
1. Introduction to the *Handbook on Transport and Urban Transformation in China*

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1 SETTING THE SCENE FOR TRANSPORT AND URBAN TRANSFORMATION IN CHINA

Since the economic reform and opening-up policy initiated in 1978, changes brought about by a series of consecutive reforms in Chinese society are unparalleled in human history. In this “post-Mao era”, the urbanisation process accelerated dramatically as “a policy exploitive of the rural sector” (Chan, 1994: 97) under the Mao regime had shifted to an urban development policy that “is not simply subordinated to industrialization policy...” and “should be treated as an inevitable process of modern development...” (Chan, 1994: 104). The rate of urbanisation, which denotes the proportion of the population living in urban areas, was merely 10.6 per cent in 1949 when the People’s Republic of China was founded. Over the course of the next thirty years, this proportion rose modestly to 17.9 per cent, whereas, since then, urbanisation has rocketed, with a further steep rise occurring soon after China joined the World Trade Organization (WTO) in 2001. In 1999, the rate of urbanisation was 30.89 per cent, a strong growth of 13 per cent over 21 years. In less than 18 years, the rate of urbanisation in 2017 had risen to 58.52 per cent, a 28 per cent increase, doubling the growth between 1978 and 1999 (NBSC, 1999 and 2018).

Transport, either as a means to meet development needs or by itself as an economic growth strategy, has played an indispensable role in contributing to rapid urbanisation, and vice versa. The aphorism of the British economist Colin Clark (Clark, 1958) – “transport is maker and breaker of cities” – proves to be insightful to depict the interactive relationship between transport and urbanisation through a series of developmental crises and technological breakthroughs. For Chinese cities, the pattern of interaction between urbanisation and transport is much more complicated than that of most advanced economies, where development of the transport infrastructure took a fairly long period of time to reach its present state. Chinese cities have been a major arena for experiments; from large-scale motorisation to public transit development, from state-led rail transit development to spawning entrepreneur-driven business ideas (such as dockless bike-sharing systems and online ride-hailing systems), all concurring and overlapping in a relatively short time and leading to dramatic urban transformation with considerable challenges for sustainable development in contemporary China. A recently-published book, *Unsustainable Transport and Transition in China* by Loo (2018), specifically addresses these challenges.

Over the past forty years, transport has been treated largely as a key facilitator for economic development and catching-up modernisation at the expense of other dimensions of urban sustainability. In the early days of reform, there was an evident lack of transport infrastructure and port handling for sufficient and efficient internal and

external circulation of people and goods (“the 1978 Statistical Communique of National Economic and Social Development”, cited in Mackerras, 2001). Up to the early 1990s, the railway network was the cornerstone of the transport systems, carrying over a third of all goods and passengers (Mackerras, 2001). However, when the Chinese government decided to promote the automobile industry as a “pillar industry” in its eighth five-year plan (1991–1995) with subsequent supporting policies (National Research Council, 2003), rapid motorisation followed, resulting in unprecedented growth in private car ownership and consequent large-scale road construction. In 1984, private ownership of vehicles was estimated at 173,500, while by 1998 it had increased to more than 4 million; a 24-fold increase. In contrast, over the same period, the length of highways had increased by only 40 per cent, from 926,700 km to 1,278,500 km (National Research Council, 2003).

Challenges brought about by rapid motorisation had begun to cause serious concerns for urban transport planners from the mid-1990s (Gakenheimer, 1995a and 1995b, cited in Shen, 1997). As urban residents are comparatively more able to afford private cars than rural residents, the congestion in urban areas grew particularly rapidly (Gakenheimer, 1995a and 1995b, cited in Shen, 1997). A vicious cycle was formed: greater congestion led to more road construction, which in turn led to more cars, with the result that congestion continued to increase. Traffic congestion relief thus became a key focus of urban transport policy which appeared straightforward but ineffective and devoid of a comprehensive and integrated strategy.

Promoting sustainable transport policies was not a priority until the twenty-first century. A series of rail-based policies (e.g. intercity high-speed rail and various kinds of urban rail transit modes) and non-motorised transport policies, were promoted, such as the urban public transport strategy in 2005, the medium- to long-term high-speed rail plan in 2004, the non-motorised transport policy (walking and cycling) in 2012, and the clean air environmental policy in 2013. However, large-scale investments in these various rail modes have created numerous issues relating to disintegration at multiple levels. For instance, high-speed rail lines on green fields outside city centres result in development challenges and stark accessibility problems to and from major centres. Likewise, extensive metro networks fail to effectively serve large metropolitan areas. For example, both Beijing and Shanghai have around 700 km of metro networks, characterised by a service pattern that requires trains to stop at every station due to a lack of passing loops. The consequence is that, with the extension of the network, commuting time increases significantly and the network appears burdensome. There is a growing awareness that a polycentric express rail network and infrastructure at the metropolitan level could efficiently connect several major sub-centres in addition to the existing metro lines. A few internationally-renowned examples include German U-bahns, the RER systems in Paris, and the Crossrail system in London. Therefore, the key is not the length of the metro network but a strategic rail network that can efficiently cater for extensive metropolitan territories. A sensible model for rail development in Chinese cities is still to be identified.

Alongside the building of cities with higher transport capacities, the urbanisation process has been driven by “urban entrepreneurialism” through “the Chinese growth machine”, using land finance and a decentralised tax-sharing system (Wu, 2015: 79). Two different, but related, explanations are suggested (Wu, 2015). On the one hand, a system of evaluating officials drives local leaders to pursue economic performance; for example, GDP growth rates for promotion. In order to attract investments, local municipalities

offered discounted or free land for industrial and real estate development. This approach was enhanced by a series of land reforms in the 1980s, when the state was endowed with enormous powers for seizing and selling state land through ownership, designation of cities, and commercialisation, in contrast with rural land, which is collectively owned by rural farmers and could not be commercialised. On the other hand, the tax-sharing system introduced in 1994 enables central government to have its own tax base and leaves land income to the local government. Meanwhile, with economic decentralisation, central government passes social and public services expenditure on to local government, which thus faces fiscal deficit and focuses more on land development for local revenue through large-scale rural-to-urban land conversion.

This unusual rural–urban land conversion has been termed a “utopian urbanisation” that is an “anti-experiential, anti-historical, arbitrary, purified, slick-city model to the world” (AD, 2008: 36). As a result, the urbanisation process and transport provision has been uncoordinated. For instance, with urban entrepreneurialism, job–home spatial separation widens (Zhao, 2011) in contrast with a high level of job–home proximity in the work unit “danwei” under the state-command economy. Although development density has been regulated in Chinese urban planning practice, the Chinese growth machines, through rapid and large-scale economic incentives, result in high-density urban sprawl without good public transport service and thus bring about worsened transport congestion and development challenges.

The inferior transportation conditions and lengthy travel distances, including long commuting times, unsafe and wide road junctions, overcrowded metros, severe air pollution, serious gridlocks, and so on, contribute to a poor quality of life and dissatisfaction. More and more Chinese scholars propose to address the challenges encountered in Chinese cities on different spatial scales. At the community level, Pan et al.’s (2009) research in Shanghai suggests that coordinated land use planning and urban design can effectively influence mobility demand and travel behaviour to achieve green transport in urban China. At the city–regional level, Yang et al. (2012) distinguish between polycentric compact development and overconcentration in high-density centres, arguing that suburban high-density nodal development could reduce travel demand into city centres. Similarly, Zhao et al. (2010) suggest the key to sustainable urban expansion is to reduce travel needs through integration of land use and transport infrastructure provision.

Senior professional technocrats and political leaders at the national level had similarly highlighted their concerns about sustainable development in both urban and rural China. At the forty-year anniversary of economic reforms, Qiu Baoxin, former deputy minister of the Ministry of Housing and Urban–Rural Development (MOHURD) urged a paradigm shift from a growth-oriented to a human-oriented reform to safeguard quality of life and green rather than grey sustainability. Moreover, in addition to cities, concerns for rural development had gained renewed attention. In 2013, Xi Jinping’s announcement that China should “build a beautiful countryside” as part of the rural reconstruction initiative, promoted the nobility of the peasantry and the sanctity of rural China.

In December 2018, the Ministry of Transport announced the latest official figures, marking the achievement of all modes of transport infrastructure, highlighting that transport is an essential facilitator for social and economic development. However, the positive role of transport appears to be taken for granted in the development process and is, thus, seldom studied to obtain deeper insights into transport and urban transformation

in contemporary China. How has the role of transport been acknowledged and exploited for serving economic development and urban transformation after the opening-up policy? To what extent has transport need for rural areas and rural–urban linkages been addressed? To what extent has the development model been identified and characterised with Chinese uniqueness? How and to what extent have technology and transport investment impacted built environment, travel behaviour, well-being, life styles and social mobility and justice? How has transport planning been governed and reformed for sustainable development under a hierarchical government system and growing mega-city regions? With the rise of China’s status as an emerging global leader, whether and to what extent has the dominant policy transfer from the West been substituted by disseminating Chinese approaches domestically and internationally? These are central questions to be answered in this handbook.

This handbook sets the scene over a period of four decades from 1978, the year that marked the onset of a unique dual system, in which a closed system encountered and exposed itself to competition from the outside world. Never previously had a “market economy condition been applied with state control [on] such a large scale” (Wu and Frazier, 2018: xli–xlii). It is in this historical context that the relationship between transport and urban transformation has been constructed and reconstructed, appearing as a source for contradiction, complexity and fascination. As Mackerras and Yorke (1991) argue, many problems have been caused by the existence of a dual system; rather than having a grand strategy in place, “crossing the river by feeling the stones” has been the motto underlying the “stop-go approach to development” (Mackerras and Yorke, 1991) and the series of reforms in response to pressing problems (Wu and Frazier, 2018). The model of Chinese-ness has demonstrated a “unified diversity” (AD, 2008); that is, that new approaches resulting from experiments that have taken place at a local level can be generalised through a centrally-managed system. This has been the approach underlying the phenomenon of fast growth. Although economic transition has resulted in much more poverty reduction and higher standards of living than in the past, increasing income inequality and social stratification across regions brings about new challenges.

In this vein, transport is not studied through a technical and engineering perspective; rather, a line of social-science inquiry delves into contexts of transport policy, investment phenomenon, and wider impacts associated with social, spatial-economic, environmental, and institutional changes and challenges. Journal papers, although fascinating, rarely document and elaborate on these stories systematically in depth. While we are fully aware that the scope is far from comprehensive, this handbook aims to fill this gap and provide a useful handbook of research into key conditions underlying and accounting for transport and urban transformation phenomenon in the forty years of the post-Mao regime. Apart from the introduction and conclusion, this handbook consists of 23 chapters addressing topics in four parts: Transport Planning: Territorial Restructuring and Development (Part I); Transport, Environment and Technology (Part II); Travel, People and Social Justice (Part III); and Reform, Governance and Development Models (Part IV). All chapters are written by either leading academics, researchers or policy makers with extensive expertise in the corresponding topic area.

2 TRANSPORT PLANNING: TERRITORIAL RESTRUCTURING AND DEVELOPMENT

The first part of this handbook contains eight chapters examining the development and planning processes of a number of transport modes (port, road, high-speed rail, rail station, air–HSR integration, non-motorised transport, and rural transport) exploring their territorial impact. Questions explored include: How have different modes of transport infrastructure been associated with territorial transformation in contemporary Chinese cities and regions? What are the underlying factors? What characteristics can be identified with unique Chinese features? To what extent and why are differences identified across different cities and regions? Has transport planning and urban development been coordinated and, if so, how? What implications can be made from the subject under study?

In the wake of the opening-up policy, which regards ports as a foundation of economic development and the forerunner to connection with the global market, port-city development has become the most intriguing category in which to embark on our intellectual enquiry into transport and urban transformation in China. In Chapter 2, James Jixian Wang enlightens the dilemmas and conflicts of port-city interplay with three case studies representing three major kinds of port cities; namely, Ningbo (a gateway-port mega city), Xiamen (a major port city) and Nanjing (a metropolis with a port). Wang shows that the port-industries–city relationship has shifted from one dominated by ports, such as “to prosper a city by growing a port, and to enhance a port by its city role”, to one that is better coordinated, such as “port-city integration” or “industry–city integration”. Three major common issues are identified. First, the impact of ports on host cities has varied significantly; different contexts displaying differing levels of effectiveness and development paths, both geographically and functionally. Second, it remains doubtful how an integrated approach can be taken into account in a privileged policy, such as “bonded port area” and “free trade experimental zone”. Third, public awareness of environmental protection has been reflected in increasing voices opposed to expansion of petrochemical industries. Beyond individual cases, Wang provides insights into how regionalisation of mega port development has affected individual ports and how that might appear as a turning point for alternative port-city sustainable development. Further beyond the domestic domain, he notices that the term “Port- (industrial) Park-City” (PPC) model has been coined and exported to some countries in the Belt- and Road-initiatives. He argues that more research is required to unveil whether and how this PPC model could work in other contexts. On this last point, Wang confirms Xu’s argument (Chapter 21 in this volume) relating to the functions and implications of rescaling in the policymaking processes for different modes of transportation in China.

In Chapter 3, Xin Fu presents a comprehensive review of China’s highway development from different aspects, including classification, development stages, system distribution, and spatial evolution patterns. After the 1978 economic reform, a critical stage for highway development followed in 1992, when the eighth five-year plan aimed to advance the overall strategy of highway construction for economic development and social progress. Admittedly, in view of the volume of traffic, the highway is by far the most dominant method for transporting both passengers and freight across the vast country. Beyond descriptive analyses, Fu critically evaluates the effects of massive investment on accessibility, economic development, and network effectiveness. He further questions whether or

not the toll policy and fiscal policy, which generate huge debt during highway expansion, are financially sustainable. These are critical aspects to enable international audiences to obtain insights into key factors underlying major policies, issues and impacts. Given the shift from a central fund to local financial initiatives, the typical policy, “loan to build, toll to repay”, has been the major approach for highway construction. Derived issues include the rationality of charging, the numerous toll gates serving as barriers to network efficiency, the huge debt burden, and so on. Fu emphasises that a pressing issue is how the highway network can be completed without exacerbating the debt crisis and financial scale.

In Chapter 4, Chia-Lin Chen explores the developmental impacts of high-speed rail (HSR) in the context of rapid urbanisation in China by examining a case of Suzhou from a multi-level analysis. Whether costly HSR investment has transformative effects is a contentious topic for debate as existing evidence shows mixed results. HSR cities that show positive developmental impacts have made their proactive and coordinated interventions over a long period of time to exploit HSR opportunities. Unlike most countries’ HSR planning sagas, without much painstaking, the Chinese HSR network has expanded to become the largest in the world within a decade of its commencement. Such rapid construction does appear to be worrisome as the developmental impacts are by no means automatic. Chen’s research attempts to identify what early spatial-economic changes have been made and how the HSR opportunity had been exploited and perceived at the local level for any possible transformation. Her findings highlight three inter-related factors that determine a number of struggles and counter-productive development impacts, including the strict urban hierarchy (accounting for train frequency, station space, and ticket availability in HSR stations), the unbalanced negotiating power between central and local government, the uncoordinated planning and development among various transport modes and between land use and transport (for accessibility issues to existing centres and economic competition among development zones).

In Chapter 5, Xueming (Jimmy) Chen explores the case for China in relation to air–HSR integration of two long-distance travel modes that traditionally compete. In this chapter, he classifies three types of air–HSR integration as an analytical framework for study; namely, Type 1 – no air–HSR physical integration, Type 2 – air–HSR physical integration without air–HSR operational integration, and Type 3 – air–HSR physical integration with partial air–HSR operational integration. Eight of the ten largest airports in China belong to Type 1. He examines the status quo in China and discusses future prospects by drawing on experiences from successful integration models in Europe, mainly France and Germany. He explains why China has such a low level of air–HSR physical and operational integration, identifying a number of contributing factors, including institutional divisions, economic return (cost and benefits), domestic rail demand, airline networks, and geographic features of Chinese cities and their urban form, shaped by air and rail networks. He argues that, although intermodal competition is unavoidable, the two modes should seek to be more cooperative and complementary. He admits that, due to the relatively smaller-sized countries and the dominant international air market, it makes more sense for air–HSR integration in Europe. Therefore, he warns that it is impossible and unnecessary to imitate their model without modifications due to the unique development trajectory and circumstances in China.

In Chapter 6, an in-depth case study of Guangzhou Rail Station in Southern China

by Xiaoxing Zhang and Yinsheng Tian is examined. This illustrates the socio-economic effects of the rail station area beyond the spatial vicinity. They stress that it is important to reflect the wider effects of a rail transport hub, referring to “station-related areas”. They disentangle stages of the land use evolution, arguing that the spatial development of the Guangzhou railway station-related area was led by the engine of the rail station and dominated by market forces that were brought into being after the open-up policy. Over a course of 40 years, Guangzhou Station has been the centre of the agglomeration economy of the wholesale industry at the regional and national level for its superior traffic location, although later a multimodal transport hub was generated to replace the conventional rail hub.

In Chapter 7, Ming Zhang probes into a phenomenon in Chinese cities keen on applying the concept of transit-oriented development (TOD), which was first invented by the American architect, Peter Calthorpe, to transform American cities from car-oriented sprawl to transit-oriented compactness. Zhang argues that the approach of development-oriented transit (DOT) investment strategy, practised widely in Chinese cities, is not fully captured by Calthorpe. Thus, he proposes that the expression “Transit Integrated Development (TID)” better characterises the co-existence of TOD and DOT practice in China. Zhang examined the national and local policy contexts and market environment that are conducive to this approach, identifying the collective features of the TID approach in five elements; namely, dealing with density, designating districts, designing for delicacy, diversifying destinations, and development driven. Despite a plethora of claimed TOD/TID projects, few projects are regarded as successful. Barriers to implementation in TOD/TID in Chinese cities include cross-institutional coordination, regulatory and legal settings, and financial constraints. Zhang argues that a new and non-physical policy-oriented model of TOD/TID is needed in the future.

In Chapter 8, Yang Tang stresses that non-motorised transport was the main mode in every Chinese city prior to the 1990s, identifying three stages of non-motorised transport development in China since the open-up reform; namely, growth, decline and renaissance. This chapter focuses on cycling. Based on a policy analysis, Tang argues that previous urban policies negatively influenced non-motorised transport, which leads to the main distraction of the rejuvenation of non-motorised transport. Those controversial policies for non-motorised transport include vehicle development, urban land use, and road-use prioritised for motorised vehicles. Tang further investigates the opportunities and challenges of three non-motorised phenomenon (e-bikes, public bike-sharing systems, and dockless private bike-sharing systems) in Chinese cities and beyond. He argues that an integrated urban transport policy should be an indispensable principle towards a sustainable non-motorised development.

In contrast to urban transport, prior to the current decade, the provision of transport for rural development in China had been largely ignored. Finally, Chapter 9 in Part I, written by Dijia Gong, looks into this topic by focusing on rural roads and rural public transport. With the implementation of urban–rural dual systems in China, he first identifies the distinction between rural transport in China and that of Western developed countries. He then reviews the key initiatives and policies to classify rural transport development in China into three phases over 40 years from 1978. He interrogates the territorial imbalance in rural roads and public transport development across provinces. Under the rapid urbanisation process, the role of transport in transforming the urban–rural relationship

and promoting urban–rural integration has been manifested by the state as a key strategy for new-type urbanisation and reducing rural–urban imbalance. Gong reflects on current trends, arguing for future rural development and policy implications, including changing rural trip features in urban–rural transition, accelerating infrastructure provision by diversifying fiscal instruments and social organisation, and considering implications for future rural public transport, envisioned from cognition, system, technical and operational/management dimensions.

3 TRANSPORT, ENVIRONMENT AND TECHNOLOGY

Part II of this edited volume, “Transport, environment and technology”, focuses on selected key environmental and technological issues related to transport and urban transformation in China. It consists of five chapters. The first two chapters focus on critical environmental problems related to transport. Although transport development has effectively facilitated economic growth, accelerating urbanisation and improving living standards in China, these positive changes have come with enormous costs, including seriously degraded air quality and people’s health, especially in its megacities and more economically developed regions. The next two chapters consider changes in urban travel resulting from the development and application of advanced information and communications technologies (ICTs) in China. Moreover, apart from physical transport, in the era of advanced ICT and e-commerce (pervasive in China), patterns of production and consumption have been revolutionised. A key question relates to the way the new technological applications have impacts on demand for travel in terms of passenger and freight movement and, subsequently, travel behaviour. Also, with the availability of big data, how can smart technology assist in understanding urban dynamics much better? What are the key advantages and limitations?

Taking on the knotty issues of “Transport and Air Quality in China”, in Chapter 10, Chao Liu and Zhong-Ren Peng provide a timely review and synthesis of the literature on this pressing subject. They cite research suggesting that transportation contributes 20–30 per cent of the total CO, NO_x, and VOC in China and is the second largest source, at about 22 per cent and 36 per cent, respectively, of PM₁₀ and PM_{2.5} in Pearl River Delta. The resulting negative effect on health translates into a large economic cost; for example, in the case of Shanghai, the estimated cost of deaths attributed to PM_{2.5} alone is equivalent to 0.13–0.20 per cent of the city’s GDP. A key message from this chapter, therefore, is that environmental and health problems caused by transportation can, in turn, deter future economic development. Moreover, they argue that transport policies alone cannot address air quality problems. Admittedly, although various transport policies have been implemented, such as limiting car ownership and usage, promoting public transportation, and raising vehicle emission standards, traffic congestion and air pollution have continued to aggravate in many Chinese cities. What should planners and policy makers do in response? They propose a stronger role for land-use planning by promoting a jobs-housing balance and a more effective environmental impact assessment (EIA) by actively soliciting public opinion in the process and by reliably estimating air pollutants associated with proposed transportation projects. Another key message from this chapter is that it is essential to improve the performance of EIA technical processes by applying GIS, system

dynamic models and other methods, and by integrating environmental modelling with a transportation scenario analysis.

In Chapter 11, Haixiao Pan and Peng Wei, using a comparative study of two suburban communities in Shanghai (Xinzhuang, an early transit suburb, and Jinqiao, a pre-transit suburb), aim to evaluate the effects of rail transit on CO₂ emissions. They find that the availability of rail transit has a major impact on choice of commuting mode and, consequently, on CO₂ emissions, and that Xinzhuang, with a lower share of commuting by car and a much higher share of commuting by metro, the provision of rail transit service has better outcomes in commuter-related CO₂ emissions, indicated by a substantially lower average amount of emissions per journey. However, they also report several surprising or disappointing findings: (1) in the case of Xinzhuang, CO₂ emissions are higher when commuters live adjacent to rail transit, as housing units with good proximity to rail transit are mostly occupied by high-income people, many of whom still choose to commute by car; (2) rail transit has attracted people who used to commute by walking and biking; and (3) the distribution of commuting CO₂ emissions differs significantly between income groups, as the top fifth of commuters in Jinqiao and Xinzhuang is responsible for about 80 per cent of emissions, while the bottom fifth accounts for almost 0 per cent. Pan and Wei discuss the major implications for urban planning and policymaking, including the critical importance of shortening commuting distances by avoiding leapfrog urban expansion and promoting mixed land use, adapting the TOD principles to local settings, fostering the habit of transit use by supplying public transportation in advance of land development, facilitating “zero-emission” non-motorised transportation, and targeting high emitters through transport development management (TDM) measures.

On the basis that China, as one of the fastest-growing markets for information consumption, has over seven hundred million internet users (the largest number in the world), in Chapter 12, Yue Shen, Na Ta, Mei-Po Kwan and Feng Zhen carefully examine the literature on the relationships between ICTs and changes in activity–travel behaviour in urban China to discern important progress and key themes. They focus on the unsettled theoretical debate and empirical research on the four conceptualised impacts of ICTs on personal activities and travel (i.e., substitution, complementarity, modification, and neutrality), as well as on the resulting spatial and temporal reorganisation of human activities. It is worth noting that a survey conducted in 2017 showed, thanks to mobile phone apps-based bicycle sharing programmes, the travel mode share for bicycles in the surveyed city increased from 5.5 per cent to 11.6 per cent in a year, reversing a 30-year decline. They then discuss empirical studies (mostly conducted since 2010) by Chinese researchers and identify two prominent research themes: (1) the relationship between online shopping and in-store shopping, and (2) the relationship between ICTs and activity–travel patterns. According to them, many recent studies employ sophisticated conceptual and statistical models, and report interesting findings. Based on new trends in the development and application of ICTs in China, Shen et al. propose three important issues for future research: (1) ICTs, sustainable mobility and health, (2) ICTs, social impacts and social equality, and (3) ICTs and intercity travel. They argue that while each of these issues is highly significant for Chinese cities, much research is needed to better understand the role of ICTs in each case. For example, rapidly growing intercity travel in China due to the construction of the world’s largest high-speed rail system presents both a great opportunity and a major challenge for

researchers wanting to understand how ICTs can positively influence the intercity travel process and passengers' well-being.

In Chapter 13, Shaoqing Huang, adopting an econometric model, analyses the impact of online ride-hailing services (ORS) on traffic congestion, and introduces the new government policy framework for regulating this kind of transportation provision. The fast-paced urbanisation in Chinese cities resulted in major gaps in bus and rail transit services. With widespread internet and mobile communications technologies and a growing pool of private car owners, ubiquitous commercial offers invented by new entrepreneurs of ORS have targeted different market segments and various social groups offering competitive prices. However, subsequent regulatory failures resulted in a shortage of taxis, deterioration in service quality, and reduced income for taxi drivers, which together created a favourable condition for ORS to emerge and grow. Given various market and regulatory conditions, his theoretical model specifies the decision-making mechanisms of ORS provision and consumption, with the market price of ORS relative to a driver's personal cost of providing ORS as key. It shows that if a platform company subsidises the driver and the passenger at the same time, which was the practice of most ORS companies, there will be a significant increase in traffic congestion. The author cites several studies with rich empirical evidence to illustrate how an unregulated ORS industry significantly reduced public transportation users, and seriously aggravated road congestion in Beijing, Guangzhou, and other cities. According to the author, China's current regulatory framework, which came into being recently, clarifies the nature of the platform company as a passenger service carrier, conditions and procedures for establishing a platform company, vehicle standards, driver qualifications, the role of market price adjustment, and the prohibition of passing data obtained from the operation to third parties. The author believes that designing appropriate regulations for ORS will be the key to easing congestion in Chinese cities. He advocates the use of price control mechanisms and strict vehicle and driver requirements, urges ORS companies to engage in the carpool business to increase the number of passengers per vehicle trip, and proposes to incorporate the booming bike share programmes into planning and policymaking for ORS.

In the last chapter in Part II, Chapter 14, Yuan Gao and Peter Newman attempt to address the questions "Are Beijing and Shanghai Automobile Dependent Cities?" and, if the answer is no, whether these two cities will succumb to automobile dependence. In line with the definition of Newman and Kenworthy (1989; 1999; 2015), regardless of any specific quantitative criterion, automobile dependence is characterised as high car ownership, high car mode share and vehicle kilometres travelled (VKT) per capita, high investment in automobile infrastructure, economic growth tied to car use, and low-density urban planning preferences. While noting that, since 2009, China has overtaken the United States as the biggest automobile producer and consumer, Gao and Newman argue that motorisation in Chinese cities is reaching "peak car" constraints, which include global constraints due to concerns about greenhouse gas emissions and local limits based on the Ambient Air Quality Standards issued by the State Council in 2012. They present empirical evidence showing that the growth rate of private car ownership has been decreasing since 2010, a trend accompanied by prioritisation of public transportation development since the twelfth five-year plan. They note that Beijing and Shanghai have pioneered a number of restrictions on private vehicle ownership, most notably the license auction policy in Shanghai with an annual quota of 10,000 cars, and the lottery system in

Beijing with increasingly restrictive annual quotas for new cars. They also note that car use has peaked in both cities (34 per cent mode share for Beijing in 2010, and less than 20 per cent for Shanghai in 2010), whereas the mode shares for transit have been increasing, with the expanding Metro systems playing a prominent role. Correspondingly, per capita VKT started to decline around 2010 in Beijing and more recently in Shanghai. Furthermore, they make a strong argument that these two cities are unlikely to succumb to automobile dependence in the future, providing four important reasons: (1) infrastructure investment priorities have been reoriented toward public transportation, (2) economic growth has decoupled from car use, (3) there has been a renaissance of bicycling, driven by e-bikes and bike-sharing programmes, and (4) Chinese cities are likely to continue to embrace high-density to facilitate traditional community culture.

4 TRAVEL, PEOPLE AND SOCIAL JUSTICE

Five chapters from Part III of this book shift from the spatial-economic, technological, and environmental perspectives of transport to the soft side of transport, such as quality of life, freedom of movement, equity, and human rights. These issues are explored from different spatial scales. Although it is widely appreciated that economic reforms led to dramatic economic growth and poverty reduction, social inequality among various social groups has increased (Wang, 2008), which clearly appears to be a key issue to be addressed as per the state's vision, "Building A Harmonious Society", announced in 2002.

In the field of transport research, social equity has been largely ignored and unexplored until recent years. Zhao and Howden-Chapman (2010) lay the groundwork for social inequality in mobility. One of the most distinctive features is the impact of the household registration "Hukou" system for mobility injustice. The Hukou system, which was radically reformed after 1949, took its current form in 1958 (Young, 2013). A Hukou that closely relates to its social welfare services, for example, education, healthcare, state sector jobs, housing distribution in one place (either urban or rural), has effectively controlled and limited access to social welfare services in another place. In the pre-1978 period, alongside urbanisation and industrialisation policies under Mao, the Hukou system maintains "a tight control of rural–urban labour and population mobility" (Chan, 1994: 92). In a shift to market-oriented reform, many rural peasants left their homes, parents and children and travelled a long distance to find a job on the east coast. The low-paid migrant labourers in China made up around one-third of the entire workforce. With the growing discontent of the mismatch between the Hukou location and the resident location, transfer from a rural to urban hukou is now allowed in small and medium-sized cities (Wu and Frazier, 2018) but is still not allowed in premier cities. Owing to concerns about the uncontrollable pressures, the Hukou system has remained to discourage permanent residents in large cities (Wu and Gaubatz, 2013). Beijing and Shanghai cap their population at 23 and 25 million people respectively. Shanghai's municipal government's 13th five-year plan announced that population control would be aimed at efficiently managing the society, allowing in only those with skills that could help the city grow (Ren, 2016). In Beijing, recent evictions and forced relocations of low-income migrant workers, likewise, illustrate a bitter circumstance in which migrants have to start again somewhere else.

The Hukou constraints, which have brought about many mobility challenges, are

manifest at both regional and local levels. At the regional level, the largest human movement over a large territory around the Spring Festival has been phenomenal, reflecting a once-a-year family reunion for most migrant workers. At the local level, thousands of rural migrants moved into the city. The built-up environment significantly increases the burden of commuting for low-income workers because the high cost of living, density control, and old apartment cleaning programmes provide less space for low-paid people to live close to their jobs. Urban sprawl and spatial mismatch between workplaces and residences cause long commuting times for low-income migrants. The differences in transport benefits and burdens between different social groups have been increasing.

In *Splintering Urbanism*, Graham and Marvin (2001: 11) rightly note, “the construction of space of mobility and flow for some, however, always involves the construction of barriers for others”. Although the low-fare transport policy was proposed and implemented in consideration of low-income users in Beijing, concern for social equity and people’s well-being in transport planning practice is largely disintegrated and not a prioritised objective in the Chinese context and thus appears to be an emerging critical issue. How can social justice be assured when poor people are forced to move out of their original homes and make a low-fare commute? To what extent can concern for social equity play a key role in transport planning in China and be part of an integrated policy? The huge traffic flow of migrant workers during the China Spring Festival aptly reflects the economic gap between the eastern and western areas of China and the population control policy within the Hukou system. To what extent could increased mobility through massive transport investment meet the people’s aspiration for work and family relations?

Large-scale transportation infrastructure investment would not only provide access to the town or country, shortening distance and time, but would level out mobility choices across the social classes. Travel opportunities offer new possibilities and can create different ways of living. To provide an effective transport system it is important to understand the narrative of mobility: the need and desire to travel. In Chapter 15, setting out the wider contexts of rapid physical urbanisation and large-scale transport investment, Austin Rhys Williams attempts to answer two main research questions on the dynamics of mobility (and mobility-restraint) discourse in contemporary China, from the economic and social perspective through regional and local frameworks. “Will transport infrastructure satisfy or inflame people’s desire for mobility?” “Will people be prepared to settle for localism, or will they want to travel more and further?” He focuses on potential impacts on the migration habits of the most vulnerable social group, the “Nongmingong”, who are Chinese peasants registered in rural areas who migrate to work in urban areas, predominantly on the east coast. To balance the development gap, the Chinese government has made significant investments in the central and western regions of China. Contradicting the belief that transport opportunities tend to generate a greater aspiration for mobility, Williams, through critical analysis of a wide range of literature, convincingly illustrates aspirations and contradictions embodied in China’s mobility revolution. Dealing with tension between desires for mobility and advancement, and the management, control, and direction of those desires to keep people in western or small towns will be a big challenge. This chapter offers no concluding remarks but sheds light on the dynamism.

Beyond conventionally instrumental criteria, such as journey time and cost, travel-related well-being has been increasingly recognised as an important outcome indicator of the success of the transport policy. In Chapter 16, Runing Ye and Helena Titheridge,

based on a survey conducted in Xi'an, pioneeringly examine the impact of individuals' commuting trips on satisfaction and subjective well-being (SWB) in Chinese cities. Their findings indicate a strong association between commuting and SWB in Xi'an, as commuting satisfaction is the second most important factor affecting SWB, while income was not significantly associated with SWB. Moreover, both commuting mode choice and level of service are associated with commuting satisfaction. Their research shows active travel (that is, walking and bicycling) commuters had the highest levels of commuting satisfaction. Car commuters were more satisfied with their most recent commuting than those relying on other motorised modes while congestion on the road could significantly reduce the commuting satisfaction of car commuters. Rail commuters were not significantly more satisfied with their commuting compared with other mode users. For rail transit commuters, having to transfer and over-crowding was associated with lower levels of commuting satisfaction. Crowding on rail transit is found to be significantly associated with negative psychological impressions and commuting stress can have further knock-on effects on other aspects, such as work performance and family relationships. They suggest "increasing network coverage, making interchange easier, less stressful and increasing the frequency of public transit during peak hours may help to improve the level of service, commuting satisfaction and thus well-being".

Admittedly, across the world, the mainstream paradigm of sustainable urban transport promotes public transit and discourages car driving. Far from straightforward investment in more public transit networks, the travel mode choices are complicated by various factors under different developmental trajectories. In Chapter 17, Shaoli Wang, Carey Curtis and Jan Scheurer incorporate a non-transport dimension into mode choices. That is, beyond a transport mode, the role of the private car should be understood as an integral part of cultural and social life for individuals and families. With a comparative perspective, the research draws on empirical data from a questionnaire survey of residents from two suburbs with high public transport accessibility – Kangjian in Shanghai, China and Bull Creek in Perth, Australia. Based on findings, they argue that, besides physical environment factors, the role of travellers' attitudes (preferences and perceptions) to the quality of services is critical in developing pathways towards public transport dominance. The findings provide policy suggestions for integrating a preference-shaping process into public transport planning, which enables changes in travel behaviour in response to policy interventions and forecast evolution for future planning.

Transport inequality has become a key barrier in the building of an inclusive city and harmonious society. In Chapter 18, Pengjun Zhao is concerned with social unfairness in the distribution of transport systems. He explored urban transport inequality issues in Beijing. His research found that car drivers benefit much more from commuting time reduction, while the institutional barriers of Hukou systems result in inherited work–residence imbalance for low-income people – disadvantaged groups who often bear a high burden in terms of travel time and cost. Transport inequality between the rich and the poor has become a key issue for sustainable urbanisation in developing countries. For several decades in China, urban transport construction has been more focused on long-distance travel, with urban motorways and metros for middle and high-income people, but less attention has been given to bus and bike systems. Urban relocation settlements are poorly served by public transport. Zhao argues that a good public transport service and jobs-housing balance will help low-income workers to shorten their commuting times. In

addition, he highlights that the Hukou system must be reformed to give migrants equal access to jobs, schools, social housing and other public services.

Reflecting on the fact that current transport planning practice serves mainly economic development, while social equity has been seldom addressed in appraisal and evaluation of transport projects, in Chapter 19, Mengqio Cao and Robin Hickman utilise the Capabilities Approach (CA) in assessing different levels of social equity in relation to transport provision. Based on a survey in the Guomao area in east Beijing where public transport service is well supported, the authors explore different levels of social equity relative to gender, age, hukou, personal income and car ownership, specifically in terms of capabilities and functioning; that is, the perceived opportunity to travel and access activities is studied as well as the way actual travel differs across population groups. The result shows that owning a car has little effect on the capabilities and functioning of residents living in Guomao. The authors argue that people's current situation or everyday travel experiences (represented by "functionings" in this case) should not be overstated; instead, more balanced consideration should include expected travel activities or potential expectations (represented by "capabilities"), and the context that frames these in exploring transport-related social equity issues. The research found that females appear to have higher levels than males for both capabilities and functioning, particularly in relation to those activities traditionally associated with women. But women are still more likely to have larger travel equity gaps than men for activities such as "accessing training and education"; "travel safety (accidents and violent assault)"; "travel affordability", and so on. Limiting the range of opportunities available to migrants, the Hukou system constitutes a key barrier to social equality today. People with higher personal incomes generally have much higher levels of both capabilities and functionings than lower income groups. These insights into the CA provided by the research indicate that it has great potential as an important conceptual framework within transport planning.

5 REFORM, GOVERNANCE AND DEVELOPMENT MODELS

In Part IV of the book, five chapters cover quite different aspects of transport policies; their applications and implications for urban development. Due to the wide spectrum of topics and the diverse backgrounds of the contributors, with the exception of the sharing of policy-orientation, readers may find minimum coherence among chapters in relation to writing styles and research methodologies. As editors, we decided to keep the deviations since we believe that the inconsistencies in style of story-telling is, in fact, a reflection of how the cases of China are approached from within and outside Mainland China.

Although investigating quite different subsectors or aspects of transport planning and development in China, all chapters in Part IV reflect issues closely related to the dynamic nature of China's rapid urbanisation. First, the emphasis on growth-driven policies and their implications. For instance, the car-oriented transport planning and urban design reviewed by Quan and Xu (Chapter 23) is a consequence of the booming car industry and housing development in suburban areas, both of which were the key part of national strategy of economic development and modernisation in the 1980s through to the 2000s. Similarly, the port development in major coastal cities discussed by Wang in Chapter 2 reflects a similar cause: government concern for economic development is the most

important driving force. Port throughputs become a localised measure of GDP, which leads to a high priority for port development rather than a more balanced use of land or better living environment.

Another key issue appearing across a few chapters is the ability and capacity for policy transfer to or from China. Taking into account rapid urbanisation and ideological differences, such transfer is by no means easy. It is interesting that non-Chinese authors seem to be more aware of institutional barriers that block the methodical or technical transfer than their Chinese fellow scholars, who tend to focus more on how “new” ideas are absorbed into the practices of planning and design rather than their implementation. At the same time, readers need to keep in mind that China is such a huge country that even policy transfers of its own may have the same level of difficulty. We see in the chapters that nationwide policies or standards of practice are suggested. In reality, however, it is questionable how such policies or standards can be implemented, since the country’s development and urbanisation pace vary significantly. Very often, two solutions are considered: (1) classifying policies by ascribing them to certain types of city or urban scale, and (2) making policies as general as possible. Both imply the difficulty of a standardised approach at the national level, although we know a country like China needs some consistency in its overall development strategy and policies. Indeed, the quality of education of local leaders and the professionalism of transport planners and practitioners are still the key for China to keep pace with the most advanced thinking in the world and to help each individual city to progress in the right direction.

Chapter 20, by Jianhong Wu, Yinqin Liu, Zhaoxia Kang and Yixiao Wang is a joint effort made by three researchers from Beijing in collaboration with a former deputy section chief in the policy and regulation department of the Chinese Ministry of Railway (abolished in 2013). The chapter provides a condensed, while comprehensive, summary of the reforms of China’s national railways over the past decades. For those unable to read Chinese, this is an excellent summary for a good understanding of the way China has progressed rapidly in almost all fronts of reforms and changes, from technological advancement to a partial reform in financing mechanisms. For those who are able to read Chinese, this chapter is worth reading as the authors have made policy suggestions and arguments against, or challenging, orthodox views in China today.

Chapter 21, by Jiang Xu from Hong Kong, is a theoretical piece, focusing on the development of the first provincial intercity railway system in China to demonstrate that in such a border-crossing business, a planning regime embedded in a web of power relations involves a political process. From a rescaling point of view, the chapter presents the way planning and construction of regional railway systems can be understood as a battle between its stakeholders at different geographical and administrative levels. We believe that the analytical framework demonstrated superbly here may apply to many other regions and countries in the world.

In Chapter 22, Alainna Thomas adopts a different approach from other chapters in this part. The author best uses her own experiences in two Chinese cities, Jinan and Kunming, illustrating that “given China’s transportation planning history, capacity building is fundamental and a possible gateway to creating greater avenues for collaboration”. She also observes that as China is in a rapid urbanisation, “education and professional development continue to lag in new approaches to urban planning problems, and that “a new urban planning context exists that sees the intersection of social, economic, and

environmental issues as well as transportation and land use issues". In this fascinating chapter, readers may follow the author's personal stories in detail to discover how difficult it was for local authorities in the two Chinese cities to accept and adopt appropriate methods and/or ideas for their urban transport planning and design, even though the local planners and leaders were open-minded. In this regard, China is still a developing country.

Chapter 23 is a comprehensive account of urban transport planning and policy in China by Bo Quan and Dingyuan Xu. Similar to Chapter 20, this chapter provides an excellent summary of the progress and current situation of China's urban transportation, its key issues, related policies, and prospects for a better future – worthy of reading, particularly for those who are not able to read similar materials in Chinese. One of the most important issues discussed is how car-oriented transport planning and construction have placed many Chinese cities in a difficult position for transition towards sustainable urban growth. The authors point out that overwhelming concerns about economic growth of modernisation through car manufacturing and marketing, as well as property markets in cities, are factors that set the basic tone for a car-oriented society, following the steps of urbanisation in major Western countries, such as the United States of America. Although the national policy has changed since 2006 to give priority to rail transit and bus rapid transit (BRT) in cities with a large population, the "modern" imprint of car-oriented society remains in most urban dwellers' minds.

Chapter 24 by Keqi Si, Tsega Gebrekrstos Wereta and Dorina Pojani provides a vivid account of practices and TOD (transit-oriented development) as a pack of policies that are transferred from Chinese cities to developing cities in Africa. This type of research on "South–South" policy transfer is much needed, since lessons and experiences from recent urbanisation in China may be considered more relevant for developing countries than lessons and experiences from the West, where urbanisation and motorisation took place long ago and with little reference to the TOD model in low-to-medium income economies. The chapter, however, shows that policy transfer in practice has factors that are difficult to quantify (such as institutions) or even to accurately define (such as "valence").

Finally, Chapter 25 is the concluding chapter of this book. Qing Shen starts by raising a series of questions about contributing factors to China's remarkable achievements in transportation infrastructure development, the resulting economic, social, and environmental effects, the existing problems and emerging challenges in transportation, as well as the implications for transnational learning and policy transfer. He then provides a summary and synthesis of the key findings presented in each of the four thematic parts of the book, and suggests that these findings can help address many important questions and inform transportation planning and policymaking in China. He also identifies some significant topics omitted from this edited volume, and provides a number of relevant thoughts and observations for interested readers. Qing Shen ends the chapter by offering exciting prospects for future research. He expects transportation researcher to play a critically important role in designing appropriate policies to steer the future development and deployment of technological and service innovations, as well as in exploring complementary land use and travel demand management approaches for promoting sustainability. In light of China's increasing prominence as a global citizen, he urges Chinese transportation researchers to become originators in transportation scholarship, creative designers of policy experiments, and effective facilitator of knowledge transfer.

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