

Progress Report

Research Programme: JPI - ERANET-Cofund Urban Accessibility and Connectivity



Progress report

File number:	File number
Project title:	Improved urban mobility toward climate neutrality under new working habits and transport modes
Project leader (Dutch side):	Klaus Hubacek & Franco Ruzzenenti
Report period:	1 september 2023 – 15 juni 2024

Please make sure that sections 2, 3 and 4 of the progress report are no longer than 12 pages (additional information/details can be given in annex A).

1 Summary of the progress

Give a summary of the progress of the project in the reporting period.

The project is being executed according to the proposal. In terms of collaboration, two offline consortium meetings have already been held in the Netherlands and China, supplemented by biweekly online meetings. Each country's investigators have conducted several meetings with stakeholders, acquiring valuable data and support for experiment promotion and volunteer recruitment. Content-wise, most of the data collection required for the project from the three countries (Poland, the Netherlands, and China), including traffic mobility data, travel survey data, trajectory data, emission factors, policies, and regulations, has been completed. Some data related to large-scale urban mobility is still being applied for and evaluated due to privacy protection concerns. Important outcomes also include the development of necessary methodologies and analyses such as carbon emission accounting frameworks, flexible remote work impact models on transportation, complex network applications in transportation networks, and traffic choice models. Some work packages have been completed ahead of schedule, such as the market analysis for ride-sharing, passenger optimization model, and multimodal energy-saving travel guidance, resulting in various reports, reviews, posters, and publications in top-tier journals. Some content is being carried out according to the timeline, involving preliminary data analysis, literature reviews, and case simulations, with plans for more in-depth simulations and analysis. The personal transportation carbon trading experiment, involving scenarios and participants, has preliminarily completed its experimental design and implementation plans, with further organization and execution of the experiments planned.

Note: This summary, as well as the original non-expert summary will be published on your project page on the NWO website to inform a broader public on the developments of your project. Please copy this update for non-experts also to the tab 'Reports' in ISAAC.'

Is your project progressing as you expected in your proposal?

Yes. Project progress is being executed according to the proposal. The project team partners will hold bi-weekly online progress meetings. As planned in the proposal, each work package (Wp1-Wp5) is being carried out in parallel in China and Europe. Each work package has deliverables and preparatory works for the next step. Present deliverables include research reports, datasets, data analysis results, posters, model building, and publications. The data management plan is also being implemented to ensure data security and privacy protection based on the NWO's requirements.

Which risks or hindrances did you encounter? How did you tackle or resolve these?

-In terms of data acquisition, large-scale citizen mobility data is difficult to obtain due to stricter privacy protection regulations.

-We are applying various approaches and methods for extensive data gathering, including searching for public datasets, web scraping data, contacting government officials for support, and finding ways to access strictly controlled data sources (e.g., public transport card recording data in the Netherlands). Through various means, we have obtained most of the data we need, but some is still being acquired.

- For the personal transportation carbon trading experiment, there are two considerations. Firstly, it is necessary to track individual movement trajectories, identify modes of transportation, and include a carbon trading module. We need to design or seek an existing application (APP). Secondly, it is necessary to find suitable experimental participants.

- We searched and tested a large number of apps in the Google Play app store. Through the testing and learning process, we gained a deeper understanding of the data collection required for the experiment and the corresponding functional modules and made revisions and improvements to the experimental design. We also conducted an in-depth exploration of one mature app, established contact with its developers, and held a preliminary meeting to discuss the design of the app module. However, the costs required for app design turned out to be too high. Considering that the number of participants in the experiment will not be large, we are currently inclined to choose manual assistance to record the process of the experiment. For example, by using the timeline feature of Google Maps, it is possible to record the participants' travel time, distance, and mode of transportation. Participants are asked to report their Timeline records daily and include their travel purposes. Through a transportation emissions accounting framework that we have developed, it is possible to calculate the daily transportation carbon emissions of the participants. Although this method requires manual involvement, its costs are controllable, making the experiment feasible. Participants' socio-economic characteristics are obtained through online surveys.

-The differing data policies between Europe and China result in certain important data not being able to be shared between the two regions. In such cases, one party would need to take responsibility for implementing the research methods and then share the methods, codes, etc., with the other party, who would then execute them using local data. This may entail challenges such as both parties needing to align their understanding of the research methods and code procedures, as well as challenges related to data format mismatches and data reproduction processes.

-During the development of our models and methods, we maintain timely communication to ensure that both the Chinese and European teams understand each other's research methodologies. Simultaneously, based on local data, we provide prompt assessments and suggestions for adjustments to the methodologies developed by each side. We also modify or remove any modules that cannot guarantee data provision to prevent scenarios where the research methods are complete, but the corresponding data for validation is unavailable.

Which opportunities arose? And (how) did you make use of these?

Through multiple meetings and exchanges with relevant stakeholders, we have established a strong foundation for collaboration on carbon trading experiments in the project. For example, Hive Mobility is an innovation center (<https://www.hivemobility.nl/>) that coordinates all partners in Northern Netherlands with interests and stakes in smart and green mobility. Due to its strong social network connections, it will assist in promoting the experiment and recruiting participants for the individual carbon trading experiment. The partners participating in the project (HET cooperative) are collaborating by providing high-resolution data on their shared mobility, the supporting platform for the experiments on their APP, and possible participants from drivers registered on their car-sharing platform.

2 Progress

2.1 Societal impact and the goals and objective(s) of the project

Please provide a short description of the societal challenge addressed by the project and the desired societal impact (see, for example, your impact statement in your application). Describe how these related to the goal(s) and objectives of the research project. Indicate if changes are made during the execution of the project to the objectives, addressed challenge, and/or desired impact, and why.

The primary goal of this project is to explore the influence of contemporary technological and societal advancements on urban mobility and associated transport emissions. We aim to assess the role of integrated Mobility as a Service (MaaS) and personal carbon trading strategies in creating an effective and sustainable urban transportation system. The objectives centre on reducing traffic congestion and emissions through decreased travel demand, enabled by flexible work arrangements and varied location choices, and minimizing personal car use by promoting a blend of transportation modes. This initiative is geared towards fostering climate-neutral cities, enhancing sustainability, and offering users comprehensive transport solutions that incorporate multiple modalities. Additionally, this project will provide valuable insights into the behaviours and decisions of potential transportation users, service providers, and other key stakeholders, alongside implications for policy-making. It will equip new transportation service providers and decision-makers with knowledge on how to effectively participate in MaaS initiatives and influence policies related to work schedules and employee welfare. This, in turn, supports the pursuit of efficient, sustainable, and equitable transportation options. By examining varying dynamics across different cities (Poznan—Poland, Groningen- the Netherlands, Beijing- China), considering social, economic, infrastructural, legal, and cultural factors, which aim to generate findings that are adaptable to diverse global environments.

The project is carried out according to the objectives set out in the proposal. However, we have encountered numerous challenges. Through coordination and testing of various feasible solutions, these issues are being gradually resolved. The social impact, as anticipated in the project proposal, is beneficial in enhancing the efficiency of citizens' transportation and providing relevant policy recommendations to decision-makers. The construction and analysis of transportation accounting will deepen the understanding of the patterns of societal emissions and generate policies that are conducive to reducing emissions, guiding low-carbon travel behaviour.

2.2 Progress towards Output

Note: Output are the most direct and immediate insights of a research project – your (provisional) results, analyses, or insights. Please provide a description of the progress towards achieving these insights, according to the headings presented below. Please relate your progress as much as possible to your project's objectives.

2.2.1 Looking back: What did you do?

Please describe the research activities that were undertaken (e.g. experiments, case studies, tests, demonstrations, etc.) as well as activities that were organised as part of your impact strategy that ensured that new insights will be relevant to their potential users.

WP1:

D1.1 Report on the state of the art in residents' work schedule flexibility and work time choices

D1.2 Survey and data collection with residents' work schedule flexibility in both the EU and China

D1.3 Residents' work time and residence location choice model with changing work policies

Publications:

1.Yue Bao, Hai Yang, Ziyu Gao, Hongli Xu, 2023. How do pre-event activities alleviate congestion and increase attendees' travel utility and the venue's profit during a special event? Transportation Research Part B: Methodological, 173, 332-253.

2. Yue Bao, Guangzhi Zang, Hai Yang, Ziyou Gao*, Jiancheng Long. Order assignment in a ride-sourcing market with a third-party integrator. *Transportation Research Part B: Methodological*, 178, 102833;

Submitted article:

3. Chao Shu, Yue Bao*, Ziyou Gao*, Zaihan Gao, 2024. Exploring electric vehicle purchases and residential choices in a two-dimensional monocentric city: An agent-based microeconomic model. *Engineering*, under review.

Reports:

WP1.1_ Work schedule flexibility and work time choices

WP1.3_ A Review-The Impact of Emerging Work Habits on Residential Location Choices

WP2:

D2.1 Report on the state of the art in new transport services;

D2.2 The integration principle and mechanism of ride-hailing platforms.

Publications:

4. Juwen Guan, Yue Bao. Does e-hailing perform better than on-street searching? an investigation based on the temporal-spatial distributions of idle vehicles. Frontiers of Engineering Management, accepted;*

Submitted articles:

5. Yue Bao, Xinwei Li, Hai Yang, Ziyou Gao. Two-Sided Spatial Matching of Mobility-On-Demand Services, Transportation research part B, under review.*

Working paper:

6. Xiangtong Su, Zaihan Gao, Yue Bao, Ziyou Gao, A periodic flexible driving restriction and reward policy considering heterogeneous travellers and their time preferences, to be submitted to a journal.*

Reports:

WP2.1_ Report on the state of the art in new transport services.

WP3:

D3.1 Traffic data sets collected in China and the EU

D3.2 A near real-time traffic-related emission accounting framework

Datasets:

• *CBS-mobility data (Netherlands):*

• *World conversion factors*

• *EFDB_output (IPCC)*

• *OV public Traffic data in the Netherlands: In the process of application*

• *Motor vehicles admitted, vehicle type, fuel type, January 1st*

• *Car ownership by make/brand in the Netherlands 2023*

• *Poznań_badanie_gospodarstw_baza-household survey_data base*

Publications:

7. Free-riding in Carbon Mitigation of Chinese Cities From 2012 to 2017, Nature Cities, accepted.

WP4:

D4.1 The principle and mechanism of MaaS-based innovative transport services

D4.2 A focus group meeting with transport service providers

D4.3 Experiments on Individuals' behaviour responses to innovative transport services

Publications:

8. Kang Huang and Feixiong Liao. "A novel two-stage approach for energy-efficient timetabling for an urban rail transit network." Transportation Research Part E: Logistics and Transportation Review 176 (2023): 103212.*

9. Kang Huang, Feixiong Liao*, Huanhuan Lyu, and Ziyou Gao. "Assessment of the tradeoff between energy efficiency and transfer opportunities in an urban rail transit network." *Sustainable Energy Technologies and Assessments* 58 (2023): 103360.

10. Kang Huang, Feixiong Liao*, Soora Rasouli, and Ziyou Gao. "Toward energy-efficient urban rail transit with capacity constraints under a public health emergency." *Frontiers of Engineering Management* 20, no. X (2023).

Working paper:

11. *Comparative Analysis of Mobility Data Management and Accessibility in Beijing, Poznań, and Groningen: Implications for Public Transport Efficiency, Congestion, and Mobility as a Service (MaaS), to be submitted to a journal.*

Report:

WP4.1_ *The principle and mechanism of MaaS-based innovative transport services.*

WP5:

D5.1 *A MaaS-based personal carbon trading principle and mechanism*

D5.2 *Experiments on personal carbon trading in daily travel in the EU and China*

Working papers:

12. *MaaS-based personal carbon trading framework: A comprehensive review, to be submitted to a journal.*

2.2.2 Insights: What did you learn?

Please describe the insights that were acquired as a result of i) conducting the research (including preliminary results and milestones, if applicable) and ii) the activities conducted as part of your impact strategy. Did the insights maybe uncover or lead to assumptions that you had not yet identified or that will influence how you will proceed?

1. Methods

During the implementation of the project, a variety of new mathematical models and algorithms involving interdisciplinary knowledge were acquired, adopted, and further developed related to customer satisfaction theory and technology acceptance model, Structural Equation model, Carbon emission accounting methods, data collection on transport activities, and Complex Network analysis in transportation networks.

2. Data

The project involves collecting various types of data from three main cities: Poznan in Poland, Groningen in Europe, and Beijing in China. This includes data on mobility, socio-economic attributes, emission factors, and traffic policies and regulations.

3. Experiments

To implement the personal transportation carbon trading experiment, we collected apps that could facilitate the experiment and preliminarily designed the experimental framework, necessary modules, and trading mechanisms.

4. Cooperations

The collaboration mainly includes two aspects. First, there is cooperation within the consortium: the Chinese team has a strong background in transportation, the Netherlands team has extensive experience in carbon emission accounting and impacts, and the Polish team excels in socio-economic experiments and geographic-related knowledge. Therefore, for the main research content of each work package it is led by an experienced PI, with other secondary participants providing data support. Throughout the execution process, participants learn from each other and address interdisciplinary

barriers. Second, there is cooperation with stakeholders, who are providers of transportation services and municipal transportation departments. We have organized multiple in-person meetings to negotiate data sharing, provision of experimental platforms, and recruitment of experimenters. We also compare the differences in transportation operations management between China and Europe, proposing different data and experimental implementation plans accordingly. Thirdly, through facilitated meetings at the program level, we have started the exchange of information with other funded projects in this program.

2.2.3 Looking forward: What will you do next?

Please describe the next steps in your project, both for the purpose of achieving new insights and testing assumptions.

1. Further develop a comprehensive transportation carbon accounting system.
2. Further establish a transportation reservation system and implement corresponding mobility demands.
3. Further collect data to analyze the relationship between urban travel mobility patterns and socio-economic data such as income.
4. Further refine the personal carbon trading experiment framework for transportation and begin recruiting participants to conduct the experiment.

2.3 Progress towards outcomes

Note: Please provide a description of the progress towards outcomes. Outcomes are changes in behavior, activities, or relationships of consortium partners and/or (key) stakeholders resulting from the exchange of knowledge and uptake of new insights.

2.3.1 Looking back: What did you do?

Please describe the activities that were undertaken, i.e., events for consultation/ knowledge exchange/dialogue/implementation/dissemination. Did these bring to light any assumptions, for example, about your stakeholders, which you had not previously foreseen?

1. Regular meetings for IMUMCN to update the research progress and complementary knowledge,
2. Meet partners from Stakeholders (Groningen municipal government, Beijing Jiaotong Transport institution, Het cooperative) for data collection on transport activities of EU and China
3. Meet with partners from China and Poland for personal transport carboning experiments and questionnaire design
4. Several presentations and posters at conferences and workshops facilitating cooperation, learning, and sharing of information.

2.3.2 Outcomes

Please describe which changes in behaviour, partnerships and activities of consortium partners and stakeholders were realised (or which first steps were taken) as a result of the activities as described above.

1. The communication among the collaborative partners has become smoother, facilitating data sharing

and shared knowledge and joint learning, thereby promoting the advancement of joint research.

2. Through collaborative exchanges with stakeholders, we have obtained mobility data under stricter controls and more convenient channels for recruiting experimenters (e.g., Hive Mobility company has strong social skills and resources, which can help promote the experiment's advertisement to individuals who have a higher enthusiasm for participating in transportation experiments.), and adjustments and supplements to the design of the personal carbon trading experiment.

3. Presenting at international conferences, seminars, and workshops has garnered additional feedback from various backgrounds and projects.

2.3.3 Looking forward: What will you do next?

Please describe the next steps for moving towards outcomes.

1. Strengthen collaboration with Beijing Jiaotong University and Beijing Transport Institute teams for data collection by designing questionnaires and further research on EV charging facilities.
2. Analysis of EU and China transport mobility considering equality and further propose policies or reservation travel services to improve the equality of society.
3. Complete transport carbon emission accounting and analysis for the EU and China.

2.4 Potential for Societal Impact

Please describe the potential for impact, and reflect on your original impact statement: which observations have you made that indicate that impact may be achieved (in the future), taking into account the assumptions and context. (NWO defines societal impact as "Cultural, economic, industrial, ecological or social changes that are entirely or in part the consequence of knowledge and expertise generated by research.")

1. Deepening the understanding of electric vehicle emissions and their environmental impacts in China and Europe can inform future policy development and implementation, guiding lower carbon travel behaviour.
2. In the rapidly evolving ride-sourcing market, emerging third-party integrators offer passengers the convenience of accessing services from multiple platforms simultaneously. This innovative business model allows a third-party integrator to send ride service requests from passengers to multiple ride-sourcing platforms, ultimately selecting the most desirable one from the ones that respond. In this study, we address the integrator's platform assignment problem in a ride-sourcing market, taking into account the stochastic nature of passenger waiting times influenced by factors such as the random locations of idle vehicles. Our findings reveal that a third-party integrator, using minimum waiting time as a criterion for platform assignment, can effectively reduce passengers' generalized trip costs and increase both passenger demand and social welfare under specific moderate conditions.

3 Co-creation and project management

Please describe how co-creation with consortium partners and/or stakeholders has been shaped and facilitated, how various types of knowledge have proven to be complementary and contributed to progress towards new insights and in your research uptake and knowledge sharing. Include in this how you shaped and facilitated a

transdisciplinary approach, and how your consortium has worked on building partnership, both within the consortium and with stakeholders.

Establishing a Common Ground:

The first step in co-creation involves establishing a common understanding and shared goals among all partners. This is typically achieved through initial meetings where the objectives of the consortium are clearly outlined, and the expected contributions from each partner are defined.

Defining Roles and Responsibilities:

Clear roles and responsibilities are assigned to ensure that each partner knows their tasks and how these contribute to the overall objectives. Each work package includes primary and secondary workers. The primary workers are responsible for leading the specific research content and implementation plans, while the secondary workers provide support in data, technology, and consultation. This clarity helps in managing expectations and ensures accountability.

Communication Channels:

Setting up efficient and open communication channels is crucial. Regular meetings and digital platforms for collaboration (e.g., Google Shared Drive, WeChat group) keep everyone informed and engaged. RUG is the project coordinator and is responsible for the regular meetings, shared data management, and progress monitoring.

The knowledge among the partners is complementary; in their principal work packages, they are responsible for expanding and supplementing the knowledge of the secondary workers.

The main collaborator of each work package is responsible for maintaining regular communication with their corresponding stakeholders. When necessary, they convene an online meeting of the entire consortium to record and address questions from all parties, fostering potential knowledge-sharing and collaboration intentions. We have found the in-person meetings (two so far) to be of crucial importance for learning and overcoming potential miscommunications and misunderstandings, as well as enhancing exchange and joint learning.

Have changes occurred in terms of project organization and management in the reporting period?

No. Project organization and management strictly follow the execution as per the project proposal.

4 International Collaboration

How has the consortium worked on building partnerships within the consortium, especially between the different countries? Which challenges has the consortium encountered in international collaboration, and how have these been addressed?

- The IMMUCN team is very diverse, includes members from multiple countries, and the research subject of the project targets cities in various nations, so the collected materials are in different languages besides English.

- Each partner is responsible for handling materials in the local language, filtering them, and then translating them to the best of their ability to explain them to other partners during regular bi-weekly meetings.

- Establishing effective and transparent communication channels is essential. Regular meetings, along with collaborative digital platforms such as Google Shared Drive and WeChat groups, ensure that all participants are well-informed and actively engaged. RUG serves as the project coordinator, tasked with organizing these meetings, managing shared data, and overseeing project progress.

- In addition, the project has recruited a postdoctoral researcher who holds dual doctoral degrees from both China and Europe. He is well-versed in the research landscapes of both regions and has access to resources from both China and Europe. This significantly reduces the communication barriers between Chinese and European collaborators.

Do you see opportunities for cross-project collaborations and joint activities?

We strongly believe there is an opportunity to initiate cross-project collaboration. Through the sharing session of the Sino-European Urbanization Project held in Hangzhou, we gained insights into other relevant projects and engaged in communication and exchanges.

The following projects:

E-MATS – Electric Multimodal Transport Systems for Enhancing Urban Accessibility and Connectivity

IMTECC – Integrated systems and analysis of urban Mobility for Climate-neutral and sustainable Cities in Europe and China

TOD2 – Transit-Oriented Development 2 – Public spaces, mobility hubs and climate neutrality toolbox

They involve multimodal transportation, similar to the "Mobility as a Service" concept in IMUMCN.

Considering citizens' multimodal transportation and their carbon emissions, as well as subsequent carbon trading, there may be opportunities for collaboration in data sharing and methodological verification.

What are enabling or hampering factors that enhance or restrict collaborative efforts? Where do you foresee challenges in potential collaboration?

The differing data policies between Europe and China result in certain important data not being able to be shared between the two regions. In such cases, one party would need to take responsibility for implementing the research methods and then share the methods, codes, etc., with the other party, who would then execute them using local data. This may entail challenges such as both parties needing to align their understanding of the research methods and code procedures, as well as challenges related to data format mismatches and data reproduction processes.

However, overall, the core members of the IMUMCN project possess international academic and professional experience, as well as extensive expertise in international interactions. They are particularly well-versed in the research and cultural interaction contexts of both China and Europe. Future collaborations are expected to reach even greater heights.

5 Personnel information

Check the appointment details of the persons involved in your project in ISAAC via the tab Project members.

- Does the appointment duration fall between the start and end date of the project?
- Is the position for the appointment in accordance with the appointments in the grant awarded?
- Is the size of the appointment in fte in accordance with the size of the appointments allocated in the grant awarded?

Personnel details checked and confirmed by the Dutch project leader:

yes

no: Any changes in personnel should be submitted for approval by means of a request for change form.

6 Publications and other products

Publications and other products (such as links to videos, patents, policy briefs etc) should be entered via your project in ISAAC via the tab Product. Here, you should also state whether it concerns an Open Access publication and you can add a DOI/URL.

Are all scientific publications and other forms of products listed in ISAAC?	
<input type="checkbox"/>	yes
<input type="checkbox"/>	no*

* Enter these details no later than four weeks after submitting this report.

Open Access

All scientific publications that emerge from a grant from NWO should be freely accessible via Open Access from the moment these are published. This applies to scientific articles, books/monographs, chapters and conference papers.

For a more detailed explanation of NWO's Open Access policy, see: www.nwo.nl/en/open-science.

Are all publications available in Open Access form?	
<input checked="" type="checkbox"/>	Yes
<input type="checkbox"/>	No, because For some research content led by China, the design of data protection and its funding arrangements have not provided an open access (OA) option.

Research data management

Is the Research data management proceeding according to plan?	
<input checked="" type="checkbox"/>	yes
<input type="checkbox"/>	no <i>Description</i>
Have the data underlying the existing publications already been made available?	
<input type="checkbox"/>	yes
<input checked="" type="checkbox"/>	no For some research content led by China, the design of data protection has not provided open access to data. Data will be made available on request.

7 Financial information

Describe the main aspects of the financial progress below. If applicable: list changes such as financial bottlenecks, depletion of credit and unexpected (dis)investments of more than € 10,000.

Budget module	NWO approved budget (allocation) and/or NWO amended budget	Expected expenditure	Difference budget – expected expenditure	Costs realised up to and including this reporting period
Personnel costs				
Material costs				
Knowledge utilisation				
Internationalisation				

NB: You should request financial changes via your ISAAC account under the tab Requests for Change.

<i>Description</i>

Partner contributions (total including this report period)

Please only complete this section if there is co-financing in your project. You do not need to include the grant from NSFC in your response to this question, as this is accounted for separately by the Chinese project leader to NSFC.

In cash contributions

Complete below form if you invoice consortium partners yourself.

<input checked="" type="checkbox"/> Not applicable			
Name co-funder	NWO approved budget k€	Contributions received in k€	Contributions still to be received in k€

In kind contributions

State which in kind contributions have been provided.

<input checked="" type="checkbox"/> Not applicable			
Name partner	NWO approved budget in k€	Contributions provided in k€	Contributions still to be provided in k€

8 Completion

<input type="checkbox"/>	I have completed this form and the required annexes truthfully and my knowledge institution and any consortium partners have been informed about the content.
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For approval
Project leader

For approval

Signature	<i>(a scanned version of your signature is sufficient)</i>
Date: Date	

Submit this report as a **Word document** via your ISAAC account under Projects/Tab Reports with subject "Progress report"

Progress Report

Research Programme: JPI - ERANET-Cofund Urban Accessibility and Connectivity



Annex A: Additional results/update Workpackages

You can choose your own layout for this annex. Please refer to/use the description of the WP in your application. You can also add the names of the researchers working on the WP's. You may add additional annexes.

A1: workpackage 1:

D1.1 Report on the state of the art in residents' work schedule flexibility and work time choices;

D1.2 Survey and data collection with residents' work schedule flexibility in both the EU and China;

D1.3 Residents' work time and residence location choice model with changing work policies

Publications:

1. Yue Bao, Hai Yang, Ziyou Gao, Hongli Xu, 2023. How do pre-event activities alleviate congestion and increase attendees' travel utility and the venue's profit during a special event? *Transportation Research Part B: Methodological*, 173, 332-253.

2. Yue Bao, Guangzhi Zang, Hai Yang, Ziyou Gao*, Jiancheng Long. Order assignment in a ride-sourcing market with a third-party integrator. *Transportation Research Part B: Methodological*, 178, 102833;

Submitted paper:

3. Chao Shu, Yue Bao*, Ziyou Gao*, Zaihan Gao, 2024. Exploring electric vehicle purchases and residential choices in a two-dimensional monocentric city: An agent-based microeconomic model. *Engineering*, under review.

Reports:

WP1.1_Work schedule flexibility and work time choices

WP1.3_A Review_The Impact of Emerging Work Habits on Residential Location Choices

A2: workpackage 2:

D2.1 Report on the state of the art in new transport services (M6);

D2.2 The integration principle and mechanism of ride-hailing platforms (M15)

Publications:

4. Juwen Guan, Yue Bao*. Does e-hailing perform better than on-street searching? an investigation based on the temporal-spatial distributions of idle vehicles. *Frontiers of Engineering Management*, accepted;

Submitted paper:

5. Yue Bao, Xinwei Li*, Hai Yang, Ziyou Gao. Two-Sided Spatial Matching of Mobility-On-Demand Services, under review.

Working paper:

6. Xiangtong Su, Zaihan Gao, Yue Bao*, Ziyou Gao, A periodic flexible driving restriction and reward policy considering heterogeneous travelers in time preference, to be submitted to a journal.

Reports:

WP2.1_Report on the state of the art in new transport services.

A3: workpackage 3:

D3.1 Traffic data sets collected in China and The EU (M10)

D3.2 A near real-time traffic-related emission accounting framework (M18)

Publication:

7. "Free-riding in Carbon Mitigation of Chinese Cities From 2012 to 2017", which has been accepted for publication in Nature Cities.

Working papers:

8. "Electric Vehicle Consumer Satisfaction and Potential Demand for Charging Facilities: A Case Study in China," which helps understand the construction of charging piles for EVs in China and proposes suggestions for future policy development and implementation based on the findings of this research.

9. "Carbon accounting for the transport sector in China and Europe," which can help identify the current situation and future characteristics of urban transport systems in European and Chinese cities.

Dataset:

- CBS-mobility data (Netherlands): Collected and processed by Yingying, assisted by Kang
- World conversion factors: Provided by Dr Yuli Shan
- EFDB_output (IPCC): Collected by Yingying
- new_pub_1DataThesisTest: Provided by Franco and Kang, processed by Yingying to the emission factor
- OV public Traffic data in the Netherlands: In the process of application: In the process of applying by Franco and Kang, assisted by Yingying
- Motor vehicles admitted; vehicle type, fuel type, January 1st: Collected and processed by Yingying
- Car ownership by make/brand in the Netherlands 2023: Collected by Yingying
- Poznań_badanie_gospodarstw_baza-household survey_data base: Provided by Marek, processed by Marek and Yingying

Dataset from the EU side	Purpose	Cities	Methods
Public transport card	Mobility analysis	Groningen	Complex network analysis
Car/bike counting points	Mobility analysis/ OD demand	Groningen	Complex network analysis
Car tests data	Emission factors	660 European cars	Carbon accounting framework
Income level of city communities (population, socio-economic data, etc.)	Transport equity analysis	Groningen (151 cells)	Complex network/ Cluster/Regression analysis

Car ownership	Emission factors/ city accessibility network construction	Groningen	Carbon accounting farmwork/Complex network analysis
Traffic survey data	Mobility pattern analysis/travel purpose	Poznan	Carbon accounting farmwork/Complex network analysis

A4: workpackage 4:

D4.1 The principle and mechanism of MaaS-based innovative transport services (M6)

D4.2 A focus group meeting with transport service providers (M10)

D4.3 Experiments on individuals' behaviour responses to innovative transport services (M12)

Publications:

10. Kang Huang and Feixiong Liao*. "A novel two-stage approach for energy-efficient timetabling for an urban rail transit network." *Transportation Research Part E: Logistics and Transportation Review* 176 (2023): 103212.

11. Kang Huang, Feixiong Liao*, Huanhuan Lyu, and Ziyou Gao. "Assessment of the tradeoff between energy efficiency and transfer opportunities in an urban rail transit network." *Sustainable Energy Technologies and Assessments* 58 (2023): 103360.

12. Kang Huang, Feixiong Liao*, Soora Rasouli, and Ziyou Gao. "Toward energy-efficient urban rail transit with capacity constraints under a public health emergency." *Frontiers of Engineering Management* 20, no. X (2023).

Working paper:

13. Comparative Analysis of Mobility Data Management and Accessibility in Beijing, Poznań, and Groningen: Implications for Public Transport Efficiency, Congestion, and Mobility as a Service (MaaS), to be submitted to a journal.

Report:

WP4.1_The principle and mechanism of MaaS-based innovative transport services.

A5: workpackage 5:

D5.1 A MaaS-based personal carbon trading principle and mechanism (M10)

D5.2 Experiments on personal carbon trading in daily travel in the EU and China (M20)

Working paper:

14. Maas-based person carbon trading farmwork: A comprehensive review, to be submitted to a journal.