

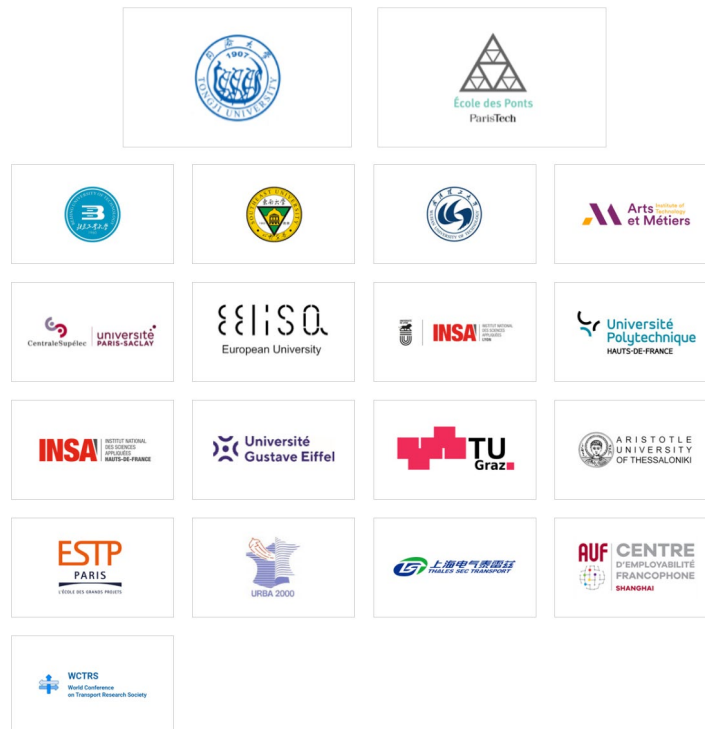
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Best Research Gold Award

IS COMMUTING A DAILY BEHAVIOR? RHYTHMIC EVIDENCE FROM FRANCE, 2019

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Key Words: commuting cycle, monthly frequency, commuting rhythm, average commuting distance

Abstract: To most workers, the working routine involves a fixed work place to which they go most of their worked days on a daily basis, i.e., involving a commuting trip on the morning and back to home on the evening. Yet, short home-to-work (H2W) distance may come with going back home around noon, yielding bi-daily commuting. Moreover, at the other end of the spectrum, there are long-range commuters that stay more than one day close to their working place: to these “overnighters”, the commuting cycle relative to home is multi-day instead of mono-day. Then, the frequency of commuting cycle is a supra-daily one and the commuting frequency of interest is the number of such cycles over a long period, say one month, yielding monthly frequency. Our study addresses the following research questions: What are the commuting rhythms in terms of cycle length and monthly frequency among the population of workers? What are the main rhythmic patterns of commuting, with what respective shares? How do the rhythmic patterns depend on individual attributes? How do they relate to travel impedance in terms of not only H2W distance but also H2W travel time and the related monthly budgets? Answers are provided for the French population as of 2019, based on the national household travel survey “EMP 2019”. At the individual level the survey is a twofold one that deals first with daily mobility and then with long-range mobility. Long-range commuting practice (i.e., euclidean H2W distance above 80km) fall in the latter part, whereas short-range commuting can be revealed from the former part. It comes out that there are 96% of short-range commuters versus 4% of long-range ones. Among short-range, 84% commute once per worked day and 16% twice per day, making bi-daily commuters. About one half of long-range commuters have mono-day cycles, yet with heterogenous frequencies deviating from an average value of about 10 days per month. Among the other half of long-range commuters, i.e., overnighters, the commuting cycle length is evenly distributed from 2 to 6 days, with average value of 3.5 days; the related monthly frequencies are heterogenous, too, around average value of 4 cycles per month. The commuting rhythms exert straightforward influences on travelled distances and, depending on the transportation mode, on the energy consumption and carbon emissions of home-to-work mobility. We provide statistical indicators to calculate the modal traffics and environmental impacts on an average working day basis.

THE NONLINEAR AND SPATIAL EFFECTS OF THE BUILT ENVIRONMENT ON SHARED BIKE USAGE

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Key Words: Dockless shared bikes, Non-linear effects, Spatial effects, Built environment

Abstract: Shared bikes are widely considered an environment friendly mode of transport that can play a substantial role in meeting the demand for travel and fostering sustainable development. Understanding the intricate and diverse impacts of the built environment (BE) on shared bike usage is crucial for policymakers and urban planners as they manage this emerging mobility option and strive to create bike-friendly cities. Numerous studies have examined the relationship between BE and shared bike usage. Recent research has delved deeper into understanding the complexity of this connection, exploring both the spatial variations and the non-linearity of the BE effect using methods such as geographically weighted regressions (GWR) and data-driven machine learning (ML) models. While models based on linear assumptions, such as GWR, could produce easily interpretable results and unveil the spatial heterogeneity of the BE effect, they often fall short in capturing the non-linear relationships. On the other hand, ML models excel at identifying non-linear patterns, but they encounter challenges in model interpretation and discerning the spatial effects. Models that effectively reveal both the non-linear and spatial effects of the BE on shared bike usage are still lacking. To address this gap in the literature, we combine a machine learning model, eXtreme Gradient Boosting (XGBoost), and a local model-agnostic method, SHapley Additive exPlanations (SHAP), to explore the non-linear and spatially-varying associations between dockless shared bike system (DLBS) usage and BE attributes in Shanghai, China. As a local interpretation method based on the game theory, SHAP offer the opportunity to interpret the results of ML models and visualize complex geographical phenomena and processes. In this study, we compute a group of indicators at the grid cell level, spanning the conventional 5-D dimensions to measure BE: density, diversity, design, distance to transit, and destination accessibility. We find that density- and road-network-design-related variables exhibit the most positive influence on DLBS usage among the BE factors and their effects show significant variations across space and different levels of BE measurement. Specifically, density-related factors exert a stronger positive effect on DLBS usage in downtown Shanghai, while road-network-design-related factors have a greater impact in the suburban areas. Moreover, the BE effects also display evident non-linear features. For instance, DLBS usage and floor area ratio (FAR) demonstrate an inverted “U”-shaped relationship, with ridership initially increasing with FAR until reaching a threshold value of around 2 and then starting to decrease. Additionally,

DLBS usage experiences a substantial growth with population density before leveling off at around 9,000 people/km². The construction of new roads facilitates the usage of shared bikes, but when road network density reaches approximately 13 km/km², its effect becomes marginal and ceases to increase. Based on these findings, we apply cluster analysis to identify five clusters of grid cells with similar patterns in the BE-shared bike connection. We propose policy recommendations tailored to the dominant BE factor in alternative clusters to promote the shared bike usage effectively.

Best Research Silver Award

EXPLORING SUBJECTIVE HEALTH COMPLAINTS OF TRAFFIC NOISE EXPOSURE FROM ROADSIDE RESIDENTS IN KUMASI, GHANA USING EXPLORATORY FACTOR ANALYSIS AND STRUCTURAL EQUATION MODELLING

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Key Words: subjective health impacts, AMOS software, structural equation model, exploratory factor analysis; traffic noise pollution

Abstract: Transportation system causes noise-induced annoyance, which is a threat to the environment, notably in urban areas. Frequent noise exposure can trigger annoyance, which is characterised by discomfort, depression, anger, and headaches that interfere with daily activities. Modelled or measured noise levels have been applied in previous studies to examine the impact of road traffic noise on psychological health. However, each person's perception of noise is unique from the other's and an individual's subjective experience can alter with time. Therefore, this study aimed to evaluate participants' perceptions of traffic noise and how it influences their health. In this work, exploratory factor analysis (EFA) followed by structural equation modelling (SEM) was integrated to assess the subjective health complaints under daily exposure to traffic noise environment. A roadside dweller perception survey through simple random sampling was conducted. Paper-based questionnaire survey was administered to a sample of 1000 participants living along road corridors. The questionnaire was prepared based on demographics, environmental conditions, and primary effects of traffic noise pollution. Three common latent factors; "Traffic noise exposure" (TN_E), "Traffic noise sources" (TN_S), and "Subjective health impacts" (SH_I), which summarize 10 questionnaire response items were obtained by EFA. The model was validated by testing the proposed hypothesis using Absolute fit, Incremental fit, and Parsimonious goodness-of-fit indices. It was found that SH_I factors like headache, hearing loss, lack of sleep and stress were greatly influenced by the primary factors of the latent factor "TN_E" with a path coefficient of 1.145. The second latent factor "Traffic noise sources" (TN_S), which was associated with parameters like heavy trucks and honking sounds showed less path coefficient

of 0.322. The health of residents at the study locations is affected by the prominent effects of daily exposure to traffic noise pollution and least by traffic noise sources. The developed model clarified some casual relationships among complex systems in the study of traffic noise exposure and sources on individuals in Kumasi city. The results of the study may aid town planners, and transport and environmental experts in urban planning, and transport impact assessment especially in low and middle-income countries.

EXPLORING THE IMPACTS OF INTEGRATION MODE CONSIDERING RIDESHARING WITH SHARED AUTONOMOUS VEHICLES AND METRO TRANSFER

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Key Words: Integration mode, Ridesharing with shared autonomous vehicles, Metro transfer, Bi-objective optimization, Improved NSGAI algorithm

Abstract: Maas (Mobility as a Service) serves as a platform that integrates urban transportation resources to offer door-to-door services. For the metro service, the existing transfer modes, such as bus, ride-hailing, and bike-sharing have the defects of long waiting time and low comfort. Shared Autonomous Vehicles (SAVs) are expected to make up for the above shortcomings, better solving the “last mile” problem, thus promoting the development and implementation of Maas services. In this paper, a two-stage decision support optimization framework is presented for the problem of the integration efficiency of metro and SAV. Firstly, based on the operational characteristics and relationship between SAV and metro, we propose three integration modes, Walk& Subway& SAV, SAV& Subway& Walk, and SAV& Subway& SAV. Taking into account the continuous dynamics of real-life passenger travel requests, the concept of refreshing time is introduced to decompose the dynamic SAV ride-splitting problem into a series of static problems in the rolling time domain. An SAV ride-sharing model considering the angle between paths is established, aiming to minimize the number of SAV vehicles and the total travel distance. Next, an improved two-stage algorithm is designed to solve the multi-objective problem. In the first stage, k-means++ clustering is applied based on the direction angles of orders to narrow down the scope of the solution. In the second stage, an improved NSGA-II algorithm based on the Large Neighborhood Search (LNS) operator is proposed to obtain stable global optimal solutions. Moreover, we validate the algorithm's results using the publicly available Solomon benchmark dataset, which confirms its consistency with known international optimal solutions. In our experiments, we utilize the order data of Ridesharing in Chengdu and analyze the advantages of the integrated mode from a spatio-temporal perspective. The results demonstrate that the integrated travel model proposed in this study achieves a higher shared ride rate (70.44%) and occupancy rate (73.60%) than traditional shared rides. It also saves an average of 19.40 seconds per person in travel time during peak hours, reduces vehicle usage by 64.27%, travel costs by 84.91%, and carbon emissions by 87.91%. Furthermore, regarding the temporal dimension, the integrated mode outperforms the conventional mode in various metrics during peak hours compared to off-peak hours. In the spatial dimension, the integrated mode reduces travel costs

and carbon emissions for longer travel distances. The algorithm proposed in this paper can be extended to other integration problems concerning public transportation and SAV, providing scientific and reliable theoretical references and technical support for integrating travel modes in future driving scenarios. Keywords: Integration mode, Ridesharing with shared autonomous vehicles, Metro transfer, Bi-objective optimization, Improved NSGAI algorithm

UNDERSTANDING PATIENTS HETEROGENEITY IN HEALTHCARE TRAVEL AND HOSPITAL CHOICE - A LATENT CLASS ANALYSIS WITH COVARIATES

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Key Words: Healthcare travel, hospital choice, latent cluster analysis, heterogeneity

Abstract: Access to health care is key to well-being, and it is increasingly clear that aggregated accessibility analysis is hard to reflect people's actual healthcare behavior. This paper employs a patient-based healthcare travel survey to obtain a nuanced picture of how healthcare travel varies across patients. The existing literature shows transportation is an essential factor in accessing health care; however, most studies focus on separate healthcare travel mode choices or hospital choices for certain segments of patients, making it difficult to derive clear profiles of patients. Also, the attitudinal factors in healthcare travel have long been neglected. This research explores the joint hospital choice and travel behavior of patients. We conducted an online survey with patients in Shanghai to identify the heterogeneity in healthcare travel behavior and hospital choice. A latent class model with covariates is adopted to identify different patient types that exhibited distinct hospital choices and healthcare travel behavior. Attitudinal factors are included in our model to form clear-separated clusters. Four categories of patients are identified: public transit patients, car-oriented patients, near-hospital patients, and non-downtown hospital patients, which differ in sociodemographic characteristics, healthcare-seeking behavior, and public transit accessibility. Our research shows that a substantial share of non-downtown hospital patients should not be underestimated in healthcare travel demand analysis. The behavior of public transit and non-downtown patients requires improvement of quality and public transit accessibility in non-downtown tertiary hospitals. Our study contributes to a better understanding of the market segments of patients and tailored healthcare and transport policies to meet patient healthcare travel demand.

Best Research Bronze Award

THE PROFESSIONALISATION OF ARTISANAL TRANSPORT OPERATORS IN THE AGGLOMERATION OF ABIDJAN: THE CASE OF THE PASSENGER TRANSPORT ON THE EBRIE LAGOON.

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Key Words: Mobility, Abidjan, artisanal transport, lagoon transport, pinasse, professionalization

Abstract: The agglomeration of Abidjan is facing real mobility problems due to the demographic pressure it has been experiencing in recent years. This demographic pressure has led to urban sprawl, resulting in longer travel distances and increased mobility needs. This situation is exacerbated by road congestion in the District of Abidjan. The reasons for this are the inadequacy and poor condition of the roads, the incivility of some drivers, the lack of mass public transport and the many road infrastructure construction projects underway. In the light of this situation, lagoon transport is clearly one of the solutions to the above-mentioned problems. At present, lagoon transport services are provided mainly by craftsmen with pinnaces and by three contracted operators: SOTRA, STL and CITRANS. However, it has to be said that transport by the pinnace is carried out in precarious conditions of comfort and safety, endangering the lives of the thousands of people transported every day. Our study on the ‘Professionalisation of artisanal transport operators in the agglomeration of Abidjan: the case of lagoon transport’ aims to propose a strategy for professionalising artisanal lagoon transport operators in the agglomeration of Abidjan. This process should lead to an improvement in the working conditions of those involved, the quality of the service provided and the safety of users of this mode of transport. The methodological approach is based firstly on data collection through documentary research, interviews, field observation and a field survey, followed by the processing and analysis of the data collected. The study shows that the pinnace sector suffers from inadequate organisation, a lack of qualifications among the players, job insecurity, the absence of equipped stations, insecurity on wooden and dilapidated docks, discomfort and insecurity on board pinnaces, most of which are made of wood, and the absence of safety equipment on board pinnaces. With a view to finding solutions to the weaknesses and shortcomings of this sector, seven (7) major actions are proposed, namely: strengthening the regulatory framework, training the players (owners and employees), improving the working conditions of the players, supporting access to financing, renewing the fleet, developing modern infrastructure (platforms and stations) and acquiring security equipment and ticketing terminals. The report also makes a number of recommendations to the government of Côte d’Ivoire. These recommendations concern, on the one hand, the development of quays, stations

and feeder roads for gbakas and woro-woros to the pinnace quays and, on the other hand, tax exemption for the acquisition of safety equipment by pinnace owners.

FROM DESIGN TO PRACTICE: REMOVING THE BARRIERS TO CONSTRUCTING BARRIER-FREE STREETS IN NEIGHBOURHOODS

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Key Words: Barrier-free, Accessibility, Street Design, Neighbourhood, Urban Governance

Abstract: In China, the barrier-free environment has long been the emphasis of urban design in the past decades. However, neighbourhood streets still cannot provide a safe environment for people with disabilities. To understand why implementing barrier-free design on neighbourhood streets encounters challenges in China, this research carried out an investigation through questionnaires, interviews, and spatial analysis across several residential neighbourhoods in Shanghai, and this article uses Caoyang as a showcase to demonstrate the research result. Specifically, the research reveals three barriers that obstruct the implementation of barrier-free design on neighbourhood streets: the inconsistent and inappropriate barrier-free facilities are defined as physical barriers; the absence of knowledge on barrier-free design among decision-makers and the dependence on car-oriented street design in practice is defined as the conceptual barriers; and the absence of capable authority and effective working mechanism to support the implementation is defined as institutional barriers. Accordingly, the article offers four strategies to resolve these barriers: enforcing barrier-free street design by law, establishing an exclusive authority and working mechanism, educating the general public, and enhancing public participation. These results underscore the importance of multi-disciplinary input from not only infrastructure engineers and urban designers but also social engineers and politicians in promoting sustainable urban design. The experience and suggestions discussed in this article will not only benefit the development of barrier-free neighbourhoods in the context of China but also have broader implications for urban management and governance in other contexts.

TRADABLE MOBILITY RIGHTS: FEASIBLE OR JUST THEORETICALLY ALLURING?

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Key Words: Travel demand management, Tradable mobility rights, Road transportation externalities, Feasibility, Road pricing

Abstract: Presented as an alternative to road pricing, tradable mobility rights (TMR) have been abundantly advocated by the academic literature as an innovative and more advantageous instrument for correcting congestion and other road transportation externalities. Nonetheless, despite their relatively vast body of scientific literature and their large use in regulating environmental externalities on markets other than mobility, tradable rights have not yet been implemented on road transportation, indicating a gap between the academic and the social perception of TMR as a feasible and effective policy instrument. Are tradable rights truly a feasible instrument for mobility management? The present paper aims to answer this research question by discussing what has been stated about TMR feasibility by researchers – conceptualizers, modelers, economists, behaviorists –, under which basis – logical, numerical study, behavioral study, and within which outreach and limitations. As methodology, a critical literature review on existing TMR literature is conducted in order to identify the gaps that may have contributed to this discordancy between theory and practice. Specifically, three strands of literature on TMR are identified and discussed, first separately and then in a general manner: conceptual, mathematic programming and behavioral studies. The existing experiences on emission trading schemes and congestion pricing are also taken into perspective. We argue that, despite its apparent economic and social feasibility, diagnostics on TMR schemes generally rely on unrealistic, inadequate or incomplete representation of travel behavior and network characteristics, either from a mathematic modelling or an experimental approach. Within TMR literature in general, key operational features such as trading, pricing and institutional structure, which are determinant to investigate transaction costs and social acceptability, have been largely overlooked. All these challenges contribute to generate a misleading feasibility assessment of TMRs, and develop skepticism towards a policy implementation. In conclusion, we point out to research directions to better address feasibility in design studies and scheme inception.

EVALUATION OF THE CURRENT SUPPLY AND DEMAND OF URBAN PUBLIC CHARGING STATIONS AND OPTIMIZATION SUGGESTIONS IN SHANGHAI

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Key Words: Low-carbon transportation, public charging station, accessibility analysis, supply and demand balance

Abstract: Under the global consensus on green and sustainable development represented by "carbon neutrality", new energy vehicles have been widely supported and promoted, becoming the main guide for the development of the automotive industry in the future, which has a positive impact on reducing the dependence on fossil fuels for transportation, lowering greenhouse gas emissions, and promoting the green development of the society. Therefore, in this context, it is crucial to optimize the layout of public charging piles to improve the low-carbon private travel environment. In this paper, taking Shanghai as an example, the total number of charging piles of each charging station and the usage of charging stations are analyzed by SPSS correlation, and according to the results, it is known that there is a significant positive correlation between the two. And on this basis, taking diversified city data, by using sDNA, UNA, APH and other analytical methods to analyze the supply-demand relationship between electric private vehicles and public charging piles at different times of the day on weekdays and weekends. Spatial visualization of overall usage, time-of-day usage, usage rate, accessibility and penetration is used to find the areas where public charging piles are lacking in Shanghai. Considering the charging scale, charging tariffs, total number of poi and population density, we propose to renovate the existing stations and add new stations to further improve the environment for the development of transportation and energy infrastructures.

RESEARCH ON CLIMATE CHANGE RISK OF AIRPORTS FROM THE PERSPECTIVE OF CLIMATE RESILIENCE

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Key Words: climate resilience, risk assessment, airport

Abstract: At present, the increasing frequency and intensity of extreme weather events as well as climate change have great negative effect on air transport activities, including operation, safety, and finance. As a consequence, it is urgent to research on the adaptation to deal with the risk posed by climate. In terms of existing literature, compared with mitigation, there are still some research gaps in adaptation, especially lack of research focusing on specific subjects such as civil aviation which is an important link of global network and sensitive to climate change. It is the scientific evaluation of climate change risks that is primarily required to form a basis on following measurement of climate resilience and systematic adaptation planning. Besides, of all air transportation stakeholders, airports are most prone to be affected by the climate. Therefore, targeting building resilience, this research develops an overall risk evaluation model for coastal airports which can identify the climate risk level of specific airports, then provide suggestions for the climate resilient development of this industry and bridge the research gap. Based on literature analysis and expert investigation, we firstly sorted out the climate risk sources and selected a series of indicators to create a three-dimension index system comprising hazard sources, exposure, and vulnerability for thorough risk analysis. Next, due to the uncertainty in the research process, the fuzzy theory was combined with the element theory to quantify the climate risk level. To verify the viability of the indicator system, we took one airport as an example and applied the data of its operation and regional meteorology to the model. It turns out that the airport's climate change risk is comprehensively evaluated and the risk levels of each dimension are concluded. All in all, this study has developed an effective information tool for the identification of climate change risk and provided valid decision references for subsequent adaptation planning for airports. In the future, according to the results, airports are capable of measuring resilience and confirming the priority of adaptation action to increase the ability to deal with climate change and build a more adaptive society.