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Measuring the impacts of Shared and Electric Autonomous Vehicles (SAEV) on urban mobility.

Exploring the research into the impacts of SAEVs, using concepts from sustainability and technology assessment.

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Autonomous driving, connectivity, car sharing, electric vehicles, and the rise of renewable energy will all have powerful mutually reinforcing effects. For example, the introduction of self-driving cars in the 2020s will increase the use of EVs in high-use services such as ride-hailing because lower operating costs will offset the higher initial costs of these vehicles.

The movement of people and goods is central to our society and economic activities.

According to a BNEF-McKinsey & Company study, the change in how people move around cities will put the automotive and energy industries, as well as governments, under pressure. Light-duty vehicle fuel consumption could drop by up to 75% in some cities by 2030, prompting governments to look for new ways to recoup lost fuel taxes. By 2030, as many as four out of every ten vehicles in some cities could be self-driving, hastening the rise of 'mobility as a service.'

The global demand for passenger mobility, particularly in cities, is expected to double by 2050; however, as demand for mobility increases, negative impacts such as congestion, air pollution, noise, and accidents tend to worsen.

To better address the challenges posed by the current mobility paradigm, innovative mobility modes and systems seek new paths to increase the number of journeys, improve transportation efficiency, and pave the way for sustainable mobility.

> *"Sectors along the mobility value chain face disruption. We believe that value pools will shift and we will see emergence of new business models and service opportunities. The power sector could see a 3% increase in demand globally. Gasoline retailers could explore new ways to monetise assets through electric charging, connected car, fleet or non-fuel services. As connectivity and autonomy increases, so does the need for sensors and software. The data generated could itself be hugely valuable." — **Surya Ramkumar**, partner at McKinsey & Company, and who co-leads McKinsey & Company's Future of Mobility Initiative*

Entering the shared mobility

Among several mobility innovations, Shared Automated Electric Vehicles (SAEV) may offer promising solutions for cities.

SAEV refers to various vehicles, including Robo-taxis and automated shuttles integrated into public transportation. Their business models can differ depending on vehicle ownership (public or private) and controls network operations.

These vehicles can offer various services, such as on-demand ride services and ridesharing, along a fixed route with fixed stops, a fixed route with on-demand stops, or door-to-door on-demand services.

They can also provide a unimodal door-to-door service or be combined with other transportation modes to form a single trip. And the scale of deployment ranges from mobility services within a local area (first and last-mile services, which are commonly

used today) to city and intercity mobility services. The arrival of new mobility technologies and innovations, such as self-driving cars, creates opportunities to address urban challenges.

The assessment of these innovations' effects on the mobility system necessitates a comprehensive set of criteria and parameters.

Research about the impact of Shared Mobility

An interesting study titled "***How to measure the impacts of shared automated electric vehicles on urban mobility***" (*Read the study below in this article*), presented by **Eliane Horschutz Nemoto**, **Roukaya Issaouia**, **Dorien Korbeea**, **Ines Jaroudi**, and **Guy Fournier** from **Pforzheim University** in Germany and the **Laboratoire Genie Industriel**, CentraleSup elec at the Universite Paris-Saclay, Gif-sur-Yvette, France, proposes a method to measure the impacts of Shared Automated Electric Vehicles (SAEV) on mobility through a sustainability assessment.

Based on an integrative literature review and the context of AVENUE, a European project deploying automated shuttles in European cities' public transportation, a set of indicators assessing SAEV's social, environmental, economic, governance, and technical impacts was defined.

The multiple dimensions of the mobility indicators help to fill knowledge gaps about SAEV performance.

The proposed method allows for evaluating and comparing SAEV to other transportation modes, thereby strengthening scientifically based transportation policy recommendations.

Closing remarks

It is evident that the introduction of new mobility technologies and innovations, such as the SAEV discussed in the study, presents a series of opportunities to improve mobility accessibility, affordability, environmental friendliness, and efficiency.

When combined with appropriate policies and incentives, new technologies can cause positive mobility changes while also causing rebound effects, such as induced travel demand and exacerbate mobility externalities.

That's why it is crucial to measure and assess the effects of SAEV deployment as an innovative model of transportation today because measuring the impacts may help fill

gaps in the scientific and empirical data available on AVs' effects in our society.

Finally, the authors' set of indicators can help compare SAEV to other modes of transportation, influence transportation system design and planning, and strengthen sustainable mobility policy responses to the limitations mentioned earlier of the current mobility paradigm for cities.

Highlights about the study

•To assess the impact of SAEVs, the authors used concepts from sustainability and technology assessment.

•Also an integrative literature review on the assessment of sustainable mobility was used to understand the impact of SAEVs.

•The study was anchored to Real-world deployments of automated shuttles in Europe.

•A vast set of indicators has been developed by the authors to assess the effects of SAEVs.

•SAEVs impact measurement can be used to support decision-makers and transportation policies.

One more thing

If you want to read more about Autonomous vehicles, the following articles can be interesting to you:

- An Introduction to Autonomous Vehicles
- This is how Autonomous Trucks will reshape the Transportation industry.
- 18 companies and startups that are leading the race for the autonomous trucks
- 5,000 autonomous trucks will hit the roads in China in 2021
- Honda will be the first to bring autonomous vehicles to the masses
- The Autonomous Vehicles are coming! Are you ready?
- Volvo Group and Aurora announced a partnership on Autonomous transportation.
- Autonomous Vehicles: a $50 billion opportunity for disruption

References

- **Transportation Research Part D**: Transport and Environment — https://www.sciencedirect.com/science/article/pii/S1361920921000705
- **The Avenue Project:** The use of Autonomous Vehicles in public transport can revolutionize public transport's complete landscape. — https://h2020-avenue.eu/
- Electric vehicles to be 35% of global new car sales by 2040
- Electric, shared and autonomous vehicles will revolutionise transport in the world's cities over the next 15 years

Click on the link below to read the study:

How to measure the impacts of shared automated electric vehicles on urban mobility