

Public Bicycle Sharing Service (BSS) in Bangladesh

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Abstract: A public bicycle sharing service (BSS) is a system where bicycles are strategically placed in a network of stations and offered for public use. Users of BSS can take advantages of biking without the responsibilities of bike purchase and maintenance. This paper provides a brief description of BSS operation in Bangladesh, current situation of the operations and services, and the users' opinions about the BSS services. An in-depth discussion with BSS providers was done and the responses of 871 users were collected through online questionnaire. The results show that the BSS provides an alternative travel mode which is cheaper than rickshaws. Almost 90% of the BSS users are satisfied with the service, however, there are several problems such as problems related to the App for unlocking, locking, and vandalism of the bike. The paper would help researchers and professionals understanding the situation and issues related to BSS in Bangladesh and formulating policy actions.

Keywords: access; bicycle sharing service (BSS); transport; trip; last-mile.

1. INTRODUCTION

The public bicycle sharing service (BSS), also known as bicycle hire scheme (BHS) or smart bike or bike hiring, is a contemporary concept of public transport that offers a pollution free and flexible transport system for people in urban areas. In this system, bicycles are strategically placed in a closely spaced network of stations and offered for public use (Rahman, 2020). The commuters can take the bicycle whenever they need and leave the bicycle after reaching their destinations (Lin et.al, 2013). For instance, an individual can check out a bike from one station with a smart card or other form of identification for a trip and return it to the same docking point or another docking point within the network (Mateo-Babiano, 2015). Therefore, they serve as an alternate mode of public transport in which people have access to cycles that can be used across a network of closely spaced stations (Lin et al, 2013; ITDP, 2013). Thus, the BSS system provides point to point active travel for short distance without the need to own a bicycle.

The concept of BSS is not new. This concept has been available in different countries for the last 50 years (Meddin, 2015). Though the concept has existed for several decades, the modern technology made this quite ubiquitous in recent time. To tap the benefits of cycling, and also promoting bicycle use among people of all classes, many cities consider public BSS scheme as a strategy to facilitate short-term bicycle rental in urban areas (Woodcock et al, 2014; Hou and Haddad, 2020). Several authors (e.g. Kou and Cai, 2019; Médard de Chardon et al, 2017; Shaheen

et al, 2010; Qian and Niemeier, 2019) claim that BSS is getting popular because it provides many social, economic and environmental benefits to the city and the people. Therefore, BSS has been widely adopted in many cities around the world (Chen et al, 2020). For instance, according to the bike-sharing world map, about 2,110 bicycle sharing programs are running throughout the world with having approximately 17,792,000 bicycles (Meddin and DeMaio, 2020).

Transport policies in Bangladesh are more concentrated on motorized traffic, whilst NMT is often ignored or considered as hindering motorized traffic flows (Rahman, 2007). Rahman (2009) argued that such approach is inconsistent with the realities of transport situation and the policy should be directed towards promoting walking and cycling along with low-cost public transport accessible for all. Bicycle is one of the cheapest forms of urban transport – only a quarter of the cost of bus travel per passenger per km and one-tenth of the cost of rickshaw travel (Rahman, 2013). Bicycling has many benefits and there are also potentials for providing BSS in Bangladesh, particularly in major cities (Rahman, 2020; Rahman and Shams, 2020). The operation of BSS in Bangladesh (known as ‘Jobike’) was first introduced in June 2018. Over the last several years, BSS operations in Bangladesh were introduced in following seven locations:

- Jahangirnagar University (JU) campus;
- Cox’s Bazar sea beach area;
- Chittagong University (CU) campus;
- Mirpur DOHS residential area;
- Sylhet Shahjalal University of Science & Technology (SUST) campus;
- Dhaka University (DU) campus; and
- Gulshan-Niketon-Banani residential area.

2. OBJECTIVES AND METHODOLOGY

The main purpose of this paper is to provide a brief description of BSS operations, its services, and the users’ opinions about BSS services in Bangladesh. The paper describes the overall condition of BSS in Bangladesh including its operational services and user’s travel pattern. This description will help in achieving information about the current scenario of BSS.

The case study approach was followed for this research. Relevant data were collected from both primary and secondary sources. Both the published and unpublished documents were reviewed. The website of BSS provider was analyzed and the data related to trips (e.g. origin and destination, trip duration, etc.) were collected from the company server. An in-depth interview with the BSS management team and the area service managers were done. A questionnaire survey of BSS users was done to understand their opinions and views about the services.

The questionnaire survey of BSS users was done during October 2019 using an online GoogleForm. The questionnaire had two major sections: demographic information (e.g. age, gender, occupation, etc.) and trip information (e.g. travel purpose, reason for using Jobike, frequency of usage, satisfaction level, etc.). The questionnaire survey was administered in five different locations, the then existing BSS service areas, in Bangladesh. The GoogleForm was shared in the verified Jobike user’s community groups of Facebook and retained for a week to collect responses on their BSS usage and travel pattern. Until September 2019, there were 20,000 total registered unique users from five different locations of service areas. Of the total 20,000 unique registered BSS users, about 871 respondents (4.5% of the total responses) were received

and used for the analysis. Table 1 shows the distribution of samples from different service locations including three university areas, one residential area and a tourist city.

Table 1. Distribution of respondents from different BSS service locations

BSS Service Areas in Bangladesh	Respondents (F)	Respondents (%)
Jahangirnagar University (JU) campus	692	79.5
Cox's Bazar	9	1
Chittagong University (CU) campus	118	13.5
Mirpur-DOHS	26	3
Sylhet University of Science & Technology (SUST) campus	26	3
Total Respondents	871	100

Source: Online Survey, October 2019.

Data from the interviews were transcribed and translated. The users' data from online survey were exported from GoogleForm and analyzed using MS Excel. Since the survey was conducted only for the system users, opinions of people who do not use BSS are unknown. Three different measures were taken into consideration for evaluating the performance of the existing BSS system. These are:

- (i) trips per day per bicycle (TDB);
- (ii) users' satisfaction rate; and
- (iii) the rate of theft or vandalism.

3. REVIEW OF LITERATURE

3.1. Importance of BSS

The BSS systems have evolved primarily to make bicycles available to a wider range of people in urban areas. A BSS can contribute in reducing traffic congestion, fossil fuel use and pressure on motor vehicle parking supply as well as increased use of mass transit (Voeller and Elise, 2011). The benefits of a BSS program include access to a low-cost public transport option, improved health (through increased physical activity), improved connectivity and travel experience, flexible mobility and increased convenience, reduced travel cost and fuel use, emission reduction, support for multimodal connections and reduction of congestion on roadways (Ricci, 2015; Wilmingtonde, 2019; Woodcock et al, 2014). The BSS program can also help to solve the 'last-mile' problems to increase bicycle use among all classes of people (ITDP, 2013; Ma et al, 2018; Qian and Niemeier, 2019); thus, may help growing awareness for bicycle use as a daily mobility option, developing tourism and meeting pollution targets or targeted modal splits of the city (Shaheen et al, 2010; ITDP, 2013). However, Csiszár (2009) showed the relation between frequency of travel and the length of trips, as shown in Figure 1, where public BSS is popular for short trips in local and urban areas.

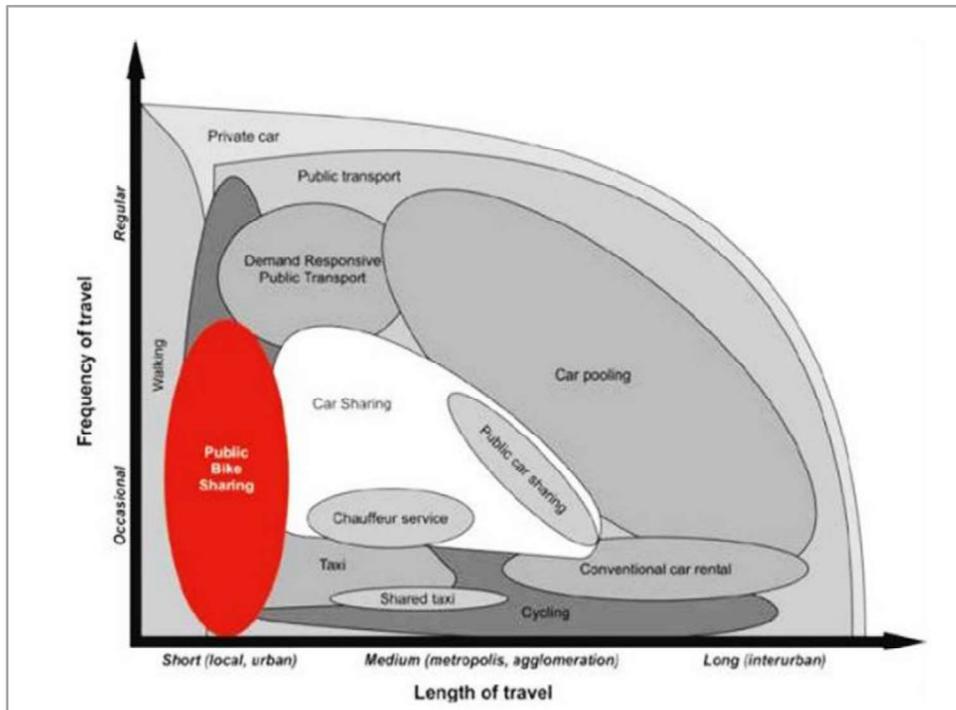


Figure 1. Comparison of travel alternatives based on frequency and length
Source: Csiszár, 2009.

The BSS program can play an important role for social inclusion of transport in the developing countries. Bicycles are cheaper and affordable transport than public transport and private cars. However, in many places the bicycle is considered as a vehicle for the poor people (Jennings, 2018). The amount of public investment allocated for bicycle infrastructures in developing countries are often very low, mostly due to low status of bicycle, which influences the use of the bicycle (Dias, 2010). However, in order to improve the bicycling situation, the countries need to introduce new policies, investments, educational campaigns, as well as to make the bicycle as a transport option for all social classes (Savan et al., 2017). In a nutshell, the BSS has two key advantages: implementation costs are comparatively low and the timeline is very short compared with other transport projects.

3.1. Distinction between BSS and Traditional Bicycle Rental

The BSS usually provides ability to the users to pick up a bicycle from anywhere within a service area (or at any self-serve bike station) and return it to any parking point or bike station located near their destination (NYC-DCP, 2011). Some systems are typically structured to provide point-to-point transport for short distance (e.g. 0.5 mile to 3 miles). The purpose of BSS is to enable cycling to become a viable travel mode as part of the whole transport system and network to promote cycling, increase mobility choices, improve air quality and reduce congestion (Midgley, 2009). Bicycle sharing differs from traditional bicycle rental services in a number of ways (Burns, 2013):

- BSS is a short-term and one-way use such as 30 to 60 minutes rather than daily or weekly rental period;
- Bicycle can be returned to any station or parking points of the BSS scheme;

- Generally, a single style and same design for all the bicycles of the scheme;
- In most BSS system, bike unlocking, and depositing is automated and the financial transaction for rental or use is fully automated therefore no need for on-site staff for most of the BSS schemes;
- After finishing the trip, bicycle is parked by the user at a special docking station and the user is no more responsible for the bicycle when the trip is complete, and bike is deposited. Thus, user's liability and the responsibility for the security of bicycle is minimized.

Modern BSS systems typically utilize a standardized specially designed bicycle (or proprietary components) built solely for the system to make the bicycles durable and also for the security issues so that the parts cannot easily be stolen and resold. The design can differentiate the BSS cycles from regular bicycles in the city through distinctive colors, frame style, molding, and graphics. One size of bicycle to fit for all with low maintenance and including storage (e.g. a front basket) are the main features of a bicycle for BSS (ITDP, 2018).

3.3. Types of BSS

There are two types of BSS schemes; docked and dock-less (Rahman, 2020). A docked scheme enables to pick the bicycle from any self-serve bicycle station and return to any other bicycle station - thus makes bicycle-sharing ideal for point-to-point trips. Usually, a docked bicycle can be used only by registering in a mobile phone Application (App), providing payment and unlocking the device from a station with a code. The main advantage of a docked scheme is: bicycles are docked in convenient locations and the user knows where (s)he can find a bicycle. As the bicycles are securely parked within a docking station, this system eliminates the likelihood of theft or vandalism of bicycles (MacDonald, 2018). However, this system requires additional spaces to install the stations, therefore, could be difficult to install in certain locations due to space restrictions. Moreover, installing the docking stations require additional costs.

On the other hand, in a dock-less scheme the bicycles do not need to be physically locked with a conventional chain or returned to a designated station or rack. Users register, pay, unlock the bicycle and after completing the trip can lock and park the bicycle in a suitable place within the service, all through a mobile phone App. The main advantage of dock-less schemes is: more convenience with using and parking the bicycle as there is no requirement to return the bicycle to a bicycle station (MacDonald, 2018). Therefore, there is no mechanism to prevent theft of the bicycles and abuse of privileges (e.g. for personal use locking the bicycle in inaccessible locations) in dock-less system.

A variety of business models are available for BSS across the world. For example, some are funded by advertising, self-funding, user fees, municipalities, and public-private partnerships. Several BSS require annual membership fees whilst some include additional hourly rental fees (St. Louis Bike Share Study, 2014). With the widespread adoption of mobile phone Apps and low-cost GPS tracking, BSS bicycle share schemes have grown significantly in the last few years.

4. BSS OPERATION AND SERVICES IN BANGLADESH

The BSS in Bangladesh is an innovative dock-less system provided in seven different cities. This section provides a brief description of Jobike operations and services in Bangladesh and the users opinions about the services.

4.1 BSS Operations and Services

4.1.1. History of BSS in Bangladesh

The BSS in Bangladesh (called Jobike) was first introduced in 2018 by the private company 'Jobike Limited'. Jobike bicycles were imported from China and the technology was developed with the help of Chinese developers (Ahmed, 2019). In order to adapt the Chinese technology in the context of Bangladesh, Jobike authority hired some Bangladeshi developers and created a new technology. Initially, it was first planned to launch BSS operation in JU campus – the only residential university in Bangladesh - in a small scale (with 20 bikes) for a test run in the early 2018 and with this to assess the technology and services and fix the problems or issues if any (Ahmed, 2019). The Jobike authority approached to the JU administration and requested for official permission to operate BSS within the campus. The then Chairman of the Department of Urban and Regional Planning at JU Professor Dr M Shafiq-Ur Rahman discussed about the innovative idea of BSS with JU administration and convinced to permit Jobike to operate BSS. After a period of about six months, Jobike received the official permission to operate BSS in JU campus (Ahmed, 2019). In the meantime, during the delay due to administrative procedures of JU, Jobike authority worked to provide BSS in Cox's Bazar (one of the most popular tourist destinations in Bangladesh). Jobike launched its operation in Cox's Bazar city – the first BSS in Bangladesh - on 18 June 2018 with 30 bicycles. Later, Jobike service in JU was introduced on 11 July 2018.

After receiving wide responses and positive feedbacks from the users both at Cox's Bazar and JU campus, Jobike was expanded in CU campus in December 2018 and then in Mirpur DOHS area and SUST campus in January 2019. Jobike authority was aiming to expand BSS in Rajshahi University campus, Bangladesh Agricultural University (BAU) campus in Mymensingh, Islamic University campus at Kushtia, different export processing zones (EPZs) areas, and in future to cover all the university campus and residential areas in different cities of the country (Ahmed, 2019). Later in October 2019, Jobike services was launched in DU campus. During COVID-19 pandemic Jobike services was expanded in Gulshan-Banani area in June 2020 with the support from Dhaka North City Corporation (DNCC). Jobike authority believes that with appropriate support from the government and local people, it would be possible expanding BSS services in all major cities of Bangladesh (Prothom Alo, 2019).

4.1.2. Service Areas

Jobike BSS can provide a solution for the short trips, particularly the last-mile problem of transport. Ride sharing services such as Uber, Pathao in recent years seem to solve the first/last mile problem in Dhaka City, however, they are very expensive compared to Jobike BSS (Fahim, 2019). Jobike BSS was introduced in seven different places in Bangladesh, shown in Figure 2.

Jobike in Cox's Bazar initially launched on a small scale, with only 20 bikes, in a test-run basis. The services were available only at Kolatoli, Sugandha, and Laboni point every day between 6am and 6pm. The BSS enabled the tourists exploring the city easily and helped the city to uphold the image by making greener and healthy initiatives (Jobike Authority, 2019). Jobike also provided 20 additional bicycles in Rohingya Refugee Camp at Nayapara, Teknaf designated for NGO workers, government officials and volunteers working in the camp to make their mobility easier.

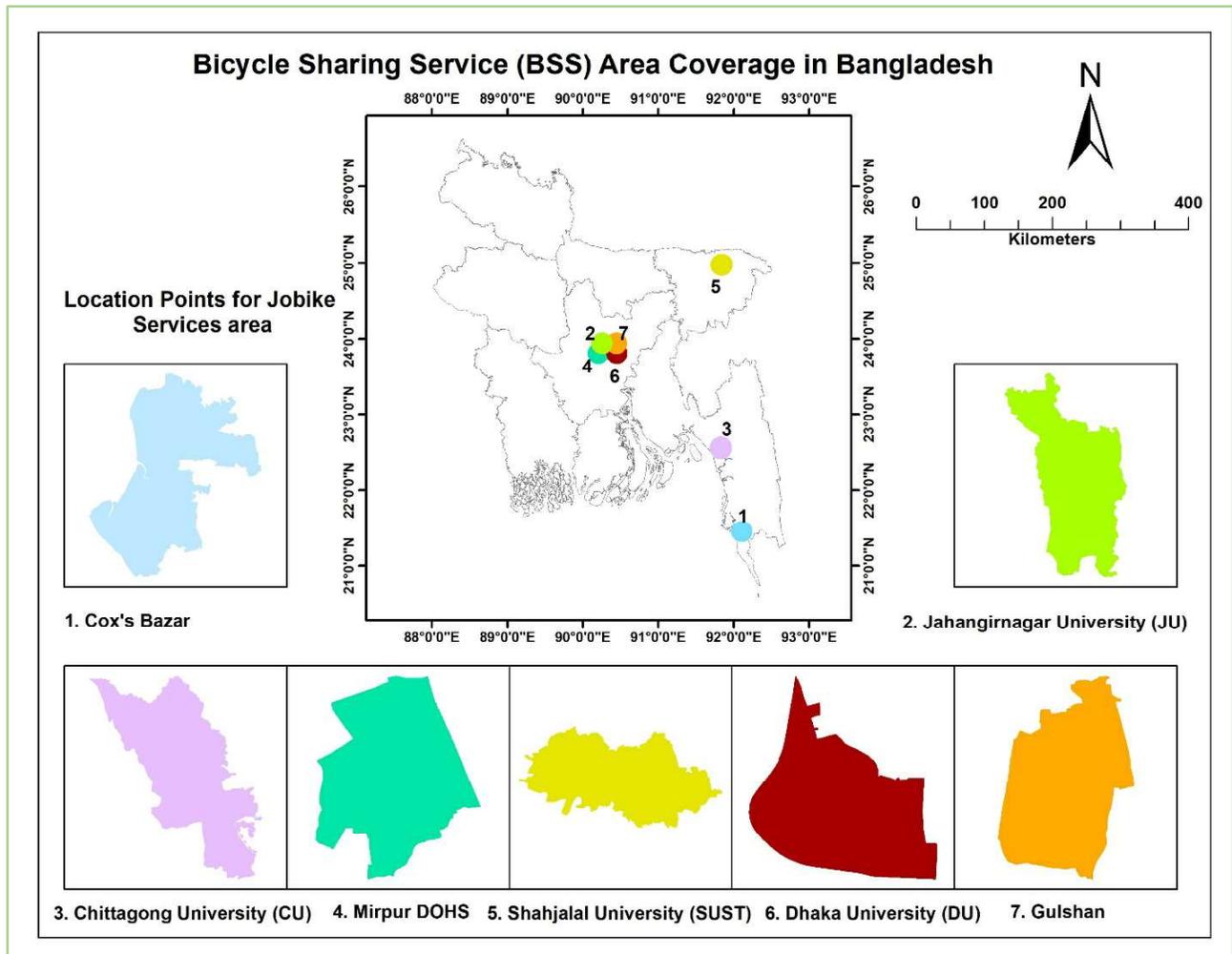


Figure 2. BSS service area locations in Bangladesh
 Source: Jobike and prepared by Authors, July 2020.

The BSS service in JU campus was initially with 20 bikes and 10 parking points and available every day from 8am to 6pm. Later, the number of bikes were increased to 100 and the duration of service was extended up to 10pm. After a successful drive at JU campus, Jobike started operating in CU campus. The BSS in CU was initially provided with 50 bikes and later increased to 80 bikes.

After receiving overwhelming responses from the users in Cox’s Bazar and two university campus (e.g. JU and CU), BSS was introduced in Mirpur DOHS in Dhaka with the help of Mirpur DOHS Society. Mirpur DOHS is the first residential area to have a BSS in Bangladesh and there were 70 bicycles. In SUST campus Jobike was introduced on a pilot basis with 35 bicycles and later increased the number to 50 bicycles. The BSS was also introduced in Dhaka University (DU) campus with 50 bicycles in association with DU Central Students' Union (DUCSU). During COVID-19 pandemic situation BSS has been introduced in Gulshan-Banani area with the support from Dhaka North City Corporation (DNCC) and 120 bikes are available for service.

Table 2. Major features of BSS (Jobike) in Bangladesh

Features	Jobike BSS Locations						
	Cox's Bazar	JU	CU	Mirpur DOHS	SUST	DU	Gulshan -Banani
BSS started	11 June 2018	11 July 2018	10 Dec 2018	5 Jan 2019	27 Jan 2019	16 Oct 2019	24 June 2020
Area in BSS service	5,782 acre (23.5 sq.km)	698 acre (2.8 sq.km)	2110 acre (8.5 sq.km)	2 sq.km	320 acre (1.3 sq.km)	600 acre (2.5 sq.km)	3.5 sq.km
Population (or daily tourists)	85,000	15,000 (approx.)	20,000 (approx.)	N/A	15,000 (approx.)	N/A	N/A
Total Bikes*	50	100	80	70	50	50	120
Parking Points	3	12	6	10	8	7	14
Support staff	5	6	6	4	6	6	6
Monthly Avg. Trips	11,000	25,000	22,000	16,500	14,000	25,000	30,000
Trips per bike per day	7	12	9	10	9	10	10
Refill Point	3	6	4	6	4	2	8
Reported Vandalism	15	30	60	5	10	10	7
Theft	0	2	1	0	0	0	0
Service Status in July 2020	Stopped / discontinued July 2019	Stopped / discontinued June 2019	Stopped / discontinued June 2019	Paused June 2020 (Covid-19)	Paused March 2020 (due to Covid-19)	Paused March 2020 (Covid19)	Ongoing operation

* Total number of bikes in a particular location was increased or reduced time to time by Jobike.
Source: Jobike Authority, July 2020.

The major features of Jobike BSS operations and services provided in different areas of Bangladesh are shown in Table 2. However, the service was discontinued in three locations (Cox's Bazar, JU campus, and CU campus) from June-July 2019. Moreover, due to Covid-19 pandemic situation, Jobike services are paused in two university campus (SUST and DU) in March 2020 (as there is now no student or users because of the vacation). Jobike operations in Mirpur DOHS also paused in June 2020. At present, the BSS only in Gulshan-Banani area is functioning.

4.1.3. Common Features of Jobike BSS

Jobike is the dock-less BSS system. Anyone can pick up these bikes by using a smartphone App and after completing the ride (s)he can park to any designated bicycle parking point or suitable place. Internet of Things (IoT) technology and smart solutions based on large data support is the main technology of this BSS system (Ahmed, 2019). Jobike bicycle has its own unique design with red color so that people can able to recognize and distinguish the BSS bicycles easily (in Figure 3). All bicycles are specially designed and flexible to use for both men and women. Tubeless tire, solar panel, seat adjustable systems, a small front basket, and a smart lock are all exclusive features of the bicycle. The smart lock includes a Global Positioning System (GPS) and

telecommunication module as well as a new generation of IoT technology which keep connecting with Jobike Server. The lock is heavily built with a plastic-metal combination that cannot be broken easily and helps the bike to be connected with the central server of Jobike. Geo-fencing technology is used which provides an alarm when an user crosses the boundary of the service area; thus people who are engaged in security as well as monitoring the Jobike services would able to prevent theft of bicycle or vandalism.



Figure 3. Jobike bicycles at parking point in JU (left), Smart lock (right) (Source: Authors, 2019).

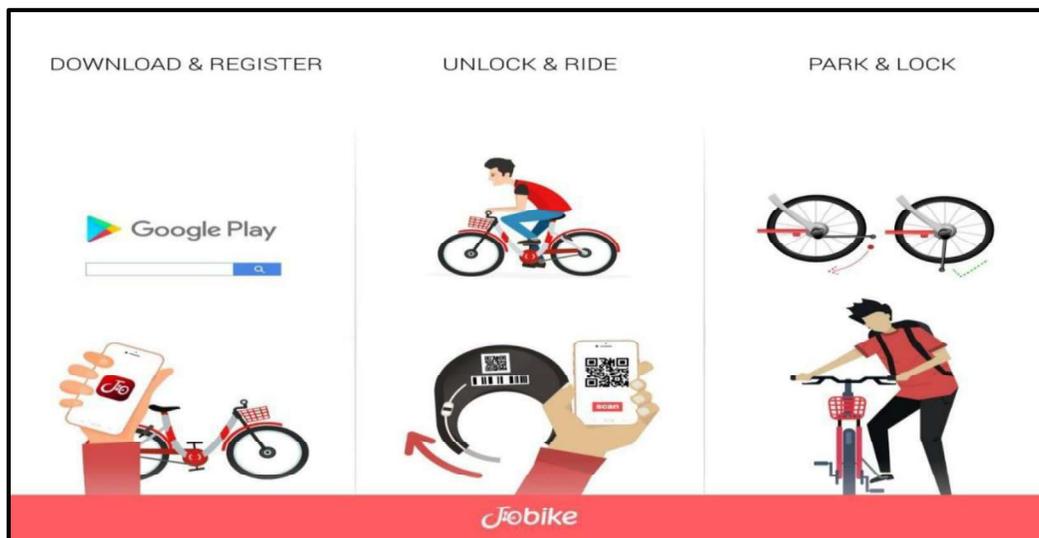


Figure 4. Jobike renting and recharging system (Source: Jobike, 2019).

To rent a Jobike bicycle, one has to download the mobile application from the related App store (android & iOS) and needs to open an account by using their phone number. The App shows the nearby available bikes on a map of that area. The user can unlock the bike by scanning the QR code provided on the lock of each bike (as shown in Figure 3). Before taking a ride, the rider needs to refill their account from the recharge points. After finishing the trip, user need to leave the bicycle in one of the designated areas and lock the bicycle manually.

4.1.4. Costs and Charges of Jobike

The average capital cost and operating cost for each bicycle of Jobike BSS is Tk 32,000 and Tk 18,000 per year respectively. Users are charged Tk 3 for every five minutes in the university areas (except in DU) and Tk 1 per minute in other areas. In DU campus, Tk 2.5 is charged for the initial 5 minutes and afterwards Tk 0.4 for additional each minute. Table 3 shows brief about different cost items for Jobike in different locations.

Table 3. Costs and user charges of Jobike

Cost items	Cox's Bazar	JU	CU	Mirpur DOHS	SUST	DU	Gulshan-Banani
Capital Cost (Tk/Bicycle)	32,000	32,000	32,000	32,000	32,000	32,000	32,000
Operating Cost (Tk/Bicycle/Year)	18000	18000	18000	18000	18000	18000	18000
User charge (Tk*)	Tk 1 per minute	Tk 3 (for every 5 minute)	Tk 3 (for every 5 minute)	Tk 1 per minute	Tk 3 (for every 5 minute)	Tk 2.5 initial 5 minute, afterwards Tk 0.4 per min	Tk 1 per minute
Membership fee for users	No	No	No	No	No	No	No

* Tk is Bangladeshi currency; the conversion rate in July 2020 is US \$ 1 = BD 85 Tk.

Source: Jobike Authority, July 2020.

4.1.5. Operation and Customer Service Center

To run the BSS effectively, Jobike authority structured and hired people in head office as per the requirements of each department (Jobike Limited had six different departments: Product, Technology, Operations, Marketing, Accounts, and Zonal Operations). There are total 35 employees working in different departments of Jobike head office and they monitor all the activities of the BSS areas.

For managing BSS, Jobike authority has developed a service centre or shop (called 'JoShop' or 'Jobike Outlet') in each are. A City Lead or Campus Lead who was appointed as in-charge of the relevant service area or zonal operation. Along with the city/campus lead in each area, there are two re-balancer, two technicians, two securities and one customer manager. The customer manager plays an important role in answering queries of the users and helps in providing solutions for the problems or issues of customers such as recharging, complaint issues, etc. Jobike Head Office cooperates with each Zonal (area) Lead.

- **Service Hours:** Initially the Jobike bicycles were available to hire from 8 am to 6 pm. Gradually the duration of service hours or Jobike operation was increased depending on the demand of users in specific service area.
- **Bike Maintenance:** Jobike zonal operation team collects the bikes for regular maintenance and repair activities and charging the locks. In each service area, every day around 20 bikes are checked for regular maintenance. A smart dashboard system in each bike shows the charge status of the lock. The maintenance team have an App on their smartphone to detect the bikes with low charge and their locations to be collected.

- **Bikes Security at Night:** Every day after the operation hour, the Jobike field authority collects the bicycles and store them in the nearest parking point. All the bicycles are kept locked by a chain to prevent theft at night.
- **Parking Points:** A service area is divided into several parking points considering the density of people or demand of users. Each parking point has a parking stand sign.
- **Refill Credits:** BSS users need to refill credit before taking a ride. Small retailer shops such as recharge points, bKash shop, etc. are the partner for Jobike refill. The refill retailers get a 4% commission of the amount recharged for Jobike. However, Jobike technology team is working to develop and build an online system for recharging.
- **Re-Balancing:** A rebalancing team with a van is vigilant in the BSS area to collect the bikes and re-balancing in different stations to ensure proper utilization of the bicycles.

A website dashboard is used to track all the records of bicycle activities such as data on daily trips, daily sales for re-charging, etc. A central customer relationship management team also works to create a close relation between Jobike operators and users. Moreover, the online community groups of BSS users (e.g. Jobike user group of JU) play a vital role to make a good relation between users and the BSS providing authority.

4.1.6. Operational Challenges

Until October 2019, Jobike App has been downloaded more than 50,000 times (Daily Sun, 2019). During that time there was no Jobike service in DU and Gulshan-Banani Area. Table 4 shows some basic statistics of Jobike usages in five different locations of Bangladesh until October 2019.

Table 4. Jobike usage statistics

Features	Statistics
Total bikes in operation	280
Total number of average daily trips (ADT)	2,700
Trips per day per bicycle (TDB)	10
Total number of unique riders (UR)	20,000
Average trip duration	15 Minutes
Total reported vandalism or bikes crashes	130
Rate of complaints from the users	20%

Source: Jobike Authority, 2019.

Whatever, financial difficulties and vandalism are the main problems the Jobike authority faced (Ahmed, 2019). The Jobike authority also mentioned that distribution and maintenance of the bikes are also challenging. Therefore, after one year of operation Jobike discontinued the services in JU mainly due to financial constraints and several incidents of vandalism whilst at CU it was mainly due to high rates of vandalism. Figure 5 shows some examples of vandalism in JU.



Figure 5. Bike rescued from pond (left) & from forest (middle), carrying child on basket (right)
Source: Authors, 2019.

Moreover, lack of public-private partnership for financing, lack of political will to promote bicycling, absence of relevant bicycle infrastructures, misuses of bikes by some of the users, accidents and theft of bicycle are the major challenges of BSS that Jobike authority faced. Jobike authority also had poor and inefficient management within the company. Not having any support or cooperation from the respective authority or administration of the service area is also an important drawback of BSS. Nevertheless, the major strengths, weaknesses, opportunities, and threats (SWOT) of BSS are portrayed in Table 5.

Table 5. SWOT analysis of Jobike BSS

Strengths	Weakness
<ul style="list-style-type: none"> ● Green transportation ● Popular concept and design ● Smart technology use ● Fashionable appearance of bike ● Durable & long-lasting product ● Interest from people & society ● Low-cost public transport 	<ul style="list-style-type: none"> ● Low financial strength of service provider ● Difficulty for regular maintenance ● High cost for product development ● Operating cost ● Poor user behavior e.g. vandalism ● Lack of bicycle infrastructure ● No support from the government or other institutions
Opportunity	Threats
<ul style="list-style-type: none"> ● Expanding service areas ● Average 10 trips per bike per day ● Partnering with government ● Cooperation with telecom companies 	<ul style="list-style-type: none"> ● Misuses of bikes by the users ● Vandalism and damage of bike ● Theft of bike ● Reckless driving

Source: Authors.

4.2. Users' Opinions about BSS

4.2.1. Demographic Profile of the Respondents

Even though BSS is provided for people of all age groups and anybody having a smartphone and required credit for payment in the App has access to Jobike in the service area, the BSS users' who responded the questionnaire are mostly young (77.5% are in age group between 16 and 24 years), from different university campus (96% from campus and only 4% are from residential areas), and students (93.5%). As three of the then five service areas of Jobike were university campus, it is

likely that the majority of the users would be students or young people. As the BSS is a tech-based service. Moreover, students may have much interest in using the tech-based service facilities on their phone to use Jobike.

4.2.2. Socio-economic Condition of Jobike Users

Almost 80% of the Jobike BSS users have no personal vehicle or bicycle, therefore, they are willing to ride Jobike. However, some of the respondents (20%) mentioned despite having personal bicycle they had a ride on Jobike to have an experience. BSS users mostly used as an alternative of rickshaws because of cheaper and time saving. Almost 68% of the Jobike users previously used a rickshaw and 12% walked whilst the remaining used other modes to reach their destinations. Usual travel frequency per week is about 20-30 trips for about 28% of the respondents whilst about 15-20 trips for 24%, 10-15 trips for 25% and below 10 trips for 23%. The respondents mostly consider ‘travel cost’ and ‘travel time’ as the main influencing factors for choosing a mode (Figure 6).

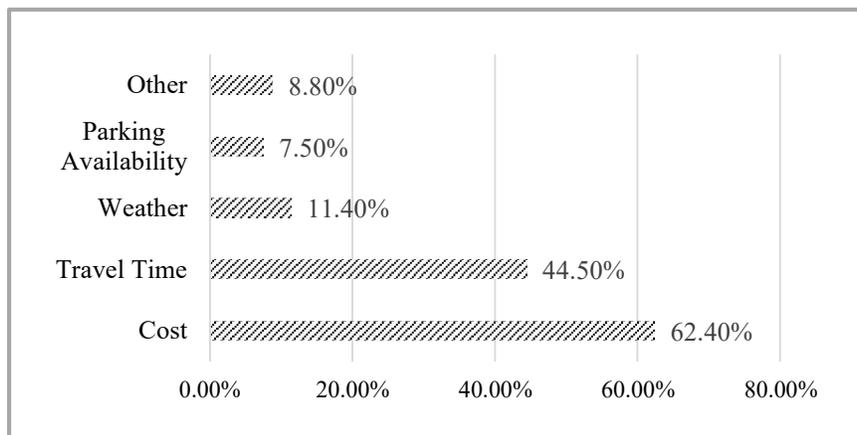


Figure 6. Factors influencing for selecting the travel modes
Source: Online Survey, 2019.

Transport cost of a person usually depends on the number of trips are made and the mode of transport being used. The average weekly travel cost for 27.5% of the respondents is Tk 151-200+, for 24.5% is Tk 101-150, for 32% it is Tk 51-100 and for 16% it is below Tk 50.

4.2.3. Respondents' Views and Feedbacks about Jobike

Almost 20% of the respondents use the Jobike BSS for more than 10 trips, 21% for 6-10 trips, 15.5% for less than 6 trips per week whilst almost half of them (43.5%) are not frequent user who use ‘sometimes’ but not in a regular basis. The availability of a bike at desired station is one of the important aspects for the BSS users. Almost half of the respondents (50%) consider that finding a bike of Jobike service is easy though 18% mentioned it is often difficult.

The design of Jobike bicycle is smartly made for both men and women, riding it requires very low paddling pressure or energy as the weight of bike is less. In terms of comfort, more than 81% of the respondents feel Jobike bicycles are ‘very comfortable’ or ‘comfortable’, as shown in Figure 7.

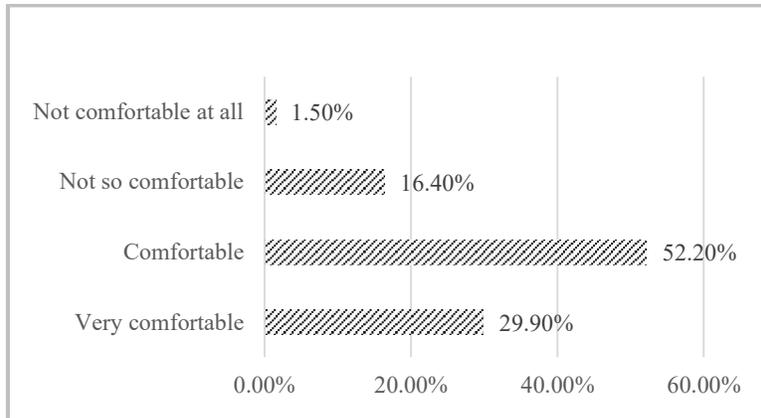


Figure 7. Comfort of Jobike bicycle
Source: Online Survey, 2019.

Among the respondents, almost 76% are satisfied with the existing pricing (cost for using BSS) of Jobike however the remaining 24% are not satisfied. Jobike users' have their own perception or view-points about different aspects of the BSS after having a ride or using the service, as seen in Figure 8. Almost three-quarter of the respondents consider that using Jobike is easy and saves their time to reach in destinations. Almost half of the respondents (49%) claimed that the Jobike BSS is using for physical exercise and usually do in the morning or evening. More than half (59%) of the respondents consider that BSS is an environment friendly mode of transport. Many students (almost 40% of the respondents) had Jobike bicycle ride just for fun.

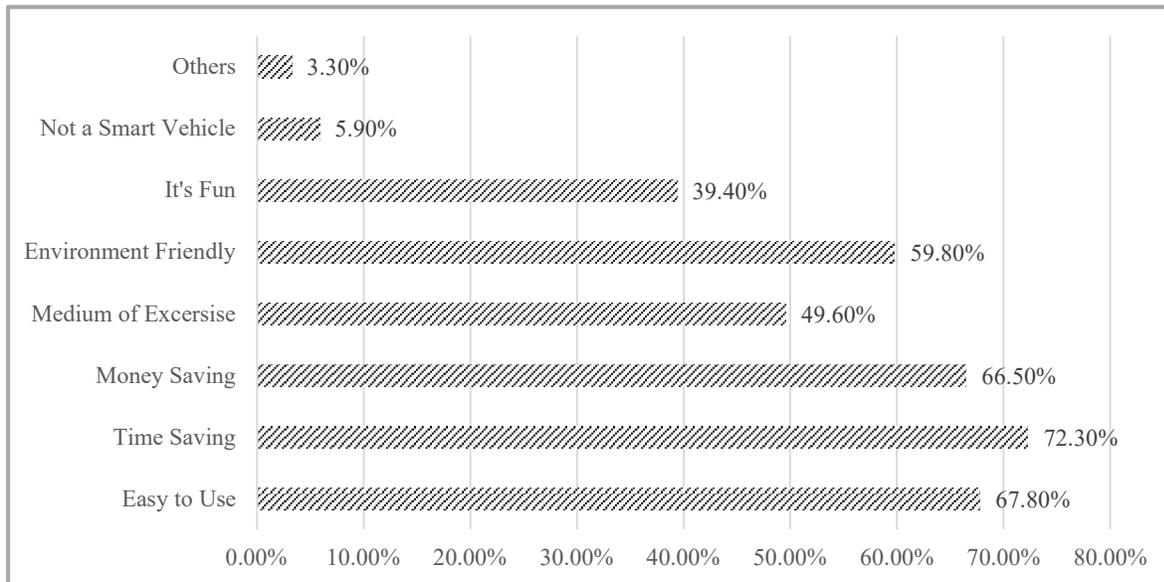


Figure 8. User's Perception about Jobike service
Source: Online Survey, 2019.

Jobike BSS has good acceptability among the users. About the overall services, almost 91% of the respondents mentioned 'satisfactory' or 'good' or 'excellent' (41%, 37% and 13% respectively) whilst only 9% mentioned that the services do not fit their expectations ('poor' and 'very poor' by 7.5% and 1.5% respectively). The responses from online community groups of Jobike also show similar information about the overall services; about 53% users are satisfied whilst 35% mentioned 'may be' (which means they are somehow satisfied but need better service) and 12% are not happy.

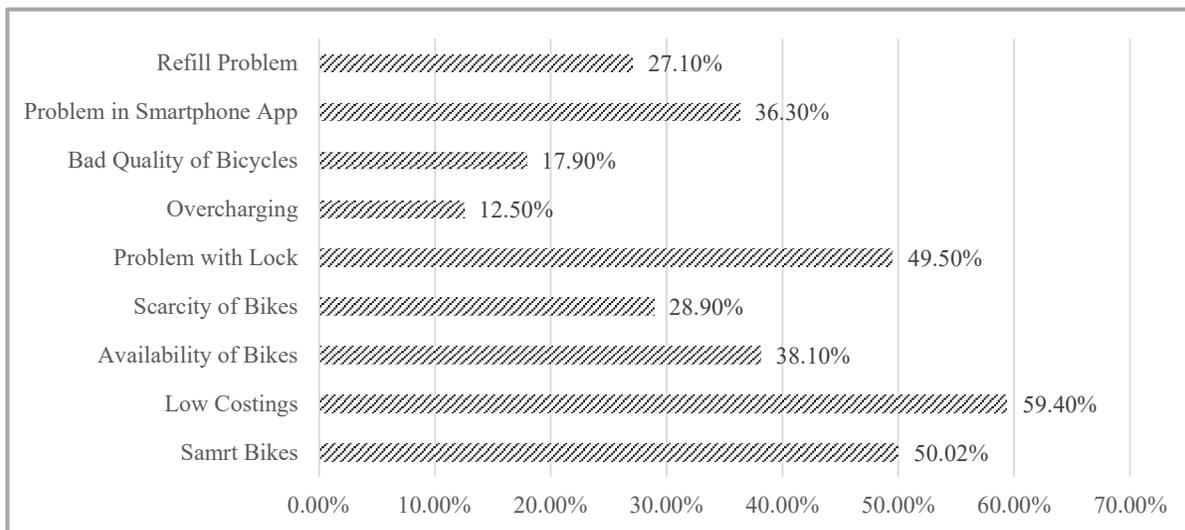


Figure 9. Users' opinions about the problems of Jobike BSS
Source: Online Survey, 2019.

More than half of the BSS users consider Jobike as a 'low-cost' mode of travel. However, almost a-third of the respondents (29%) think there is scarcity of bikes though more than a third (39%) mentioned during service hour the availability of bicycles is good. Nevertheless, the problems with smartphone App and bicycle lock is the major issue; almost 50% of the respondents mentioned there are problems with smart lock system. Network issues, low charge on locks can be the reason for unlocking problem on locks. Figure 9 shows some other problems are bad quality of bicycles, overcharging, and refill problems.

5. DISCUSSION

The BSS is a very new concept of transport service in Bangladesh. After launching the BSS (Jobike), it was widely accepted by people in all the service areas. People were curious and interested for using BSS. Within a few days of inauguration, it become a popular mode for short trips. Jobike bikes are equally popular to both male and female users for their unique design. Light weight of the bicycle is comfortable for many users. It was found that the BSS is cheaper mode and able to minimize travel time than rickshaws, therefore, many of the respondents used BSS as an alternative of rickshaw trips. Though a portion of the BSS users are occasional users, about 20% of the respondents have more than two rides per day. Many people consider BSS as environment friendly travel mode as well as a form of physical exercise. A few students also consider riding BSS for fun. However, though Jobike was received warmly by the wider groups of the society in the service area, almost 60% of the users reported that the bike is not available in their bicycle station when it was in need. Several respondents reported the problems in smart lock for unlocking the bicycle with the smartphone App and again locking it after completing the trip.

The trips per day per bicycle (TDB) is one of the important factors or criteria to assess the performance of BSS system (Médard de Chardon, et al. 2017). The higher the TDB, the more effective the system is. This is the most common measure for performance of BSS system and widely used across the globe. The average TDB for Jobike in Bangladesh is 7 to 10 (in Table 2)

which is much higher (better) than any other BSS in other countries where TDB is usually between 4 to 8.

Jobike BSS in Bangladesh was widely accepted among the users of the service area. Only 11% of the respondents mentioned that the BSS do not match with their expectations and the remaining 89% are satisfied. However, though 89% are satisfied, one-third of them suggested that Jobike services need to be improved. Need to address the issues and problems to improve the service level and satisfaction of users. For instance, hardware problems of the bike need to remove, regular technical improvement of App (and the system improvement) is required to solve unlocking problems and rebalancing system of the bikes to improve bicycle availability. Increasing the number of bikes may improve the availability of bikes. Developing an online system to refill money and introducing different pricing strategies are required to satisfy one-third of the users who are not satisfied with existing service or fare rates. Preparing local transport plan will help to develop BSS considering the local contexts, culture and users' expectations. It is important to have a proper feasibility study, BSS planning and design, and appropriate business plan (financial mechanism) before launching a BSS in any area.

Nevertheless, a total more than 130 incidents of vandalism were reported and 6 bikes were stolen in different BSS areas of Bangladesh. Jobike service was discontinued in several locations due to financial crisis of the organization to maintain operating costs and the higher rate of vandalism. Raising awareness about green transport and introducing registration using valid National ID or Student Card may help reducing theft, vandalism and parking in wrong places.

The BSS area for all the locations provided by Jobike in Bangladesh is either a very small area (e.g. university campus) or a small portion of the city. However, research (e.g. Burden and Barth, 2009) mentioned that the small BSS systems do not work efficiently. ITDP (2013) planning and design guidelines for BSS suggested that the coverage area for BSS should be the whole city or 10 sq. km area with around 10-30 bikes for every 1,000 residents. Even though the capital cost and operating cost of Jobike is very less compared with other BSS in Europe or in other Asian countries, the cost could be further reduced if the bicycles are produced in mass and BSS is in city-scale. BSS may provide better services to more people if integrated with public transport system.

Support from the government agencies responsible for providing transport infrastructure and services, local governments, and private organizations would help to overcome financial constraints to continue the operation of BSS. For instance, partnering with telecom operators may help providing free internet access for BSS App and applying big data for service provision or strategic planning. Moreover, enhancing political will and collaboration with local government authority will facilitate to develop proper and safe infrastructure for cycling, such as integrated network of bicycle lanes and bicycle parking points.

6. CONCLUSIONS

The BSS is an alternative mode of transport which can help solving last-mile problems, reducing transport-induced pollution in built-up areas, and minimizing travel cost and time. Jobike is the first BSS provided in several areas in Bangladesh. This paper provides a brief history and background of Jobike BSS, current scenario of operations and service and the users' opinions regarding the services.

Jobike began operation in Bangladesh in 2018 and over the years launched in seven different locations. It was found that most of the Jobike BSS users have positive response to the scheme.

However, there are some challenges for operations; such as financial drawbacks, bicycle theft and vandalism. Due to financial shortage and vandalism, BSS services were discontinued in Cox's Bazar, JU and CU campus after about a year of operation. Preventing theft and vandalism is very important to make BSS successful. Public-private partnership may help to overcome the financial constraints. The majority of the BSS users are satisfied with the services available, however, the system needs some improvements to overcome the problems and issues. Awareness generation among the users and community participation could be helpful for the BSS system.

This paper will be helpful for researchers and transport professionals to understand the history and services of BSS in Bangladesh and the users' opinions about the services. The results are helpful for the service providers to improve BSS in Bangladesh and for the organizations planning to introduce BSS. Further research could be on: cost benefit analysis of BSS; public-private investment for BSS; how to integrate BSS with Metro Rail or bus rapid transit (BRT) systems; how to perform BSS on making social distance during COVID-19; developing a more advanced AI platform to further facilitate the efficiency in using big data collected from BSS; possibility of using electric bicycles for BSS.

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