LKYSPP Present(ing) Futures #2: What are the limitations and challenges of Singapore's current transport system? And what reforms and innovations do you think are required to overcome those limitations and challenges, particularly in terms of improving mobility for all?

Summary

Singapore has long recognised the strategic benefits of integration between transport and urban planning to balance various land-use demands. This essay builds on the public transport trilemma (Tan and Leong, 2013) to further consider dimensions of environmental sustainability, which would promote inter- and intra-generational equity. From this perspective, built-in structural challenges such as the centrality of cars increasingly inhibit the system from addressing societal needs. Thus, this essay seeks to argue that Singapore's transport system is characterised by both technological and institutional "lock-ins" (Foxon, 2014). Firstly, the lack of regulations inhibit Singapore from reaping the benefits of the sharing economy (Chia, 2016). Prevailing institutional structures and mindsets reify the commitment to cars, contributing to health issues, greater land-use pressures and environmental concerns. To combat these, the transport system should firstly be made more open to technological innovations. This would involve small-scale, short-term urban experimentation, to be reviewed after trial periods and expanded where successful. Clear institutional frameworks and responsibilities need to be defined, to guide responses to these disruptive technologies and regulate how they are used. With clear and coherent policy directions across different agencies, transport planning must be integrated with other parts of the urban system and policymaking (Banister, 2008). Infrastructural projects must be complemented by programmes to encourage commuters to use more sustainable means of transport. Finally, drawing from insights of 'the new mobility paradigm' (Sheller and Urry, 2006), this essay discusses how transport planners should consider the diversity of users' experiences, question assumptions about transit, and humanise the transport system.

Policies should more effectively promote environmentally-friendly behavioural changes. Overall, a coherent, multi-dimensional policy strategy must be adopted, involving multi-stakeholder collaborations and consensus-building. Technological and institutional changes must be accompanied by behavioural changes as well, to consider long-term societal needs and build a resilient and inclusive transport system.

What are the limitations and challenges of Singapore's current transport system? And what reforms and innovations do you think are required to overcome those limitations and challenges, particularly in terms of improving mobility for all?

Singapore has long recognised the strategic benefits of integration between transport and urban planning to balance various land-use demands. This essay builds on the public transport trilemma (Tan and Leong, 2013) to further consider dimensions of environmental sustainability. From this perspective, built-in structural challenges such as the centrality of cars increasingly inhibit the system from addressing societal needs. Thus, this essay seeks to argue that Singapore's transport system is characterised by both technological and institutional "lock-ins" (Foxon, 2014). To combat these, the transport system should firstly be more open to disruptive technologies, guided under clear institutional frameworks for the public sector to regulate such transport innovations. Transport planning must be integrated with other parts of the urban system and policymaking. Finally, drawing from insights of 'the new mobility paradigm' (Sheller and Urry, 2006), this essay discusses how transport policies need to more effectively promote environmentally-friendly behavioural changes and humanise the transport system by understanding the diversity of users' experiences. Overall, a coherent, multi-dimensional policy strategy must be adopted, involving multi-stakeholder collaborations and consensus-building, to build a resilient transport system inclusive for all.

Singapore's transport system is subject to technological lock-ins, with an inability to increase capacity in the short-term. As Tan and Leong (2013) have argued, transport capacity has been outpaced by increase in commuters and population growth. Limited infrastructural investments have thus inhibited the ability of the transport system to respond to commuter demand. Additionally, the train system's prevailing faults have cast doubt on its cost-effectiveness and long-term sustainability. Although technological solutions such as fuel-efficient vehicles and autonomous vehicles exist, the transport system in Singapore has been slow to adopt them. While initiatives promoting mobility-as-a-service such as

carsharing and ridesharing have emerged to address unmet transport needs, unclear regulations and concerns about the welfare of affected stakeholders such as taxi drivers have inhibited widespread adoption (Chia, 2016). Singapore has thus been slow to respond to developments in the sharing economy and set up the necessary framework to facilitate growth of these sectors.

Underlying structural issues also limit how effectively the transport system meets societal needs. Singapore's transport system has an inbuilt prioritisation of automobiles and making the existing road system work better, by accommodating expansion of roads and private transport. The urban environment has been designed for cars - car transport is often still the most direct, fastest way to get from place to place; buses and trains are convenient but sometimes unreliable due to technical issues; bicycles are seen as ideal for short journeys, not long ones; walking seems totally out of the question. Automobiles are reified as vehicles of freedom and choice, which may be a perception instead of reality (Sheller and Urry, 2006). Automobile dependency has wider ramifications in the urban system, such as health issues, land-use demand and environmental costs. Sedentary modes of transport contribute to increased inactivity, which has been linked to health problems (Giles-Corti et al., 2016). Additionally, road networks already occupy a significant proportion of land use in Singapore. Increased road expansion only reduces the land available for other uses such as housing and economic activities. Transport accounts for 26% of greenhouse gas emissions and energy use globally (IEA, 2016); a significant percentage coming from car transport. The new urban mobility should take into consideration environmental costs for intergenerational equity (Hull, 2007). Yet, discussions of autonomous vehicles, carpooling and carsharing do not address underlying structural issues, allowing a deep car culture to endure. Instead of harnessing technology, we become subject to its demands. It is important to recognise that mobility improvements that only reify the centrality of private transport are undesirable. There is no reason to expect that carsharing or carpooling will directly lead to sustainability if overall it attracts people who once used relatively environmentally-friendly means of

transport to switch to private transport modes. By incorporating technological innovations into a deeply-flawed transport system, we will only reproduce its inherent structural deficiencies.

Discussions of the new urban mobility or mobility-as-a-service need to be considered in this light. This essay does not advocate a total removal of private transport facilities or all car journeys with more sustainable modes of transport. Doing so would likely reduce mobility for certain societal groups. Instead, this essay advocates a gradual shift away from private transport and promoting the use of more sustainable modes of transport. By engaging multiple stakeholders and implementing multi-dimensional policies, the transport system can be integrated and improved to be wheelchair-friendly and accessible to all commuters.

Firstly, the transport system can be made more robust to tap into the latest technological developments from the private sector. These may include: alternative fuel vehicles, electric cars, autonomous vehicles and car- and ride-sharing programmes (WEF, 2016). However, these must be accompanied by clearly defined policy frameworks identifying each stakeholders' responsibilities and commitment, which would allow for faster decision-making when the system faces challenges. Pilot 'smart city' projects are a good first step to present to private sector actors opportunities for urban experimentation. These may include car-free zones in both new towns and older residential districts. Private companies will be personally invested in making projects successful, aware of the worldwide attention and potential replicability in different markets. Sustained, small-scale trials can facilitate trust-building as stakeholders become familiarised with each other and iron out programme details. The performance of these interventions can be evaluated after some time; if successful, it can be expanded gradually with tweaks if necessary. Examples of trials of mobility-as-a-service include the Ubigo trial in Gothenburg, where the transport network complemented by autonomous vehicles was found to increase overall efficiency (Sochor et al., 2014). Insights from Singapore's past are relevant in this discussion. In particular, Tan

and Leong (2013) have pointed out that transport demand-supply management is crucial, and that funding must be negotiated for long-term cost-efficiency. In addition, roles and emergency responses must be outlined, in anticipation of system breakdowns.

Transport interventions are not necessarily top-down, however, governments are crucial in setting clear, internally consistent policy directions for society (Schwanen et al., 2012). The perception of contradictory behaviour, such as new road-building for economic benefits while supporting transitions to low-carbon mobility, will cause confusing signals. Thus, policymakers need to adopt a coherent stance on which transport modes are desirable. This could include identifying whether carsharing programmes are to be treated as carpooling/ridesharing or as car rentals. Besides forming a coherent, united vision of sustainable transport system, each stakeholder must have clear responsibilities at the various spatial levels and commitment to carbon reduction (Marsden and Rye, 2010). This defines a collective responsibility for society and allows stakeholders to hold each other accountable. Multi-stakeholder partnerships are also useful to share perspectives on the complex, inter-disciplinary issue of mobility (Sallis et al., 2016). Dialogue between stakeholders – from academia, media, private sector companies, civil society and support groups - also allows for consensus-building. Participants will better understand policy justifications, increase public acceptance and support behavioural changes, which may be radical (Banister, 2008). As linear or cyclical planning models do not address complexity adequately, (Rydin et al., 2016) Singapore should continue to integrate inter-agency collaboration for urban design and infrastructure planning, and address any mismatch between institutional and disciplinary perspectives. The integration of the public transport system, be it spatially with other systems, and with other transport modes, should be continued. Like all collaborations involving multiple stakeholders, this would encounter problems in consensus-building, but is nevertheless a means to achieve greater integration in the overall urban system.

Currently, Singapore's high-density facilitates short journeys for walking and cycling, but the absence of infrastructure or concerns over safety may inhibit implementation (Sallis et al., 2016). Some improvements may include providing well-integrated infrastructure and enabling user-friendly, convenient systems. Changes in transport infrastructure include prioritisation of buses, bicycles and pedestrians, building high occupancy vehicle lanes, park-and-ride schemes, increased frequency of bus services, subsidies and real-time traffic information (Chapman, 2007). In Singapore, existing activities to reclaim street space for people, such as Pedestrian Night and car-free Sundays may be expanded at local scales. Infrastructure may also take place outside transport systems, such as shower facilities at workplaces. These are complemented by programmes such as car clubs encouraging carpooling through social networks. Alternative transport modes include public bicycle sharing and rental systems, and creation of bicycle-accessible maps as shown in Moscow (Gorobets, 2016). User safety can be promoted through infrastructure and safeguards (Stevenson et al., 2016). Sallis *et al.* (2016)'s case study of Transport for London found that the authority constructed segregated routes along residential areas, bearing in mind cyclists' safety concerns. The resultant shift from cars to cycling contributed to decreases in vehicle traffic and increases in cycling in ten years. Thus, making public transport more efficient and convenient can break the ideological link between private transport and personal mobility and individual agency.

The above technological and institutional reforms must be combined with understandings of individual users' experiences, and apply behavioural insights to implement socio-cultural changes. As Schwanen (2015) argues, market, technological and infrastructure-building interventions alone cannot significantly change the environmental impact of transport. Behavioural changes are crucial to realise the benefits of technological and policy innovations (Chapman, 2007). In particular, insights from mobility studies should complement existing knowledge from behavioural economics and social psychology. We need to question the entrenched assumption that transport is a derived demand – an

unwanted but necessary part of daily routines to do more engaging activities (Shaw and Sidaway, 2010). Instead of solely focusing on reducing this 'wasted' time, we should observe the affective atmospheres (Bissell, 2009) and range of activities that occur during transit – social interactions and exchanges of information (Sheller and Urry, 2006). Transport users experience environmental stimuli collectively and react to each other subconsciously (Sheller and Urry, 2006). Instead of seeing transport as an ends in itself, it is the means to facilitate a vibrant city life. Planners should consider transit vehicles or sites as everyday landscapes which can impact mindsets, reinforcing prejudices or bridging divides (Wilson, 2010). This would allow planners to take into account how transport users interact with each other as well as the environment they are in. Evaluation criteria of transport improvements should thus look into user experiences, besides conventional measures of time-cost minimisation. Additionally, through environmental interventions, it is possible for planners to cultivate an engaging environment and improve the overall transport experience. Shaw et al. (2010) suggest that information-communication technologies allow spaces in transit to be used for work and leisure. Gamification has been explored in various settings to improve commuting experiences (Kuramoto et al., 2013). Additionally, sustainable behaviour such as using active transport for short journeys within local scales are promoted (Vierira et al., 2012). Next, it is important to consider how behavioural habits are constructed or dispelled. Schwanen et al. (2012) argues that habits are fluid and linked to the wider community; to pursue a low-carbon, environmentally sustainable mobility model, we should replace environmentally-harmful habits with environmentally-friendly ones. This can include switching to low-carbon modes of transport such as public transport, cycling and walking. This will only be successful if there are systemic changes challenging entrenched beliefs and bringing together multiple stakeholders in private sectors, non-state actors and civil society. Policy changes may include legislative restrictions on car advertising, and education to reinforce environmental consciousness. Pucher and Dijkstra (2003) concluded that the cycling culture in Netherlands was supported by early education cycling programmes – something that is replicable in Singapore as well. Such policies would look into individual

lifestyle habits and routines (Bannister, 2000), to complement wider technological and institutional changes.

This essay has explored the inherent technological and structural lock-ins in Singapore's transport system, critiquing current policies based on environmental sustainability. To overcome these limitations, some reforms are needed. The transport system must be open to technological innovations, with comprehensive institutional regulations. Political consensus and partnerships must work to overcome the prevalent prioritisation of automobiles, and create sufficient infrastructure to support environmentally sustainable modes of transport. Finally, commuting experiences should be reconsidered to effect long-term behavioural changes. Ensuring a highly-integrated system requires continual improvements, with the benefit of hindsight.

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