Evaluation of Bus Rapid Transit (BRT) Peshawar in Pakistan By Comparison With International Standards

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Abstract
BRT Peshawar is introduced in the business hub of China Pakistan Economic Corridor (CPEC), Peshawar city which bears an important geographical location in Asia to enhance transport efficiency, and reduce carbon footprints, congestion and safety issues. This research study has evaluated BRT Peshawar by comparing it with international standards of “BRT Standards 2016”. It was found satisfactory as it meets most of the criteria of international standards, and achieved “Gold Standard BRT” status. However, improvement is needed in some key areas like service planning, infrastructure, and access and integration in which it has scored little low. The policy makers and operating agencies should focus on operating hours, passing lanes, bicycle lanes, and integration of bicycle sharing for increased ridership, service quality and user satisfaction.

Keywords: Bus Rapid Transit (BRT), Evaluation, Peshawar BRT, BRT Standards 2016, BRT Scoring, Performance Evaluation

Introduction
Peshawar is the capital of Khyber Pakhtunkhwa (KPK) with the population of 4.26 million in 2017 census(Pakistan Bureau of Statistics, 2017). It bears important geographical location in Central Asia as a main business hub of China Pakistan Economic Corridor (CPEC), and is also a gateway to Afghanistan for North Atlantic Treaty Organization (NATO) supplies(Farooq, Javaid, & Karl, 2015). In last few decades, the city has suffered increased problem of congestion, carbon footprints, and safety (accidents/fatalities) due to
tremendous increase in private motorization plying on roads. Modal shares of public modes are on decline e.g. private cars are increased by 229% in a last decade in Peshawar which has compromised the environmental, road capacity, and safety aspects of the city (Ali, Shah, & Hussain, 2012; Khan & Arshad, 2015; Ullah, Liu, & Vanduy, 2019). There are several reasons behind this decline e.g. poor policies and strategies, inconvenience to schedule which has forced many to shift towards private modes (car, motorcycles, taxi etc.). Thus, there is a great need that policy makers and stakeholders sit together, and investigate policies, strategies, and interventions related to public transport in Peshawar to have a sustainable urban development.

Urban transportation schemes like Bus Rapid Transit (BRT) is considered as most efficient and economical solution which compensates for congestion, environmental, and safety issues to have a sustainable urban transportation system. BRT projects have been proven effective in different parts of world which reduced costs of travel time, traffic fatalities, and air pollution (Bel & Holst, 2018; Carrigan, King, Velasquez, Raifman, & Duduta, 2013). It is found to be low carbon target for Asian countries which will emit low carbon dioxide (CO₂) by compelling users toward it (Kikuchi, Fukuda, Ishizaka, Ito, & Satienam, 2013; Satienam, Tankasem, Satienam, Jantosut, & Detdamrong, 2013). The effectiveness of BRT has intended government of KPK to initiate construction of BRT Peshawar project in 2017. It has a 26km long corridor having 31 stations at an average distance of 850m, and 15km is at-grade and 8km consists of flyover while the remaining 3km section constitutes of underpass (TransPeshawar).

Evaluation of urban transportation schemes is vital in order to assess the performance and operations as well as to determine the acceptance of such scheme over the daily commuters. The primary concern with BRT project is to determine that the scheme has a potential to provide comfortable and accessible services. Second, is to determine that BRT mode fulfils the international criteria of implementation which will be influencing the ridership and quality of BRT mode. These statements provide the basis to conduct this research study that will evaluate BRT Peshawar according to BRT Standards which will point out the mitigation measures accordingly for the deficient areas for sustainable development.

**Literature Review**

Rathore and Ali (2015) evaluated Lahore Bus Rapid Transit System on basis of 2014 BRT Standards and compared various elements of BRT Lahore with BRT standards 2014. Lahore BRT failed to achieve Gold, Bronze and Silver and achieved Basic BRT level. It was found that the Lahore BRT is facing operational and maintenance problems.

Jalil (2017) evaluated Rawalpindi-Islamabad BRT on basis of BRT Standards 2016 and compared various elements of BRT Rawalpindi-Islamabad with international BRT standards 2016. It achieved the Bronze BRT criteria, and evaluated that Rawalpindi-Islamabad BRT does not fulfil the criteria of infrastructure, service planning and integration and access.

Chaurasia (2014) investigated the properties and various features of BRT System with help of already operating various BRTS. The case study of Bhopal was selected to analyse the conditions of BRT. Bhopal BRT connects different parts of the city having 24km route and consists of 82 bus stops. The evaluation results show that more than half of the BRT corridor infrastructure is in poor condition, and there is lot to do in public information system, foot over bridges, safety concerns of pedestrians etc. It was found that BRT provides comfortable and safe corridor for motor vehicles, pedestrians and cyclists with the important elements including public information system, pedestrian crossing signals, curbs, platform, pedestrian subways, bus stops, foot over bridges, railings, signage and road markings etc.

Ahmed and Azeem (2015) did performance evaluation of Metro Bus Lahore which is 27km long corridor with 27 stations, and the average daily ridership of 125,000. Performance evaluation was assessed on basis of productivity, service frequency, product capacity, safety, utilization and service provided. It was evaluated that the metro bus service is satisfactory in all respects including safety, quality, security and of good reliability.
Panchore and Khushwaha (2016) defined BRT as faster mode of mass transportation than other available modes with 50kph or more average operating speed. According to him, exclusive right of way is required for rapid transit. Rapid transit is faster mode as compared to those sharing road. BRT is a rapid transit mode with high flexibility and performance and it combines different system, operating and physical elements into integrated system that provide high quality and reliable service. BRT is lower cost and high capacity service that can increase mobility.

Rahul and Kasundra (2017) did a review study on Performance evaluation of BRT System in India. The Janmarg, Ahmadabad BRT was evaluated on basis of some parameter including environmental, social and traffic impacts. It was found that there is an increase in average speed, and decrease in congestion and composition of pollutants along corridors due to BRT implementation. The corridor of Ambedkar to Moolchand of Delhi BRT was also evaluated for performance evaluation. It was evaluated that non-BRT section carry comparable flows of traffic, and passenger load as compared to non-BRT is higher on BRT routes. There is average speed increase of 3% on BRT route, and the corridor is rated between average to good. Accidents are increased and average queue length increased after implementation of BRT.

Hidalgo and Pai (2010) evaluated Delhi bus corridor, and concluded that the Delhi bus corridor has improved mobility of people. Speeds of buses are 150% faster than buses outside the corridor, and travel experience is improved by having facilities for pedestrians and bicycles. However, it requires significant safety, performance and overall quality enhancements. It is also lacked in integrated implementation of service plans, technologies, education and operations.

Jaiswal, Sharma, and Krishnan (2002) studied the impact of BRT System on Ahmadabad’s transport sector, and analysed that BRT Ahmadabad has improved access for local riders, average speed along corridor, user satisfaction. It was evaluated there is significant reduction in congestion and composition of pollutants along BRT corridor.

Sekhar and Velmurugan (2013) analysed the performance evaluation of Ambedkar to Moolchand corridor of Delhi BRT. It was found that non-BRT section carry comparable flows of traffic, and passenger load is higher on BRT routes as compared to non-BRT. There is average speed increase of 3% on BRT route, and the corridor was rated between average to good. Accidents and queue lengths are increased after implementation of BRT.

GANDHI, TIWARI, and FAZIO (2013) studied alternate operation, planning and design options for BRTS. Results show that bus operational speeds are 25% less in open system than in closed system. Speed for the trip length of less than 10km in open system is higher for passengers than closed bus operations. It was found that by restricting peak speed of bus to less than 40kph for safety purposes does not alter passengers or operational performance.

Methodology
The BRT Standard is a tool which evaluates BRT with international practices followed around the world. It acts as a planning and scoring tool which assists in defining a framework for planners, decision makers, and designers to implement a BRT that ensures high quality and reliable services. The evaluation tool is based on some essential elements that defines the quality and performance of BRT by scoring the elements. It results in the rankings of BRT as gold, silver, bronze, and basic BRT. The first three ranking shows the excellence of projects from gold as excellent to bronze as a good category while basic BRT lies in the category which just justify the corridor as a BRT by achieving minimum criteria.

This research has evaluated the BRT Peshawar by comparison with the “BRT Standards 2016”. The elements on behalf of which the evaluation is carried out are: BRT basics, service planning, infrastructure, stations, communications, and access and integration which are further sub-categorized. The data was collected from field visits and TransPeshawar department which assisted to carry out evaluation.
Results

1. BRT Basics

The BRT basics consists of elements that are essential minimum criteria to consider the corridor as a BRT. It provides the basics without which the project will not be considered as BRT and is the condition for further achieving bronze, silver, and gold categories. The elements include dedicated right of way, busway alignment, off-board fare collection, intersection treatment, platform-level boarding. The BRT corridor must achieve minimum score of 20 for all five elements, and must achieve a score of 4 on both dedicated right of way and busway alignment (ITDP, 2016). BRT Peshawar has achieved 38/38 score in BRT basics while 8/8 for both dedicated right of way and busway alignment. The elements of BRT basics are discussed as follows:

1.1 Dedicated right-of-way

A dedicated right-of-way ensures the high speed of bus which is unaffected by congestion. There are many ways to separate a corridor from a mixed traffic but physical separation like fencing, prevent the corridor to be used by vehicles except bus. A corridor must be of at least 3km to be defined as BRT and BRT Peshawar is 26km long corridor that is physically separated by fencing with dedicated lanes. The score for physically separated, color-differentiated dedicated lane without physical separation, dedicated lanes segregated by painted line, and without dedicated lane is 8, 6, 4, and 0 respectively (ITDP, 2016). BRT Peshawar achieved a score of 8/8 in this regard.

1.2 Busway alignment

The best location for busway alignment is where there are minimum conflicts with other vehicles. The busway in the centre of the roadway faces reduced conflicts as compared to busway on the curb side due to minimizing conflicts of turning and access to curbside (ITDP, 2016). BRT Peshawar runs in the middle of two way Jamrud Road with median aligned two-way busway. BRT Peshawar achieved a score of 8/8 in this element.

1.3 Off-board fare collection

Off-board fare collection helps to reduce the travel time of the trip, and also improve the experience of passengers. It can be done by two approaches: Barrier-controlled, and proof-of-payment. In first approach, passengers enter through turnstile, gate or checkpoint where they have to show the proof of payment or pay by smart card, while in second approach passenger buy tickets and are checked by inspectors on boarding to vehicle. The stations which are barrier-controlled are awarded maximum score of 8 (ITDP, 2016). BRT Peshawar have all stations barrier-controlled in which turnstile will be installed that will speed-up the journey of users. So, it is awarded 8/8 score in this element.

1.4 Intersection treatment

Intersection is the important element that significantly effects the travel time, speed, and delays. A well-treated intersection helps to reduce travel time and delays, and increase the speed of vehicle. The signal priority intersection is useful on low frequency BRT corridors which is activated when BRT vehicle approaches. The prohibited turns across the BRT lane is more effective in reducing the delays, and travel time (ITDP, 2016). BRT Peshawar has prohibited turns across the bus lanes by having fencing throughout the corridor. It is awarded 7/7 score in intersection treatment.

1.5 Platform-level boarding

The platform-level boarding is an important element in sustainable urban transportation that provides safe and comfortable boarding to the passengers. It reduces the delays caused due to disabled persons in alighting and boarding at stations which increase the efficiency of the system. The vertical gap between the station platform and the bus floor should be either 4 centimeters or less to account for comfortable and safe boarding of disabled passengers (ITDP, 2016). All busses of BRT Peshawar have floor level with the
platform of stations having less than 4 centimeters of vertical gaps. The maximum score for the aforementioned element is 7 and BRT Peshawar achieved a 7/7 score in this element.

2  Service Planning

Service planning helps to ensure that the system has the capacity to overcome the current needs as well as future demand of transportation to have a sustainable urban transportation. It has various elements which are: multiple routes, express, limited-stop and local services, control center, demand profile, multi-corridor network, hours of operation, demand profile, and location in top ten corridors. BRT Peshawar scored 16/19 in service planning criteria which is representation of good planning. The various elements are discussed as follows:

2.1  Multiple routes

Multiple routes operating in a corridor that goes to various destinations helps to reduce the door to door travel time by decreasing the transfer time. The BRT Standards assign a score of 4, and 0 to multiple routes, and no multiple routes respectively. BRT Peshawar has a single corridor that runs from Chamkani to Karkhano Market including five feeder routes that will help to reduce the travel time of passengers. Therefore, it has achieved a score of 4/4 in this element.

2.2  Express, limited-stop, and local services

BRT corridors operating with express and limited-stop services reduce the travel time and increase the speed of journey. Express service carry passengers from one end to the other end of the corridor or to the city centre and stops at few stations, while limited-stop services stops at high demand stations and skips stations of lower demand. The local service provides pick and drop at each and every station in corridor. BRT Peshawar have all express, limited-stop, and local services. Hence, it achieved a score of 3/3 for the mentioned criteria.

2.3  Control center

Control center are essential for monitoring operations of BRT as well as to respond problems directly to the operators. It uses Global Positioning System (GPS) and automatic vehicle location (AVL) to monitor the location, incidents, spacing, maintenance status, and records passenger alighting and boarding of BRT buses in real time to respond control center for further action. BRT standards have established scoring criteria for various control centers from full service to limited functional control centers. A full service control center is which have automated dispatch, active bus control, and AVL system to increase quality of BRT service as well as reduce travel time of passengers by proper monitoring. Peshawar BRT have a full service control center including all services at Chamkani that will monitor the operations of BRT buses. Subsequently, it scored 3/3 in this criteria.

2.4  Located in top ten corridors

A significant proportion of commuters can be attracted by BRT system if it lies in the corridor that is a better choice for BRT and, can attract users. The maximum score of 2 is awarded if BRT corridor lies in top demand corridor. BRT Peshawar is located in top ten corridors, and is a better choice that will attract significant commuters. Therefore, it scored 2/2 in this element.

2.5  Demand profile

The efficiency of BRT system can be improved if the dedicated corridor having good alignment is constructed in the highest demand segment of the route. It will ensure to improve the quality as well as reduce the travel time of passengers. BRT Peshawar is located in the highest demand area of Peshawar running in the middle of two-way road with two-way busway. So, it scored 3/3 in the demand profile criteria.

2.6  Hours of operation
A good BRT service should operate throughout the whole day until midnight and seven days a week to seek the attention of commuters otherwise they will prefer other modes for trip making. BRT Peshawar will operate between 6:00AM to 10:00PM in the whole week, and will not provide late night services. Therefore, it scored 1/2 in this criteria.

4.2.2.7 Multi-corridor network

Multi-corridor network is more viable in BRT system as it provides travel options to commuters for movement in the urban areas. It results in improved experience of passengers and ultimately increase the ridership of the service. BRT Peshawar has a single corridor and scored 0/2 as there are no planned networks that will connect the existing corridor.

3 Infrastructure

Infrastructure is the fundamental element in any urban transportation scheme that provides a ride quality and user satisfaction of the journey. BRT Standards has introduced various components for scoring criteria of infrastructure which are: passing lanes, reduction in bus emission, stations set back from intersections, center stations, and quality of pavement which are further explained below. BRT Peshawar scored 10/13 in criteria of infrastructure which depicts the good and high quality infrastructure.

3.1 Passing lanes at stations

Passing lanes play an important role in safe maneuvering and travel time saving of passengers at stations. The local and express services need passing lanes to avoid bunching of buses, and increase capacity at stations for maintaining speed. In some cases, overtaking in oncoming lane is permitted given safe circumstances when there are no passing lanes. The maximum score for the passing lanes criteria is 3. BRT Peshawar have no passing lanes, and therefore scored 0/3 in the given criteria.

3.2 Minimizing bus emissions

The urban pollution has increased to the large extent now-a-days due to emissions of vehicles plying on roads that effects the surrounding environment. The main concerned pollutants released by buses are nitrogen oxides (NO\textsubscript{X}), and particulate matter (PM). These pollutants need to be minimized to have a sustainable urban development by improving health of both passengers and surrounding population. It will increase the quality of BRT service. BRT Peshawar scored 3/3 as it has diesel hybrid buses which are in compliance with Euro VI emission standards.

3.3 Stations set back from intersections

BRT Standards has specified a least distance of 26 meters for stations from intersections to avoid but ideally a minimum distance of 40 meters should be provided to avoid congestion and delays at intersections. The traffic signal will increase the queues and delays of buses if stations are located just before intersection, and will block the way of other buses to pull in. The stations should be separated from intersections to mitigate the issues of congestion and delays at stations. BRT Peshawar has a dedicated corridor which does not encounter intersections, and thus achieved 3/3 score in this element.

3.4 Center stations

BRT corridors having single center stations assists in serving passengers of both directions easily which reduces the construction as well as right-of-way costs. BRT Standards award higher score to the centrally designed stations, and fewer points to physically separated stations serving single direction. There are centrally designed stations in BRT Peshawar serving both directions and therefore achieved 2/2 score.

3.5 Pavement quality

Pavement quality plays an important role in determining users satisfaction of ride quality over the roads. The pavement having good quality serves for longer period by offering better operations and services minimizing rehabilitation and maintenance costs on busway. On the other hand, busway pavements with poor quality are
often closed for maintenance, and provides poor quality ride to users which subsequently effect the quality and ridership of buses. The corridor of BRT Peshawar is newly constructed, and has a good quality pavement which meet the criteria of pavement design for thirty years. This, it achieved 2/2 score in this element.

4 Stations

Stations in the urban scheme provide space for the alighting and boarding passengers, and space for off-board collection of fare. The stations designed as per international standards improve the quality as well as user satisfaction of the scheme. The scoring is based on various components including inter-station distance, comfortable and safe stations, doors on buses, substops and docking bays, and sliding doors at BRT stations. BRT Peshawar scored 8/10 in station criteria which depicts that stations are designed according to international standards. The components are discussed in detail in following sections.

4.1 Distance between stations

BRT Standards has specified the average distance of 0.3 to 0.8 km between stations which is reasonable for passengers to walk to stations, and also for maintaining bus speed. BRT Peshawar has achieved 0/2 score in this criteria as the average distance between stations is 0.85 meters which is greater than 0.8 meters.

4.2 Safe and comfortable stations

The stations must provide comfortable and safe services to the daily users to enhance the quality of BRT. The stations should be wide enough to accommodate passengers easily with the minimum width of 3 meters. It should provide protection against adverse weather conditions like rain, wind, cold, heat, and snow etc. There should be features of safety and attractiveness at stations to enhance quality as well as ridership of buses. The stations of BRT Peshawar are having width of greater than 3 meters, and also weather protected, safe and attractive which meets the criteria of BRT Standards. Therefore, it achieved a score of 3/3 in this element.

4.3 Number of doors on buses

The delays and travel time can be reduced by introduction of multiple doors in buses to ease the boarding and alighting passengers. BRT Peshawar has articulated buses that only runs on main corridor are provided with three doors on station side. While in non-articulated buses, two doors are provided on station side to serve passengers of main corridor, and 3 doors are provided on other side to serve passengers of feeder routes. Thus, it scored 3/3 in doors criteria of buses.

4.4 Docking bays and substops

Multiple substops and docking bays not only saves user time but it also enhance the capacity as well as level of service of the stations. The substops allow buses to pass the station and stop at the adjacent station separated by a walk way while docking bays allow buses to pull up behind the bus already standing at the station. There should be atleat two substops or docking bays at the station to avoid congestion and save user time. BRT Peshawar scored 1/1 in the aforementioned criteria as there are three docking bays at stations.

4.5 Sliding doors in BRT Stations

Sliding doors enhance the quality of environment as well as the aesthetics of stations. It prevents passengers from adverse weather conditions, and increase the safety of stations. BRT Peshawar scored 1/1 as there are sliding doors at all stations.

5 Communications

It is the guidance of passengers regarding the required information about bus service which increases the quality and performance of the service. The scoring criteria is based on two components including passenger information and branding. BRT Peshawar scored 5/5 in the communication criteria. The two components are discussed in following sections.
5.1 Branding
Branding plays an important role in acceptance and enhancing the ridership of service by differentiating the service from other competitive services. The BRT buses should have a unique identity and brand to have a higher quality service. Peshawar has buses of green color which differs it from other transport services that depicts one brand. While physical segregation and dedicated corridor that prevents corridor from other vehicles, represents one brand. Therefore, it scored 3/3 in the criteria of branding.

5.2 Passenger information
Real time information assists in guidance of passengers regarding departure and arrival of buses at both stations and buses which operates through GPS data. On the other hand, static passenger information provides guidance about vehicle and station signage, route maps, network maps etc. BRT Peshawar has achieved 2/2 score in this criteria as there will be provided real time and static information to passengers at stations and buses.

6 Access and integration
BRT Standards has divided the scoring of this criteria into various components including universal access, integration with public transport, pedestrian safety and access, bicycle lanes, and bicycle sharing. BRT Peshawar scored 11/15 in this criteria which depicts that further attention is required to improve the quality and service of BRT Peshawar. The various components are discussed in detail in following sections.

6.1 Universal access
Accessibility should be provided to all passengers of special needs including visually, physically and hearing impaired person. Physical accessibility should be provided at fare gates, vehicles and stations for disabled person with wheelchairs. Audiovisual accessibility is provided for visually impaired passengers including tactile surface indicators and Braille readers at stations to safely move through stations. BRT Peshawar has provided physical and audiovisual accessibility by providing lifts, escalators and tactile surface indicators at all stations. It scored 3/3 in this element.

6.2 Integration with other public transport
Integration of BRT service with existing transport system is vital to increase the quality and ridership of the service. The distance of transferring points between modes should be minimum in order to reduce travel time and delays. It should also include fare integration where one fare system is used for various modes. BRT Peshawar is physically integrated, but there is not fare integration with existing transport. Therefore, it scored 2/3 in this component.

6.3 Pedestrian access and safety
Stations should provide safe accessibility to pedestrians in order to achieve the goals and to have an increased level of service. Accessibility can be provided through bridges and underpasses with elevators or escalators, and at-grade crossings with signal and without signals etc. BRT Peshawar provides safe pedestrian access to all stations, and pedestrian bridges are provided at most of stations as it is built in the center of road which increase the safety of the service. While at some stations, pedestrians have to cross the road and modest improvements are provided along corridor. So, it scored 3/4 in this component.

6.4 Secure bicycle parking
Secure parking for bicycles should be provided to enhance the system coverage and quality, and reduce travel time of passengers to access the corridor. BRT Peshawar will provide secure parking for bicycles monitored by cameras, and therefore scored 2/2 in this criteria.

6.5 Bicycle lanes
Bicycle lanes in BRT corridor provides sustainable way of travel improving passengers access and road safety. BRT Peshawar has bicycle lanes at some sections and do not span the entire corridor. So, it scored 1/2 in this criteria.

6.6 Bicycle sharing integration

Sharing bicycle provides an opportunity in making short trips from corridor which increases the access to most of destinations. It can be seen as the low cost best alternative for feeder busses which reduces passenger travel time and increases the coverage of transportation system. BRT Peshawar scored 0/1 in this criteria as there will be bicycle sharing at less than 50% of the stations.

The summarized results of evaluation of BRT by comparison with BRT Standards 2016 are presented in Table 1.

Table 1 Summarized results of BRT Peshawar comparison with BRT Standards 2016

<table>
<thead>
<tr>
<th>BRT Standards</th>
<th>BRT Standards 2016</th>
<th>BRT Peshawar Achieved Points</th>
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<tr>
<td>BRT Basics</td>
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<tr>
<td>Dedicated Right-of-Way (Minimum 4 Points)</td>
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</table>

The graphical representation of comparison of BRT Peshawar with the BRT Standards 2016 is shown in Figure 1. The scoring of six elements and total score is graphically represented.
BRT Standards 2016 has categorized the scoring criteria into three categories: Gold, silver, and bronze categories. Gold, silver, and bronze standard is awarded to BRT if it scores 85-100, 70-84.9, and 55-69.9 points in BRT Standards 2016 respectively. BRT Peshawar achieved “Gold-Standard” as it scored 88 out of 100 by comparison with BRT Standards 2016 as shown in Table 1. It can be seen that there is improvement required in some areas like service planning, infrastructure, and access and integration to upgrade the BRT service in order to achieve good passenger satisfaction, ride quality, and increase in ridership of service.

**Conclusion**

This research study has assessed the performance evaluation of the proposed BRT Peshawar. It was found satisfactory based on various elements, and achieved “Gold-Standard BRT” status as it scored 88 out of 100 while comparison with the international standards of “BRT Standards 2016”. However, much improvement can be seen in some areas of BRT Peshawar to have a sustainable development in the business hub of CPEC. It has scored low in service planning, infrastructure, and access and integration elements which are the key components of the urban scheme. The deviation of proposed scheme from standards can lead towards failure of transportation system. The operating agencies should focus on the operational hours, multi-corridor network, passing lanes at stations, bicycle lanes, and integration of bicycle sharing for improving the service quality, user satisfaction, and increasing ridership of BRT Peshawar.

**Recommendations**

- The operational hours of the service should be increased so that the service is available 24 hours a day. It will increase the shifts towards BRT because passengers will not avail any other service for trip making during late hours.
- Passing lanes at the stations should be provided in order to reduce the delays and travel time. Passing lanes will permit the fully loaded buses to pass the bus standing at the station.
- Bicycle lanes should be provided throughout the corridor so that the sustainable way of travel is provided by increasing access and safety.
The bicycle sharing should be integrated which provides an opportunity in making short trips from corridor that increases the access to most of destinations. It can be seen as the low cost best alternative for feeder buses which reduces passenger travel time and increases the coverage of transportation system.

References


TransPeshawar. BRT Features. from https://transpeshawar.pk/brt-features/