	General Motors (parent company)	Microsoft, Walmart
Aurora	- Ride-hailing - Trucking	Toyota, Volvo, PACCAR	FedEx, Schneider, Uber Werner Entreprises
tu simple	- Trucking	Traton Group (subsidiary of VW), Navistar	Ryder Nvidia
Baidu 百度	- Ride-hailing - Autonomous shuttles - Special purpose vehicles	BAID Group Geely	Swiss Re Black Berry

*Partners: Not exhaustive list

PTOLEMUS Consulting Group

- **Start with specific regions:** AVs deployment will not be the same in all regions, it depends on:
  I. The regulatory environment, Europe has a more centralised regulatory environment while the US has a more decentralised system. The regulatory environment is different and depends on the region/ state

  II. The infrastructure, European cities tend to be more densely populated and have older infrastructure than cities in the US, this will make it challenging to deploy AVs for last mile delivery for example

  III. Public acceptance: the acceptance of AVs depends on the cultural background of each region

US states with enacted AVs legislation
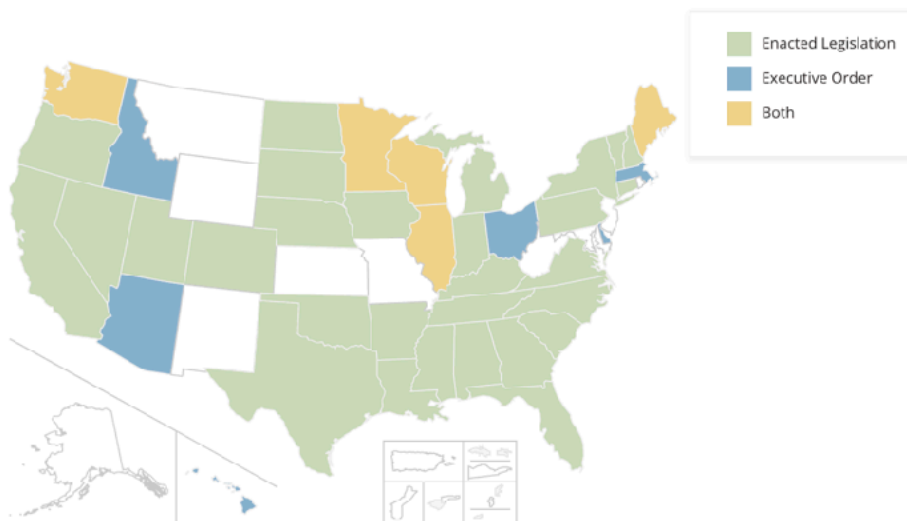
*Photo source: National Conference of State Legislatures

Conclusions

Self-driving cars are promising and can shape different industries. Billions of dollars were invested in prototypes and software developments, helping the technology reach a high level of reliability.

But, introducing it to the mass market is still not achievable because of the governance of the technology.

Start-ups should be innovative but have to build short-term profitable use cases in order to survive. They must be driven by serving clients and providing short term saleable products.

There is a need to make special-purpose vehicles and trucks driverless, and we may see growth in this area of the business. However, AV developers should explore the different use cases.

They must also build strategic partnerships that will help them grow and go to the market quickly.

AV startups will likely need to build vehicles that are modular and adaptable for different regions in the world, they will need to comply with local regulations and infrastructure design.

The improvement of self-driving software and the performance of on-road tests should continue. These tests will refine and improve AV capabilities by gathering more data that will feed the machine-learning algorithms and power the decision-making process.

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