RGS-IBG Annual International Conference 2021

The politics of mobility futures

Is the strategy for sustainable transition of automobility through electric shared automated vehicles realistic? An analysis of key actors' purposes and motivations

Dimitris Milakis, Stephan Müller, Dennis Seibert

Institute of Transport Research, German Aerospace Center (DLR)

September 1st, 2021

Presentation outline

1. **Introduction**

Three revolutions of automobility (electric-shared-automated): scientific, market and policy perspectives

2. Theoretical background and methods

3. Key actor I: Automotive industry and mobility operators

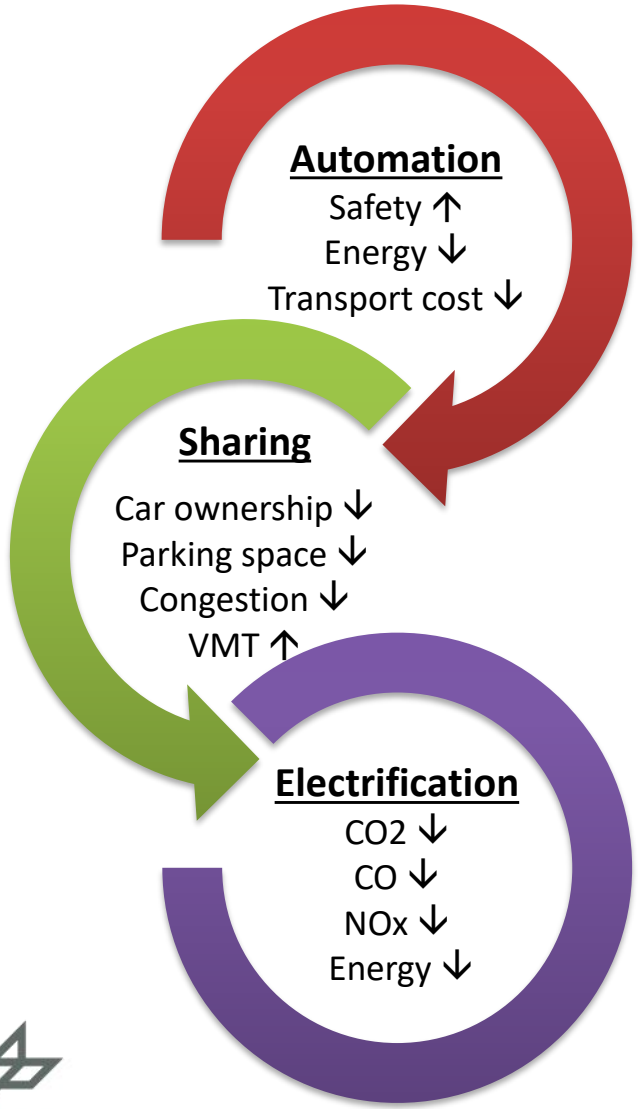
4. Key actor II: Users

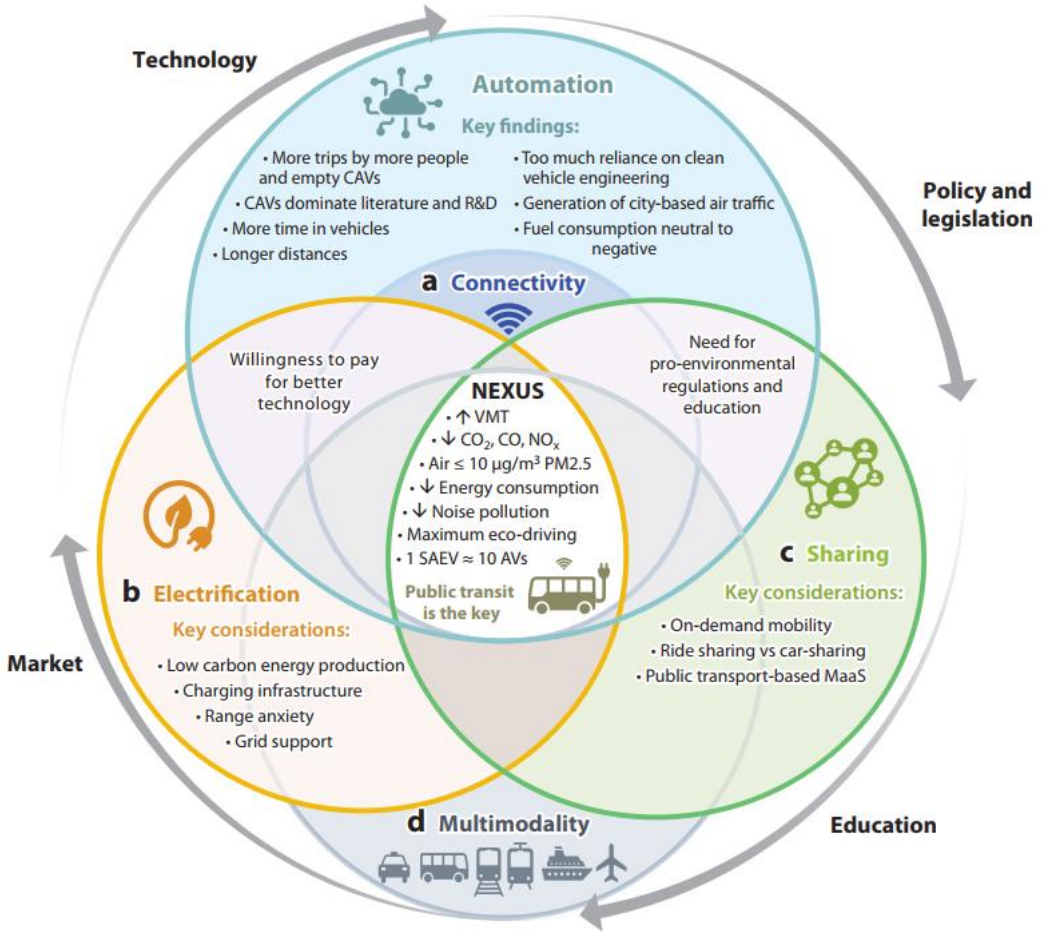
5. Key actor III: Public authorities

6. Conclusions

1. Introduction

Three revolutions of automobility (electric-shared-automated): scientific evidence

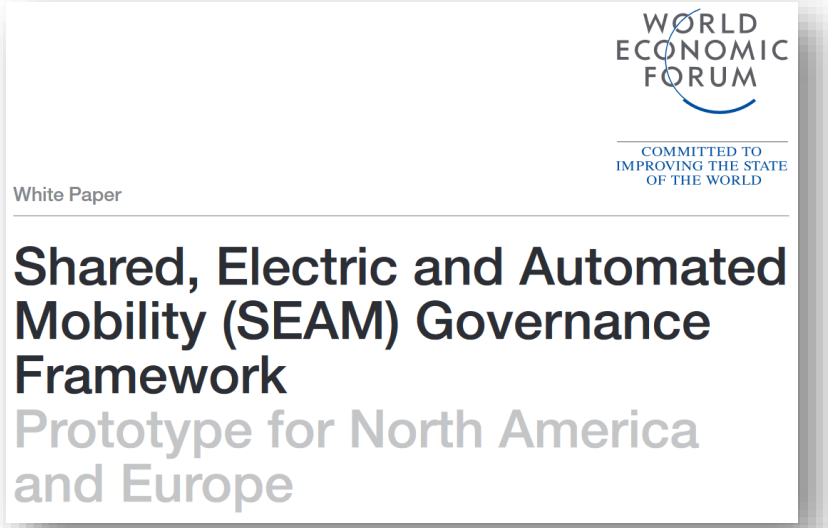


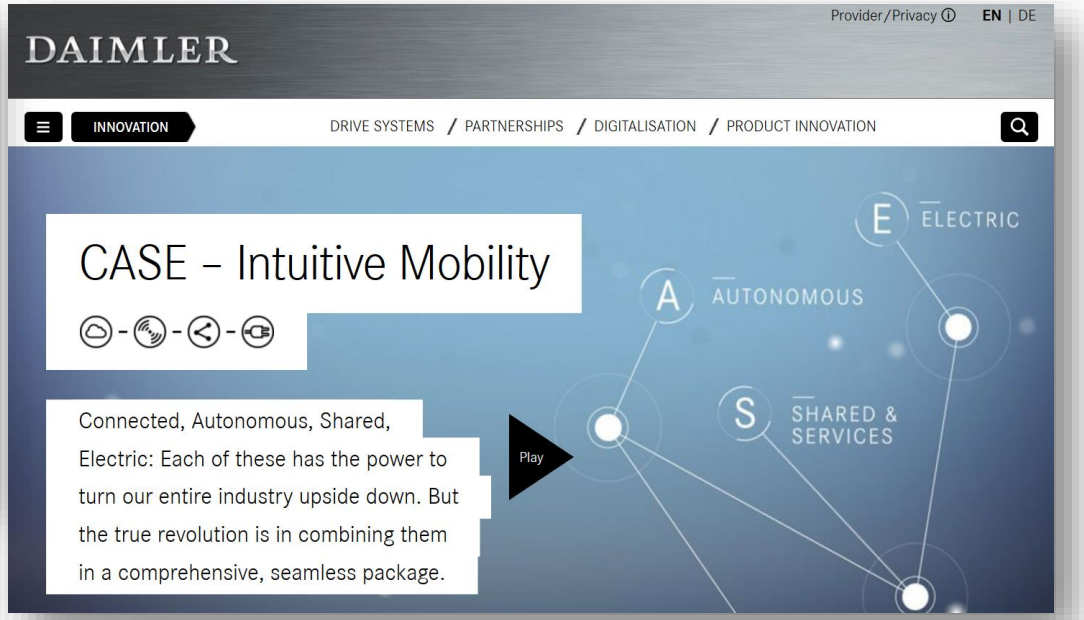


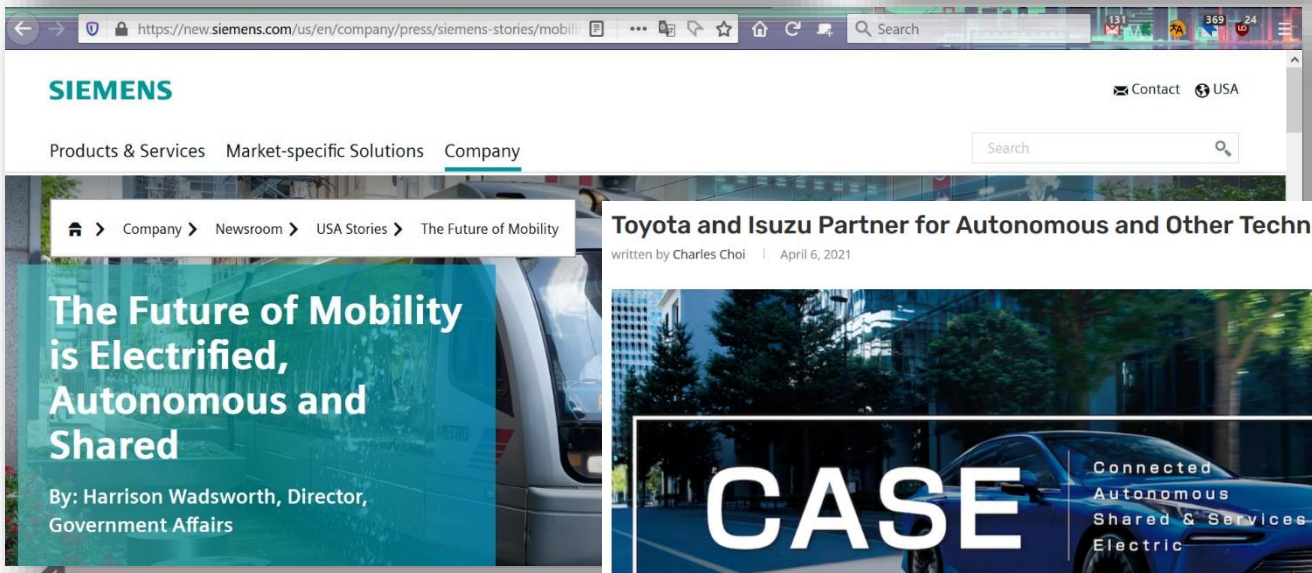
Nikitas, A., Thomopoulos, N., Milakis, D., The Environmental and Resource Dimensions of Automated Transport: A Nexus for Enabling Vehicle Automation to Support Sustainable Urban Mobility. Annual Review of Environment and Resources (in press)

1. Introduction

Three revolutions of automobility (electric-shared-automated): market and policy







DLR

1. Introduction

To what extent is the strategy for sustainable transition of automobility through electric shared automated vehicles realistic?

2. Theoretical background and methods

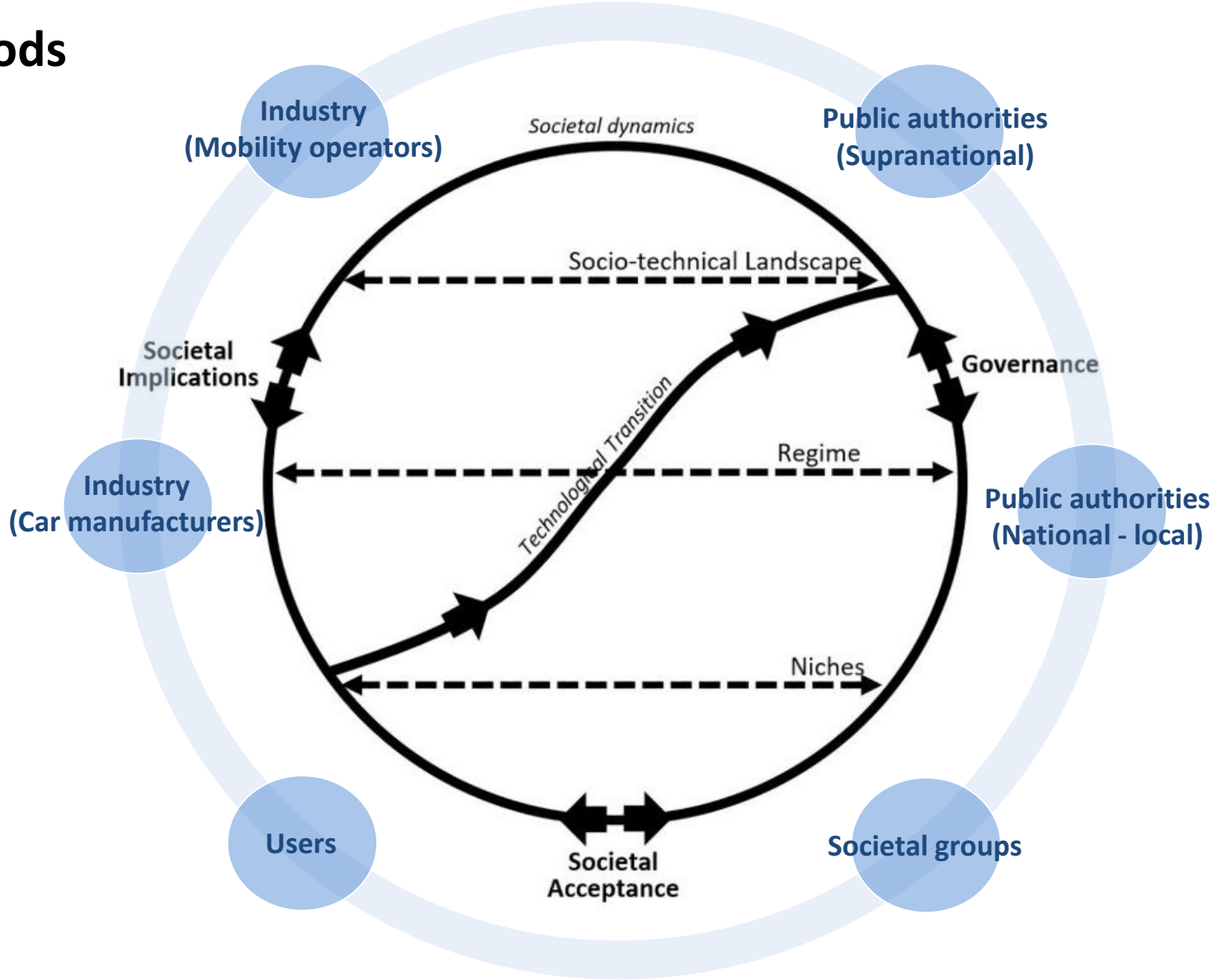
1. Theoretical background:
Social construction of technology (SCOT) and multi-level perspective (MLP)

▼

2. Identification of key actors:
Automotive industry and mobility operators, users and societal groups, public authorities

▼

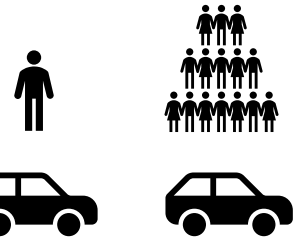
3. Analysis of key actors' preferences and motivations towards shared automated electric vehicles:
Backward snowballing of grey and peer-reviewed literature per key actor



Milakis, D., Müller, S. (2021). The societal dimension of the automated vehicles transition: Towards a research agenda. Cities, 113, 103144.

3. Key actor I: Automotive industry and mobility operators

Preferences towards owned vs shared vehicles business model



- ***With an increase in shared mobility in Europe, vehicle manufacturers face …***

  … a decline in vehicle sales (private segment),

  … an increase in vehicles sales (shared vehicles segment; partly compensating the decline in private segment sales),

  … large fleet customers (strong negotiation power, main focus on cost-related factors),

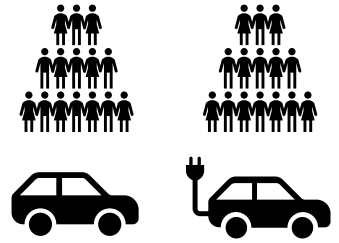
  … fierce competition (traditional competitors developing mobility services; new market entrants – tech related companies in the mobility sector, e.g. Waymo),

  … and brand building challenges (“aviationfication” of car market).

Deloitte (2020). Future of Automotive Sales and Aftersales. Impact of current industry trends on OEM revenues and profits until 2035.

3. Key actor I: Automotive industry and mobility operators

Preferences towards ICE shared vs electric shared vehicles business model



- ***Today, (independent) fleet operators large rely on the ICE shared business model due to …***
  - … higher leasing costs of electric vehicles,
  - … an insufficient public charging infrastructure,
  - … range anxiety of electric vehicle users,
  - … the lower number of electric vehicle repair shops.

- ***In the future, however, electric fleets will be more profitable for operators due to …***
  - … vanishing additional leasing costs,
  - … smaller maintenance costs,
  - … and lower energy consumptions, especially for short distance services of shared vehicles.

Handelsblatt (2021). „Desaster“: Warum reines E-Carsharing ohne Subventionen chancenlos ist. auto motor und sport (2021). *MOOVE podcast. Oliver Mackprang, Miles Mobility.*

4. Key actor II: Users

Preferences towards shared vs owned AVs

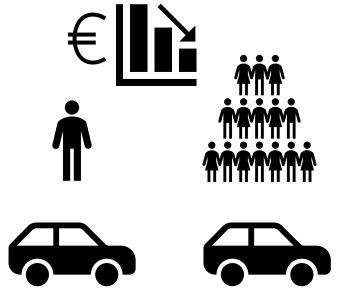
- ***Preference for shared AVs is lower than owned AVs due to…***

  …instrumental factors: limited vehicle availability, higher waiting or access time, increased journey time, lower time and cost reliability, higher total cost of ownership and use,

  …psychological factors: aversion of sharing, privacy and security concerns, self-efficacy concerns, inherent attractiveness of ownership,

  …ideological and symbolic factors: socio-economic status, subjective identity, sense of power, freedom, superiority, proprietorship, individuality, independence, masculinity, professional accomplishment.

Acheampong, et al. 2021; Wadud & Chintakayala, 2021; Tian et al. 2021; Wang et al. 2020; Clayton et al. 2020; Mohammadzadeh 2021; Bansal and Kockelman 2018; Pakusch et al. 2018; Lavieri and Bhat 2019; Saeed et al. 2020; Wadud and Mattioli 2021; Rahimi, Azimi and Jin 2020; Jabbari and MacKenzie 2020; Polydoropoulou et al. 2021



5. Key actor III: Public authorities

Possible public revenue losses from the transition from owned to shared AVs

- ***For public authorities shared AVs translate into lower public revenues because of less…***

  …sales and property taxes,

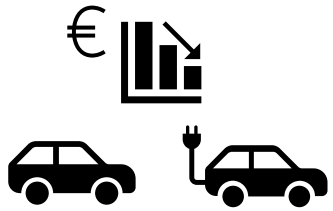
  …license plate and registration fees,

  …parking tickets,

  …traffic fines.

- *Overall transport-related revenues could by reduced by more than 20% (US context).*
- *Case study Buenos Aires: 70%/30% owned/shared AVs (-17.9% transport revenues)*
  30%/70% owned/shared AVs (-57.4% transport revenues)

Blas, F., G. Giacobone, T. Massin & F. Rodríguez Tourón (2020) Impacts of vehicle automation in public revenues and transport equity. Economic challenges and policy paths for Buenos Aires. Research in Transportation Business & Management, 100566.



5. Key actor III: Public authorities

Possible public revenue losses from the transition from ICE to electric vehicles

- ***For public authorities electric vehicles translate into lower public revenues because…***

  … revenues today primarily come from energy taxes on gasoline and diesel,

  … the electricity tax paid by an electric vehicle user per kilometer is less than 10 percent of the energy tax paid by an ICE vehicle user.

Umweltbundesamt (2020). Klimaschutz im Verkehr: Reformbedarf der fiskalpolitischen Rahmenbedingungen und international Beispiele.

6. Conclusions

- **Electric shared automated vehicles:** silver bullet for **sustainable transition** of **automobility** (automotive industry, consultancies, media supported by research evidence).

- **Our outcomes: key actors** (automotive industry, users, public authorities) have **opposing** interests, preferences, motivations or financing schemes to the **electric shared automated vehicles transition**. Appears as a no realistic transition at the moment.

- **Primary resistance**: vehicle ownership to sharing transition, **secondary resistance**: ICE to electric vehicles transition.

- **Reasons:** (a) automotive industry - **smaller profit margins**, (b) users - **instrumental, psychological, symbolic reasons**, (c) public authorities - **less public revenues**.

- **Future research:** explore 'contradictions' of expressed visions by key actors on the future of automobility (e.g. greenwashing, market overcapitalization, discourses of sustainable mobility delay).

References

- Acheampong, R. A., F. Cugurullo, M. Gueriau & I. Dusparic (2021) Can autonomous vehicles enable sustainable mobility in future cities? Insights and policy challenges from user preferences over different urban transport options. Cities, 112, 103134.
- Bansal, P. & K. M. Kockelman (2018) Are we ready to embrace connected and self-driving vehicles? A case study of Texans. Transportation, 45, 641-675.
- Blas, F., G. Giacobone, T. Massin & F. Rodríguez Tourón (2020) Impacts of vehicle automation in public revenues and transport equity. Economic challenges and policy paths for Buenos Aires. Research in Transportation Business & Management, 100566.
- Clayton, W., D. Paddeu, G. Parkhurst & J. Parkin (2020) Autonomous vehicles: who will use them, and will they share? Transportation Planning and Technology, 43, 343-364.
- Deloitte (2020). Future of Automotive Sales and Aftersales. Impact of current industry trends on OEM revenues and profits until 2035.
- Jabbari, P. & D. MacKenzie (2020) Ride Sharing Attitudes Before and During the COVID-19 Pandemic in the United States. Findings.
- Lavieri, P. S. & C. R. Bhat (2019) Modeling individuals' willingness to share trips with strangers in an autonomous vehicle future. Transportation Research Part A: Policy and Practice, 124, 242-261.
- Milakis, D., Müller, S. (2021). The societal dimension of the automated vehicles transition: Towards a research agenda. Cities, 113, 103144.
- Mohammadzadeh, M. (2021) Sharing or owning autonomous vehicles? Comprehending the role of ideology in the adoption of autonomous vehicles in the society of automobility. Transportation Research Interdisciplinary Perspectives, 9, 100294.
- Nikitas, A., Thomopoulos, N., Milakis, D., The Environmental and Resource Dimensions of Automated Transport: A Nexus for Enabling Vehicle Automation to Support Sustainable Urban Mobility. Annual Review of Environment and Resources (in press)
- Polydoropoulou, A., I. Tsouros, N. Thomopoulos, C. Pronello, A. Elvarsson, H. Sigþórsson, N. Dadashzadeh, K. Stojmenova, J. Sodnik, S. Neophytou, D. Esztergár-Kiss, J. Hamadneh, G. Parkhurst, S. Etzioni, Y. Shiftan & F. D. Ciommo (2021) Who Is Willing to Share Their AV? Insights about Gender Differences among Seven Countries. Sustainability, 13, 4769.
- Rahimi, A., G. Azimi & X. Jin (2020) Examining human attitudes toward shared mobility options and autonomous vehicles. Transportation Research Part F: Traffic Psychology and Behaviour, 72, 133-154.
- Saeed, T. U., M. W. Burris, S. Labi & K. C. Sinha (2020) An empirical discourse on forecasting the use of autonomous vehicles using consumers' preferences. Technological Forecasting and Social Change, 158.
- Tian, Z., T. Feng, H. J. P. Timmermans & B. Yao (2021) Using autonomous vehicles or shared cars? Results of a stated choice experiment. Transportation Research Part C: Emerging Technologies, 128.
- Wadud, Z. & G. Mattioli (2021) Fully automated vehicles: A cost-based analysis of the share of ownership and mobility services, and its socio-economic determinants. Transportation Research Part A: Policy and Practice.
- Wadud, Z. & P. K. Chintakayala (2021) To own or not to own – That is the question: The value of owning a (fully automated) vehicle. Transportation Research Part C: Emerging Technologies, 123, 102978.
- Wang, S., Z. Jiang, R. B. Noland & A. S. Mondschein (2020) Attitudes towards privately-owned and shared autonomous vehicles. Transportation Research Part F: Traffic Psychology and Behaviour, 72, 297-306.