



Pre Feasibility Report-Public Bicycle Scheme in Jaipur

EMBARQ India
The World Resources Institute,
www.embarqindia.org

Contents

Executive Summary	3
1. Introduction	4
1.1 Connectivity	5
1.1.1 Road.....	5
1.1.2 Rail	5
1.1.3 Air	5
1.2 Urban Transport Scenario	5
1.2.1 City Bus Service	5
1.2.2 Bus Rapid Transit System (BRTS)	5
1.2.3 Jaipur Metro	6
1.3 Non Motorized Transport	6
2. Public Bicycle Scheme	6
2.1 Stakeholder Consultation	8
2.1.1 Aim	8
2.1.2 Findings	9
2.1.3 Institutional Structure.....	10
2.1.4 Models for Implementation	10
3. Project Configuration.....	11
3.1 Walled City	11
3.2 Demand Assessment	13
3.3 Project Components	17
3.3.1 The cycle	17
3.3.2 Stations	18
3.3.3 Terminal.....	19
3.3.4 Customer Service.....	19
3.3.5 IT System.....	20
3.3.6 Redistribution	20
3.3.7 Payment options	21
3.3.8 Maintenance	21
4. Project Financials.....	22
4.1 Capital costs	22
4.2 Operating costs	22
4.3 Revenue	23
4.3.1 User Tariff Plan	23
4.3.2 Subscription	23
4.3.3 Other Potential revenue sources	24
5. Project Implementation Structure	25
5.1 Institutional roles & responsibilities	25
5.2 Contracting	25
5.3 Support Required from JDA	26

Executive Summary

The Jaipur Development Authority (JDA) with a view to restore and preserve the rich historic and cultural heritage of Jaipur are desirous of implementing a public bicycle scheme on public private partnership (PPP) basis in the city of Jaipur. In this regard, EMBARQ India was requested to assist in preparing the pre-feasibility report for the project.

This report is divided in to five chapters, each of which deals with a specific aspect of the system.

Chapter 1 gives a background of the city of Jaipur in terms of its history, demographics, population and the economic mainstay of the city. It goes on to describe the connectivity of the city through various means of transport, the urban transport scenario, which includes the bus rapid transit system, city bus service, and the upcoming metro. It also highlights the vast component of non-motorized transport, which constitutes nearly 40% of the total trips in Jaipur.

Chapter 2 gives an introduction to the public bicycle scheme, its benefits and the need to have such a scheme in place in Jaipur. It explains how this concept is different from cycle rental. This chapter also discusses the stakeholder interaction wherein JDA with EMBARQ India organized a workshop on public bicycle schemes, which had participants ranging from private entrepreneurs, NGOs, professionals in the field of public bicycling, municipal authorities, media, and representatives from the city of Jaipur. It discusses the various aspects ranging from cost, coverage, and the area where the scheme needs to be implemented. The walled city has been suggested as a pilot project, the success of which can be then replicated across the city.

Chapter 3 throws light on the actual project wherein the factors favourable for the implementation of the scheme in the walled city are discussed. It discusses the target group of users, which basically comprises of tourists, students and others visiting the area. The demand assessment has been discussed in detail which includes number of cycles, docks, location of stands, the rationale behind choosing the cycle stand locations and also the various components like the cycle, stations, terminals, IT system, redistribution and the payment system have been discussed.

Chapter 4 gives an insight into the project financials, which include the capital and the operating cost of the system. It further discusses the various revenue streams, which include annual and daily subscriptions, cycle rentals, and advertisement revenue. Innovative supplementary sources of revenue have been suggested to cover the consequent shortfall that has to be covered by the public agency.

Chapter 5 deals with the implementation structure, listing out the roles and responsibilities of each of the stakeholders, the contracting arrangements between the parties where it is strongly suggested that separate contracts for advertisement and operations be made. Moreover, the support that the operator needs from JDA has been described. This primarily consists of tackling the issues of on-street parking, encroachment of space by hawkers and the issue of putting up advertisements on the cycle stations.

**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*

1. Introduction

Jaipur is the capital and largest city of the Indian state of Rajasthan. It was founded on 18 November 1727 by Maharaja Sawai Jai Singh II, the ruler of Amber, after whom the city has been named. The city today has a population of 3.1 million. Jaipur is also known as **Pink City** and **Paris of India**. The Jaipur region/JDA area has an extent of 1464 Sq. Km and comprises the following spatial units

- The Jaipur Municipal Corporation (JMC)
- Rest of JDA area that includes the satellite towns and the villages.



Figure 1 Map of Jaipur

Jaipur is the 10th largest city of India according to census of 2011. It is one of the fastest growing mega cities of the country with an annual average growth rate of 4.5%. Jaipur district is a centre for both traditional and modern industries. It is famous as a large exporter of gold, diamond and stone jewellery in Asia and is the only city that produces the blue diamond, or tanzanite, in the world.

The city is remarkable among pre-modern Indian cities for the width and regularity of its streets, which are laid out into six sectors separated by broad streets 34 m (111 ft) wide. The urban quarters are divided by networks of gridded streets. Five quarters wrap around the east, south, and west sides of a central palace quarter, with a sixth quarter immediately to the east. The Palace quarter encloses a sprawling palace complex, (Hawa Mahal), formal gardens, and a small lake. Nahargarh Fort, which was the residence of the King Sawai Jai Singh II, crowns the hill in the northwest corner of the old city. The observatory, Jantar Mantar, is one of the World Heritage Sites. Included on the Golden

**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*

Triangle tourist circuit, along with Delhi and Agra, Jaipur is an extremely popular tourist destination in Rajasthan and India.

1.1 Connectivity

1.1.1 Road

The city of Jaipur the capital of the state of Rajasthan and is centrally located in the State. National Highway No.8 links Delhi to Mumbai, National Highway No.12 links to Kota, Baran District and National Highway No.11 links Bikaner to Agra, passing through Jaipur district with a total length of 366 km.

1.1.2 Rail

Jaipur is well connected to Delhi, Mumbai and other metro cities and also with number of towns within Rajasthan. The prestigious Shatabdi train connects Delhi with Jaipur.

1.1.3 Air

Jaipur International Airport is situated in its satellite town of Sanganer, at a distance of 10 km from city center and offers connectivity to major domestic and international locations. The Terminal 1 is used for both international and domestic flights, while Terminal 2 is reserved for domestic carriers. The airport handled 255,704 international and 1,267,876 passengers in 2009–2010.

1.2 Urban Transport Scenario

1.2.1 City Bus Service

The Jaipur City Transport Services Limited (JCTSL), a Special Purpose Vehicle formed by the Jaipur Development Authority and Jaipur Nagar Nigam in a joint venture, runs the city bus service and receives funding from the JnNURM. It is a unique example of a successful public partnership wherein the operator, the Rajasthan Road Transport Corporation, is a public entity, and JCTSL, is in charge of supervising, controlling and monitoring of operations. The service operates 300 low-floor buses and minibuses on 26 routes carrying approximately 160,000 passengers daily. The buses are colour coded with each route being designated by a different color. The bus system runs direction-based services i.e. by making 1 transfer one can traverse the entire city.

1.2.2 Bus Rapid Transit System (BRTS)

The Jaipur Bus Rapid Transit Service was approved by the government in August 2006. The responsibility for managing the Jaipur BRTS has been given

*This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.

to JCSTL. The BRTS is expected to counter the city's growing traffic for next 15–20 years. In Phase I, two corridors have been proposed: "North-South Corridor" from Sikar Road to Tonk Road, and an "East-West Corridor" from Ajmer Road to Delhi Road. A section of the *North-South Corridor* from C-Zone Bypass near Harmada to Pani Pech became operational in 2010.

1.2.3 Jaipur Metro

A rapid transit rail project by the name Jaipur Metro is under progress. It will provide means of faster commutation for the city residents. It is expected to be operational by June 2013.

1.3 Non Motorized Transport

Non-motorized transport accounts for 38% of the trips in the city of Jaipur. This forms a huge proportion of trips which are environment friendly and which need to be preserved so as to continue to make the city more sustainable. Cyclists account for 20% of the total traffic in the walled city which is testimony to the fact that the cycle is a mode that is widely used in that area. 50% of the total trips are catered to by private modes of transport, which comprises of cars and 2 wheelers, with the latter contributing to 45% of the total trips. Intermediate public transport and Public transport together account for 13% of the trips in Jaipur.

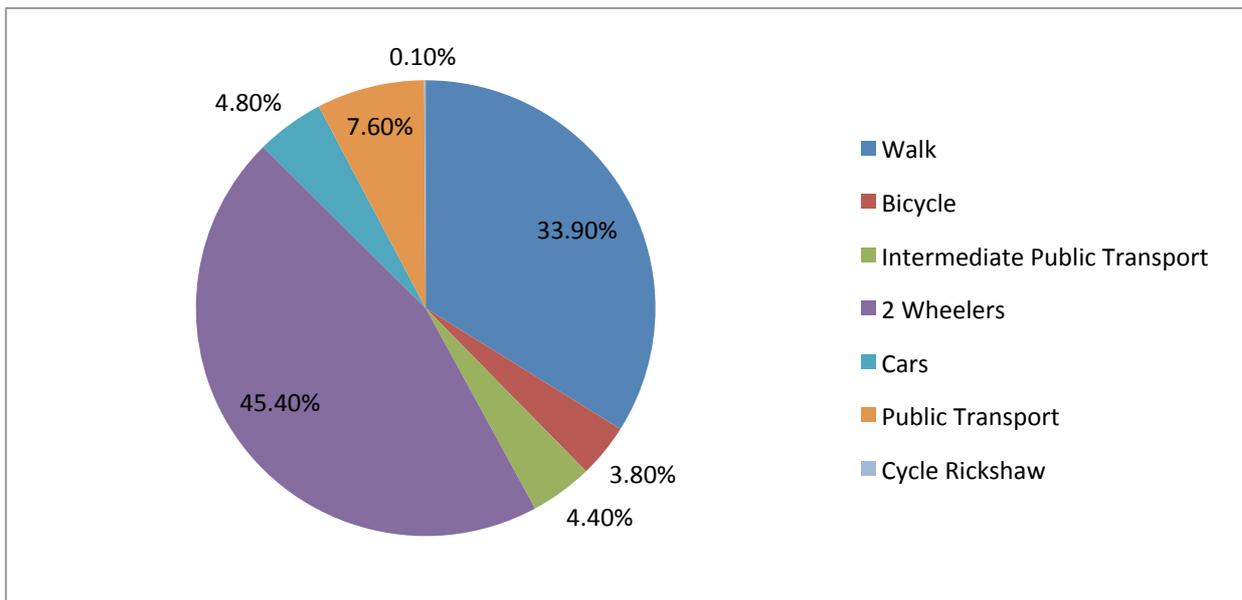


Figure 2 Modal Split in the city of Jaipur

2. Public Bicycle Scheme

Public bicycle sharing is an innovative platform comprising short-term bicycle rental schemes in which bicycles can be picked up at any self-serve bicycle station and returned to any other bicycle station. Public bicycle schemes are ideal for need-based, point-to-point short distance trips and are an alternative transport mode to complete the “last mile” of a journey. Public bicycle schemes differ from traditional leisure-oriented bicycle rental services in that they provide fast and easy access, and can be used for one-way trips in daily mobility. Additionally, they do not put the burden of ownership on the user. Thus, the bicycle is seen as an alternative and viable individual transport mode or as an extension service for “first and last mile” connectivity for distances that may be considered too far to walk between home and public transport facilities and/or from public transport to the home or the work place.

Cycle sharing is a flexible form of personal public transport. Cycles are stored in a closely spaced network of stations. With a smart card or other form of identification, a user can check out a cycle from a station and return it to any other station.

Most cycle sharing systems operate in a public-private partnership structure in which the government carries out planning and oversight activities and the private sector handles day-to-day operations. Successful implementation of a cycle sharing system requires meticulous planning and oversight on the part of the government.

As in most public transport systems, cycle sharing systems generally require supplemental revenue sources to cover operating and investment costs. Revenue streams used in major cycle sharing systems around the world include annual and temporary membership fees, advertising, sponsorships, and on-street parking fee proceeds.

Key features of cycle sharing systems

- A dense network of stations across the coverage area
- Cycles of varying sizes with specially designed parts to discourage theft
- Radio frequency identification devices (RFIDs) to track where a cycle is picked up, where it is returned, and the identity of the user
- Real-time monitoring of station occupancy rates through General Packet Radio Service (GPRS), used to guide the redistribution of cycles

Real-time user information provided through various platforms, including the web, mobile phones, and/or on-site terminals

Modern cycle sharing systems have the ability to track the identity of the user as a way of preventing theft of cycles. All users are required to furnish identity proof, either at the time of registration or when signing up for temporary subscriptions. Credit cards can be used as a security mechanism if the user fails to return a cycle, a fine can be charged against the user’s credit card. The user’s account can also be blocked to prevent him/her from checking out other cycles.



Figure 3 Image of Smart Card

2.1 Stakeholder Consultation

2.1.1 Aim

The Jaipur Development Authority (JDA) in association with EMBARQ India organized a workshop in February 2012 to explore the possibilities of implementing a public bicycling system under a public-private-partnership, to reduce road congestion, accidents and pollution, and improve the quality of life for the people of Jaipur. A panel of experts were invited to give insight into various aspects of the workings of this system.

Over 20 participants attended the workshop and had representation from the Jaipur Development Authority, the Jaipur City Transport Corporation Ltd., local NGOs involved with road safety and transport, private corporations and other agencies.



**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*



2.1.2 Findings

- Identification of government bodies, local associations, corporate stakeholders, and individuals likely to benefit or be affected by the implementation of public bicycling schemes in Jaipur.
- The need for clear and essential policies for promoting non-motorised transport and having public bicycling schemes as part of a comprehensive non-motorised transport policy for the city.
- It was emphasized that a political buy in and support of the people is essential for the project and it is imperative to set benchmarks so that performance of the project can subsequently be judged against specific parameters.
- Majority of trips in the walled city would be short (up to 2km) would be a good choice to implement as it is an integral part of the tourist circuit which attracts about 5000 tourists daily on an average.
- The payment system could be phone based as the mobile phone penetration is relatively high, or a cash based system with attendants could also be used. For mass subscriptions, resident welfare associations and hotels could be ideal targets as they already have their identification documents of the citizens/guests.
- It was also felt that there should be park and ride system at the periphery of the walled city and simultaneously there should be a steep hike in the parking fees.

Major costs in the system are station set up, cycle costs, software, and fare collection

- Station costs Rs 3-4 lakhs
- Cycle costs range from Rs 5000-10000
- Software / management costs – Rs 50 lakhs (100 cycles, 5 stations)
- 15% should be budgeted into thefts

Moving forward it was agreed that a pilot project with 1100-1200 cycles with 60 stations should be implemented.

An analysis of the prospective areas (listed below) where the system could be implemented will be carried out to determine the best location for the pilot phase of the project.

1. Walled City
2. Jawahar Nagar
3. Vidyadhar Nagar
4. Mansarovar

Parameters to be taken into account while doing the SWOT analysis for the above areas are as follows:

1. Land use
2. Public transport network
3. Existing usage pattern
4. Political support
5. Space availability
6. Origin destination patterns

2.1.3 Institutional Structure

An SPV, a combination of JCTSL and JMRC, would be responsible for planning and monitoring the PBS. The NMT cell should be part of the SPV and should have dedicated human resources and budget.

Jaipur Transport Authority (JDA) will be the contracting agency.

2.1.4 Models for Implementation

1. **Public Private Partnership:** Under this format, the capital investment on rolling stock, cycle stations, IT etc will be made by the public agency while the operation and maintenance will be the responsibility of the private player. Advertisement revenue goes to public agency. Only a fixed amount is given to the private player
2. **DBFOT:** The private player will design, build, finance, operate and transfer the facility after expiry of the concession period. The private player will collect the user fees for the length of the concession period.

Based on discussions with JDA, it was suggested by JDA that walled city be taken up for implementing the Public Bicycle Scheme.

3. Project Configuration

3.1 Walled City

Jaipur is one of the few planned cities of its times based on the ancient town planning doctrine of Shilpa Shastra. The city conformed to the traditional walled city concept with the encircling wall and 9 entry gates.

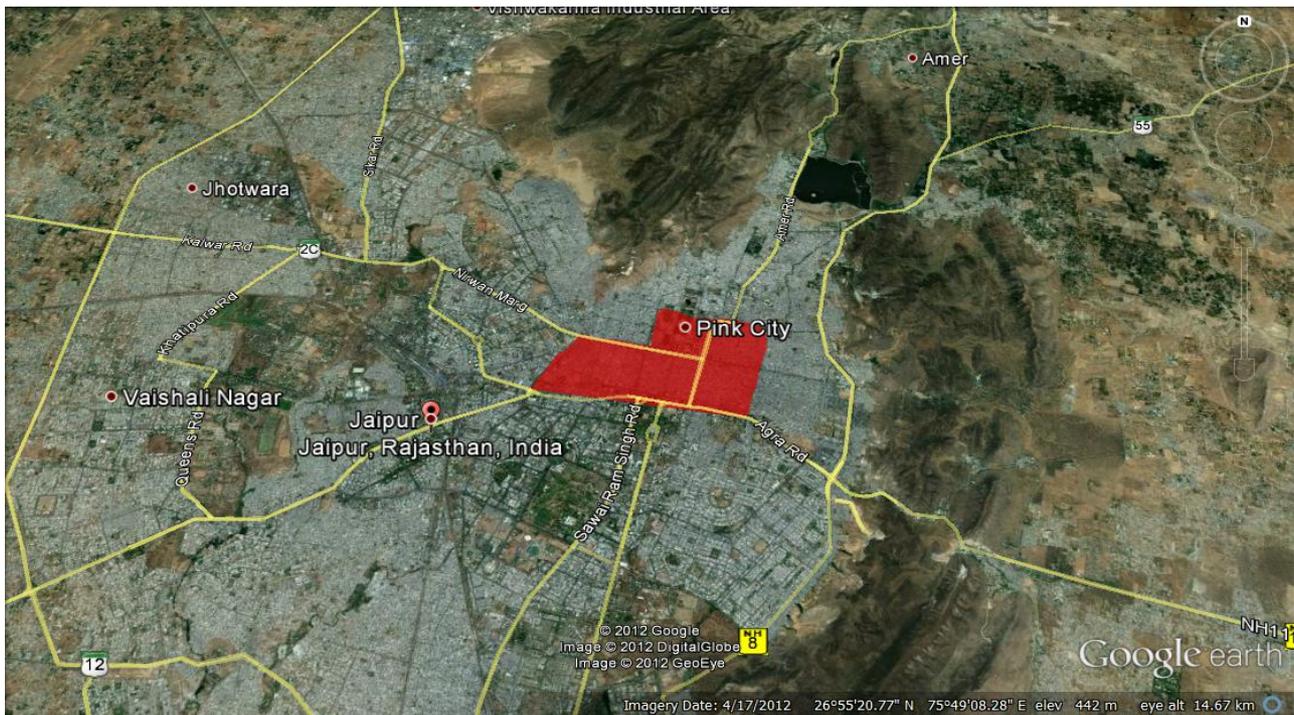


Figure 4 Image of Walled City

Jaipur’s walled city evolved as a gridiron plan with the main road running almost east west along the ridge in the centre, and the palace complex at the core. The buildings were built following a strict Architectural guideline. By 1734, the main markets of the town including Johari Bazaar, Sireh Deorhi Bazaar, Kishanpole Bazaar and Gangauri Bazaar had been built.

The walled city has the highest population density in the city at 58207 persons/sq km. The total area of the walled city is 6.7 sq.km. Jaipur is an economically vibrant city. Tourism, trade and commerce and local handicrafts industries are the key strengths of the city. 30% of all employment in household industry sector is being generated from the walled city. The maximum percentage of workers (42%) can be seen in HawaMahal East that includes the walled city. Hawa Mahal West also has a large proportion of workers (20%). The tie and dye, Sanganer block printing, jewelry and the blue pottery are the most famous handicrafts of the city. Other crafts include embroideries, stone carving, woodcarving, leatherwork, metal ware, ivory carving and painting. Traditional Bazaars with their specializations are listed below:

1. Badi Chaupar – Turbans

**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute’s Centre for Sustainable Transport in India, and is part of WRI’s global EMBARQ network.*

2. Bhindon Ka Rasta Marble Statue Carving
3. Chandpole Pickles and Sharbats
4. Chora Rasta Jaipur Book Shop, Maps, Guide books and Snacks
5. Chhoti Chaupar Moodas(Straw Chairs)
6. Ghatgate Bazaar Iron Work
7. Gheewalon ka Rasta and Haldiyan ka Rasta Special Sweets, Digestives and Supari
8. Hawa Mahal Antiques, Textiles, Quilts, Costume Jewellery, Fashion Accessories and Leather Crafts
9. Johari Bazaar Jewellery, Textiles, Precious and Semi- Precious Stones, Snacks,
10. Kishanpole Bazaar Tent Makers and Silver Jewellery
11. Ramganj Bazaar Shoes/ Mojari
12. Tripolia Bazaar, Utensils, Tin Trunks and Metal Work

The city is known as the “Pink City” and has a vast and rich heritage. The largest concentration of the heritage buildings is within the walled city. 8 major heritage buildings are within the walled city.

The walled city accounts for 54% of the total commercial area of the city and 32% of the total workforce of the city. Most of the people involved in informal sector activities walk to their place of work, about 20% use cycles and the rest use public transport.

Based on the discussions with stakeholders and the following facts it was decided by JDA to take up the walled city for the implementation of a pilot project, the success of which could then be leveraged to expand the scheme to the whole city. The following facts favour the introduction of PBS in the walled city:

- The share of cycles in the vehicular composition is high especially in the walled city area (22%).
- The average vehicular speed in the walled city area is quite low (12-15km/hr)
- On street parking is very high which contributes to congestion
- It forms an integral part of the tourist circuit which will encourage tourists to use cycles as they are well versed with the concept of PBS
- Majority of bus routes pass through the walled city area which can use cycle for last mile connectivity
- High density of population and mixed land use (residential, commercial, education) encourages short distance trips which can be easily catered to by cycles

The walled city especially owing to its location in the heart of the city and home to a number of historical monuments which are of great tourist interest like Hawa Mahal, and the City Palace. The abundance of shops dealing with handicrafts, jewellery attract close to half a million tourists annually, of which a quarter are foreign tourists. This contributes to the foreign exchange of the exchequer as well as provides employment to thousands of people, especially the hotels, which are in abundance both in and around the walled city. Moreover there are many schools and colleges in the area provide favorable conditions for the launch of the scheme.

The target population is:

- Tourists

- Students
- People visiting the walled city for work, recreation etc.

On an average, 3500 tourists visit the city of Jaipur every day, of which 900 are foreign tourists. It has been observed that most of the tourists visit the walled city therefore it can be assumed that tourists form a sizeable number of potential users.

Table 1 Trend of Tourist Flow in Jaipur

Year	Tourist inflow			
	Indian	Foreign	Total	Per day
2001	655715	172950	828665	2270
2002	589414	81451	670865	1838
2003	640130	105161	745291	2042
2004	968123	206272	1174395	3218
2005	1198000	387295	1585295	4343
2006	1278603	441910	1720513	4714
2007	1297072	464841	1761913	4827
2008	1138859	456165	1595024	4370
2009	995996	283423	1279419	3505

There are 37000 students enrolled in 210 schools and colleges in the walled city area. Therefore the total target audience is to the tune of 41000 people. In addition there are approximately 4 lakh people who reside in the walled city area and thousands of people who visit, work in this area.

3.2 Demand Assessment

It is difficult to accurately estimate the demand for the Public Bicycle Scheme as no such scheme has been implemented in the country so far. However, the public bicycling toolkit developed by Ministry of Urban Development(MoUD), recommends to have at least 1000 bicycles in an area of 5 sq km, which is quite similar to the area of the walled city. Therefore it is recommended to start with 1000 bicycles, which can be later expanded based on the response it receives once operational. It is recommended to start the scheme on Public Private Partnership (PPP) basis, with 1000 cycles spread over 72 cycle stands, each stand having 15 bicycles on an average. Number of docks required, as recommended in the toolkit developed by MoUD, should be 1.5 times the number of cycles i.e. the scheme should be implemented with 1500 docks.

The system will be automated with the facility of payment through cash, credit cards and the Common Mobility Card. Total project is estimated to cost INR 90 million.

The number of cycle stands have been worked out based on the premise of having a dense network of cycle stands and spacing of 300-400m. Further stands will be placed on each side of the road and the major roundabouts to have 4 stands i.e. one on each arm of the major roundabout. The locations consist of major activity

**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*

nodes, public transport nodes, historical monuments, educational institutions, hotels etc. The cycle stand locations are as under:

Table 2 Cycle Stand Locations

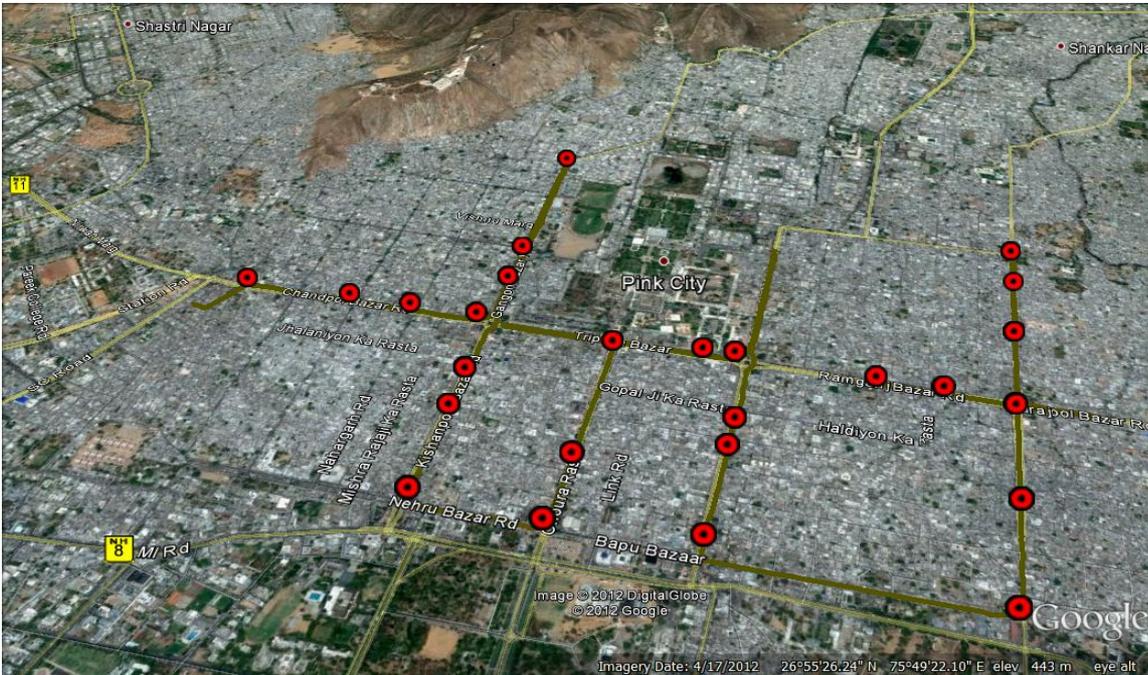
S.No	Location	Number of Cycle stands	No of cycles
1	Chandpole	4	60
2	Choti Chopad	4	80
3	Badi Chopad	4	80
4	Ramganj Chopad	4	80
5	Hawa Mahal	2	30
6	City Palace	2	30
7	Johari Bazar	4	60
8	Tripolia Bazar	4	60
9	Kishanpol	6	70
10	Gangori	6	60
11	LMB	2	30
12	Birla Mandir	2	30
13	Hotel Country Inn Suites	2	30
14	Hotel Rajputana Sheraton	2	30
15	Hotel Om Tower	2	30
16	Hotel Man Singh	2	20
17	Hotel Rambagh Palace	2	20
18	Hotel Maharani	2	30
19	Chaura Rasta	6	30
20	Ramganj Bazaar	10	140



**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*



**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*



**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*

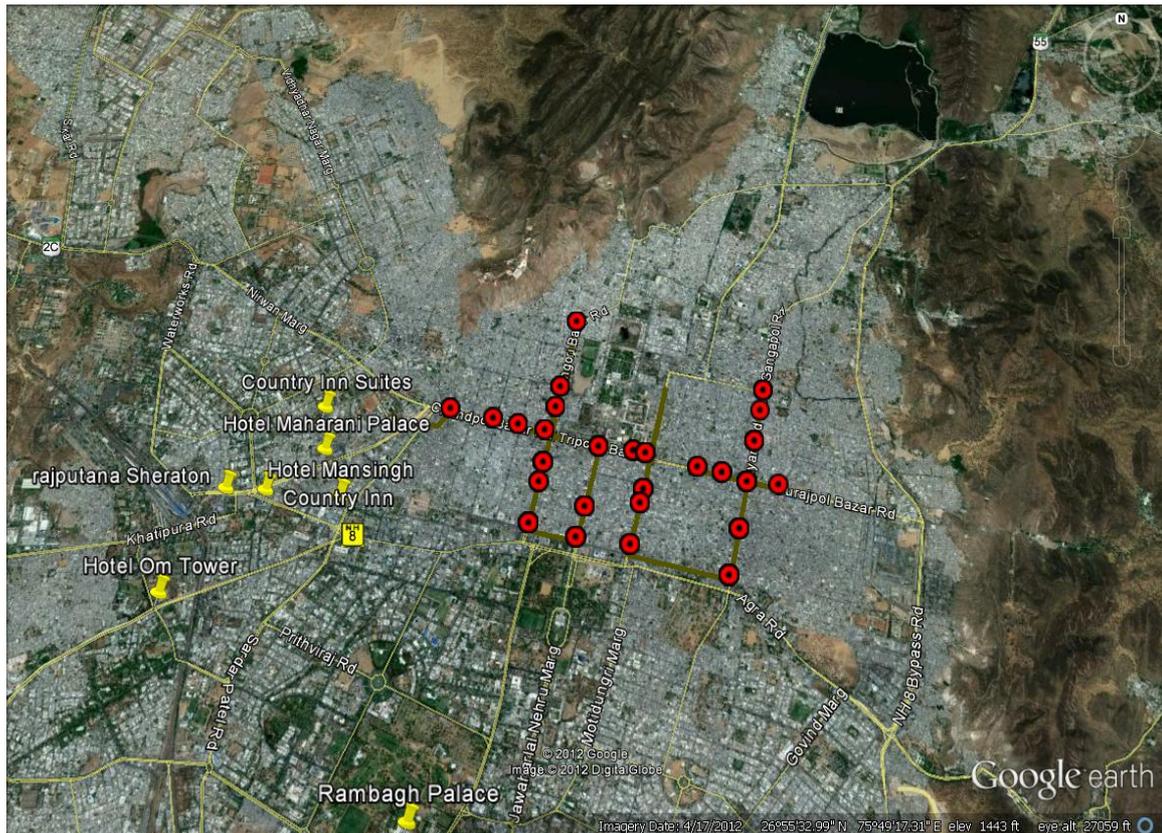


Figure 5 Images of Proposed Cycle Stand Locations

Bicycle sharing schemes are quite popular among tourists, especially foreign tourists. Most of the proposed cycle stands are conveniently located within short distances of each other. Such short distances can be traversed by walking or using public transit. Amongst these, the cycle is a relatively fast mode of commute and is environment friendly.

3.3 Project Components

3.3.1 The cycle

It is proposed that there be modified unisex bicycles. The aim of having modified bicycles is to reduce the chance of theft. The actual bicycle design should be left to the operator, although the bicycle should have at least the following components:

- Adjustable seats
- Front basket
- Step through frame
- Unobstructed reflectors at the front and rear
- Uniform design and branding
- Each bicycle should be identifiable by a unique reference number both electronically and manually

MoUD has set up a sub group to develop bicycle design guidelines, which can be referred

**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*

to for detailed design of the bicycle. The link to the document is given below:
<http://urbanindia.nic.in/programme/ut/BicycleDesignSpecificationDraft.pdf>



Figure 6: Cycles

3.3.2 Stations

The most common type of bike sharing station includes docking points and a rental terminal - connected with each other. The bike is locked to the electronically controlled docking point. The rental process takes place at the rental unit (terminal or at the docking point itself which can include touch screen display, card reader, RFID-Reader printer and keyboard. The stations preferably must be placed in the parking lane and as close to public transport stops as possible.

Each Docking Point should at least have:

- a) An automated mechanism for releasing a bicycle when hired by a customer;
- b) An automated mechanism to dock a returned bicycle;

**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*

- c) An automated system clearly indicating to a customer when a bicycle has been successfully released, docked or cannot be hired either because there is a fault with the docking point or the bicycle is damaged;
- d) A manual means to dock a bicycle if there is no power at the docking point.
- f) A Mobility Card reader to allow registered customers to obtain bicycles by using the Mobility Card.



Figure 7: Docking Point and Terminal

3.3.3 Terminal

The Terminal should comprise of at least:

- A screen;
- An input device to allow the customer to interact with the services systems;
- A card reader for taking charge payments from debit cards/credit cards;
- A Mobility Card reader;
- A device for printing receipts;
- A wireless communications link with the central systems, to enable authorisation of charge payments and the provision of real-time information regarding the Public Bicycle Scheme and customer information panels for the display of customer information.

3.3.4 Customer Service

Customer service platforms collect and disseminate information from and to the user through various mediums. They allow customers to set up accounts and receive information

**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*

about the system and their account. The web is an ideal platform as it has the advantage of being available 24/7 and offers seamless interaction without the hassle of waiting in long queues.

Cycle sharing website contents should reflect the following:

- Procedure of registering
- Hours of operation
- The process of checking out a cycle
- Customer service phone numbers and - e-mail addresses
- A map of station locations with real-time station data

While many users may access the system through the website or station terminals, it is important to have attendants to allow for customers without access to technology to access and use the system.

3.3.5 IT System

Information technology (IT) systems manage the interaction between the user and the operator. They allow for real-time data exchange enabling the user to have access to important information on both internet and mobiles and also at terminals on parameters like availability of cycles etc and also enables the operator to track the movement of cycles which enables him to plan the operations in an optimal manner. Additionally, the problem of theft can be handled better as the identity of the user can be tracked.

The implementing agency also needs to have access to the IT system because the system data are used to evaluate whether the private operator has met the service level standards outlined.

3.3.6 Redistribution

Redistribution is broadly defined as the rebalancing of cycles from stations that are near or at capacity to stations that are close to empty. Redistribution is one of the greatest challenges to operating a cycle sharing system, accounting for as much as 30 percent of operating costs.



Figure 8: Redistribution Vehicles

3.3.7 Payment options

The system will be automated with the facility of payment through cash, credit cards and the Common Mobility Card. Going forward, it is recommended to explore payment through mobile phones.

3.3.8 Maintenance

Regular preventative maintenance is necessary to keep the cycles in good working condition. The maintenance has to be done based on service level benchmarks, which will be agreed upon by the operator and the city authority.

4. Project Financials

4.1 Capital costs

A review of the capital costs of the system in Ahmedabad including terminals, docking points, cycles, and construction costs has been undertaken and the costs for the system in Jaipur has been calculated based on the same. The capital cost is to the tune of Rs 90 million.

Table 3 Capital Cost

Item	Unit Cost(Rs)	Quantity	Total Cost(Rs)	% of total cost
Docks	30,840	1500	4,62,60,000	51
Installation	1,68,356	72	1,21,21,632	12
Cycles	8,630	1000	86,30,000	10
Terminals	1,14,284	66	75,42,744	8
Software	86,13,301	1	86,13,301	10
Stations-Manned Kiosk	5,62,175	6	33,73,050	4
Control centre	32,25,996	1	32,25,996	4
Redistribution vehicles	8,00,000	1	8,00,000	1
Total			9,05,66,723	

4.2 Operating costs

Operating costs include administrative, maintenance and redistribution costs. Redistribution costs represent the largest portion of operating expenses.

The operating costs of systems in China in the cities of Hangzhou and Guangzhou were in the range of Rs10,000 to 14,000 per bicycle which is largely due to the economies of scale that are achieved as these systems have very large number of cycles reaching up to 60,000 cycles. The cost of the system in the city of Pune was to the tune of Rs24,000 per bicycle which is due to the fact that the system is totally manual. Therefore it is safe to assume that the operating cost for the system in Jaipur to be Rs15,000 per bicycle.

**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*

4.3 Revenue

4.3.1 User Tariff Plan

Subscription and rental fee collection from bike usage is the only direct revenue source for public-bicycle-sharing schemes. In order to encourage short term use of the bike, in other words to ensure maximum turnover per bicycle the tariffs have been set which allows the first half hour to be free while the rates increase steeply thereafter. The recommended tariff structure is as follows:

Table 4 Tariff Structure

Usage Time(Min)	Tariff (Rs)
<30 min	Free
30-60	5
60-120	10
>120	20

Increase in tariff @5% per year

4.3.2 Subscription

An assumption of 3 annual subscriptions per bicycle means that the system shall attract around 3000 annual subscriptions. This is around 9% of the total student population in the walled city. Daily subscriptions are generally taken for leisure activities, usually by tourists. We have assumed a daily subscription of 1 per bicycle which gives a total of 1000 daily subscriptions.

Table 5 Annual and Daily Subscription

Annual	
Registration	Rs 600
Upto 30 min	Free
30-60	5
60-120	10
>120	20
Daily	
Registration	Rs 50
Upto 30 min	Free
30-60	5
60-120	10
Every Subsequent Hour	20

Table 6 Revenue Stream

Revenue Stream	No of Members/yr	Rate(Rs)	Amount/Yr(Rs)
Annual Subscription	3000	600	18,00,000

**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*

Daily Subscription	1000	50	50,000
Total Subscription Revenue/yr			18,50,000
Daily Revenue	No of Users	Rate(Rs)	Amount/Yr(Rs)
Users renting for 30-60 min	700	5	12,77,500
Users renting 1-2 hr	200	10	7,30,000
Users renting >2hrs	100	20	7,30,000
Total Rental Revenue/yr			27,37,500

It is assumed that the turnover of each bicycle is 5 i.e. 5 trips per bicycle per day. It is also assumed that 4 trips per bicycle per day will be free i.e. the cycles will be rented for less than half hour. 1 trip per bicycle per day is assumed to be chargeable. Out of the chargeable trips, it is assumed that 70% of the users will rent the cycle for 30-60 min, 20% of the users will rent the cycle for 1-2 hours while 10% will rent the cycle for more than 2 hours. Total rental revenue per year is to the tune of INR 46 lakhs as against an operating cost of INR 1.5 Crore. Some revenue would accrue on account of advertisement, still there would be a considerable shortfall which needs to be made up by allocating some portion of revenue of traffic fines, parking revenue, taxes on fuels etc or this amount has to be given to the concessionaire to make the project viable.

4.3.3 Other Potential revenue sources

- Parking fees. Charges for on-street motor vehicle parking in the cycle sharing coverage area can provide a sizable revenue stream.
- Cess on fuel could be used to fund the system
- Stamp duty etc can also be diverted for the same

An important source of revenue for the concessionaire in this PPP arrangement shall be advertisement and branding revenue from docking stations and bicycles. Advertisement potential would be present at the docking stations in form of hoardings.

Government shall provide land at appropriate sites to the concessionaire for the period of the concession. This will also transfer the right of collection of ground rent from government to the concessionaire. However, the government shall retain the right to collect advertisement tax. The locations selected for docking stations are frequented mainly by tourists and students. These target segments are very attractive to advertisers. These sites will also be located at highly visible places to attract more users.

The projected costs and revenue streams for a 15 year period is presented in Table 7. It is assumed that the life of cycle is 5 years while the other infrastructure will last 15 years. Therefore at the end of 5 year period capital cost in the form of fleet replacement will have to be made. The costs and revenue are expected to increase by 5% per annum.

Table 7 Project Financials

	Year														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*

Rental Revenue (Rs Mn)	4.6	4.8	5.1	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.5	7.9	8.3	8.7	9.1
Capital Cost (Rs Mn)					11.0					14.1					17.9
O&M Cost (Rs Mn)	15.0	15.8	16.5	17.4	18.2	19.1	20.1	21.1	22.2	23.3	24.4	25.7	26.9	28.3	29.7
Deficit (Rs Mn)	10.4	10.9	11.5	12.0	23.7	13.3	13.9	14.6	15.4	30.2	16.9	17.8	18.7	19.6	38.5

5. Project Implementation Structure

5.1 Institutional roles & responsibilities

It is recommended that a special purpose vehicle implement cycle sharing systems. Setting up an SPV can confer several benefits with regard to revenue management and flexibility in hiring. Day-to-day operations are handled by a private entity that enters into an agreement with the SPV. The system requires active and ongoing support from the municipal and state governments. The division of responsibilities is indicated in the table below.

Table 8 Roles and Responsibilities

Institution	Roles and Responsibilities
Jaipur Municipal Corporation	Technical Guidance
	Provides space for stations and revenue rights
	Policy Support
	VGF if required
JDA	System Planning
	Contract for operations
	Monitoring of operator and system performance
	Recipient of all revenue. Pays the operator for service provided, with incentives and penalties as laid out in the Service Level Agreement(SLA)
Private Operator	Day to day operations including redistribution, maintenance and customer service activities

The SPV should hire a dedicated team of staff who can focus on implementing the cycle sharing system. This team is responsible for evaluating of the local environment, planning the system, contracting private operators, and overseeing the phased roll-out of the system.

5.2 Contracting

Most cycle sharing contracts combine the installation of infrastructure with the operations once the system is launched. Such an arrangement creates an incentive for the contractor to supply high quality infrastructure so as to minimize maintenance costs over the life of the contract. A suggested term for a cycle sharing contract is 5 years. This term length is designed to coincide with the point at which most of the cycle fleet must be recapitalised. The contract is long enough to create an incentive for the operator to procure high quality cycles but short enough to give the implementing agency the flexibility to find a new operator in the event of lacklustre performance. Since the station and IT infrastructure is expected to last beyond the first 5-year contract, the implementing agency should ensure that the software systems are non-proprietary, so as to allow for a change in operator at the end of the contract.

It is therefore advisable that the implementing agency maintains control of the cycle sharing system by signing different contracts with operators and advertisers. This allows the government to cancel or penalize either contract without affecting the other. It also reduces the revenue risk for the cycle sharing operator. If the government does award a single contract for advertising and cycle sharing, the contract should specify that all revenues be deposited in an escrow account. In the event that the operator fails to meet service levels, some of the escrow account funds can be withheld

5.3 Support Required from JDA

The following support is required from various governmental agencies :

- Encumbrance free land at mutually agreed sites at the locations selected above.
- Permissions to erect hoardings at the docking stations
- The issue of on street parking needs to be handled and preferably parallel parking be adopted and space may be demarcated, leaving atleast 2 car spaces for the cycle stand to be accommodated.
- Encroachment of road space by hawkers need to be dealt with





Figure 9: Encroachment by Hawkers and On Street Parking

**This report has been created by EMBARQ India for the Jaipur Development Authority, with the express purpose of informing the Authority on the feasibility of PBS in Jaipur. The views expressed here are those of the authors, and specific to the context and objective of report. EMBARQ India is the World Resources Institute's Centre for Sustainable Transport in India, and is part of WRI's global EMBARQ network.*