

Governing Urban Transformation

[e-Forum: Sustainable Urbanisation in China]

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Author declaration:

I [Aileen Duffy] confirm that this report is based on my own work and that I am happy with both my own and my partner's [James Johnson] contribution to the final submitted version.

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Executive Summary

This report was commissioned to provide an analysis and evaluation of three different examples of sustainable transportation in response to rapid urbanisation across China. Methods of analysis include reviewing of academic and grey literatures and exploration of successes and pitfalls of existing and previous projects.

The results of the research show that the prospects for sustainable transport initiatives remain high, but highlights that issues of governance have served to increase the spillover effects of excess, personal transportation usage.

The report concludes that whilst successes have been minimal, future prosperity for similar projects remain likely but should focus on higher collaboration, and should address the existing issue of car ownership as well as increasing public transport usage.

Recommendations of this study are centralised upon a deeper understanding of individual, city contexts and a wider appreciation of how these may be implementing elsewhere.

The research also highlights that such analysis bears its limitations. A more thorough and extensive study may seek to unearth how projects have performed and for what reason. The work of e-Forum in providing a platform for continued collaboration between cities is a necessary step in ensuring that a trans-national approach remain central to sharing both idea and innovation.

1.0.0. Introduction

China finds itself at a unique intersection along a trajectory of rapid urban development. Extensive economic growth and urbanisation has afforded opportunity to millions of people alleviated of poverty but the effects of rapid growth seek to halt the efficient and sustainable growth of Chinese cities.

China's urban population has recently surpassed its rural population and The World Bank (2012) estimates a further 350 million will come to inhabit Chinese urban centres in the coming 20 years. Most pressing to environmental, economic and social concerns surrounding sustainability is the efficiency with which China's population are mobilised within its major cities. As air pollution-related mortality renders China an unfortunate global leader (2010), a focus on sustainable, efficient public transport is more pressing a policy-focus than ever.

1.1.0. *E-Forum*

The pressing influence of sustainable urbanisation in China has been given precedence through a networking of cities between the EU and China, as realised by Europa, and has witnessed the partnership of more than 700 cities. Taking aim at tackling issues of social inclusion, low-energy infrastructure and most notably in this case, clean mobility. Projects agreed upon between 12 cities have helped to foster sustainable urbanisation partnerships and in recent years, continued dialogues have helped to conceive the 'EU-China Smart Cities Dialogue' which has proven effective in widening relations between the EU and China (EU-China Smart Cities, 2014)

1.2.0. *Sustainable Urbanisation through Transport*

This dichotomy between the opportunity for growth and the question of sustainability presents China a unique opportunity to implement policy directly aiming to alleviate the spillover effects of excessive transport usage. The cost of traffic congestion in Beijing stand at over 4% of its GDP (Mao, Zhu and Duan, 2012)

A shift toward the emphasis on the benefits of public transportation and the movement of people rather than vehicles has gained importance in policy focus, and will shape the

grounded focus of this research. This report will explicitly take aim at the national agenda of sustainability through the lens of sustainable transportations and highlight the successes and pitfalls of multiple projects across China.

2.0.0. Context

China's current and future development is expected to have a huge environmental impact (Lin, et al. 2009), and so the application of policies, particularly through E-FORUM towards sustainable urbanisation, particularly within transport, is key to creating a smart city approach and alleviating the negative impacts of unsustainable, environmentally harmful urbanisation. By investing in human and social capital, alongside sustainable economic growth and a wise management of natural resources, China can become a nation of smart, sustainable cities, as is being done successfully within Europe (Caragliu et al. 2011).

There is extensive evidence showing the enormous impact transportation is having in China both environmentally and economically (Economy, E. 2011); year on year CO₂ emissions are increasing and cities around and including the capital, Beijing, are suffering from soaring 2.5PM (fine particulate matter) air quality readings, considered to be particularly hazardous to public health (WHO, 2016; Poon et al. 2006). Whilst there is recognition that other sources are to blame for such high pollution levels, such as factories or home heating systems (IEA, 2016), transport accounts for around $\frac{1}{3}$ of the pollution in Chinese cities (IEA, 2016).

Applying Geels (2004) dynamic multi-level perspective on system change to this report, of which understands the non-linear processes of socio-technical transitions (Geels, 2011), we can begin to evaluate examples wherein the adaptation of transportation reform in china has been successful despite the initial stages of take up (Geels, 2004). This will demonstrate to the stakeholders of E-FORUM that certain aspects of change are indeed worthwhile and beneficial despite apprehensions surrounding capital input, timescales or successes of new project endeavours.

The special administrative area of Hong Kong has demonstrated a successful, clean, and efficient approach towards transportation, in one of the most populated areas in the

world, and it should be suggested here that the report finds examples of cities within China where similar movements have been made, adapting from the lessons of Hong Kong and combining it with the partnerships from European countries.

3.0.0. Methodology

Through the author's personal experiences of transportation within different Chinese cities, the interests of this research were founded upon the particular efficiency of public transportation within cities such as Hong Kong and Guangzhou; the latter previously identified as the world's most sustainable transport system (CNBC, 2015). This is considered in relation to the wider issue of unsustainable urbanisation across China and how efficient public transport is, focussing on the movement of people rather than vehicles, and the consequent reduced need for personal transport is a most effective method of ensuring a sustainable mode of urbanisation.

Due to the size and scope of China, it is not practical to assess the changes in urbanisation and transportation across the country as a whole, and as such, this report has chosen three key examples, situated in three different locations different areas across China where specific initiatives were implemented to alleviate the issues of rapid urban development, pollution, traffic congestions and associated spillover effects.

This study corroborates available academic and grey literatures to evaluate the impact of three examples of sustainable transportation efforts across China. The following research questions will help to guide and ground the research in its efforts to evaluate the key drivers of sustainable transportation efforts in three different contexts. The guiding questions will help to give further analysis to the effectiveness with which these initiatives, noting successes and unique methods. Finally, the research will move towards making suggestions for further research and will highlight that, particularly in today's climate, sustainable transportation efforts hold great currency in helping to alleviate the spillover effects of excessive vehicle usage.

3.1.0. Research Questions

I. What are the key drivers behind sustainable transportation efforts in Beijing, Zhenjiang and Tianjin?

II. To what degree have the sustainable transportation efforts been successful in reducing the spillover effects of excessive vehicle usage?

III. How might the successes and pitfalls of the case studies be used to continue the dialogue of 'best practices and lessons learned' in the development of smarter cities within the EU/China E-Forum partnerships?

4.0.0. Findings

4.1.0. Public Transportation in Zhenjiang

In Zhenjiang, China, a city with a population of 3 million, there has been an overhaul of the operation of the bus transportation system in order to improve the problem of the city's stagnant traffic flows and encourage the movement of people via public transport as opposed to personal transportation such as car travel. The aims of this initiative were to reduce the environmental and economic impacts of traffic on the city that have been shown as incredibly troublesome in other major Chinese cities, such as Shanghai and Beijing (Nelson, 2014).

The E-FORUM Smart Cities Initiative group has collaborated with the government of the People's Republic of China, specifically the Ministry of Industry and Information Technology (MIIT) to introduce a 'smart bus' system for the whole city. This involves the placement of GPS trackers on all busses in Zhenjiang, alongside the development of a smartphone app which enables users to access real time updates of the location of all busses in the city. The integrated system allows managers a consolidated view of the state of traffic in the city, as well as helping to provide bus schedules that work around traffic and congestion patterns. The smartphone app also allows passengers to buy their tickets on their phone, saving crucial commuting time and establishing wider access to

citizens, making it much easier and more inviting to choose public over private transport.

The results are both economically and environmentally beneficial. 'According to the city, half a million riders a day are checking bus arrival times using smartphone apps, and the city is saving 6,700 tons of carbon dioxide and ¥17 million (\$2.7 million) in fuel costs per year.' (Nelson, 2014). Furthermore, this initiative has experienced such success in that there is now a new initiative being implemented to introduce 4G wireless internet access on all busses. This shows that 'people centred' transport initiatives have built on their successes to improve and encourage people-centred transportation.

4.2.0. Pollution Control in Beijing

Beijing is the heralded capital of China, a cultural, political, and economic hub, as well as one of the most visited places by tourists on Earth (Wang et al., 2009). The rapid increase of its population has enhanced a number of urbanisation issues, such as pollution increase and associated health warnings, alongside increased congestion and traffic. Between the 2000 and 2010 censuses, the number of people living in the city grew by 44% - from 13,569,194 in 2000 to 19,612,368 in 2010 (World Population Review, 2017).

In preparation for the 2008 Beijing Olympics, the Chinese government issued a law to reduce congestion and subsequent pollution. This newly introduced law stated that cars with number plates ending in an even number were only allowed to drive on certain days of the week, and cars with odd numbers would drive on alternating days (Wang et al., 2009; Wang, et al. 2014).

Whilst initially it was deemed particularly innovative and served to reduce the number of cars on the road on the alternating days of the week, the result of this new law proved to actually increase the problem at hand. Vehicle owners found themselves purchasing additional vehicles with different licence plates in order to avoid the restrictions placed on given days of the week. This not only increases road traffic but leads to increased congestion, increased emissions of harmful pollutants and longer commuting times, in contrast to the environmentally beneficial intentions of the project (Mathiesen, 2014).

Though it would have proven difficult to implement without prior testing, user centred interaction design would have perhaps prevented this practice of avoidance from taking place by understanding how the users would respond to this new law prior to implementing it (Nielsen, 1994).

4.3.0. Green Mobility in Tianjin

Tianjin, alongside 20 other cities in China, decided to implement the suggested policy from the E-FORUM group of incentivising the public to buy electric vehicles as opposed to petroleum based ones. The subsidies were suggested in 2010 as a recognition that vehicle ownership was unlikely to decrease, as we have seen in Beijing, but that pollution levels could be controlled via electronic power which is a significantly lower emitter of harmful pollutants.

“It is difficult for China to totally depend on oil for cars, so it is urgent to develop alternative energy cars”

(China State Information Centre, 2010)

As stated by Boon, 2010: “zero emissions electric cars are the preferred vehicle for subsidies but hybrids, fuel cell and hydrogen vehicles would also be applicable to the subsidy”. The rates for the subsidy were for new cars, and are as follows:

- RMB50,000 subsidy for Hybrid Vehicle
- RMB60,000 subsidy for pure Electric Vehicle
- RMB500,000 subsidy for Electric Bus

The results of this case study are still ongoing; however, again it seems in theory to be promising, yet the reality is slower to produce positive results. Tianjin’s air pollution levels are still incredibly high, and do not seem to indicate signs of retreating to a significantly suitable level. There unfortunately is little information available following up this report, though in 2020 it may be revisited for a full and thorough evaluation. China has committed itself to becoming a sustainable, environmentally friendly country through treaties such as COP 2016 in Paris (Phillips, 2016), and their continued vocal commitment to reducing their emission is ostensibly very promising. However, with

transport accounting for such a large proportion of pollution in the country, not being able to tackle it significantly in the 7 year period of implementation in Tianjin shows little promise for the future but suggests that policy innovation is key and emphasises the need for continued discussion as necessary further steps.

The case studies in this report have shown that there is a great need to be clearer in analysis and that a wider understanding of how policies in China are adapted to in contrast to the same policies applied in Europe, as the success rates vary quite significantly. The approaches taken by Chinese society towards the implementation of the policies in Beijing and Tianjin have shown to be conflicting and relatively unsuccessful - seeing the response in Beijing to the banning of cars being to buy more cars undermines the policy in place dramatically. Trying to create a sustainable society through transportation management with European policy interests at heart does not appear to be easily replicable and doesn't appear to create the same level of success towards the issues of rapid urban change as it does in principle EU cities.

It can also be suggested here that perhaps a modified, or stronger stance needs to be taken by the Chinese government towards the issues of sustainability within transport as the apparent leniency of allowing non-inclusive policies has meant that the uptake of measures in place to prevent pollution, congestion and rapid urban development have not worked.

5.0.0. Conclusion

This report has been able to demonstrate that despite the best intentions of knowledge transfers between the EFORUM smart cities initiative to China, the particular successes of one area are not necessarily replicable to a different city. The examples considered in Beijing, Zhejiang, and Tianjin show that although there is sincere effort made towards alleviating the problems raised by transport in rapidly urbanising areas, it is not well adapted enough to create substantial change. The approaches taken towards severe congestion, pollution, and rapid urban development across China need to be addressed sincerely in the near future if there is to be any hope of reducing their environmental impact and creating sustainable, smart cities that coincide with China's commitment to the Paris agreement and their own personal goals (Li et al., 2015; Phillips, 2016). This report shows that Zhenjiang has implemented successful initiatives to a certain extent in

that their approach to human-oriented change through the creation of efficient and accessible public transport renders the system an 'easier option' for citizens whilst its city continues to expand. To develop upon this, it may be fair to suggest a transition to using cleaner energies within its public transport systems, capitalising on the effectiveness and public confidence in the system. This may serve to consolidate public interest, increase citizen participation and potentially, reap the rewards of greener mobilities.

Considering Beijing, the situation is more difficult to address; here it seems to be evident that issues surrounding governance have often served to increase the problems of transportation related pollution rather than to minimise it. Through the outright restriction of certain vehicles, citizens bypass the law by purchasing additional vehicles, further adding to the issue of pollution. It might be fair to suggest that more collaborative efforts of transition to greener transportation methods would prove more successful.

Tianjin's introduction of electric car subsidies is certainly an encouraging step in the right direction, but does not address the current problem of lock-in with petroleum based cars. Though this is undoubtedly an issue worldwide, the government needs to look beyond the purchasing of new technologies and perhaps consider the ability of retrofitting to benefit a greater proportion of vehicles in the city. Overall however, the approach towards sustainability within transport and urbanisation should not be abandoned due to the lack of strong success, rather, it should be pursued with more collaborative and reflexive development if we wish to see more tangible results. It is as much to change public attitudes to public transportation as it is to introduce greener, more efficient means of transport.

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