Zhaoxiang Li

School of Urban Planning and Design, Peking University
Email: zhaoxiangli@stu.pku.edu.cn ✉ | Google Scholar 🎓 | Personal Website

Education

Peking University **Beijing, China**
Master of Science, Urban and Regional Planning *Sep.2022-Jul.2025(Expected)*

- **GPA:3.67/4.00**, Supervised by Prof. Pengjun Zhao
  National Scholarship for Graduate Students of China, 2024, **Rank 1/51**

Tongji University **Shanghai, China**
BEng, Traffic Engineering *Sep.2018-Jun.2022*

- **GPA:4.76/5.00**, which is equivalent to 92.61 on 100 basis
  National Scholarship for Undergraduate Students of China, 2020, **Rank 1/225**

Research Interests

Research Areas: Sustainable Transportation, Emerging Mobility Systems, Transportation Impact Assessment, Energy & Environment, Behavioral Science, Transportation Equity, Transportation Policies.

Research Vision: My research interests lie at the intersection of **Sustainable Mobility**, **Green Transformations in Transportation, Transportation Planning,** and **Transportation Equity**:

(1) Urban Mobility and Travel Behaviour: Leveraging transit data to understand the mobility patterns and behavioural dynamics of people and goods in urban areas; exploring incentive mechanisms and intervention measures to promote more sustainable mobility.

(2) Green Transformations in Transportation: Focused on technological innovation, governance, and strategic planning techniques to achieve green transformations in transportation systems.

(3) Urban and Transportation Planning: Using causal inference methods to assess the relationship between planning strategies (e.g., traffic restriction policies, congestion taxes) and sustainable transportation.

(4) Social and Spatial Justice: In relation to accessibility to essential services, transportation infrastructure, climate and environmental impacts of transportation systems among different communities and groups.

Publications

(* indicates the corresponding author; † indicates co-first authors.)

Referred publications

1. **Li, Z.,** Ma, X., Pan, R., Yang, C., & Yuan, Q*. (2025). Explaining the Spatial Dynamics and Identifying Potential Risks of Hazardous Materials Truck Movements. *Journal of Transport Geography*, *123*, 104125.
2. **Li, Z.**, Zhao, P.*, He, Z., & Xiao, Z. (2024). Non-linear Effects of CO_2 Emissions from Road Transport in Port Landside Area. *Transportation Research Part D: Transport and Environment*, *132*, 104264.
3. Zhao, P.*, **Li, Z.**, Xiao, Z., Jiang, S., He, Z., & Zhang, M. (2023). Spatiotemporal Characteristics and Driving Factors of CO_2 Emissions from Road Freight Transportation. *Transportation Research Part D: Transport and Environment*, *125*, 103983.
4. He, Z., Zhao, P.*, Xiao, Z., Huang, X., **Li, Z.**, & Kang, T. (2024). Exploring the Distance Decay in Port Hinterlands under Port Regionalization Using Truck GPS Data. *Transportation Research Part E: Logistics and Transportation Review*, *181*, 103390.
5. He, Z., Zhao, P.*, Zhang, S., **Li, Z.**, Huang, G., Zhang, C., & Niu, Y. (2024). Analyzing Foreland Dynamics in China's Port Clusters under Global Major Events (2019–2022) by AIS Trajectory Data. *Ocean & Coastal Management*, *255*, 107269.

Forthcoming publications

1. Zhao, P.*, **Li, Z.***, He, Z., Chen, Y., & Xiao, Z. (2025). Reducing the Road Freight's Emissions through Integrated Strategy in Port Cities. *Nature Communications*. **(Accepted)**
2. **Li, Z.**, Zhao, P.*, Liu, Q.*, & Jiang, S. (2025). Just Transition to Sustainable Road Freight Transport in China. *Nature Sustainability*. (Under review)
3. He, Z., Zhao, P.*, **Li, Z.**, Huang, G., Niu, Y., Zhang, C., & Huang, Z. (2025). Assessing the Adaptivity of Global Container Shipping Network during the Russia-Ukraine Conflict by AIS Trajectory Data. *Journal of Transport Geography*. (Under revision)

Academic Conferences

The 24th COTA International Conference of Transportation Professionals (Summer 2024) **Shenzhen, China**

The 15th International Conference on Applied Energy (Fall 2023) **Matsue & Tokyo, Japan**

The 14th Workshop on Computational Transportation Science (Fall 2023) **Shanghai, China**

The 28th Conference on Atmospheric Environment Science and Technology of China (Winter 2022) **Beijing, China**

Research Experience

Key Laboratory of Earth Surface System and Human-Earth Relations **Shenzhen, China**
Ministry of Natural Resources of China, Peking University

Project 1: Carbon Footprint and Environmental Impacts of Urban Transportation Systems *(Shenzhen Science and Technology Program, Grant No. JCYJ20220818100810024,* ***€1,944, 00****), Participant* *Sep.2022-Present*

- Constructed high resolution CO_2 and air pollutants (NO_x, PM) emission inventories of road transportation in China based on 51 billion GPS trajectory signals of heavy-duty trucks, utilizing COPERT model.
- Identified spatiotemporal patterns and drivers of CO_2 emission from road transportation using geospatial (MGWR) and machine learning (XGBoost + ALE) approaches.
- Established a mesoscale road traffic simulation model to simulate the impact of road network changes on traffic flow, and its subsequent effects on road transportation emissions reduction.
- Developed a scenario-based approach to assess the integrated effects of truck fleet electrification and road network development on deep decarbonization and air pollution emissions reduction in the Greater Bay Area (GBA) of China by 2035, under both the BAU scenario and the net-zero emission electricity grids scenario.

Project 2: Building Capacity for the Future City in Developing Countries (PEAK) *(UKRI's Global Challenge Research Fund, Grant No.ES/P011055/1,* ***€8,573,766****), Participant* *Sep.2022-Present*

- Extracted human travel origin-destination (OD) data from 35 billion mobile signalling records during the 2019-2023 period and analysed the mobility patterns in China before and after the COVID-19 epidemic.
- Proposed the Pollution-Benefit Matching Index (PBMI) to quantify the social inequalities of economic benefits and pollution burdens (NO_x, PM) from road freight transport activities in China at a 1 km grid scale.
- Evaluated the impacts of traffic restriction policies on pollutant emissions from road transportation and analyzed the resulting inequalities using DID analysis.
- Assessed the potential of policy interventions (e.g., pollution taxes, electrification, land use mix) to promote environmental justice, using a simulation-based approach.

Project 3: Mechanism and Simulation of Sea-land Resources Flow via Big Data *(National Natural Science Foundation of China, Grant No.42130402,* ***€375,930****), Participant* *Sep.2022-Present*

- Devised a data-driven algorithm to extract liner shipping networks and voyage information via 4.5 billion AIS

(Automatic Identification System) data.

- Employed the complex network approach to demarcate the foreland structures of China's port clusters.
- Estimated the distance decay effect of freight flows in port-hinterland relationship (between the Shenzhen Port and primary freight facilities) by adopting the gravity model.
- Investigated the allocation of freight facilities related to the Shenzhen Port using the DBSCAN algorithm.

Key Laboratory of Road and Traffic Engineering **Shanghai, China**
Ministry of Education of China, Tongji University

Project 1: Cloud Supervision Service System for Autonomous Vehicle Fleet Operation *(National Innovation Training Project, Grant No.202010247139,* ***€2,600****),* ***Principal Investigator*** *Jan.2020-May.2021*

- Built a Bayesian network to extract features from autonomous vehicle on-road test data, constructed a CNN-LSTM model to identify autonomous vehicle risk events from the feature matrix.
- Constructed a federated learning framework to collect data from multiple vehicles with privacy preservation.
- Conducted causal analysis to identify the key factors for driving risk in a human-machine mixed driving environment using DREAM method.

Project 2: Travel Decision-making Mechanism and Control Method for Urban Heavy-duty Trucks *(National Natural Science Foundation of China, Grant No.52302394,* ***€38,870****), Participant Apr.2021-Jun.2022*

- Proposed a data-driven approach (a dual-constraint PELT algorithm) for extracting stops and trips from GPS data, determined dwell time thresholds of HazMat truck stops.
- Developed a spatial clustering algorithm to identify stopping hotspots for HazMat transportation.
- Analysed the mobility patterns of HazMat trucks based on the truncated power-law distribution.
- Modified the risk assessment method of the US DOT to calculate the potential risks of HazMat transportation.

Selected Honors and Awards

Membership: American Society Civil Engineering (ASCE) 2021-Present

Outstanding Student Award, Peking University (**Rank 1/51**) 2024

National Scholarship (Awarded by Ministry of Education of China, **Rank 1/225**) 2024

Outstanding Graduate of Shanghai (Awarded by Shanghai Education Commission, **Rank 1/225**) 2022

Xiangcheng High-Tech Talent Scholarship, Tongji University (**Rank 2/225**) 2021

First Prize of the 16th National Competition of Transport Science and Technology (Awarded by Ministry of Transport of China, **Rank 1/1130**) 2021

5th in 2021 American Society Civil Engineering Mid-Pacific Student Conference Transportation Contest 2021

National Scholarship (Awarded by Ministry of Education of China, **Rank 1/225**) 2020

Outstanding Student Award, Tongji University (**Top 1%** of all undergraduate students at TJU) 2019-2022

Research Skills

- **Programming**: Python, C++, SQL, MATLAB, STATA, ArcGIS, QGIS, TransCAD, PTV Visum/Vissim, EPA MOVES, COPERT.
- **Machine Learning Framework**: Pytorch, TensorFlow.
- **Analytical Skills**: Econometrics, Statistics, Deep Learning, Computer Vision, Spatial Visualization and Data Management, Discrete Choice Analysis, Web Scrapping, Hypothesis Testing, Transportation Policy Analysis.