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Declaration

I declare that this assignment is my own work and does not involve plagiarism or collusion. The sources of other people's work have been appropriately referenced, failing which I am willing to accept the necessary disciplinary action(s) to be taken against me.

Student's Signature:

Date of Submission:

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Chapter 1: Introduction

1.1: General Background:

East Asia is home to 1.7 billion people, or roughly 20.5% of the world population (Wang et. al, 2018). With its rapid economic rise throughout the past 40 years, the region has seen one of the most rapid urbanization rates, resulting in newfound challenges faced by urban transportation systems as they struggle to cope with the steep increase in population. In stark contrast to the hub-and-spoke, or polar/radial networks used by European and American planners in times long past to cater to monocentric urban forms, rapid increases in population of East Asian cities has caused new urban planning models to gradually take root. Instead of a gradually built-up urban core through consistent but slow increases in urban population, the population explosion in many cities has instead resulted in the creation of multiple urban clusters appearing across an extended "metropolitan region" in no particular pattern, resulting in uneven and random urban distribution, a far cry from that of orderly, zoned land use seen in Western planning. Different patterns of travel are thus observed and therefore any urban transportation system in East Asia sees different measure**s** of success from their Western counterparts. Emerging means of transportation, both public and private, as well as revolutionary new models of operation unheard of in the developed world also herald the gradual obsolescence of established models. Yet some key aspects of an urban transportation system that are successful, namely integration, reliability, durability and connectivity, and for public transit frequency, capacity and speed and well-used by the public transcend social, political and cultural boundaries.

1.2 Rationale:

The study examines the performance of urban transportation systems in selected East Asian cities (stated ~~below~~ in 1.5), compared against the slightly modified (~~see~~ Annex A) Abundant Access Theory by Jarrett Walker to fit the unique demands of East Asian city residents. This paper thus analyses the aspects of East Asian urban transportation policy that resulted in the outcomes present today, the policies, practices, and mindsets that brought the cities'

transportation system to their success or failure considering the different context of East Asian urban development from that of established Western models.

1.3 Research Questions:

1. What should constitute a successful ***East Asian*** urban transportation system?
    a. What aspects do ***users*** of urban transportation networks prioritise and value?
    b. Which cities have met such requirements of urban transportation users, and which do not fulfil the needs of urban users?
2. How have successful cities achieved these outcomes highly valued by users?
    a. What are the differences in value (i.e. personal ideals) and priority, and where do they come from?
3. What policies have allowed these cities to achieve user satisfaction? Conversely, what are the policies that have driven away users and is counter-productive to the overall functioning of the cities?

1.4 Thesis Statement:

For East Asian transportation systems, success is defined by its value and satisfaction to urban residents as well as the sustainability of the system over the long term. This is achieved by a strongly user-centric, people-first transport policy that benefits the city as a whole.

1.5 Scope of Research / Delimitation(s):

For the purposes of this research paper "urban transportation" strictly refers to mass transit as it constitutes the largest mode share in East Asian cities, thus an emphasis on the analysis of the shape of urban rail and bus transit networks. Urban road network is inevitably incorporated into the road-based public transit discussion. When considering network shape this paper examines mainly urban and urban fringe sections of rail transit thus not including suburban segments with

the exception of Singapore. The cities of Singapore, Kunming (both with populations about 4-6 million), Beijing and Tokyo (both with populations above 25 million) have been chosen for the study, due to their similar populations in each pair as well as somewhat similar urban planning practices, all of which have a "town-centric" outlook in which towns are individually developed with considerable distances between them, yet with much varying results in terms of transportation outcomes and user satisfaction. A slightly modified Abundant Access Model, based on the needs and preferences of urban residents in the 4 cities, will be used to measure the level of achievement for urban transportation development.

KEYWORDS: Urban Transportation, Public Transit, Transport Network, Urban Form, East Asia

1.6 Significance of Research / Usefulness:

This paper serves to bring greater insight into examining best practices obtained by cities in East Asia and provide comprehensive and detailed analysis of policy decisions behind such practices, as well as taking into account the larger policy picture, and provide fresh new insights for cities which have followed alternate models of urban planning when designing their urban transportation systems. As East Asian city planning models influence that of other regions through the heavily infrastructure-focused Belt and Road initiative (BRI), these existing Western transport planning models are even more irrelevant and hence call for a greater need to connect the dots between current East Asian urban planning and that of a successful urban transportation system valued by its users.

1.7 Limitation(s):

While this paper aspires to cover a broad topic of examining various factors of success in East Asian transportation networks a wide variety of constraints as well as the unfortunate timing of the writing of this paper has severely impeded access to valuable first-hand data that would be of key importance to assessing performance metrics that determine service quality. An inability to

visit the cities cited in person (except Singapore where the author is based) has blocked off the possibility of collecting data on the ground which the author personally regards as the most reliable source of information, forcing data to be drawn from mostly online sources which are comparatively more challenging to obtain and come with many technical limitations which limit their usefulness. It was also much more difficult to conduct surveying operations, given major internet-related factors that have to be accounted for when conducting surveying operations in Chinese cities. A natural bias is also present in the surveying results as it is anticipated that individuals more interested in transportation affairs (the “busfans” and “trainfans”) would be more likely to respond and their needs may not exactly align with that of the general populace. The selection of cities were based on the author’s familiarity, thus may not be representative of East Asia as a whole. Vaguacies in the survey form may have also resulted in imprecise answers given by respondents, affecting overall analysis.

Chapter 2: Lit Review

2.1: Urban Transport Planning Principles

While culture and politics may vary drastically across different continents and is locality-specific the demands of urban public transport users remain consistent no matter the location, a fact agreed on by transport planning experts from both East and West. Firstly the need to future impact on the city is a critical factor in keeping a healthy and successful transportation system so in the long term, with Morichi (2005) and CAI-Asia (2006) highlighting that urban transport should be planned with its potential long-term impacts on urban shape in mind. Especially true is this for rapidly developing cities which have yet to abate in their breakneck speed of population and urban growth, such as megacities like Shanghai or immigrant cities like Singapore. Other features like frequency, capacity, right-of-way and connectivity remain important to users too, as stressed by Walker (2011) and later absorbed into the Abundant Access Model. As stated, with greater demands and a much higher usage of urban mass transit in Asian cities vis-a-vis their American or even European counterparts it is even more important that the systems are built with these users in mind, as in extreme cases proper implementation may well make or break the economic vibrance of the city, especially for highly-populated dense megacities common in East Asia.

2.2 Network Design

Aside from the modal debate (bus vs rail) that will be discussed later, the next most contentious topic in both the East and the West would be the network design of public transportation. Walker (2011) presents the two extremes of the spectrum for just the transit network: the polar system that assumes a single point of primacy (Fig 1), or the grid network of regular intersections between perpendicular elements (Fig 2), which he touts to be far more convenient and well-connected than the former. Morichi (2005) concurs on the need to plan towards a “multidestinational” grid system similar to Walker.

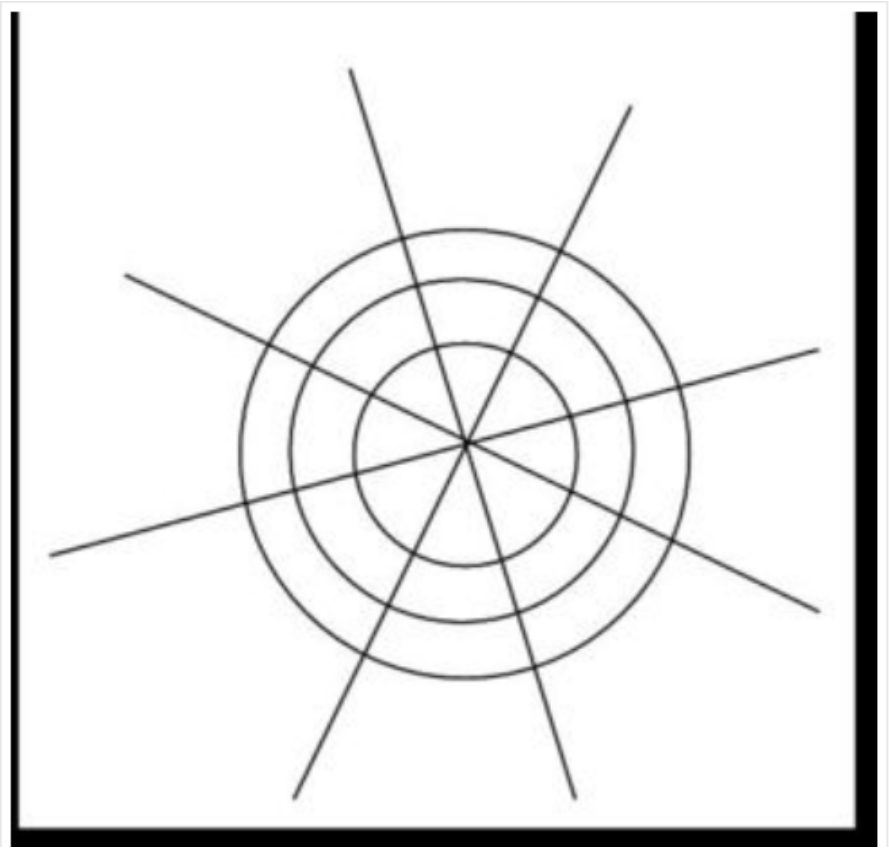


Fig 1: The radial/polar transit network (Walker, 2011)

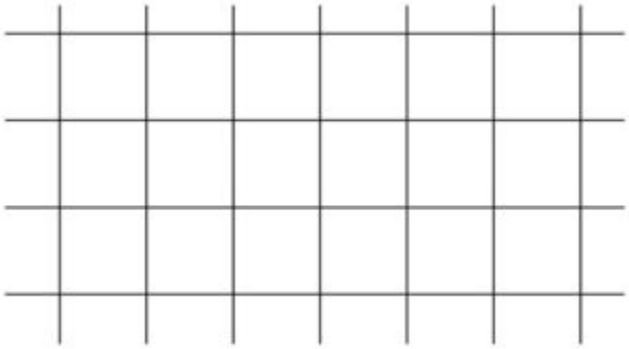
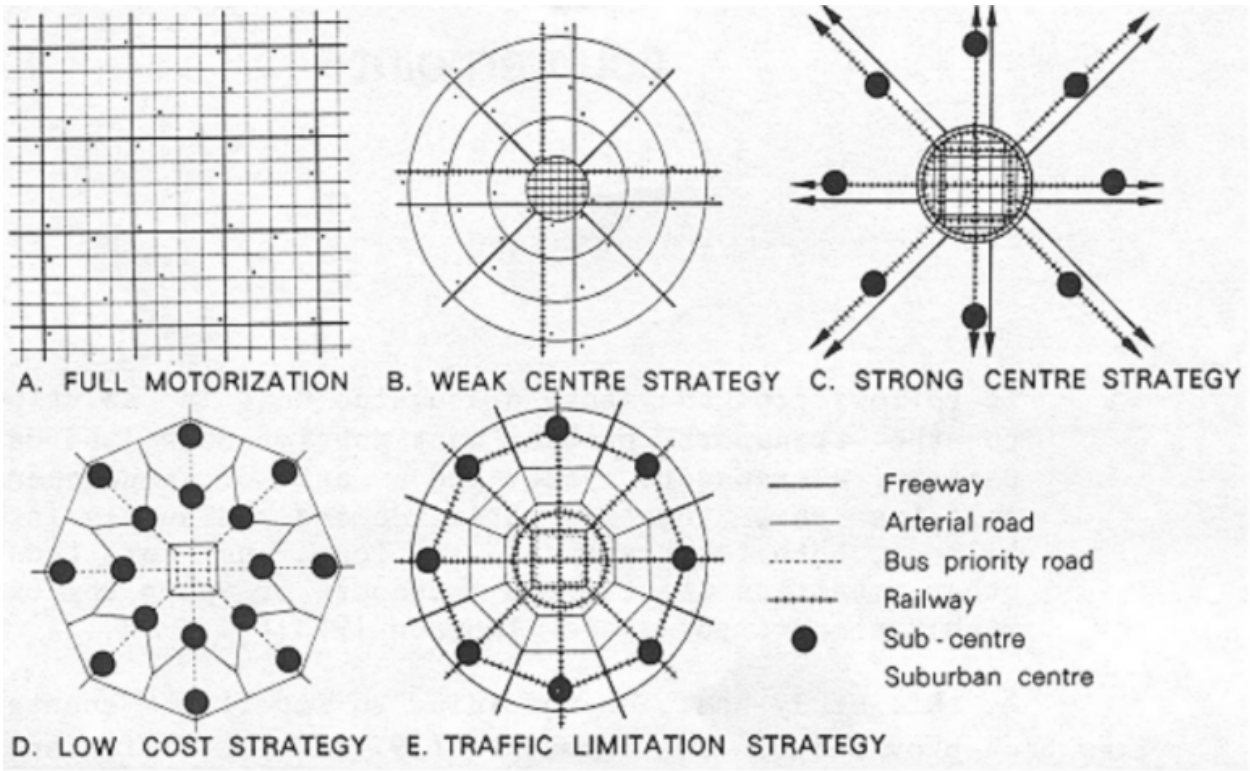


Fig 2: The grid network (Walker, 2011)

Transit systems however, are far more complex than to be reduced to "pure" polar or grid shape, especially considering the more decentralised planning approach many East Asian cities went through during their urban growth boom, with the common characteristic of dominant core over rural hinterland (Nemeth et al., 1985), resulting in conditions that are unfavourable for the

growth of either type of network shape (Townsend, 2003). Rapid growth of public transit in East Asian cities was also preceded by a period of automobile-driven growth, thereby complicating network design once consideration for road infrastructure in transit planning must take place. Thomson (1977) thus concludes a few land use and transport planning strategies (Fig 3), of which East Asian cities typically fall into scheme C.



Source: Thomson (1977) as adapted by Rimmer (1986c: 262).

Fig 3: Thomson (1977)'s 5 route network shapes. (Townsend, 2003)

Interestingly, Thomson's definition of route network shapes tend towards the opposite of Walker's preferred "transit grid", instead seeing grids as the hallmark of an automobile-dominated urban planning structure and prefers polar elements radiating out from a strong "gridded" core towards sub-centers that may be located further from downtown, joined together by concentric orbitals. Yet this raises the issue of deciding boundaries, key to Levy (2018)'s argument against grids: that grids stand to lose their effectiveness if not universally applied across the entire metropolitan area due to resulting reduced connectivity (e.g. Fig 4). Some East Asian cities work around this through *varying* the grid density based on development

levels in certain regions (e.g. Fig 5.), though it should be noted that this is due to the decentralisation of amenities throughout the city that makes this arrangement feasible.

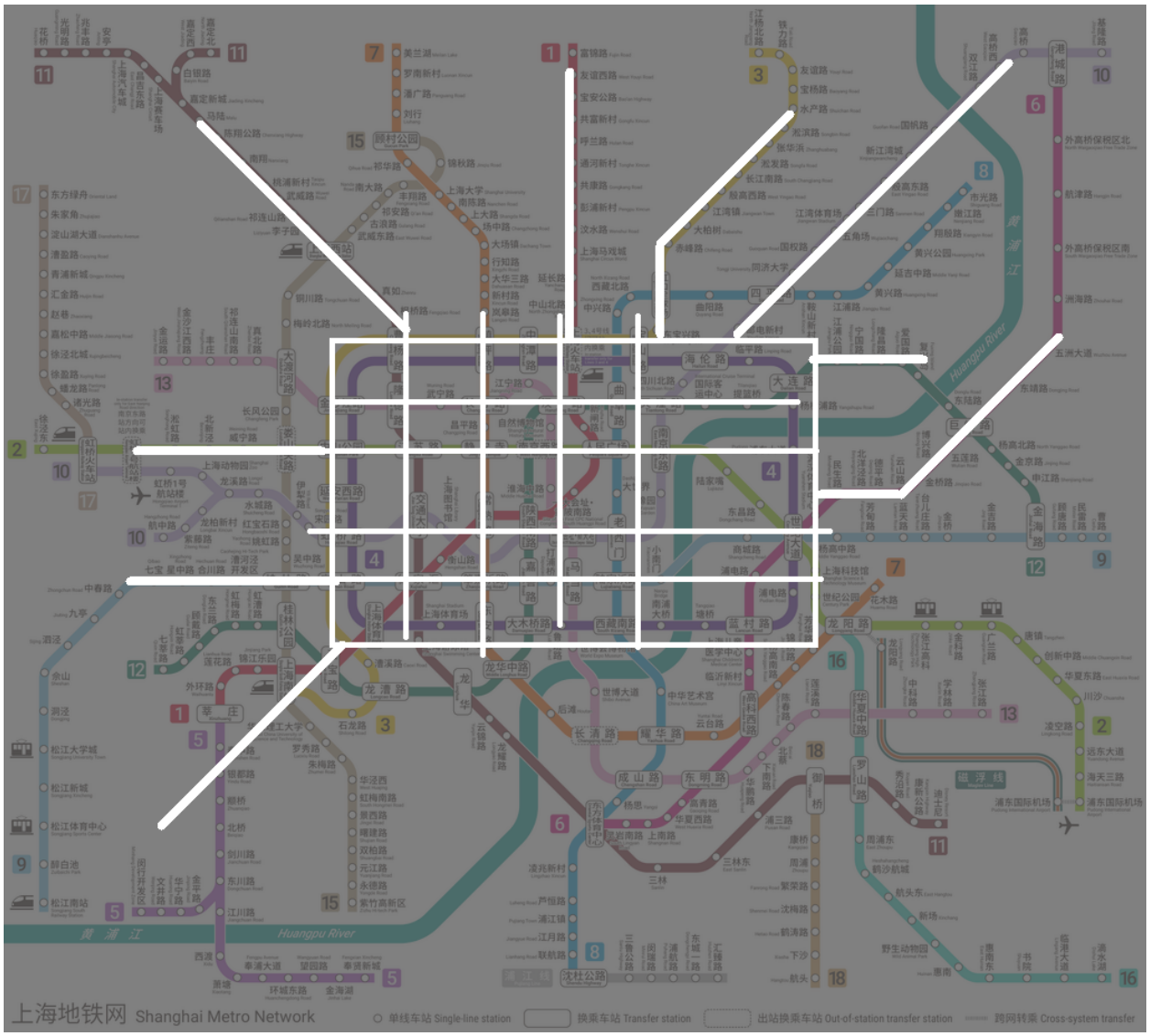


Fig 4: Shanghai Metro system map schematic, showing the pitfalls of a limited grid. Puxi CBD is located within the rectangular box (the “edges' of the grid) and lines radiating away from it experience far fewer connection points.

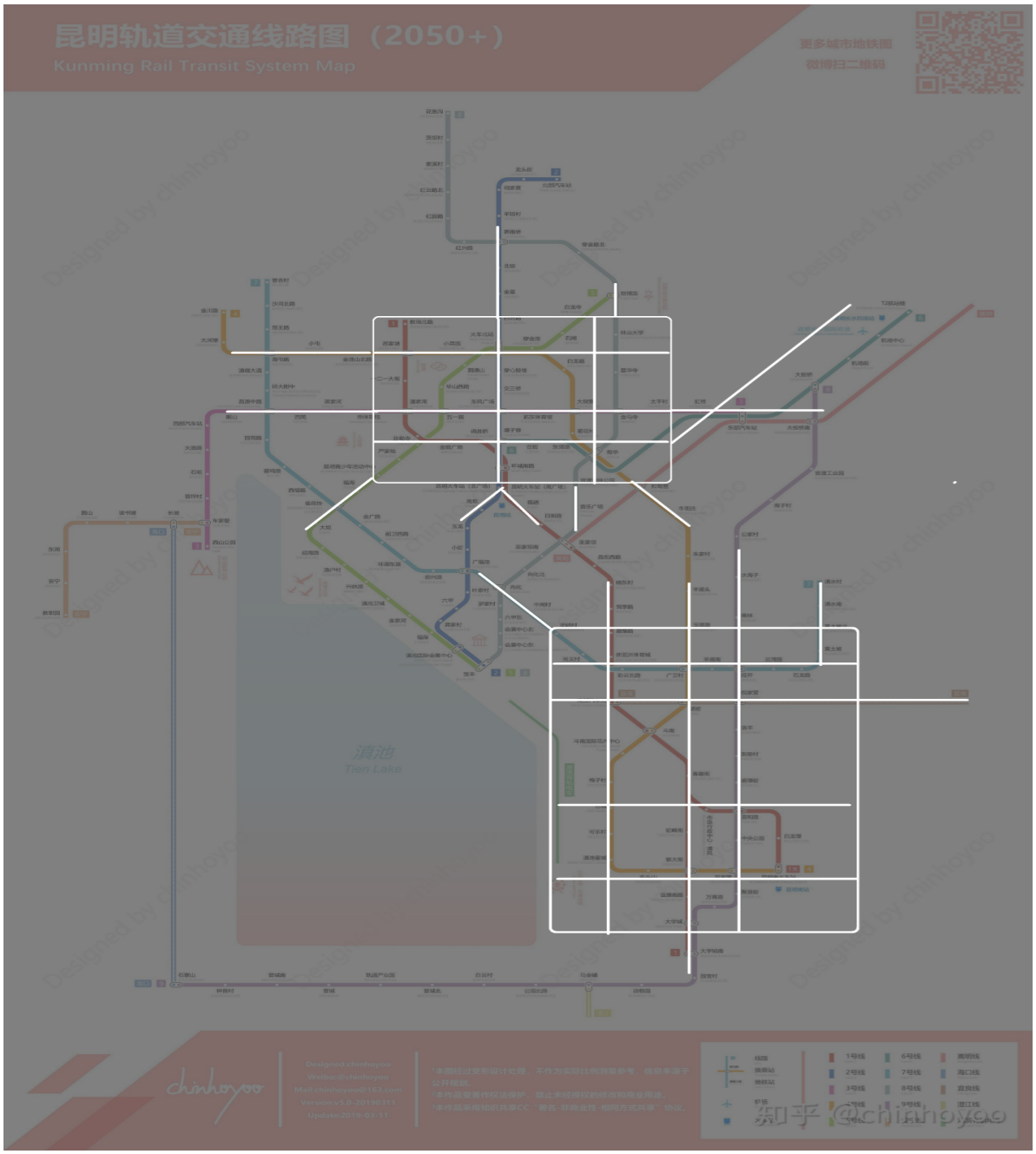


Fig 5: Kunming Metro 2050 planning map. (Chinhoyoo, 2019). Overall a network shape cannot be discerned due to the distortion by Dianchi Lake, but Scheme C planning (Thomson, 1977) is visible for more developed areas here becoming its own “center”.

2.3 Line design

Transit corridors should be as straight as possible. That's a unanimous agreement among all in the transit community. But what isn't, is the topic of what service to run on these corridors.Vuchic (2009) presents the different types of transit service on a given corridor: right-of-way (Fig 6), stop spacing, and service span. Dodson (2006) and Morichi (2005) believe in tiered service on each corridor, the former noting the benefits of choice for transit users, the latter instead noting the diverse trip profiles that is expected on any given corridor, and even more so for East Asian systems with higher passenger numbers. Buses in East Asian cities, unlike their Western counterparts, also have the unfortunate feature of locating bus stops away from junctions, and this coupled with topographical constraints makes duplication of services inevitable. Yet Walker (2011) and Vuchic (2009) discourage such practices where possible., due to the lower demand for public transportation in Europe and North America with a significantly higher proportion of motorists, coupled with a more austere financial mindset that would make service duplication something frowned upon.

2.4 Modal Choice

The impacts of the choice of technology on a certain transit route is not the clearest, and where opinion is most divergent, organising along the typical "bus vs rail" binarisms (Walker, 2011). Pojani (2015) presents the case for robust bus transit for East Asian cities as a solution more accessible and easily replicated on a widespread scale for the vast majority of East Asian cities whose development has yet to reach the stage to justify the considerable investment needed to construct rail rapid transit in sufficient quantity to be of benefit. Fearnly (2016) however argues that rail rapid transit casts a more permanent effect on urban form due to the relative permanence of rail routings in comparison to buses that gives greater assurance of investment returns in the area. Vuchic (2009) advises cities to focus instead on grade-separation and service speed (Fig 6) while Walker (2011) notes that upgrades supposedly brought about by switching to rail are not solely attributable to the mode change.

	Type A	Type B	Type C

Rail	Fully grade-separated rail service. - Rail rapid transit systems	At-grade separation of rail service from traffic - Light rail in Europe	Rail service mixed with traffic - “Streetcars” in USA
Bus	Fully enclosed, grade-separated busway - Brisbane Busway - Xiamen BRT	At-grade separation of bus lanes from general traffic - Typical bus lane schemes - Los Angelos Orange Line	Street-running buses

Fig 6: Vuchic’s type A, B and C grade-separation levels for public transportation, as adapted by Walker (2011)

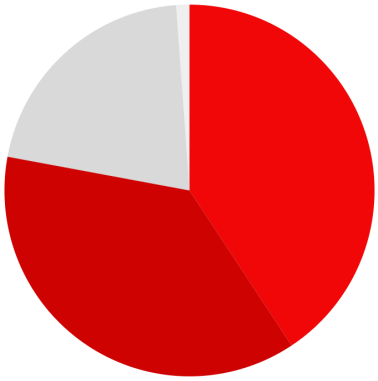
Chapter 3: Methodology

3.1 Data Collection Processes

To gain greater insight into the intricacies of the studied East Asian urban transit systems (Singapore, Kunming, Beijing, Tokyo), as well as to achieve a definitive conclusion on the factors for the success of an East Asian urban transport system, many sources were consulted, and surveying operations across the 3 nations involved in the study (Singapore, China, and Japan) were conducted to poll the opinions of urban residents on the subject. Other sources consulted for this paper, aside from previous analysis of urban transportation planning by other scholars, include maps of all related sorts of these cities, including topographical maps, road maps, official rapid transit maps (including planning and unofficial future maps), bus route maps (where available) and urban planning maps, alongside other official transport-related documents. In relation to public transport management aspects such as frequency, reliability, capacity, and the like, multiple sources across the Internet for provision of such information were scoured, and where permissible, onsite data collection was the preferred method for Singapore where such was possible. The combined set of data was then analysed, together with other factors and existing parameters in the transport systems, based on outcome, and then the new AAT was crafted from such, with the self-reinforcing aspects most beneficial forming a positive feedback loop in the center of the AAT.

Chapter 4: Discussion and Analysis

Initial surveying operations garnered 86 responses from four countries: 35 from Singapore, 32 from China, 1 from Malaysia[1], and 18 from Japan. (See Fig 7)



Country	Singapore	China	Japan	Malaysia
No. of respondents	35	32	18	1

Fig 7: Breakdown of survey responses by nationality.

Key sectors of the population represented in the survey are students and working adults (Fig 8), two groups with fixed and predictable travel patterns. It should thus come as no surprise that a supermajority of respondents only use public transport once or twice a day, typical of the commuter whose main travel needs are that between their workplace/school and home.

[1] The response of this Malaysian respondent will not be examined much in this paper, and if needed will be lumped into the analysis of Singapore as he resides in the neighbouring Johor Bahru city.

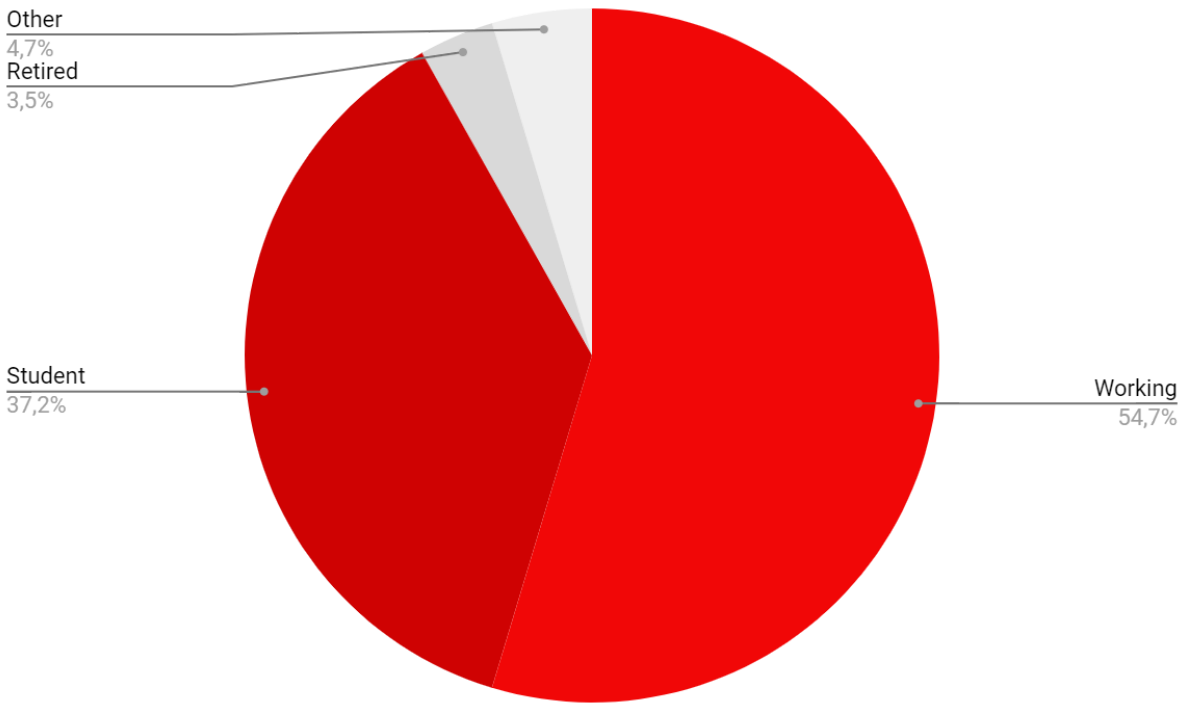


Fig 8: Breakdown of respondents by profile.

Satisfaction rates of the respondents for their city's transport systems varies among the 20 cities polled, but is generally higher in China, with 23 of 32 of Chinese respondents giving net positive comments for their transport systems, as compared to 15 of 35 for Singapore. Surprisingly, Japanese respondents did not give many positive responses to their transportation systems, with only half (9 of 18) giving net positive comments, almost on par with Singapore despite having a far more comprehensive and denser network.

Key positives noted for Chinese respondents were mostly fare-related issues: many laud their systems for being able to accept e-payment like Alipay and Wechat Pay directly, while others note the fares that have been kept affordable through active government subsidisation. In more major cities system coverage (especially for the bus system) and convenience were also cited as plus points for the transportation system in their city. A net positive opinion on buses in the respondents' cities was also only observed in China: many cite the regular and frequent intervals of bus services, and the high number of routes in Chinese cities that give it massive connectivity. On the other hand, many note that crowding and overcrowding on urban transportation systems

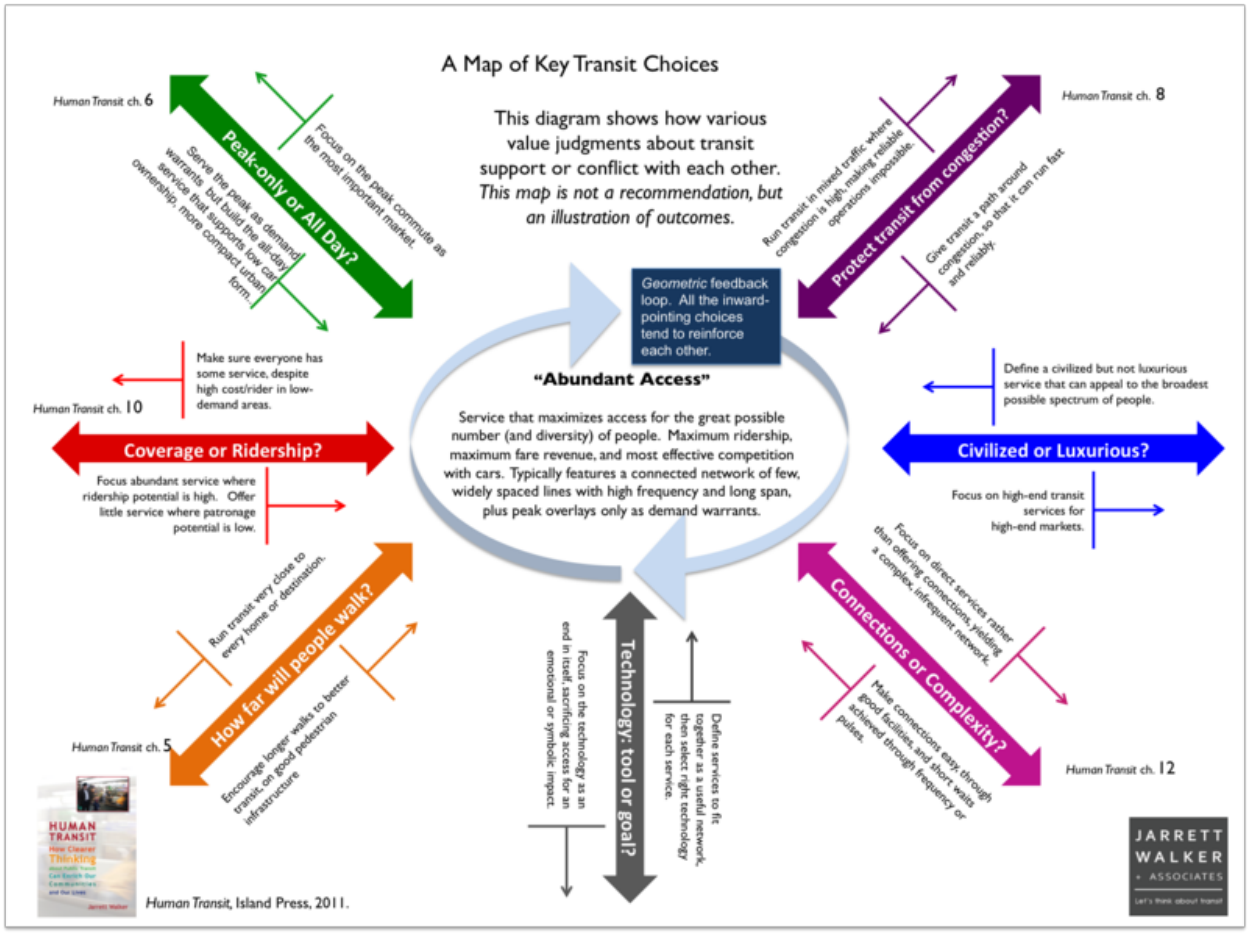
are a key concern that should be addressed especially during peak hours where crowd levels have been known to surge to 150% capacity (Li et al, 2014). In cities that do not make it to the "first tier" (i.e. outside the economically advanced cities of Beijing, Shanghai, Chongqing, Tianjin, Guangzhou, Shenzhen), many also lament the poor coverage of the rail system in cities where construction of rail rapid transit has begun but have been affected by recent regulations on approval of rapid transit projects requiring a certain level of economic output as a prerequisite (Zhang, 2018). Issues with traffic congestion are also prevalent, with reliability not appearing very much in the positive comments. Some also reflect the overly short operation span of the urban transportation systems, being unable to meet late-night travel demands: in some cities such as Kunming it is indeed quite typical to see buses beginning to cease operating at 9pm and the metro as early as 10.30pm.

For Japan, strengths of the urban transportation system (in Tokyo in this case as all Japanese respondents originate from there) are primarily directed towards the rail system: efficient, punctual, fast, and most importantly -- safe. They also note the coverage of Japanese urban rail systems that exceed far beyond that of any Chinese city -- practically the whole city including the suburban wards and districts is served by at least 3 or more rail lines operating at high capacity. Connectivity was also a main point of praise (among the few who gave positive responses), as they note the integration of ticketing, facilities and schedules at key nodes even between rail lines under purview of different operators, which number more than a dozen in Tokyo alone -- that crossing from the zone of one operator to another when making connections is seamless and the boundary is almost unfelt by Japanese urban transportation users. As for negative aspects, an overwhelming majority (13 of 18) highlight the well-known, almost infamous overcrowding situation aboard Japanese rail systems to the extent of being internationally infamous (Li, 2014), but other issues highlighted include the lack of last-mile connectivity for the outskirts of the city, and a lack of bus services that would function as a more local-stop alternative to the train system. Security issues for women were also highlighted among respondents to the survey: a considerable number note a prevalent *chikan* (pervert) culture of men rubbing up women on board crowded public transportation, although it is acknowledged that the provision of women-only carriages on the subway system is addressing it to some extent.

Singaporean respondents mainly cite the facilities located on the urban transportation systems (i.e. train and bus stations, on board buses and trains etc.) as the plus point, and many also note the cleanliness as well as modernity of the system despite being fairly advanced in age as compared to other systems in the region. However certain points are rather contentious, being argued both in favour and against the local transportation system, with frequency and reliability being the two most controversial aspects, with diverse voices suggesting either that Singapore has frequent public transit that is reliable, and a large number contending that bus frequencies are certainly an area for improvement that the system could work on. The Singapore MRT, plagued with numerous disruptions over the past decade, has also been lambasted for scenarios of overcrowding even outside the peak hours as a result of reduced off-peak frequencies. Connectivity is also a major problem: while some stations on the system offer the most convenient cross-platform transfer set-up (e.g. Bayfront, City Hall/Raffles Place, Jurong East, Tanah Merah), many transfers involve long transfer walkways (especially noted that newer transfer walkways tend not to be equipped with travelators that would have made the transfer less strenuous), which has been the subject of bitter ruse among commuters who must utilise these less-than-ideally thought out connections during their daily commute.

Annex A: Comparison between the original and modified AAT

Original



Amended AAT:

The amended AAT serves to place more emphasis on the needs of East Asian urban transportation users, with some rather irrelevant axes in the original AAT (e.g. Civilised - Luxurious) that do not apply being replaced by others that concern East Asian riders more (e.g. capacity). A "virtuous cycle" with the inward-pointing aspects reinforcing one another is the core belief of the old AAT, and this feature is retained in the new AAT. However, the "geometric" part of the feedback loop has been removed in the new AAT as East Asian cities do not have geometric constraints to the same extent as Western cities due to different administrative boundary-drawing here: with the exception of island-cities (e.g. Xiamen, Singapore, Hong Kong), the administrative boundary of East Asian cities extending deep into the surrounding counties and suburbs means that space is not as pressing an issue.

The purpose of the AAT is to outline the aspects of a transportation system along multiple axes organised to present a vision for such a transport system that is coherent and effective at meeting the needs of a city. While not explicitly implying a preferred path, Walker contends that the AAT

model is intended for leaders of communities and transportation planners to make “informed choices” and be able to visualise the effects of their choices on the overall system as a whole. Thus the modified AAT can be considered as the concluding statement to this paper - this modified AAT summarises the aspects that would lead to success the East Asian transport system, and the city that it serves, a complementary infographic.

Amended AAT:

Annex B: Factsheet of Urban Transport Systems Studied in this Paper

Singapore

Public transport modes available: Bus, MRT, APM
Total rail network length: 216km (Projected: 360km by 2030)
First opened: November 1987
Number of rail lines: 9 (4 heavy rail, 2 light rail[2], 3 APM) (12 in future: 6 heavy rail, 3 light rail, 3 APM)
Number of bus lines: >370
Total network coverage: Rail network serves all HDB towns and city, bus network covers entire island excepting rural/abandoned northwest and protected central catchment
Unique aspects: Operation of public transport services (both bus and rail) are contracted out to private operators for a fixed period of time. Currently 2 rail operators and 4 bus operators exist in Singapore.

Kunming
Public transport modes available: Bus, BRT, metro
Total rail network length: 139.4km (Projected: 562km beyond 2050)
First opened: BRT in April 1999, metro in June 2012 (trial), May 2013 (actual)
Number of rail lines: 5 (5 heavy rail) (15 in future: 9 heavy rail, 5 suburban, 1 light rail)
Number of BRT corridors: 2
Number of bus lines: 270-481 (number varies depending on how routes are counted)
Total network coverage: Rail network currently serves major thoroughfares and economic development zones in manufacturing, retail, education, and tourism. Public bus network blankets metropolitan Kunming and surrounding counties (75km east to west, 100km north to south) in a dense web.
Unique aspects: Within metro Kunming two bus operators hold a duopoly over the public bus market: Kunming Bus operates primarily trunk and feeder routes within the city and its suburbs, Zhongbei Bus operates primarily suburban rapid bus routes aimed at linking suburban residents to downtown. Unlike some East Asian cities, Kunming does not practice bus rationalisation even with fully duplicating bus routes with metro lines.

Beijing
Public transport modes available: Bus, BRT, metro, suburban commuter railway, light rail
Total rail network length: 727 km (Projected: 1524km by 2035) (Figures exclude suburban network statistics)
[3]First opened: Subway in January 1971 (military only), September 1981 (civilian use), BRT in December 2005, suburban railway (as a commuter service) in December 2008, light rail in December 2017
Number of rail lines: 29 (23 heavy rail, 5 suburban commuter rail, 1 light rail)

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[2] The Circle and Downtown MRT lines are classified "light rail" due to the comparatively lower capacity of the trains running, as well as to standardise with similar lines elsewhere in Asia running similar-length trains yet being called "light rail" lines.
[3] Figures exclude statistics for Beijing Suburban Railway

Number of BRT corridors: 4
Number of bus lines: >500
Total network coverage: Rail network covers entire downtown Beijing as well as serving well some suburbs to the north. Suburban commuter rail lines extend the reach of the system to as far as Zhangjiakou and the Great Wall at Badaling. Bus lines evenly blanket Beijing all the way until the fourth ring road and coverage is still maintained beyond. Four BRT lines radiating out from the location of the first ring road increase the carrying capacity of the east-west and north-south corridors into the city.
Unique aspects: Beijing's road and rail network are almost perfect grids. Some lines of the Beijing Subway are operated by the Beijing arm of Hong Kong's MTR Corporation under a PPP agreement. Fares on the Beijing Subway are capped at CNY9, except the Daxing Airport line at CNY25.

Tokyo

Public transport modes available: Shinkansen, metro, regional commuter rail (JR East), buses, BRT, light rail
Total rail network length: 195.1km[4]
First opened: Metro in December 1927, regional commuter rail as part of the national system after WW2, Shinkansen in October 1964, BRT in July 2019
Number of rail lines: 9 (9 heavy rail)[5]
Number of BRT corridors: 1
Number of bus lines: 138
Total network coverage: Rail is the overarching component of public transportation in Tokyo and even for Japan in general, superseding the role of trunk buses, resulting in overblown proportions of railway network coverage and cross-duplication stretching as far out into the neighbouring wards and prefectures up to 100km away.
Unique aspects: There is shockingly low levels of bus service in Tokyo for a population as large as 30 million. The subway system is also split into two operators running two separate systems (similar to Hong Kong's MTR and KCR pre-2007).

[4] Figure is that of the Tokyo Metro.
[5] Figure is that of the Tokyo Metro.

Annex C: Survey Questionnaire and Responses.

Below was the list of survey questions sent out to 68 participants across the nations that were studied in this paper: Singapore, China, and Japan. Questions sent to respondents in China and Japan were translated from this list into the respective languages.

1. Are you interested in public transport? (Y/N)
2. Which city are you from?
3. Which best describes you? (Student/Working/Unemployed/Retired)
4. How many public transport trips do you make a day on average, excluding transfers?[6]
5. When do you typically make these trips?[7]
6. What do you think the public transport in your city is doing well at?
7. What do you think the public transport in your city is doing poorly at?
8. What are the aspects of public transportation that you believe should be prioritised? Please rank them in order (1 being most important, 8 being least important)[8]
9. What are the aspects of public transportation that you personally value? Please rank them in order (1 being most important, 8 being least important)
10. What other aspects of urban public transport do you think are important?
11. Do you think the choice of public transport mode (e.g. bus, train) matters? (Y/N)
12. Why do you say so? (in response to Q11)
13. If you had the chance to change three things in your city's public transport system, what would they be?
14. What do you think constitutes your ideal public transport system?

Below are the responses collated from a total of 68 respondents. Responses for open-ended questions are not reflected below.

1. Are you interested in public transport?

Yes	66
No	20

2. Which city are you from? (Cities studied in this paper are **bolded**)

City	Respondents
Singapore	35

[6] Respondents were given range from 0-10

[7] Respondents were asked to choose from the time periods of pre-AM peak, AM peak, after AM peak to noon, noon to before PM peak, PM peak, post-PM peak, night peak (around 10-11pm, common in cosmopolitan cities), and post-night peak

[8] For questions 8 and 9, respondents were asked to rank the following aspects: service frequency, service reliability, connection quality at transport nodes, service capacity, fare affordability, user friendliness, profitability of the system and speed of service.

Tokyo, Japan	18
Kunming, Yunnan, China	9
Shanghai, China	4
Beijing, China	3
Xi'an, Shaanxi, China	2
Suzhou, Jiangsu, China	2
Changchun, Jilin, China	1
Chengdu, Sichuan, China	1
Daqing, Heilongjiang, China	1
Dalian, Liaoning, China	1
Fuzhou[9], Fujian, China	1
Haikou[10], Hainan, China	1
Jinan, Shandong, China	1
Johor Bahru, Johor, Malaysia	1
Ningbo, Zhejiang, China	1
Shenzhen, Guangdong, China	1
Tianjin, China	1
Wuhan, Hubei, China	1
Yantai, Shandong, China	1

3. Which best describes you?

Type	Respondents

[9] An identity of "Fuzhou", the seat of Fujian, was assumed as this respondent gave only "Fujian Province" and IP tracking was inconclusive.
[10] An identity of "Haikou", the seat of Hainan, was assumed as this respondent gave only "Hainan Province" and IP tracking was inconclusive.

Working	47
Student	32
Unemployed/not working	3
Retired	3
Other	1

4. How many public transport trips do you make a day, excluding transfers?

No of daily trips	Respondents
0[11]	9
1	18
2	53
3	6

5. When do you typically make these trips?

Timing	Number of respondents
Before AM Peak	25
AM Peak	26
AM Peak to noon	19
Noon to PM Peak	31
PM Peak	40
After PM Peak	17
Night Peak[12]	4

[11] While the paper aimed to study public transit in East Asian cities an option for "zero transit trips daily" was included for non-transit users and those who do not use transit regularly.
[12] Night Peak refers to the time period between 2200 and 2300 where public transport experiences once again another demand surge, typical in cosmopolitan cities with a strong retail industry like most studied in this paper. This peak, unlike the usual AM and PM peaks, are characterised by a greater proportion of blue-collar workers travelling during this period.

After Night Peak	2

8. What are the aspects of public transportation that you believe should be prioritised? Please rank them in order (1 being most important, 8 being least important)

	1	2	3	4	5	6	7	8
Service Frequency	18	19	8	5	8	2	5	3
Service Reliability	22	11	11	10	2	5	3	4
Good Transfers	11	14	12	8	7	4	6	6
Service Capacity	8	8	3	18	14	4	7	6
Affordable fares	13	7	11	6	10	10	7	4
User Friendliness	18	9	8	7	9	6	8	5
Profitability	0	3	5	10	1	5	8	36
Service Speed	6	12	15	6	3	14	6	6

9. What are the aspects of public transportation that you personally value? Please rank them in order (1 being most important, 8 being least important)

	1	2	3	4	5	6	7	8
Service Frequency	18	19	8	5	8	2	5	3
Service Reliability	22	11	11	10	2	5	3	4
Good Transfers	11	14	12	8	7	4	6	6
Service	8	8	3	18	14	4	7	6

Capacity								
Affordable fares	13	7	11	6	10	10	7	4
User Friendliness	18	9	8	7	9	6	8	5
Profitability	0	3	5	10	1	5	8	36
Service Speed	6	12	15	6	3	14	6	6

11. Do you think the choice of public transport mode (e.g. bus, train) matters?

Answer	Number of respondents
Yes	75
No	11

References:

- Dodson et al. (2011) The Principles of Public Transport Network Planning: A review of the emerging literature with select examples *Urban Research Program*
- Han et al. (2013) Challenges and Opportunities Facing China's Urban Development in the New Era, *China Perspectives*
- Morichi, S. (2005) Long Term Strategy for Planning of Transportation in Asian Megacities, *Journal of the Eastern Asia Society for Transportation Studies, Vol. 6, pp. 1 - 22, 2005.*
- Xiang, B. (2017) Chinese rail maker develops smart bus, *Xinhua*
- Walker, J. (2011) Human Transit: How clearer thinking about Public Transit can enrich our communities and lives, Island Press
- Walker, J. (2018) To Predict with Confidence, Plan for Freedom, *Journal of Public Transportation,* Vol 21 No. 1
- Wang et al. (2018) *Hereditas* 155:19
- Sustainable Urban Transport in Asia: Making the Vision a Reality, 2006 (no author found)
- Nemeth, R. and Smith, D. (1985) A historical analysis of East Asian urban hierarchies, *Michigan Sociological Association*
- Li et al. (2014) Measuring Passenger Crowd in Subway Network: Beijing Experience, *TRB Weekly*
- Zhang M. (2018) 国务院提高地铁申建标准 乌鲁木齐等多个已获批城市不达标, *Xinhua News*
- Townsend, C. (2003) In whose interest? A critical approach to Southeast Asia's urban transport dynamics, *Murdoch University*
- Barter, P. (1999) AN INTERNATIONAL COMPARATIVE PERSPECTIVE ON
- URBAN TRANSPORT AND URBAN FORM IN PACIFIC ASIA: THE CHALLENGE OF RAPID MOTORISATION IN DENSE CITIES, *Murdoch University*
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