Transitioning Different Stages of Transport Planning in Urban Areas: Experiences of Singapore and Vietnam

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Abstract. Level of urbanisation – as population density and transport demand – is rapidly increasing in many cities. Planning approaches vary from city to city and authorities everywhere are being challenged to provide sustainable infrastructure that meets social needs, maximise space and benefits. Transport planning, especially in urban areas, is crucial as it influences sustainable city-growth and space-usage. Transport planning can be classified into three stages, which evolve with level of urbanisation and other city's characteristics: (1st) vehicle-based, (2nd) person or trip-based, and (3rd) liveable-city.
This study presents an overview of the three transport planning stages and relevant examples. For each stage, the study discusses factors such as capacity, social needs, different modes of transport, features of the built-environment, emerging technologies (where applicable), and sustainability impacts. The focus is on planning approaches from Singapore to enhance the long-term vision for sustainable urban development of big cities in Vietnam. Singapore, being currently in the 3rd stage of planning, is focusing efforts in providing inclusive infrastructure and promoting sustainable modes of transport. Ho-Chi-Minh City and Hanoi are still focused on motorised transport with low rates of walking and cycling. Lessons from Singapore to Vietnam are delineated accordingly.

Keywords: Stages of Transport Planning, Vehicle-Based, Person or Trip-Based, Liveable City, Singapore, Vietnam.

1 Introduction

Transport planning has been evolving in line with social requirements and changes in the urban landscape. Changes occur globally, yet practices in planning vary. Authorities select the approach that is deemed to: maximise available space and resources, meet social needs, and protect the environment. The task is even more intrinsic in urban areas, where demands of a globalised society triggers changes in inhabitants needs and requirements [1]. Urban transport planning has been classified into 3 stages: (1st) vehicle-based approach (VBA), (2nd) person or trip-based approach (TBA), and the most recent, (3rd) activity-based approach (ABA) also known as liveable-city approach [2]. Cities commonly transition through these stages in the quest for quality of lives, sustainability, and healthier lifestyles. This paper presents an overview of these stages and take examples on Singapore and main cities of Vietnam.

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Singapore and Vietnam are countries in Asia. Singapore is an island country with one of the highest population densities in the world (5.6 million inhabitants and a land area of 716 km^2 [3]). The island-country can be placed in the 3rd stage of urban transport planning as authorities and planners are working towards developing a 'liveable city' by fostering a 'car-lite' society [4]. Vietnam is a country with 33 cities, of which Ho-Chi-Minh city (HCMC) and Hanoi are the largest and most densely populated [5]. HCMC hosts 8.4 million people in an area of 2,062 km^2 and Hanoi hosts 7.5 million people in an area of 3,329 km^2 [6]. In these 2 cities, and the country in general, planning for transport is mostly focused on motorised vehicles and there is limited public transport and provisions for active modes of transport (e.g. walking and cycling) [7]. This study aims to explore the three transport planning stages and present relevant examples of Singapore and Vietnam.

2 The Three Stages of Transport Planning

The 1st stage is a VBA focusing on traffic growth. At this stage, approaches that can help to maximise capacity for vehicles are prioritised. Vehicle-centric engineering approaches and infrastructures are often developed and even land-uses are planned to favour motorised vehicles [8]. This stage has been considered suitable for cities with low density and wide land space such as some cities in the United States of America and South America [2]. However, with population, vehicular, and urban growth, the VBA quickly becomes hard to sustain. Planners soon realised the negative effects of motorisation, such as congestions, air pollution, and traffic accidents.

The negativities of motorised modes of transport eventually triggers the 2nd stage of urban transport planning – TBA. At this stage, the main aim is to maximise the trips made by a person (i.e. person-trips approach) [2]. Herein, options to facilitate people movements in the most efficient way are considered. Countries/cities in this stage (e.g. Western Europe, Japan, big cities in China – Beijing, Shanghai) commonly pay attention to developing public mass transits, such as rail and bus systems. In addition to infrastructure, changes in policies are also introduced to favour mass transport (e.g. road pricing) [9]. While being more sustainable than the previous stage, 2nd stage planning often fails to understand the factors that affect trips' motivation, and first/last mile (FLM) trips to/from public transport stations are often disregarded. Thus, planning travel demand prediction usually does not match users' constantly shifting needs.

With advances of research and technology, authorities and planners gained knowledge on travelling motivation and characteristics of FLM trips. This caused a shift to the 3rd and latest stage of transport planning or ABA. In this stage, the main aim is to develop a liveable city, where much interest and investment are focused on investigating people's needs (social, economic, cultural) and activity participation [10]. This stage takes a holistic approach to urban transport planning, incorporating spaces for socialisation, creating an eco-friendly environment, considering health impact of different modes of transport, and aiming to improve overall quality of life. As such, the role of active trips in enhancing liveability and improving health are acknowledged, and infrastructure for active travelling is provided accordingly [11].

3 The Case of Singapore

A three-tier planning framework has been developed and implemented since the early days of Singapore's nation building. In the top-tier, or concept plan, land uses are investigated with a 50-40 years' horizon. Then, in the middle-tier, or master plan, the transport network features are considered with a horizon of 15-10 years in accordance to society's needs. Finally, in the lowest-tier, or detailed plan, specific features of near-term developments, policies, and programmes are considered [12]. This planning framework provides physical arrangements for developments of a transport network that shapes the land use for long-term planning horizon. Backed up by planning, Singapore made transport infrastructure the centre of interest for urban development. As such, it can be said that right from early nation building, Singapore started off at the 2nd stage or TBA. The 1st concept plan, developed in 1971, presented the ring concept, where residences, commercial areas, and industries were planned to be developed in a ring formation around a water catchment, with an interconnected expressway and rail network, known today as the Mass Rapid Transit (MRT). This has evolved to an MRT centric planning of self-sufficient towns that can cater for the targeted population of close to 7 million by 2030 [12].

The towns have been planned so that these are served by regional centres in central, north, east, south, and west regions of Singapore, connected by MRT rail lines. In the towns, infrastructure is based on the current and targeted population, with 1/3 for residential, 1/3 for education, industrial, and commercial, and 1/3 for transport, green spaces, and recreational activities. A public bus system of feeder buses is also available to further enhance connectivity. MRT and buses in Singapore follow disciplined operating practices, always following established stops and rarely experiencing delays. Public transport is accessible for the majority of the population, being the most commonly used modes of transport. It has been reported that 62% of the population ride public transport during peak periods and expected to increase to 75% by 2040 [13].

Moreover, 3 types of road systems are available in each town for buses and other motorised vehicle movements. They are the expressways – connecting towns with each other, major arterial roads – connecting with town centres, and minor arterial roads – connecting with main residential buildings [14]. Today, around 12% of Singapore's available land area is dedicated to transport infrastructure [15]. To restrain vehicle growth, a certificate of entitlement (COE) is needed to acquire a vehicle, which can have a cost of over half of the total cost of the car [16]. In addition, an electronic road pricing system (ERP) is in operation to manage congestion [17].

In recent years, much effort has been placed in promoting active transport modes in Singapore. This can be seen as the transition from 2nd to 3rd stage, or ABA. Inhabitants are being encouraged to use these active modes as part of health campaigns, environmental movements, and for social interaction. Also, personal mobility devices (PMDs) such as electric scooters, hoverboards, and unicycles are gaining popularity. Singapore presents a very unique layout whereby cyclists and PMD users share off-road facilities since late 2016. Footpaths are ubiquitously available alongside most roads in Singapore [18]. Today, walking trips account for 11% of the mode share, with most of these trips being made for FLM purposes. On the other hand, after a long period of low popularity,

cycling resurfaced in the last decade and was boosted with the introduction of dockless bicycle-sharing system in the country. From traffic counts conducted in recent studies, it is estimated that prevailing cycling rate is close to 5%, while that for PMDs is estimated to be around 2%. To cope with the increasing demand for cycling and PMD riding, authorities are investing efforts to provide off-road cycling paths and other dedicated facilities [17]. These developments are likely to further elevate the active mobility rates in the country that is fostering active lifestyles.

4 The Case of Vietnam

Being a developing country, initial transport planning in Vietnam around 1960-70s was focused on a VBA. The approach attempts to arrange the road network configuration to maximise traffic stream. Between 6% and 15% of the available land in the country is dedicated to transport [7]. The road transport planning is made in compliance with the socio-economic development strategies, and is integrated with planning for other transport modes. It is made for at least 10 years, oriented for the next 10 years, and is adjusted accordingly to the socio-economic situation in each period.

HCMC and Hanoi are the biggest and most densely populated cities in the country. It is not surprising that they have a very high number of vehicles (mostly motorcycles), at 7.4 and 5.8 million in HCMC and Hanoi, respectively [7]. This number of motorised vehicles is expected to further increase regardless of finance policies to control the increase that have been implemented, such as taxes and registration fee [7]. This rapid growth in inhabitants and vehicles is the major cause of overloading of transport infrastructures [18]. It is not surprising that pervasive traffic congestion occurs daily, and negative environmental consequences by vehicle emissions are overwhelming [19]. Efforts have been made to extend the road network [20]. While extension of roads can help to alleviate traffic, it has also been suggested that providing infrastructure for private motorised vehicles only begets more traffic [18]. Rather than catering for unrestrained vehicle usage in the cities, the primary objective of transport planning should focus on catering for growing travel demand in another manner, such as TBA.

Around 1980-90's, Vietnam aimed to shift towards the 2nd stage of transport planning (TBA) with the development of a public transport system. This planning approach was primarily introduced by the national transport institutions and international organisations who conducted formal comprehensive transport studies for major urban transport development projects [21]. Public bus services are available in HCMC and Hanoi, yet, these can meet only 7% and 14% of the demand, respectively [7]. The Hanoi Master Plan indicated that the bus system would be improved, and the target is to achieve 35% mode share by 2020 [20].

Regarding active mobility, the rates of walking and cycling in Vietnam are still low. There are some footpaths available in HCMC as well as in Hanoi, yet these are mostly used for business purposes. The unavailability of infrastructure, the big size of the cities as well as travel behaviour have deterred people from active travelling. Provision of infrastructure and enforcement of traffic regulations could help to further elevate the walking habit and cycling rate. Further, creation of pedestrian-only streets promote the

liability of the cities substantially. Indeed, the idea of a liveable city has been partly actualised in some streets in the CBDs. HCMC and Hanoi are the principal economic, political, and cultural centres of the country. Thus, meeting people's activity participation should be among primary concerns in transport planning. There are increasing requirements on promotion of public transport and provision of facilities for active modes and enhancing public space. This could help the main cities in Vietnam to advance towards the 3rd stage or ABA.

5 Lessons from Singapore to Vietnam

Singapore's transport situations and planning approaches are very much different from that of HCMC and Hanoi of Vietnam. Being a small densely populated country with scarcity of land and historically encountered similar urban transport problems as Vietnam, Singapore success story becomes prominent example for developing countries who look for ways to transform from vehicle-dependent to livable and sustainable city. Cities in Vietnam could take some positive points from Singapore's planning approach. The main point can be the three-tier planning architecture. This procedure allows for close collaboration between land use and transport planning in a manner that transport shapes the structure of the urban space while accommodating anticipated population and economic growth. This ensures sufficient land and other resources for transport-related developments. While Vietnam's proportion of land area dedicated to transport is compatible, the rate of public transport usage is minimal. In Singapore, a substantial proportion of land is dedicated to public transport and active mobility. Singapore developed an integrated public-oriented transport system (TOD) to ensure large capacity and mobility. The TOD represents a comprehensive system or rail and buses fully integrated with urban developments. This helps to reduce the need for travel, and to maximise accessibility to housing, commercial and recreational facilities. In this way, the integrated transport system provides seamless and comfortable travel for people, as a vital function for a liveable and sustainable urban growth [22].

Vietnam could aim to review existing plans and prioritise projects/developments that favour usage of public transport. Noticing that public transport will entail some active travelling for the FLM purposes, regulations that can be of aid to active mobility users should be considered. Also, considering the increasing number of private motorised vehicles, transport planning should be supported by traffic management and control such as travel demand management (e.g. COE), and economic instruments (e.g. ERP), that have been applied effectively in Singapore.

6 Conclusion

Features of the 3 stages of transport planning are presented with examples of Singapore and 2 cities in Vietnam. Singapore is in the 3rd and latest stage of urban transport planning, where much interest is placed in understanding factors that encourage demand for different modes and providing adequate infrastructure to foster a liveable city, while cities in Vietnam are basically in the 1st stage of transport planning pertinent to

vehicle-centric cities. Some experiences from Singapore applicable to Vietnam are identified and discussed accordingly, indicating that in general, urban transport planning should always consider existing features of the area and should be constantly reviewed to incorporate innovative approaches to cater for the future.

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