

## User's Perception on Quality and Reliability of Urban Public Transport Services in Asian Cities

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**Abstract:** Asia has urbanized and growing urban population demands for better urban mobility. There are concerted efforts by authorities to improve public transport in Asian cities. However, the mode share of public transport is still low in many cities and use of personal vehicles are dominant. This is leading to an increase in congestion, consumption of fossil fuels, road accidents, emissions, and air pollution. Quality and reliability of public transport services plays an important role in increasing ridership. Stakeholders participation is an important aspect of urban transport planning according to their needs. The paper seeks to understand the user's perception on the state of urban public transport services in Asian cities. The satisfaction surveys along key public transport routes in selected cities indicate the mixed results. While the users are satisfied with services in Bandung, Thimphu and Tehran, majority of survey respondents in Dhaka and Ho Chi Minh city are not satisfied with the public transport services. The results provide useful insights for transport planners and public transport regulators and operators to improve accessibility, safety, quality and reliability of public transport systems. The improvement services would help to attract more commuters to the system and increase the mode share of public transport thereby contribution the Sustainable Development Goal target 11.2.

*Keywords:* Public Transport, Asia, User's Perception, Quality, Reliability, Safety

### 1. INTRODUCTION

There has been growing arguments on the wider use of public transport systems. Globally many cities and countries are planning and implementing policies and programmes to extend the reach of public transport systems. Asian countries and cities are also implementing policies, programmes and projects to improve public transport infrastructure and services. Various forms of public transport systems such as bus, bus rapid transit (BRT), metro, subway, light rapid transit (LRT) are popular in Asia. In addition, different types of paratransit complement public transport systems and provided services to inner city areas. Despite the efforts to improve of physical infrastructure, network, and services of urban public transport, it is often seen that in many Asian cities the public transport is not able to attract enough passengers. The issues and challenges relate to accessibility, infrastructure, physical integration of services, facilities for the commuters, fare, and many more. Operational arrangements whether the system is operated under public transport operator, state enterprises or by the private sector plays an important role in service quality (Weicker, 2020). Identification of policy gaps to improve reliability of bus and BRT operations can be helpful for the public transit planning and operations (Diab *et al.*, 2015).

Public perception about the quality and reliability of public transport service plays important

role in attracting more commuters to use the public transport. Stakeholder engagement and interaction contribute most to loyalty, followed by service quality perceptions and satisfaction (de Oña, 2020). In this context, the paper aims to evaluate the user perception on public transport system in Asian cities. The findings will be useful for the cities and countries to attract more patronage, increase their revenue and reduce operational costs, and help reduce car dependence.

In a way evaluating user's perception in public transport would also contribute to the monitoring of achievement of SDG target 11.2 "By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all" and SDG target 9.1 "Develop quality, reliable, sustainable and resilient infrastructure" (United Nations, 2015).

Following this introduction, section 2 describes the existing situation of public transport in Asian cities. Section 3 presents literature review highlighting the importance of users' perception on planning and improvement of urban public transport services. Based on literature review section 4 outlines method and data collection approaches taken for the study, section 5 presents result and discussion and finally conclusions are presented in section 6.

## **2. EXISTING CONTEXT OF PUBLIC TRANSPORT IN ASIAN CITIES**

More than 50% of Asia population are living in urban areas. By 2030, 2.7 billion people will be living in urban areas in Asia (United Nations, 2019). This rapid urbanization and the growth and concentration of motor vehicles in urban areas is putting pressure on already congested urban public transport systems. Decreasing share of public transport, increase in road fatalities, emissions, fuel consumption, GHG emissions and air pollution, are some of the challenges faced by Asian cities.

Countries and cities of the region are working to improve public transport systems in cities. Bus rapid transit systems are operating in 45 Asian cities with 1647 km of routes carrying 9.5 million passengers per day (BRT data, 2020). Construction and expansion of mass transit systems is progressing in Jakarta, Dhaka, Bangkok, Hanoi, Ho Chi Minh city and many Asian cities including Chinese, Indian and Iranian cities. However, the mode share of public transport is still low in many cities and use of personal vehicles are dominant.

There is an aspiration for Asian cities to be seen as a metro city and some cities are planning to develop at least a line of metro. Cities with large and dense transit networks developed based on the concept of transit-oriented development (TOD) with affordable fare structure can attract and serve more commuter and become green (Shyr et al., 2017). If planned well in advance, the land-value capture can contribute towards the some of the investment cost. There have been efforts to look at engagement of community and people in improving public transit and TOD (Chen et al., 2021). Land value capture could be one variable financing option and public private partnership (PPP) is used in development of rail transit in Asia (Chang and Phang, 2017).

For efficient mobility solution, a network of public transport providing accessibility to maximum number of urban residents is essential. The public transport network could include combination of different forms and modes of transport with integration that allow users for seamless intermodal transfer among modes. One important aspect of using various modes is

service and fare integration with combined ticketing. A trip usually needs to use a combination of transport modes. Providing real-time information and digital payment for public transport makes it more efficient, attractive as well as convenient for users for smooth transfer.

While capital and major cities have attracted more attention from national Governments and development partners, there is also a great scope to plan for integrated public transport, land use and city planning in secondary and medium-sized cities in their early stages of development.

Assessment of urban mobility in 16 Asian cities has revealed that in most of cities the fare of public transport is affordable, and city usually has an urban transport master plan. The accessibility of public transport ranges from 38% to 98% of urban population. The mode share of public transport and active mobility (walking and cycling) ranged 13% to 87%. The quality and reliability of public transport services varied from 30% to 89% satisfied users. The TomTom Traffic Index indicates that Mumbai, Manila, Bengaluru, New Delhi, and Bangkok are Asian cities with high level of congestion (TomTom, 2021).

The investment in public transport was low as a share of total transport investment in many cities. It is usually observed that cities have preference for high end transit systems rather than improving the services in existing system. Usually the operation of public transport is subsidized by city, state, or national government. But the low fare level was not able to attract many commuters to public transport owing to poor quality, reliability and safety of the systems. Therefore, assessing and evaluating user's perception on the quality and reliability of public transport is important to plan public transport system considering the users need as well as to improve the services. Davis (2018) argues for the transparency of policy formulation and implementation process and continuous engagement of multiple-stakeholders and innovations can support enhancement of governance capacity.

Commercial paratransit services, known as marshrutkas, are popular in Russian and Central Asian cities. However, there is always an issue of safety, comfort, and behaviors of operators. On demand transport is getting popular their use is strongly correlated with age and lifecycle stage and it has potential to grow and increase use of public transport and get new users in Australia (Vij et al., 2020). Given the existence of many forms of paratransit in Asia, some put blame on the informal transport and their operators for low service quality in public transport (Canitez, 2020).

There has been practices of obtaining users' perception in Asian cities. But it is important to use the results to improve services. Even in Europe (Spain) the public consultation is considered more theoretical rather than practical (Mozos-Blanco et al., 2018).

It is important to define attributes and dimensions of quality and reliability of public transport services. Concerns of differently abled and gender need to be considered in planning processes to improve the quality of public transport and living in urban areas (Kawgan-Kagan, 2020). Looking the gender issues of public transport in Azerbaijan, Georgia and Pakistan, it was observed that the public transport is failing in providing required service to women and girls in terms of safety and security and there were cases of harassment while using public transport (ADB, 2017).

### 3. LITERATURE REVIEW

There is plenty of literature on assessment of public transport quality and reliability, but there is no agreed standard for it. There are two approaches taken, the subjective assessment through the satisfaction survey, and objective assessment evaluating functional aspects of public transport quality such as punctuality or connectivity. The GIZ provides a condensed summary of various approaches on ‘Measuring Public Transport Performance’ (GIZ, 2020).

Relationships among customer preferences, customer satisfaction, and customer segments in public transport have been the interest of many researchers (Wallin Andreassen, 1995; Eboli and Mazzullo 2012; Barabino et al., 2012, GIZ, 2020; WBCSD, 2016; Eboli, and Mazzulla, 2007; de Oña and de Oña, 2015). Some studies look at the specific issues of public transport services in developing countries and developed criteria to improve design of quality standards for public transport (Ngoc et al., 2017). Canitez (2019) used the concept of socio-technical perspective to study the role institutional settings, governance structures, and urban mobility challenges taking a case of Istanbul city.

Some explored three main perspectives of place sustainability that included the perception of residents, the physical reality, and the investment of the local government (Taecharungroj et al., 2019). There are different quality factors that could be included in public transport user satisfactions surveys (Eboli and Mazzulla, 2009). The World Business Council (WBCSD) adopts an indicator approach to assess transport quality. The WBCSD pilot study for the city of Indore (WBCSD, 2016) focused on measuring satisfaction with the city’s BRT system only.

The objective assessments are often used by major, technically advanced systems such as Metros. Three of the most commonly used attributes are on-time performance, headway regularity, and the adherence to running time (Eboli and Mazzullo, 2012). One of the most sophisticated measures to reflect passenger experience is the excess wait time used by Transport for London (van Ort 2014). Many other possible objective indicators for reliability have been applied but according to van Ort (2014) and others there is still limited consistency in their usage and interpretation as an indicators of public transport quality. Therefore, the subjective measurement through satisfaction survey is commonly used.

For customer satisfaction survey reliability, safety, customer services and comfort are important attributes, and these have been used in BRT in Latin America (Allen *et al.*, 2019), bus transit in Scotland (Morton *et al.*, 2016), intercity rail service in Thailand (Jomnonkwao *et al.*, 2020) and bus in Phnom Penh (Sum *et.al.*, 2020). While others stressed the importance of convenience (İmre and Çelebi, 2017). Many argues that the service quality has a significant and direct relationship with accessibility (Friman et al., 2020) and user’s perception on integration of services that includes fares and physical and service (Choudhary *et al.*, 2018, Aziz *et al.*, 2012).

Satisfaction survey of six European cities revealed that travel satisfaction is positively related to accessibility (network coverage, travel speed and service frequency), costs and perceived societal and environmental importance of public transport (Ingvardson and Nielsen, 2019). There is however difference in opinion of users, planners, and policymakers on how to make mobility sustainable (Brůhová Foltýnová *et al.*, 2020).

Social sustainability in urban mobility is still an area to be explored, a study on the relationship between transport users' perceptions and travel behaviours within South-East Asia revealed that locational, socio-demographic, psychological and cultural factors much affect mode choice (Loo *et al.*, 2015).

There are concepts of evaluating whole of journey approach when commuting by using more than one mode of public transport. Dixit *et al.* (2019) developed a methodology using smart card to study reliability of multiple transfers and factors influencing the variability of travel time (Kathuria, *et al.*, 2020). In some cities the car dependency is hampering the use of public transport due to limited accessibility and survey was conducted to understand the public opinion and to shift behavior to use metro in Qatar (Al-Thawadi, *et al.*, 2021).

Improvement of public transport is linked to sustainability and quality of life. A review of Istanbul public transport systems shows that the quality of life there has improved (Canitez *et al.*, 2020). A recent survey in a Japanese city indicate that generally older people show higher travel satisfaction in using public transit (Kim *et al.*, 2020).

Based on the above review, it is important to identify key attributes of urban public transport services to seek feedback from the users on quality and reliability of services. The results then can be used to improve overall service quality of public transport. Public transport regulators can use the results to seek improved services from operators where the result values are low or less satisfactory. The paper uses eight attributes recommended by ESCAP (ESCAP, 2020) which are also based on the study by de Oña and de Oña (2015).

## **4. METHOD AND DATA**

### **4.1 Method used to collect user's perception**

High quality and reliable urban public transport service are crucial to attract passengers and reducing personal motorized transport in the long term. The user's positive experience of the service is critical for people's desire to choose public transport. Periodic evaluation of user satisfaction is therefore becoming a common approach among urban public transport operators using satisfaction surveys (de Oña *et al.*, 2016). There are both objective and subjective indicators approach used to measure quality and reliability of public transport services, but the subjective approach is usually preferred. Also, stakeholder consultation and engagement are critical part in the process of development of policy and plan to improve mobility (Davis, 2018). The quality and reliability of public transport service is one of the indicators of the sustainable urban transport index (SUTI) developed and used by ESCAP (ESCAP, 2016 and Gudmundsson and Regmi, 2017).

The quality and reliability of public transport services is defined as the degree to which passengers of the public transport system are satisfied with various attributes of the quality and reliability of service while using the different modes of public transport (ESCAP, 2016). The result is expressed as the overall share of satisfied customers as percentage (%) of all public transport users based on a survey. ESCAP recommend a minimum of 30% satisfaction and 95% satisfaction is the expected maximum.

The pilot cities were selected in consultation with countries and cities following the proposal received from the candidate cities expressing interest for assessment of urban mobility using the SUTI framework. The five Asian cities selected for the study are part of 20 cities where the sustainability assessment of urban mobility was conducted. The study was designed to include city from different subregion of Asia having different public transport systems, economy, and urban context. Tehran city is from South-West Asia, Dhaka and Thimphu are from South Asia, and Bandung and Ho Chi Minh city from South-East Asia are selected for this study. The cities are of different sizes, represent different national, and spatial and economic characteristics and have different form of public transport systems and services. Table 1 shows basic characteristics of five cities selected for the study.

**Table 1: Basic characteristics of the five cities selected for studies**

Characteristics/city	Bandung	Thimphu	Dhaka	Ho Chi Minh	Tehran
Size (sq Km)	167.7	26.13	303	2,095	730
Population	2.48 mil.	114,551	17 mil.	8.99 mil.	9.1 mil.
Average density (pop/sq Km)	14,795	4,384	56,105	4,291	12,465
Form of public transport	BRT, Bus (expansion of BRT planned)	Bus (Improvement Bus, light BRT and LRT)	Bus, water taxi (BRT and Metro planned)	Bus, water taxi (Metro and BRT planned)	Metro, BRT, Bus (Expansion of BRT and Metro planned)

(Source: compiled from various sources)

The survey method outlined in SUTI guideline (UNESCAP, 2020) is used to evaluate the quality and reliability of public transport services by collecting and analyzing data either through a new satisfaction survey or adapting from satisfaction survey conducted by transport operators.

**4.2 Data collection**

ESCAP data collection guideline provides detail information on the collection of data on quality and reliability and conduct of survey (ESCAP, 2020). The following eight attributes of quality and reliability dimensions which are similar to the highlighted in the study by de Oña and de Oña (2015) are considered for the survey questions. The question to be asked is “How satisfied are you with the following aspect of public transport service:

- i. Frequency of the service
- ii. Punctuality (delay)
- iii. Comfort and cleanliness of vehicles

- iv. Safety of vehicles
- v. Convenience of stops/stations
- vi. Availability of information
- vii. Personnel courtesy
- viii. Fare level.

During the survey, the commuters or survey respondents will be asked to rate their satisfaction with the above eight attributes on a Likert 7, 5- or 3-point scale. The suggestion is to use a seven-point scale with the level 4 as neutral. The following are the rating scale:

1. 'Very dissatisfied'
2. 'Dissatisfied'
3. 'Partly dissatisfied'
4. 'Neither satisfied nor dissatisfied'
5. 'Partly satisfied'
6. 'Satisfied'
7. 'Very satisfied'.

The surveys were conducted in Dhaka, Tehran and Thimphu during 2017 and 2019 (Alam, 2018; Mehta, 2019; Mojtehdzadeh, 2019) and for the Ho Chi Minh City and Bandung the results of the customer satisfaction survey of public transport conducted by the research institute and transport agency is used (Pham, 2018 and Weningtyas, 2018). The sample size of surveys was 280 for Dhaka, 300 in Tehran (100 for each mode bus, BRT and Metro), 125 in Thimphu, 400 households in Ho Chi Minh city and 250 commuters in Bandung. The data collection and evaluation were part of overall sustainability assessment of these cities using ten SUTI indicators (ESCAP, 2016, Gudmundsson and Regmi, 2017, ESCAP, 2020 and Regmi, 2020).

#### **4.3 Limitation of survey**

The sample size and response varied among cities. The commuters were asked to rate their preference on a Likert 7, 5- or 3-point scale. But in case of Tehran and Thimphu- the results are presented in only two categories- satisfied and unsatisfied even though survey included these ratings. The survey of Bandung only included BRT users. It does not include the perception on other modes such as bus and paratransit (*Angkot*) which is very popular in Bandung. The result shows high level of satisfaction. As the survey was administered by the transport operator in Bandung- a positive bias can be sensed. Also, in Tehran and Ho Chi Minh city, the surveys used different and more attributes of quality and reliability for the survey. The gender and social dimensions of public transport is an important aspect to be considered in planning and provision of service, however the survey did not include specific questions related to gender and social dimension.

### **5. RESULTS AND DISCUSSIONS**

The following section presents results of user's satisfaction survey conducted in Dhaka, Tehran and Thimphu (Alam, 2018; Mehta, 2019; and Mojtehdzadeh, 2019). For Bandung and Ho Chi Minh city the customer satisfaction survey conducted by the BRT operator and a research institute is used (Weningtyas, 2018 and Pham, 2018).

## 5.1 Comparison of five cities

Table 2 shows key four indicators related to public transport in five Asian cities. In these cities, the mode share of public and active transport ranges from 19% in Bandung to 87% in Dhaka, accessibility ranges from 38% in Bandung to maximum 93% in Tehran, satisfaction level of quality and reliability was low with 38% in Dhaka and high 88% in Bandung (only BRT). The fatality data for Dhaka is 1.64 fatality per 100,000 population is too good compared with national average of 15.3 (WHO, 2018). This could represent underreporting and result of dense population in Dhaka. Also, the mode share includes share of active transport (17%) and fixed service paratransit (14%). The commuter's dissatisfaction in the survey do not go along with high mode share of public transport indicating the captive users of forced to use irregular public transport systems in Dhaka. Among these five cities Tehran has high accessibility covering 93% of urban residents with bus, metro and BRT network followed by Ho Chi Minh city with 76% coverage. The completion of ongoing BRT and metro system in Dhaka is expected to increase the accessibility of public transport.

Table 2: Key public transport indicators of sustainability in Asian Cities

	<b>Sustainability indicators</b>	<b>Bandung</b>	<b>Dhaka</b>	<b>Ho Chi Minh</b>	<b>Tehran</b>	<b>Thimphu</b>
1	Modal share of active and public transport in commuting	19.34%	87.11%	28.58%	37.4%	36.8%
2	Convenient access to public transport service (% of population covered by public transport)	38%	56.5%	75.77%	93.23%	52.76%
3	Public transport quality and reliability (% satisfied)	88%	37.9%	41.77%	62.01%%	63.52
4	Traffic fatalities per 100,000 inhabitants	4.36	1.64	8	7.39	6.11

(Sources: Alam, 2018; Mehta, 2019; Mojtehdzadeh, 2019; Pham, 2018; Weningtyas, 2018)

Figure 1 shows the radar plot of satisfaction survey of five Asian cities. It can be clearly observed that the commuters in Bandung, Thimphu and Tehran are more satisfied with the service quality and reliability of public transport. The majority of commuters in Dhaka and Ho Chi Minh city are not satisfied with the quality and reliability of public transport in those two cities. In case of Dhaka, the users poorly rated the punctuality, safety, comfort, and provision of information to the users. While in Tehran all public transport modes (BRT, Bus and Metro) the provision of information was rated poorly, the operations were not punctual, and the location of public transport stops were not adequate. The case was similar in terms of provision of information to users in Thimphu bus service and where users also rated location of bus stops and comfort and cleanliness in bus poorly. Ho Chi Minh city was only city among five where the respondents rated all attributes on quality and reliability poorly. While Bandung BRT was rated highly by respondents and only the punctuality scored lowest among other attributes. The detail results of individual cities are discussed in the following section.

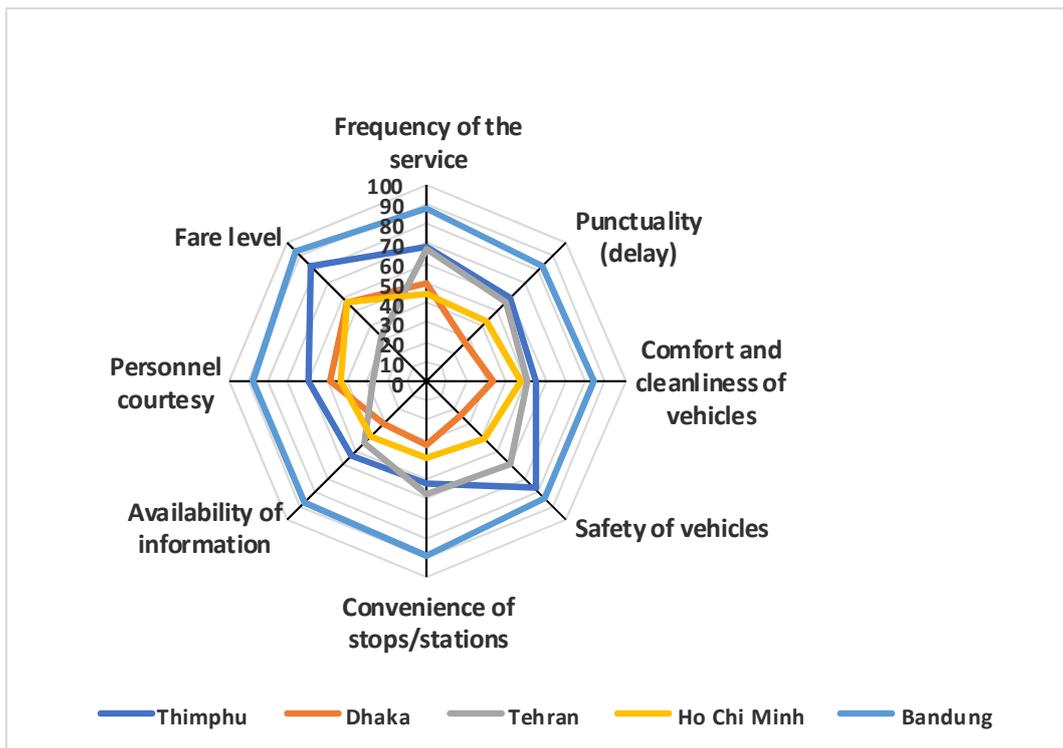


Figure 1: Radar plot of perception survey of Asian cities

## 5.2 Survey result of individual city

### 5.2.1 Dhaka

Dhaka, one of the most populous and dense emerging megacities in the world suffers from lack of efficient public transport systems. Bus, minibus, various paratransit, and rickshaw are main constituent of public transport systems in Dhaka. There are 152 bus routes with 237 bus stops in Dhaka. Water transport, Hatirjheel Water Taxi service is also getting popular in providing a cost effective and quick transportation system inside Dhaka city. Circular bus service (Dhaka-Chaka) in Hatirjheel area is also popular and helping to ease the movement in and around Gulshan and Banani area (Alam, 2018). In order to improve public transport construction of BRT and metro is progressing in Dhaka.

A field survey was conducted at bus stops and on-boards, along 5 important public transport corridors in Dhaka to derive user's perception on quality and reliability of public transport. The selected corridors were: Azimpur-Mirpur 1; Gulisthan-Mohakhali-Gazipur; Gulisthan-Mohammadpur; Azimpur-Mirpur 10; and Jatrabari-Progoti Shoroni-Abdullahpur. Passengers of the public transports in their day to day life were asked questions about the reliability and quality of public transport. Total 280 commuters were interviewed among them 100 were women. The questions included all the 8 aspects of quality and reliability as outlined in the methodology and used a 7-point Likert scale for rating the responses.

Table 3: Results of survey of public transport quality and reliability in Dhaka

Attributes	Dissatisfied			Neutral	Satisfied			Responses	Average Score	% Satisfied
	Very		Partly		Partly		Very			
	1	2	3		4	5	6			
Frequency of Service	52	44	32	12	108	26	5	279	3.64	49.82
Punctuality	18	85	77	23	56	17	4	280	3.29	27.50
Comfort and Cleanliness	23	28	84	53	67	23	2	280	3.68	32.86
Safety of Vehicles	25	35	78	71	48	16	2	275	3.50	24.00
Convenience of Bus Stops or Stations	25	28	74	58	76	11	2	274	3.63	32.48
Availability of Information	21	22	72	78	64	23	0	280	3.75	31.07
Personal courtesy	17	23	49	54	119	14	3	279	4.04	48.75
Fare Level	8	20	45	46	83	51	22	275	4.52	56.73
Total	189	285	511	395	621	181	40	2222	3.75	<b>37.90</b>

(Source: Alam, 2018)

Table 3 shows the result of satisfaction survey in Dhaka. It can be observed from the result that that overall, 38% of respondents are satisfied with the quality and reliability of public transport in Dhaka. Only the fare level received a score of 56% and personal courtesy and frequency of service is satisfactory. But people are highly dis-satisfied with the safety issues (24%). The old vehicle fleet, lack of proper bus stops and bus bays for boarding and alighting passengers are adding to safety concerns (Alam, 2018). Punctuality received very poor score (27%) due to frequent undesignated stops and sudden boarding/alighting of passengers and due to congestion maintaining the schedule is difficult. Comfort and cleanliness also received poor score. Though enough buses from different companies are available on the road, still there is a huge lack of well-defined bus stops.

There is much work to be done to improve quality and reliability of public transport in Dhaka city. Some of measures that can be taken to attract more commuters to public transport could be: (i) designation of bus bays and stops; (ii) at grade boarding and alighting and provision for special need people at stations and inside buses; (iii) regular maintenance of buses and phasing out old bus fleets from the city; (iv) improvement of traffic management system; and (v) provide regular training for drivers and bus crew.

### 5.2.2 Tehran

Tehran's public transport system includes variety of public transport modes like bus, bus rapid transit (BRT), metro, taxi, fixed- route taxi, private taxi, and internet taxi. Taxi is the most popular public transport modes in Tehran. There are about 4785 bus stations and 347 BRT stations in Tehran. Tehran BRT system with 8 corridors and 130 km in length carries 2 million

passengers per day (BRT data, 2021). Tehran metro consist of six lines, with a total 215 km length and 114 stations and total of 723 million trips were made by metro in 2017 (Mojtehdzadeh, 2019). A new bike service named “Bidood” is in operation in 3 districts of Tehran. Tehran Municipality is implementing “Safe and Smooth Transportation and Traffic” policy to improve public transport in Tehran.

In Tehran public transport operators, such as Metro conducts passenger satisfaction surveys but does not cover all attributes as outlined in the methodology. Three satisfaction surveys of passengers of bus, BRT and Metro were conducted that received 100 responses for each mode (Mojtehdzadeh, 2019). The questionnaire used were slightly different but covered all attributes outlined in the methodology. The weighted average of the users’ satisfaction level of these three main public transport modes, was 60% (Table 4). The result of surveys is shown in Table 5. For bus, metro and BRT transport availability of information was poorly rated with only 16%, 27% and 17% satisfied respectively, punctuality of BRT was also poorly rated by users at 33%, for metro fare level was rated poorly with 32% satisfied.

Table 4. Public transport user’s satisfaction survey in Tehran

Mode	Satisfied %	Mode Share (%)	Weightage Satisfied
Bus	60.10	46	27.64
BRT	64.2	39	25.04
Metro	49.15	15	7.37
<b>Total satisfied</b>			<b>60.05%</b>

Table 5: Survey result of user's perception on quality and reliability of the Public Transport in Tehran

Survey attributes	Bus			Metro			BRT		
	Dissatisfied	Satisfied	% Satisfied	Dissatisfied	Satisfied	% Satisfied	Dissatisfied	Satisfied	% Satisfied
Frequency of the service	25	75	75.00	33	67	67	18	82	82
Condition of air & temperature inside the vehicles	38	62	62.00	-	-	-	24	76	76
Cleanliness of inside the vehicles	27	73	73.00	44	56	56	15	85	85
Cleanliness of outside the vehicles	28	72	72.00	-	-	-	18	82	82
Personnel courtesy	21	79	79.00	49	51	51	32	68	68
Satisfaction/safety of vehicles driving	23	77	77.00	41	59	59	20	80	80
Punctuality (delay)	50	50	50.00	43	57	57	67	33	33
Convenience of stops/stations	50	50	50.00	55	45	45	42	58	58
Availability of information	84	16	16.00	73	27	27	83	17	17
Fare level	53	47	47.00	68	32	32	39	61	61.00
<b>Total Responses</b>	<b>399</b>	<b>601</b>	<b>60.1%</b>	<b>407</b>	<b>393</b>	<b>49.15%</b>	<b>358</b>	<b>642</b>	<b>64.2%</b>

Source (Mojtehdzadeh, 2019)

### 5.2.3 Thimphu

Thimphu with population of 114,551 is stretched along narrow Wangchu river valley running 17 km north south direction, and three km east west direction. Total 270 km of road network and pedestrian walkways provide public transport infrastructure. A fleet of 56 city buses, 3024 taxis, 36567 private cars, 1591 government cars and 3334 two wheelers support the transport needs of the city. Public bus service along 15 routes with a fleet of 49 buses is operated by Bhutan Postal Corporation, a public sector entity. Use of private cars for commuting dominates mode share with 49%. Only 15% of the commuters use city bus services followed by use of taxi by 9.7% commuters. Walking remains the second most popular mode with 22% share (Mehta, 2019). Studies to develop a light rail transit to connect Paro (airport) and Thimphu and development of light BRT to improve public transport were conducted and discussed.

Table 6 shows the result of survey on quality and reliability of the public transport in Thimphu. A survey of 125 commuters was undertaken in the first and second week of October 2019. The response rate was 24 to 30%. Overall score on quality and reliability of public transport is 63.5%. Riders rated the fare of city buses as very reasonable and the total score on the fare is 82.9%. This is quite expected as the government has subsidized the city bus services operated by the Bhutan Postal Corporation. The commuters have rated the convenience of bus stops, availability of information and comfort and cleanliness the lowest. The high satisfaction level seems to have not translated to more share of public transport in Thimphu with 36.8%. The fact that personal vehicles are the preferred mode for commuters due to the complex behavioural aspect that make using a personal vehicles a prestige.

Table 6: Survey of Quality and Reliability of the Public Transport in Thimphu

Attributes	Dissatisfied	Satisfied	Respondents	% Satisfied
Frequency of the service	10	21	31	<b>67.74</b>
Punctuality (delay)	13	19	32	<b>59.38</b>
Comfort and cleanliness of vehicles	17	21	38	<b>55.26</b>
Safety of vehicles	8	27	35	<b>77.14</b>
Convenience of stops/stations	16	17	33	<b>51.52</b>
Availability of information	16	19	35	<b>54.29</b>
Personnel courtesy	12	18	30	<b>60.00</b>
Fare level	6	29	35	<b>82.86</b>
Total Responses	98	171	269	<b>63.52</b>

Source (Mehta, 2019)

### 5.2.4 Ho Chi Minh City

Public bus is main mode of transport in Ho Chi Minh city and the city operates total 144 bus routes (including 105 subsidized bus routes and 39 non-subsidized bus routes). The bus based public transport services with 4,405 bus stops/stations cover about 27% of city area and 67% of population (Pham, 2018). However, the mode share of scheduled bus and minibus is very low as the accessibility is not even across different parts of the city. Water bus along the

Saigon River has started service in recent years with limited stations. To enhance sustainability the city operates 299 buses using clean fuel CNG. Construction of subway is ongoing with planned completion in 2022.

Table 7 shows the result of commutes satisfaction survey of 400 households in Ho Chi Minh city conducted by the Institute for Development Studies in 2017. The survey included more attributes than 8 suggested in the methodology and used 5-point Likert scale. The overall satisfaction level was low with 44.77%. Among attributes cleanliness at bus and bus stops received low score, followed by safety and security and bus route.

Table 7: Result of commuter’s satisfaction survey in Ho Chi Minh City

Attributes	Dissatisfied		Neither	Satisfied		Response	Av. Score	Satisfied
	Very	Partly	Nor	Partly	Very			
	1	2	3	4	5			
Driver’s attitude	2	41	178	166	13	400	3.37	<b>44.75</b>
Bus conductor’s attitude	1	35	188	162	14	400	3.38	<b>44.00</b>
On-bus facilities (air conditioner, seats)	3	25	182	174	16	400	3.44	<b>47.50</b>
Bus route	1	16	214	155	14	400	3.41	<b>42.25</b>
Running time (open/close of line)	2	24	198	162	14	400	3.41	<b>44.00</b>
Ticket price	1	4	166	202	27	400	3.63	<b>57.25</b>
Safety, security	3	58	176	141	22	400	3.30	<b>40.75</b>
Cleanliness of bus	3	37	212	135	13	400	3.30	<b>37.00</b>
Cleanliness at bus station	6	45	216	122	11	400	3.22	<b>33.25</b>
Operation information of bus	1	20	220	148	11	400	3.37	<b>39.75</b>
Station distance	2	22	220	145	11	400	3.35	<b>39.00</b>
Feedback on questions	2	7	246	135	10	400	3.36	<b>36.25</b>
General evaluation	11	30	210	148	1	400	3.25	<b>37.25</b>
<b>Responses</b>	<b>38</b>	<b>364</b>	<b>2626</b>	<b>1995</b>	<b>177</b>	<b>5200</b>		<b>41.77</b>

(Source: Pham, 2018)

### 5.2.5 Bandung

Public bus, Trans Bandung Metro (TBM), paratransit (minibuses) and taxis provide public transport service to commuters. There are 15 bus routes operated by DAMRI, four BRT corridors, 39 *Angkot* (paratransit) routes which is very popular and convenient modes of public transport in Bandung. In addition, a fleet of free yellow school bus for school students is operated by the city. Mode share of bus and scheduled minibus is very low with *Angkot* taking significant share of public transport because of affordability, frequency, and convenience.

Table 8 shows the results of customer satisfaction survey of 250 commuters of the Trans Metro Bandung conducted by the Transport Technical Implementation Unit for second trimester of 2017. The result show that the commuters are satisfied (88%) with the service of BRT system in Bandung (Weningtyas, 2018). In addition to the eight attributes suggested in

the methodology, the survey included one additional attribute. Bandung also has bus and semi organized paratransit (*Angkot*) services which is not included in the survey. Punctuality and quality of services are two attributes that received low rating of 82% and 84% respectively. Some of the bus stops of the TBM are not actually used as they are raised from road.

Table 8: Customer satisfaction survey of Trans Metro Bandung

<b>Num</b>	<b>Attibutes</b>	<b>% Satisfied</b>
1	Frequency of the service	88.02
2	Service (include comfort, cleanlines, safety, and convenience)	84.64
3	Time of Service	92,84
4	Fare level	93.02
5	Physical Facilities	88.73
6	Punctuality (delay)	82.37
7	Personnel courtesy	87.40
8	Availability of information	87.36
9	Complain Service	87.86
<b>Average</b>		<b>88.03</b>

(Source: Weningtyas, 2018)

**6. CONCLUSIONS**

The paper has analyzed the perception of commuters towards the quality and reliability of public transport systems and services in five Asian cities. Eight key dimensions are suggested for a user’s satisfaction survey and rating on 7-, 5- or 3-point Likert scale. Despite the efforts of authorities to improve public transport in five cities surveyed, the ridership has not been increasing. The results indicate that commuters in Thimphu, Tehran and Bandung are satisfied with the service and the commuters in Dhaka and Ho Chi Minh city were not satisfied with public transport services.

All these cities operated combination of transport systems. Dhaka the much-talked BRT and Metro is yet to start operation. The construction of metro in Ho Chi Minh city is ongoing. Thimphu is planning for light BRT and LRT; expansions of metro and BRT is ongoing in Tehran and expansion of BRT is planned in Bandung.

It is important to increase accessibility by extending service and improve quality and reliability of services based on feedback received from the commuters. Users rated fare level positively in all cities except for metro in Tehran. The fare is affordable in Asian cities and usually these are subsidized by local or national government. There is practice of conducting periodic user’s satisfaction survey by transport authorities- that need to include all important attributes of quality and reliability of public transport services. But the question is how effectively the results is used to improve service and further planning of public transport systems in the city. It would largely depend on the management of regulator and operators of public transport in each city.

The public transport regulator should use the survey results to seek improve public transport

services from the operators. In case of Dhaka, many efforts are required to improve punctuality, safety, comfort and provide information to users. While in Tehran all public transport modes (BRT, Bus and Metro) need to provide more information to the users, improve punctuality and improve accessibility by designing appropriate location of public transport stops. Additional efforts are required to provide information to users, designate proper bus stops and improve comfort and cleanliness in bus service in Thimphu. Ho Chi Minh city bus operation need to improve all aspects of service quality and reliability. While the survey indicated good satisfaction on the services of Bandung BRT and punctuality scored lowest among others.

We could observe the different perception of commuter with respect to eight dimensions that relate to quality and reliability of service of public transport. There is growing use of different form of paratransit in Asian cities with mode share of passenger using paratransit is significant such as *Angkot* in Bandung. They should also be included while evaluating and assessing existing public transport systems in cities. Even though there are plan to expand public transport systems in these five cities, it is important that the city authorities, regulators or operators use the survey results to improve safety, comfort, and courtesy, and to provide adequate information on public transport to the public and plan public transport stops at convenient locations. Similarly, more Asian cities could utilize the survey methodology to receive feedback of commuters and utilize the results to improve quality and reliability of public transport services.

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