



THE EVOLUTION OF BIKE SHARING: 10 QUESTIONS ON THE EMERGENCE OF NEW TECHNOLOGIES, OPPORTUNITIES, AND RISKS

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EXECUTIVE SUMMARY

Highlights

- Bicycle-sharing schemes (BSSs) are experiencing a major breakthrough in cities at a global scale. Of the estimated 1,600 schemes in operation in 2017, approximately 95 percent were launched since 2007, with more than 200 in 2017 alone. Recent technological transformations and innovations are dramatically reshaping our cities and increasing their options to introduce and manage bike-sharing services as a new mode of transport.
- The rapid evolution of technological advancements in BSSs, such as dockless bike-sharing schemes, electric bicycles, and increased private sector involvement, are prompting cities to ensure that legislation and regulations are in place to adequately safeguard the efficiency and safety of this mobility option.
- To ensure a safe and sustainably integrated urban mobility network including a BSS, it is essential for local governments and bike-sharing operators to work together.
- The role of public-private partnerships can be important in any public mobility service, particularly in terms of bike sharing. City administrators and private entities must work together to develop appropriate legislation, provide adequate infrastructure, and manage the operation and maintenance of the service.
- To ensure success, the key factors are the scale of and access to BSSs, whereby bike sharing should be at a scale that corresponds to the size of the city and is easily accessible to achieve ridership.

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Context

A BSS allows a user to collect a bicycle on loan from one location and return it at another destination. Bike sharing began in the 1960s in simple form in Amsterdam; it has continued to evolve through technological innovation to a more sophisticated model of bike transportation within cities, and has rapidly expanded over the last decade. The evolution of business models and private investment continues to reshape and widen the reach of bike-sharing services dramatically, so much so that the increased popularity is embedded now in the wider landscape of an emerging sharing economy in urban centers worldwide. Other similar services include Uber and Lyft, which allow users to avoid the high costs of and other barriers to ownership.

About This Working Paper

The objective of this working paper is to provide decision-makers at the city level a series of frequently asked questions and responses in order to assess the adoption and implementation of a BSS. It is not designed to be a comprehensive guide to bike-sharing implementation, nor is it meant to provide prescriptive recommendations; rather, it offers questions and answers objectively in order to assist city officials to navigate through the recent developments and innovations of new and improved technologies, data, and business models relating to bike sharing. The emergence of new technologies, including dockless and electric (e-) bikes, is creating new opportunities, so much so as to raise the interest and risk concerns of city officials around the world. This publication aims to shed light on these.

The Evolution of Bike Sharing: 10 Questions on the Emergence of New Technologies, Opportunities, and Risks

Questions have been formulated to include all phases of a typical bike-sharing project cycle. They have been selected carefully by the authors, based on their expertise in providing technical assistance to local decision-makers whose aim is to implement a BSS in their cities. The World Resources Institute has provided technical support to cities such as Bhopal, India; Mexico City, Mexico; Bogotá and Santiago de Cali, Colombia; among others. The questions explore the role of policy, technology, safety regulations, financing, and monitoring and evaluation (M&E), these key topics having arisen during consultations with city officials regarding the integration of bike sharing into their larger public transit networks. Brief summaries of the questions that will be touched upon in this publication

are included below. These are intended to provide context to the relevance of each topic, rather than offer direct answers to the questions posed, which will be elaborated later in the paper in separate sections.

Question 1: What are the characteristics of a BSS?

Bike-sharing technology has continuously evolved over multiple generations, becoming more and more sophisticated. Earlier generations (first generation and second generation) struggled with theft and vandalism, leading to innovations (third generation) that improved user information, payment options, and distribution stations across the city. A fourth BSS generation has now emerged, with dockless and electric bikes coming into the fold. Dockless provides a more flexible solution in terms of the use of public space for the parking and distribution of bicycles. As increasing variations and innovations in BSSs emerge, cities increasingly will be able to adopt and operate the model within a local context. The variety of options today requires more in-depth analysis, dedicated planning, and regulations than what was needed for previous generations, particularly in light of the new business models that are coming to the fore within the private sector.

Question 2: What are key elements to consider in fitting bike sharing into my city's policy and mobility framework?

The type of BSS that best suits a city varies based on a range of specific variables such as city size, geography, safety infrastructure, and legal structure. To ensure smooth implementation of a BSS within the broader urban mobility landscape, for instance, cities should (i) identify the enabling policies currently in place or those that are necessary at the federal, state, and local levels; (ii) ensure integration with public transit networks; and (iii) assess the bicycling objectives of the city. A BSS has many economic, social, and health benefits, including among others an additional transportation option for short trips; enhanced first- and last-kilometer connectivity and integration with the public transport network; reduction of barriers to biking; reduction of greenhouse gas emissions; improvement of local air quality; and increased physical activity for users. There also are costs that are associated with a BSS that are other than financial in terms of implementation; a BSS, for example, often faces opposition from private car owners at the planning and implementation stages, given that docking stations in streets may decrease street width, thus reducing the availability of spaces in which to park cars. Furthermore, the inclusion of dockless bikes within the mobility system may raise the

debate on how public street space should be put to use.

Question 3: What institutional and regulatory frameworks are required for a BSS?

Political will and leadership are essential for the success of any urban transport system. With regard to the BSS, it is evident from many cases that it is essential to form a coordinating team that includes members of various relevant institutions. Effective management and the setting of and compliance with regulatory standards also are crucial to ensure that dock-based and dockless bike-sharing (DBS) models alike will create not only benefits relating to mobility in the short term but also opportunities in the long term. The preparation of regulatory frameworks is especially critical for cities that expect to introduce or expand a DBS scheme. DBS companies and local government authorities (e.g., planning and transport department officials) should work together to put in place permit schemes and set regulatory standards to facilitate implementation as well as provide cities with the ability to control safety, manage public spaces, and plan effectively.

Question 4: What is the planning process to implement a BSS?

The BSS planning process is a significant initial step to creating a beneficial asset to the city and its residents, as well as to the success of the operator. To achieve the necessary ridership rate for long-term success, the scheme must be developed such that it is widely accessible. This will depend, to some extent, on a planning process that is sufficiently robust as to include a prefeasibility study to assess BSS potential; a feasibility study to define the technical components of the project; a detailed project design process; and a competitive tender or permit for implementation. Experience indicates that by integrating BSS stations with public transport and providing sufficient numbers of these across the city will increase accessibility and thus ridership. Also evident is the importance of positioning stations (or service areas for dockless bikes) in mixed land-use zones to ensure short-trip coverage benefits in various directions so as to extend usage from only peak hours to increased usage throughout the day.

Question 5: What are the operations and maintenance strategies for a BSS?

The operations and maintenance (O&M) of a BSS is critical to ensure its long-term success and extended life span as a mobility option. O&M also determine quality and safety to boost user confidence. Cities have adopted various models of O&M, whereby a scheme may be

publicly owned and operated, or publicly owned and privately operated, or fully private with a formal alliance at the municipal level. During contracting or permitting, O&M strategies and funding should be clearly defined and allocated, respectively. The structure of the scheme should include a specific bike-sharing agency or authority at the public level to also ensure the sharing of data.

Question 6: What are the available options for BSS financing?

In some cases, schemes have benefitted from commercial loans and guarantees, despite the fact that a BSS, in general, has relatively low upfront capital investment needs compared with other urban mobility options. For the longer term, though, user and membership fees alone are often insufficient to cover the cost of O&M. To bridge the gap, cities should be able to diversify revenue sources to include sponsorship or advertising deals, grants, and general municipal budgets. In terms of the DBS scheme, cities have tended to place the financial burden on the private sector. There is, however, potential to create a hybrid model to include the public and private sector alike—a model yet to be explored.

Question 7: What should be the structure for monitoring and evaluation?

An M&E framework not only ensures that the BSS will function effectively and that it will inform ongoing operations and expansions; it also enables cities to assess the positive and negative impacts on the mobility, health, equity, and quality of life of their societies. A critical characteristic of an M&E framework is the service level benchmark, which measures operations (hardware and software), customer service, maintenance, redistribution, marketing, and reporting of a scheme. Financial reporting, another component, evaluates operating costs such as labor, replacement parts, redistribution costs, and marketing, among others. Understanding the usage, impact, and financial status of a scheme informs decision-making in terms of further expansion and upgrading.

Question 8: Why is the focus on safety a success factor and what elements need to be considered?

The safety of the user depends on the design of the BSS and compliance with regulations, as well as on the design of infrastructure and the management efficiency of street networks. Cities should first conduct a thorough review of the (i) rate and locations of collisions and fatalities and their relationship to road infrastructure design and road safety measures; (ii) current cycling levels and provision

of cycling-related activities; (iii) presence and adequacy of cycling infrastructure and equipment; and (iv) infrastructure and equipment that support cycling, and then create and execute a plan to improve these factors alongside the implementation of a BSS. A network of appropriately designed and located cycling infrastructure will not only improve safety conditions, but also boost the attractiveness of BSS to potential users, motivating more people to take up cycling as a means of transportation.

Question 9: What are the branding and marketing elements of a BSS?

The branding and marketing of a BSS is essential for its success. It provides the scheme its own identity to boost rider usage and rider frequency. Outreach efforts through workshops, training sessions, contests, festivals, and events (e.g., car-free days, cycle days, walk days) can help build the brand and foster the culture of cycling. Harnessing the experiences and connections of local organizations, such as universities and cycling advocacy groups, will extend the scheme's reach and provide access for under-represented groups (e.g., minority and lower-income populations). Cities also can examine and take advantage, where possible, of branding associations through sponsorships. Creative names, logos, and taglines also strengthen brand identity.

Question 10: What aspects should be considered when integrating the dockless model?

DBS technology will continue to reshape the bike-sharing landscape, catalyzing cities to examine potential opportunities and impacts on the local mobility system and to determine how to accommodate the new BSS generation. It remains unclear how the traditional docked BSS will coexist with one that is dockless, although initial results indicate that there is room for complementarity. Further peer-reviewed research and documentation is required before reaching any conclusion. What does remain certain, however, is that cities must ensure that the BSS planning process is rigorous, as should be its evaluation, permitting, and regulation. This should apply whether they intend to implement a new BSS into the public transit and urban mobility environment or expand an existing BSS or DBS scheme.

Conclusion

Providing an opportunity for safe and convenient bicycling to citizens is a fundamental element in mobility and transport planning and strategizing. The BSS represents a powerful means to consolidate urban bicycle use in cities while integrating it into the wider mobility network. Awareness of these aspects in the decision-making process may contribute to cities finding the means to implement BSSs in terms of planning, regulatory standards, O&M, M&E, financing, safety, and branding. The benefits of this third generation docked BSS are well established. With the rapid evolution of bike-sharing technology, cities must be proactive, not reactive, in the face of new innovations to understand the risks and opportunities they represent. The knowledge they gain as a result of being proactive will equip them not only to identify the need for a BSS but will also facilitate the establishment of one or more within the local context.

Dockless bikes and/or e-bikes are the most significant technological advancements to date in terms of the BSSs and are able to provide a range of benefits to cities. In order to capture these benefits, however, cities must be able to establish the type of regulatory standards that will manage the challenges of, for example, the use of public space, sharing of data, road safety, and financing. While a scheme may be entirely privately operated, cities nevertheless must ensure that private sector companies apply the same planning process that is applied to other modes of transport, taking into account the city's broader mobility and road safety strategy.