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The Management Model of Bike Sharing System

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ABSTRACT

As a new sort of environmentally friendly mode of transportation, shared bicycles provide the benefits of reduced carbon emissions and inexpensive costs and have grown significantly in China in recent years. The most recent generation of shared bicycles is based on the notion of Internet sharing, which decision analytics a high level of travel convenience and efficiency. However, there are still obstacles in the administration of shared bicycles, which pose issues such as pedestrian traffic disruptions and difficulties in vehicle maintenance and recycling. The focus and consideration of bicycle management staff. Currently, there is no single management model or suitable management plans or standards for shared bicycle enterprises in the United States. Based on the theoretical analysis and experience summary of the current situation of shared bicycle management in Shanghai, this paper investigates the management personnel of shared bicycles, analyses their management mode and its influencing factors, investigates the problems existing in the shared bicycle management mode, and proposes the collaborative optimization perspective. From the standpoint of the sharing economy, it gives references for the invention and development of shared bicycle management mode, and aids in the sustainable growth of shared bicycles.

1. Introduction

Shared bicycles, a low-carbon, low-cost method of transportation, may alleviate traffic congestion and environmental pollution, reviving bicycle riding in China [1,2]. A shared bicycle is a bicycle sharing service given by the government or companies in metropolitan public spaces to reduce traffic and improve slow-moving public transit. Like a bike rental shop. Rental companies often provide bikes with positioning and locking functions. It optimises public road passage rates, has low carbon and environmental protection, rapid service, shared service, and a wide service group. Recently, bike-sharing systems (BSS) have become a feasible and ecologically beneficial short-distance transportation option [3]. Several Chinese cities offer public bike-sharing programmes to encourage low-carbon transportation. China will have 253 million shared bike users by 2020 [4]. Shared bikes reduce energy use and pollution [5]. Residents also benefit from cycling's health, financial savings, and mental calm [6].

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With technology and large data, the sharing economy has emerged [7]. Startups like Mobike and ofo launched mobile bike-sharing systems in China in 2016 [8]. The sharing economy, “Internet sharing” and smartphone usage inspired the newest dockless, stationless, or floating shared bikes [9]. Using the bike’s built-in GPS, users may use a smartphone app to find nearby bikes, leave them, and pay for the journey [10]. Mobile payment and GPS location make the dockless shared bicycle solution more easier to use and manage [2].

Despite shared bicycles’ efficiency, speed, and convenience, their administration still faces challenges, such as riders’ lack of public knowledge and uncivilised riding behaviour, social organisations and enterprises’ lack of cooperative awareness, and public facilities’ assistance. These management difficulties have complicated shared bicycle management model construction. Thus, the government, enterprises, and social organisations must closely monitor shared bicycle operation, maintenance, and administration difficulties and take immediate action to rectify them.

This research examines the changes in China’s shared bicycle management mode, their causes, and their risk response and avoidance techniques. By collaboratively optimising shared bicycle management. The research on this paper's impact promotes the development of shared bicycles in Shanghai and the sound and rapid development of the sharing economy, boosting market vitality and even resolving overcapacity in certain industries by expanding sharing.

1.1 Status of Bike Sharing in China

Bike sharing has existed for almost 50 years [11]. Bike-sharing has grown rapidly since Amsterdam’s 1965 “White Bike” programme [12]. Beijing launched China’s first non-IT bike-sharing system in 2005 [13]. The system failed in 2010 due to poor user experience, a lack of stations, and poorly maintained bicycles [14,15]. Since then, IT-based bike-sharing initiatives have blossomed in other Chinese cities. Hangzhou established its first IT-based public bike-sharing programme in 2008 with 2,032 stations and 57,000 bicycles managed by station-based systems. Local governments distribute bicycle stations, manage infrastructure and equipment, and subsidise bicycle-sharing companies [16, 17].

From 2016 to 2018, station-less bike sharing programmes like Mobike and ofo expanded rapidly in China [18]. Former station-based system operators now use stationless solutions [19]. Supplier integration has occurred in the shared bike sector in 2019. A market share change. During rapid growth, most companies registered more users and focused on marketing. Big enterprises’ competitiveness and customer share increase with consolidation. However, user growth has stagnated. In this situation, small enterprises gradually leave the market or close. Market share decrease causes most of these failures [20].

After years of research and testing, my nation’s public bicycle firm has produced a solid operating model, according to the current management model [21]. The public bicycle service is a social public good, thus it will benefit everyone and provide high social value. Additional-value services may only be used as a supplement. Market-based income cannot cover investment and operating costs, while government-funded public bicycle initiatives cannot encourage short-distance riding or enhance turnover speed. The long-term biker will pay. This concept sells public bicycles to the government or government-affiliated enterprises and groups, while the public uses them [22]. However, the model of “government investment, enterprise operation” has more growth potential because market-oriented entities can better home government functions, capitalise on the market economy, improve public service quality and professional operation, and increase financial fund efficiency. The government may also encourage enterprises to invest and operate directly, charging citizens directly and offering financial help [17,18].

1.2 The Importance of Management Models

Management mode includes concepts, techniques, procedures, systems, and methods [23]. The government, businesses, and users follow the shared bicycle management model to supply and use shared bicycle services, deposit management, and user feedback on riding specifications, riding experience, and supervision. The corporation, government, and users must manage shared bicycles [15]. Government-led, subject-parallel, or multi-driven [24,25].

1.3 The Relationship Between Research Theory and the Optimization of Shared Bicycle Management Mode

Cooperation amongst actors with varied interests and purposes, cooperation in government combining numerous stakeholders' ambitions and interests via regulation, policy formulation, and public administration, is collaborative governance. Improved shared bicycle management aims to promote multiparty governance by harmonising the advantages of government agencies and societal forces including the government, companies, and consumers. The collaborative governance paradigm only suggests studying government coordination and collaboration with enterprises, consumers, and other social groupings. The behaviour model of government public services, collaborative governance theory, and shared bicycle management model optimisation share goals. The collaborative governance theory guides shared bicycle management model optimisation, and the responsive government theory guides management model optimisation research, which can improve government functional department service efficiency [26]. The externality theory offers several viewpoints on shared bicycle management from varied persons, behavioural patterns, and interest correlations. It can prompt the author to identify problems in the management mode of shared bicycles [26], determine the effect of the optimisation mode, and analyse and study the path necessary to optimise the management mode in Shanghai from the perspective of collaborative governance theory. Research from various theoretical perspectives will help determine the best method for optimising shared bicycle management and improving Shanghai's institutional mechanism for shared bicycle management.

2. Methodology

2.1 Case Study

The first shared bicycle with GPS electronic locking is Mobike, created in 2015. As of June 2017, Mobike has over 5 million bicycles in 100 cities, 25 million daily orders, and 1 billion registered users.

Mobike collaborates with government, banks, Internet companies, etc. Mobike and China Merchants Bank partnered to build Baoshan Qingjing Sea Lake Road with Longyang District, Yunnan, in deposit monitoring, payment and settlement, financing, service, and marketing. Collaboration in numerous disciplines has helped Mobike grab 50% of the shared bicycle market [25]. Since its inception, Mobike has prioritised technology management. Effective smart locks have quickly increased the gap between Mobike and ofo. Mobike makes its own parts instead of working with OEMs. The team builds high-quality bikes and upgrades new models based on customer feedback to achieve the organization's aim [12].

2.2 Data Collection

2.2.1 Data source

The management, investment, and use of shared bicycles will be discussed from May to July 2022 to understand the issues and provide solutions for first-tier city management. Companies, consumers, and real management completed questionnaire questionnaires and interviews, then reviewed the survey sample data to construct this survey report. This research collects primary data through surveys and interviews. First, read about shared bicycle enterprises and their use in the media, then understand the government's shared bicycle laws and development strategies. Based on the above, the questionnaire and interview questions were created. Users and managers of shared bicycle businesses will be polled using 250 questionnaires.

2.3 Questionnaires

We will categorise data by persons who help back-end migrations during this time. Theory-driven second-order analysis interacts significantly with the literature by developing a thorough description of these categories to identify back-end transformation-relevant concepts. Additionally, the second-order themes will be condensed into a theoretical dimension to create a smooth back-end change plan driven by operations. At this step, the data structure will be developed, showcasing the analytical process from raw data to theoretical concepts and qualitative research rigour. Along with static data structures, they encourage research towards dynamic grounded theoretical models.

2.4 Interview

The Phrase induction interview method is discussed here. The main goal is to summarise interview data. Its main uses in qualitative research (especially story analysis and grounded theory) are:

- (1) Process interview manuscripts, literary, text, picture, video, survey, website, social media, etc.
- (2) Quickly retrieve all data, automatically find keywords and topics in complex data, and suggest analytical paths.
- (3) Fast data categorization and automatic preliminary analysis.
- (4) Find material species rules by linking related information.

With the author's practical usage of the programme, we can witness its efficiency in several procedures. The preliminary finding is that search, query, and visual search make Phrase induction convenient. Visual search organises complex materials.

3. Results

3.1 The Management Modo of Shared Bicycles

Over half of participants thought the government-enterprise collaborative management model was important. 72.2% of 173 managers said government-enterprise collaborative management is the current paradigm.

In the early stages of listing shared bicycles, the authorities did not monitor emergent behaviours. The industry gradually developed an operational business self-management model. Many functioning firms have participated in many rounds. Access to large operating funds is needed. Under this business administration, bike rental firms pick raw materials, unlock designs, and produce sophisticated modules. The operational firm determines how many goods to launch and where to place them depending on its expertise and strategic plans.

Self-management businesses focus on investments rather than operations and maintenance, ignore social effect, and aim for market dominance. Shared bicycles on sidewalks and blind lanes are forcing walkers to "choose a difficult path". Sharing and parking bicycles may make it hard for handicapped individuals to travel and endanger their mobility.

Since April 2017, local governments have implemented shared bicycle management methods in response to a high number of issues after identifying them. In the government-led model of management, the planning department develops a shared bicycle development plan based on urban resources and development conditions, limits the number of shared bicycles, and sends the shared bicycle facility supporting plan to the facility supporting department, which implements the plan. The planning department creates a shared bicycle development plan based on urban resources and growth. The government-led management model describes this technique. Urban bicycle slow-moving system, shared bicycle parking spots, etc.; the industry and commerce department supervise shared bicycle platform firms in real time; law enforcement agencies write shared bicycle market laws and address illegal activities; and the publicity and advice department promotes user compliance. The operational business is a subordinate manager in the government-directed management paradigm.

3.2 The Main Factors Affecting the Management Model

Operations management has always emphasised safety, efficiency, and low costs. Despite each model's specific risks, section 4.1 shows that some types are suitable for a variety of bicycle sharing systems. Risk management is essential to reduce the risks associated with various management styles and optimise the efficiency of a single-vehicle project. According to management interviews, economic factors impact 35.26 percent of decision-making, policy concerns 39.88 percent, and humanistic problems 24.86 percent.

3.3 Factors Influencing the Management Model

Economic factors: Bicycle project development expenditures have significant startup costs and long return periods. Interviewees said the project may last two or three years, requiring large financial reserves. Mobike projects often involve medium to long-term financing. Some private investors want long-term financing arrangements, while others choose short-term needs. Their funding method is limited to short-term projects. In the long run, they will use this financial structure and management model until the different components alter drastically. If they do, they will need to reorganise the money.

The initial step of a shared bike concept includes enterprise-led management. The overall investment, service range, and utilisation rate define this model's profitability. Because of this, firms have quickly expanded user groups and equipment. The majority of investor funds go to shared bicycle equipment. The profitability of a single rental price is low, and the number of shared bicycles has reached saturation in recent years. Due to the sector's bright outlook, several social capitalists have boosted their shared bicycle industry investments. The shared bicycle industry's financing reached 10 billion Chinese yuan in 2018, and eleven platforms have disclosed their financial statistics. Mobike's operations were transferred to Meituan on November 27, 2018. Due to many investors and regulatory scrutiny, Mobike has adopted a collaborative management model. Mobike Company's second key profit goal will be to target merchants who advertise and promote Mobike bicycles through vehicle body and software channels when a particular number of bicycles and users achieve a threshold. This occurs when the firm meets its first main profit goal. Meituan's platform has helped partners and merchants advertise and promote with Mobike in a cooperative manner. Mobike eliminated its delivery-focused business model, rationally organised its sharing bicycle fleet, and generated money through advertising and platform diversion fees.

A survey of bike-sharing managers found that policy concerns are the second-largest factor impacting management techniques. Shared bicycles were first intended as a new product and

managed by a company. Big firms increased bicycle manufacturing and quickly entered the national market for major and medium cities to seize the market. Additionally, other issues arose. This causes government management challenges. The national and local governments typically encourage shared bicycles and associated businesses. To support healthy development of shared bicycles, the government intervenes in their administration to create government-enterprise co-management and collaborative management. How to oversee and monitor shared bicycles without limiting market innovation and enthusiasm is a key government management issue. Many local rules and regulations have converged to regulate urban shared bicycles during the past two years. Key Chinese cities and departments including Guangzhou, Shanghai, Beijing, Shenzhen, Chengdu, Wuhan, and the Ministry of Communications structured their policies. Most shared bicycle legislation in various regions solicit public involvement and focus on corporate duties, traffic patterns, user safety, and deposits. Government engagement in management has considerably limited shared bicycle use and stimulated the development of shared bicycle management models in the direction of different initiatives and co-governance by government and enterprises.

Human considerations are the most important component in shared bike management. Human requirements include travel, conduct, etc. According to the questionnaire survey, 43% of respondents choose shared bicycle ease. After taking the metro or bus to the station, many white-collar office workers ride Mobikes to their apartments. The “last stretch”. The continuous move from docked to dockless bicycles has improved “last mile” needs due to people’s growing desire for shared bicycle convenience. Most shared bicycles are used during the city’s morning and evening peaks. Thus, after the peak, shared bicycles would be piled near the metro and bus stations, making it hard to grab one in the residential area. Although shared bicycle users require bicycle transit, they are more subject to environmental changes. The enterprise-led management style prioritises organisations’ own interests. Putting all shared bicycles on busy roads and near subway stations ignores the traveler's use experience, resulting in a severe bicycle resource imbalance, a buildup of vehicles in urban areas, and a shortage of cars in remote locations. Under government-enterprise co-management, the government controls shared bicycle quantity and location and encourages civilised use.

3.4 The Main Factors Affecting the Management Model

The lack of public knowledge and uncivilised riding behaviour of riders, the lack of cooperative awareness of social organisations and enterprises, and the assistance of public facilities all hinder Mobike’s shared bicycle administration. Even if shared bicycles boost productivity, speed, and convenience. This is due to many things, including managerial concerns. Studies on shared bicycle management in first-tier cities have demonstrated that there is one common method. Next set of questions.

1. Incompetence in government regulation: Even if the government monitored the various linkages in the life cycle of shared bicycles using the current management model, the market’s shared bicycle goods would show that government regulation lacks industry direction and experience. This is true even though the government oversees these many linkages in shared bicycle life cycles. Long-term, 85.44 percent of respondents believe shared bicycle maintenance is challenging. The government does not restrict shared bicycles with design issues from entering the market because it does not comprehend products access monitoring. The accumulation of abandoned and malfunctioning automobiles has been caused by the lack of expert assistance and long-term monitoring.

Government administration is getting less effective over time. This study found that 36.89% of respondents think shared bicycles affect pedestrian traffic and 53.4% think they increase traffic

congestion. Based on these data, 90% of respondents think shared bicycles hurt pedestrian traffic and the transportation system. This is because my country's transit network is outdated. Since a long time, non-motorized vehicle lanes have been slowly reduced to allow motor vehicle movement in urban planning. Since shared bicycles are becoming more popular, cities lack bike parking and services. The administration has established practical and feasible management measures to solve current difficulties. These proposals include halting new releases, offering service packages, mandating scrapping years, and other steps to reduce the social conflicts caused by shared bicycles. These proposals also include delaying new launches, offering service bundles, mandating scrapping years, and more. The government cannot monitor and control the sector's development in real time, therefore it cannot explore remedies until difficulties have been identified. This delays solution consideration until difficulties are identified. The outcome is a waste of management resources and governance time.

2. Poor government-business communication: This survey found that 85.44 percent of respondents thought shared bicycles had maintenance issues, and 56.65 percent thought the number and location of shared bicycles were still insufficient, which is the main cause. The problem is poor business-government communication. The paradigm of governance that solely governs the government cannot fulfil the needs of social affairs governance or governance objectives. The cooperative management technique for shared bicycles requires government agencies, enterprises, consumers, and civic groups to gain some autonomy while working together. Businesses and the government must communicate well. Consumer travel data may provide corporations with reliable evidence to help the government expand bike-sharing services. The lack of a reciprocal supply of data and information between bicycle-sharing platform operators and key government agencies and the ineffective use of big data for bicycle-sharing programme management cause the process of locating and planning shared bicycles to deviate from user needs. This is due to the inadequate use of big data for bicycle-sharing programme management and the lack of a reciprocal data and information exchange between platform operators and key stakeholders. Due to the delay in giving each other notice. There is no long-term, efficient, or both communication link between government functional departments, the next level of government, and the shared bicycle business platform. Coordinating policies and processes at all three levels is tough.

3. Government-enterprise rights and obligations are unclear. With shared bicycle usage growing, rules and regulations may not be followed. Functional departments within the government will not understand their powers and responsibilities in public affairs like shared bicycle management if they do not understand their own powers and responsibilities and how they should coordinate with one another. Additionally, that is not the right answer. The government needs management failure and higher management expenses, but opaque governance and coordination challenges would contribute to them.

The situation is serious because essential rules and regulations have not been created, the monitoring and management system is flawed, and the government has not moved swiftly enough to new occurrences. Management of the bike sharing initiative is having issues. For instance, haphazard parking of shared bicycles, purposely damaged bicycles, and too many shared bicycles in one place harm traffic. Government agencies must create suitable policies, reinforce regulations, and improve management systems. Bike sharing issues must be addressed.

4. Conclusion

This paper begins with a description of shared bicycle development in China, then evaluates the usefulness of shared bicycle management models and discusses research theories and shared bicycle management models. Second, I surveyed Mobike, now Meituan Bicycle, managers and found that

most adopted the enterprise-led management approach in the early phases of shared bicycle growth. This was found using surveys and interviews. The industry's development has transformed the management model. The government and commercial sector use this management paradigm. In conclusion, significant elements affecting shared bicycle management type and challenges are examined.

This study made the following significant contributions: Provide additional information about shared bicycle management in my country's major cities. The management style and how it impacts shared bicycles may be unknown. The goal of this project is to optimise shared bicycle management in first-tier cities. This research on shared bicycle management assumes the country has no traffic management mechanism. 2. Study variables that affect shared bike management. The survey and interview results show that economic variables, political difficulties, and human factors may all affect shared bicycle management models, with economic variables having the most impact. Examine the shared bike management strategy's current issues. The existing government-private company collaborative management paradigm lacks communication and a clear allocation of rights and duties. Because of this, shared bicycles are unreliable and maintenance and monitoring are late. The scenario is acceptable.

This research project found that government-private sector collaboration management should improve communication, cooperation, information sharing, and rights and responsibilities. If the government and commercial enterprises can communicate information both ways, shared bicycle infrastructure must be expanded and enhanced. Big data from bicycle-sharing firms on user riding habits and movement trajectories may help the government plan shared bicycle locations and numbers. This research suggests improving shared bicycle management in the following ways: The government-private sector cooperation management strategy should promote increased communication and collaboration. The bicycle sharing information transmission infrastructure must be expanded if the government and private enterprises can communicate information in both ways. Rights and responsibilities distributed fairly. Clarify government and business rights and obligations. The government is primarily responsible for formulating regulations, clarifying standards, supervising platform enterprises' operation and management behaviours and consumers' riding behaviours, and guiding the healthy and orderly development of shared bicycle enterprises. Enterprises are primarily responsible for technological innovation, safe use of shared bicycles. Include third-party professional groupings. Given the issues in shared bicycle parking management and the scarcity of full-time management specialists, it is possible to diversify bicycle sharing management employees. Bicycle sharing in many areas. Local governments and businesses may work with social organisations for collaborative governance.

The first-tier cities are the research object for this literature. Second, this research only examined Mobike, therefore its findings may not apply to other firms even if they utilise the same data. The last argument is that shared bicycle manufacturing is continually evolving. Thus, shared bicycle management is always evolving.

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Conflicts of Interest

The authors declare no conflicts of interest.

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