Proceedings of the 2nd International Conference on Financial Technology and Business Analysis
DOI: 10.54254/2754-1169/97/20231556

The Role of Government in Transforming the Existing Transportation Paradigm: Based on the Historical Review of Chinese Sharing Transportation

Yang Zhang[1,a,*], Yuxuan Zhang[2], Qiyu Ji[3], Xiheng Qian[4]

[1]Department of Sino-Global, WLSA Shanghai Academy, Shanghai, 200136, China
[2]School of Economic & Management, South China Normal University, Guangzhou, 510631, China
[3]School of Business Administration, Northeastern University at Qinhuangdao, Qinhuangdao, 066004, China
[4]Department of Sino-Global, WLSA Shanghai Academy, Shanghai, 200136, China
a. yzhang0601@163.com
**corresponding author*

Abstract: As a representative of the sharing economy model, the shared mobility industry provides people with additional mobility options to make their lives more convenient and offers possible options for future urban transportation paradigms. However, transportation problems in cities are still serious, and the role of the government in developing shared mobility and changing the future urban transportation paradigm remains unclear. This paper mainly adopts the literature method, takes the shared mobility industry as the research object, puts forward the hypothesis of the future transportation paradigm, and explores how the government should promote the formation of this paradigm. This paper bridges the gap in research related to the shared mobility industry and, at the same time, provides a reference for the government to promote the development of shared mobility, facilitate the formation of a new paradigm, and alleviate urban transportation problems.

Keywords: Transportation, Government, Sharing Economy

1. Introduction

The transportation industry in China, serving as the lifeline of cities, is undergoing accelerated expansion with the continuous improvement of infrastructure, transportation services, and urbanization development [1]. In response to the increasing demand for three types of transportation needs - increasing or optimizing infrastructure, improving supply-demand matching, and providing more alternative modes of transportation [2], shared mobility has emerged as a new solution that the Chinese government is committed to addressing urban transportation issues while achieving multiple benefits.

Taking traffic congestion as an example, according to the 2023 Amap Traffic Health Index of major cities in China, nearly half of the cities in China are still in a sub-healthy state of traffic, mainly concentrated in economically developed regions with high levels of urbanization and informatization [3]. These regions are particularly suitable for the development of shared mobility. And the proliferation of private cars there is a key factor contributing to traffic congestion. By 2020, 41.67%

DOI: 10.54254/2754-1169/97/20231556

of households in China had owned private cars, and the number of private cars in China had reached 243 million [4]. At the same time, the lack of measures to regulate private car usage has continued to diminish the attractiveness of public transportation in large and medium-sized cities in China [5], further exacerbating congestion. So if shared mobility can be seen as a supplement to public transportation rather than an impediment and can play a role in reducing private car usage, it will bring about positive changes in the transportation paradigm.

Currently, shared mobility modes represented by shared bikes and ride-hailing services have significantly changed people's travel habits in China, to some extent proving the feasibility of shared mobility models in the country. However, if shared mobility is to further play a role in transforming the future transportation paradigm, strong government regulation is still needed to maintain market order, promote industry development, and increase public willingness to share. However, the Chinese government has shown some resistance to this new economic model from the outside, including its vague strategic attitude, outdated regulations, regional regulatory differences, insufficient data privacy and security protection, lax control over service quality and industry standards, and inadequate integration of public transportation [6]. In the current academic field, most of the literature tends to analyze the conflicts between specific shared mobility companies' development and government regulation, while lacking discussions on the government's new role in future transportation paradigm reforms. At the same time, there is a lack of literature proposing a vision for the future urban travel paradigm based on the development of shared mobility and providing specific analysis of the paths to achieve this paradigm.

This study primarily uses a literature-based method. It proposes a vision for the future urban transportation paradigm based on the development of shared mobility. It explores the role that the government can play in transportation paradigm reforms to better promote the development of shared mobility and bring new thinking to solve urban transportation issues, reduce carbon emissions, and improve environmental sustainability.

2. Literature review

2.1. Sharing transportation in China

Scholars have investigated many kinds of shared transportation. As stated by Shaheen, Sperling, and Wagner: car-sharing, bike-sharing, ride-sharing, and shared shuttle services are included in shared mobility's range of services [7]. These services intend to provide an alternative to traditional transportation modes by offering flexible, affordable, and sustainable transportation options because it provides individuals with the benefits of private vehicle usage without the costs and responsibilities of ownership. The sharing transportation is built on digital platforms that provide an interface for exchanging goods and services for the sharing services, which utilize technology to connect individuals needing a particular product or service with others having it.

In the last few years, the current sharing transportation changes people's transportation modes in a positive way. For example, the rise of station-less sharing bicycles in China offers a compelling illustration. These bicycles, which do not require physical docking stations, have partially solved the so-called "last mile problem" [8]. The station-less sharing bicycles helps individuals conveniently to navigate the last mile to their destination after using public transport.

However, since 2015, scholars also argue that this new sharing model also brings some problems. Firstly, a big challenge faced by shared bike systems is the lack of designated parking areas. The haphazard parking of two-wheeled vehicles on walkways and other public areas, obstructing pedestrian movement and creating a chaotic, visually unappealing landscape, coupled with the lack of proper parking infrastructure, has emerged as a significant urban management challenge for many bike share programs [9]. Secondly, sharing bike companies often rely heavily on user deposits and

DOI: 10.54254/2754-1169/97/20231556

investor funding, raising concerns about the long-term viability of their business models. The collapse of Mobike proves the unsustainable business model of sharing transportation companies in China.

2.2. Government Regulation in the Mobility Industry

Government regulation means that government administrative agencies in a market economy system employ various regulatory approaches to oversee and influence the restrictive and incentive actions of micro-market entities, based on public interest goals and legal supports [10]. In the past decade, urban transportation in China has been rapidly developing under the effective regulation of the government. But it also faces issues such as traffic congestion, the mismatch between supply and demand of infrastructure construction, limited energy-saving and emission reduction, and operational difficulties [11], which will be further involved in our discussion. To better solve these problems through deeper analysis, this paper have focused on the research of several parallel directions of China's government regulation in transportation as follows.

The first direction is supply-side structural reforms. In China, urban transportation infrastructure-related aspects are generally considered public goods whose services are solely provided and mainly produced by the government [12]. This strong government plus weak market model gives China greater control compared to many other countries, and this is also the reason why China can be a pioneer in constructing a new paradigm with the sharing concept. For example, the government controls the issuance of licenses in the traditional taxi industry, and they have made similar attempts in the area of shared ride-hailing services [2]. However, the competitive and exclusive nature of urban transportation services has been increasing because there are more needs for travel, causing the market's demand begins to conflict with the traditional supply-oriented systems of transportation regulation. On the other hand, excessive market competition may lead to market failure [13]. The new economic and social forms require the government to seek new balance, vitality, and paradigms for sustainable transportation development.

And the second one is the adaptation of transportation regulation to internal factors. China's comprehensive management system for transportation across modes, departments, and regions is not yet well-established. And some areas have excessive governance, insufficient governance, or passive filling [14]. So, it is necessary to clarify the legal and responsibility relationships and emphasize priorities like synergistic governance among multiple entities, data sharing, and multidimensional and regional coordinated development. Furthermore, innovative approaches such as leveraging intelligent technologies and administrative procedures can provide precise services for transportation development [15]. To give an example from the technical side, flexible regulatory regimes like "pop-up" or "flash" style [16], which are beneficial for adapting to rapidly changing economic conditions, are still overlooked.

And the third one is the adaptation of transportation regulation to external factors. According to Liu and Zhang, in response to urban development, the Chinese government's governance strategy has shifted from focusing on transportation tools to road construction, controlling travel, and currently establishing a diversified model [1]. Also, the overall regulatory model for urban transportation in China demonstrates continuous improvement, expanding connotations, progressive forms, and evolving philosophies under the effects of the information age [17].

The above three aspects indicated that the Chinese government possesses the ability to regulate, internal space for regulatory development, and sensitivity to updating external issues when facing any new challenges. Existing literature has recognized the aspects and discussed the hot topics of government regulation and the sharing economy. However, there is a lack of a comprehensive analysis of transportation issues that combines these three perspectives. Due to the uncertainty of change, current analysis tends to be macroscopic and vague in terms of government regulation, the

DOI: 10.54254/2754-1169/97/20231556

balance of government-business cooperation, and differentiating the transportation situations between China and foreign countries, leaving certain academic gaps.

2.3. New challenges from sharing transportation

However, for a number of reasons, there are conflicting interests and mandates between sharing economy businesses and governments: While governments are committed to maintaining social stability and need to align public transport planning and provision with their urban plans, the primary goal of companies in the mobility sharing industry remains profit maximization. This conflict between government regulation and the industry is evident in China [18].

In the early stages of the shared mobility industry's development in China, the government's understanding of the shared mobility industry was very limited due to the fact that companies did not communicate with the local government prior to providing services within the city, leaving companies with a lack of legal and policy support [19]. Some scholars have pointed out that at the early stage of the industry's development, due to insufficient government regulation, the malicious competitive behavior among enterprises generated a large number of wasted resources.

The unclear division of powers and responsibilities within the Government is also a problem. lower levels of government often don't know who is responsible for the regulation of shared mobility, and there has been an internal shifting of responsibility. As a result, government regulation of the shared mobility industry has been inefficient and sometimes contradictory [20]. For example, in Shanghai, the city government has designated parking areas for shared bikes, but when it comes to the concrete implementation of the policy, different government officials have different opinions on whether shared bikes can be legally parked [20].

In August 2017, China's central government drafted the first national framework for the regulation of the shared mobility industry. The framework clarifies the responsibilities of government departments, and the obligations of operators and users, and sets out a number of principles for regulating the shared mobility industry. However, according to some studies [20], this framework is still imperfect and still focuses on the macro level, and lacks specific local policies. So even though the local government complies with this overall framework, there are still no specialized management departments within the government, and each city has its own management measures and rules, which creates a lot of problems for business operations [20]. For example, in Nanjing, there are no restrictions on the number of online ride-hailing platforms and the issuance of online ride-hailing licenses. This is fundamentally different from cities like Beijing, Shanghai, and Guangzhou, which have license plate quotas and stricter regulations [21].

While current academics have pointed out the friction of government regulation within the shared mobility industry, these studies typically focus on specific firms within the shared mobility industry and do not consider the shared industry as a whole. At the same time, while academics recognize the role that the development of shared mobility can play in changing the urban mobility paradigm in the future, there is no research at this time that proposes a specific vision for future urban mobility patterns. The contribution of this paper is to consider the shared mobility industry as a whole, systematically analyze the conflicts and frictions caused by government regulation in the current industry, and explore how the government can better play its role in changing the future mobility paradigm in cities. At the same time, the paper also proposes a conceptualization of a new model for future urban mobility.

DOI: 10.54254/2754-1169/97/20231556

3. Discussion:

3.1. The problem of the current transportation paradigm

This paper proposes an optimal target model for society to achieve that will maximize the utility of every car on the road and try to decrease the traffic congestion problem. In order to propose this new kind of urban transportation paradigm, it is necessary to analyze the underutilized resources in the current transportation paradigm. In this paper, two kinds of idle forms for transportation tools are identified. One is when this transportation tool is parked and unused, which is the idle asset used by the current sharing transportation industry. The current Chinese sharing transportation has decreased the number of parked cars by letting more full-time driver drive their car all the time. Although this kind of model eliminates part of the idle car, it actually creates more additional pressure on the transportation network. These full-time drivers in the sharing platform have their car empty and search for customers for a long time every day, which create additional pressure without actually solving the demand for transportation. At the same time, it is important to note that existing ride-sharing platforms have not reduced the amount of traffic on the road. Because it is more like the characteristics of the rental economy in China, only the ownership of vehicles has changed. In essence, people's travel demand has not reduced, and travel vehicles are also. Therefore, the current sharing transportation industry didn't completely solve the problem of traffic congestion. Moreover, there are still idle assets in the current sharing transportation industry, which are empty seats during transportation. Therefore, the goal of the proposed model is to use these idle seats during the whole transportation.

3.2. The "door-to-door public transportation system"

Table 1: Connections between Model's characteristics and Discussion.

Connections between Model's characteristics and Discussion		
Model's Characteristics	Discussion	Frictions
Centralized database	A government-unified data platform for pricing and regulating.	Between government and platform
Government leading role	Realistic rules and management	
	Increasing government intervention in the platform	
	Uniformity in governmental regulatory standards and department	Between government and government
Share ride based	Increase in trust	Between government and consumer
Driverless car	Alleviation of unemployment pressure	Between the government and the driver

Our theory proposed that every driver on the road can become a participant in the sharing transportation industry, thereby matching the others' needs of transportation through a unified platform led by the government. As shown in Table 1, there will be four characteristics of this model: Unified data center, government-leading platform, shared ride-based services, and driverless cars for the future.

DOI: 10.54254/2754-1169/97/20231556

3.2.1. Centralized database

The centralization and integration of data is the first feature of our model. The government could work with the current major players in the shared mobility industry to integrate their databases and form a new platform. At the same time, the government can support and guide the operation of the platform by purchasing the services and technologies of these enterprises and by hiring experts. This platform thus contains information on all customers who use shared mobility services and all drivers who provide shared mobility services currently.

By integrating these data, technologies, and people, the platform can accurately identify and locate all operating shared vehicles in the city and keep track of their carrying capacity, matching the needs for a shared ride more efficiently compared with the current separated platform. The government can protect the security of this information and ensure that it is used in a standardized manner through strong regulation and enactment of relevant rules.

3.2.2. Government-leading platform

In our model, this integrated shared mobility platform is a state-owned enterprise in its corporate nature. It means that the ownership or control of the platform belongs to the government, which is the second characteristic of our model. This new shared mobility transportation paradigm would be coordinated and controlled by the state, like the subway and bus system, which is somehow part of the public transportation system. Such platforms would be a form of national welfare and infrastructure in the cities of the future, with the costs of operation borne primarily by the government. Only in this way can the platform facilitate the unified supervision and management of shared vehicles and maximize the assurance that the travel information in the system will not be used illegally. In addition, because the platform is run and managed by the government, the public will have a higher level of trust in the platform and accept this new mode of transportation more quickly. And the quality of the platform's service will remain relatively stable without pressure on profits.

3.2.3. Share riding based

The third characteristic of our model is that the services are provided completely by share riding. This means that the transportation service provided by this platform came from the on-demanded travel of others. Before each driver decides to drive to a place, he or she will upload his planned path and the number of empty seats in his car. Therefore, for people who don't have a car but have travel demand, they would be able to upload their requests into this platform and wait for others who shared a similar path with them to pick them up. All shared mobility requests in the city can be processed on this platform, and different mobility needs with destinations on the same route will be consolidated and matched with the nearest vehicle. In this way, the number of idling vehicles in the city can be minimized and multiple travel demands can be met with the minimum number of vehicles to the greatest extent possible, and ultimately reduce the pressure on the city's transportation network and alleviate the current serious traffic congestion problem.

3.2.4. Driverless car

The fourth characteristic of this platform is the driverless vehicles. In the future, when unmanned driverless vehicles appeared, the full efficiency of the platform can be achieved. Because at present, the accuracy of the existing shared travel platform for positioning and the communication efficiency between drivers and passengers are not enough to meet the efficiency under the ideal model. In addition to that, driverless vehicles cannot only carry out hitch business when the owner has travel needs but also when the owner has no travel needs. The idle vehicle can go out to receive orders to

DOI: 10.54254/2754-1169/97/20231556

meet the travel needs of people in different places at different times. In reality, before the driverless car came out, the shared ride vehicle on the platform could still be driven by different individuals who bought the car. There will be some loss of efficiency due to human error, but it is still within the acceptable range.

3.3. The advantages of our model

The advantages of our model mainly come from three parts: the time factor and the economic factor. These advantages appealed to the public to transform their current urban transportation paradigm into our transport paradigm.

For the time factor, our system provides overall faster transportation in the urban area. The increase in time due to shared rides will be recovered by the time gained with less traffic congestion, thus having an overall faster urban transportation speed.

A simulation based on the French city of Lyon could prove our point [22]. In this simulation, the scholars compared the data of shared trips with different marches and different sharing times with the data of no sharing behavior. Compared with the data of the shared mobility market share of 100%, which is the case of our assumed perfect model, the full shared mobility significantly reduces the number of vehicles required to complete the travel demand under the real-life data volume (205,124 requests). From 17,102 cars without sharing to 9,489 cars with one share-ride behavior, 6,826 cars with two share-ride behaviors, and 6,595 cars with three share-ride behaviors, it shows the superiority of fully shared travel mode to solve the existing traffic jam problem. In the meantime, for the most common case of single share ride situations, each request is answered within 1 minute, with average travel time duration decreasing only by 2%, which shows that this mode of travel is acceptable for both drivers and passengers. Therefore, the time advantages are clear, and consumers will choose to adopt this model because it actually makes their travel durations become shorter. Moreover, there are certain policies that the government can adopt to accelerate this process. First, the government can limit the unshared car entering the traffic jam section since they are not as efficient as the shared car. Because these congested sections are generally the core sections of the city, if you want to quickly reach the CBD during peak times, drivers have to join this shared travel platform. This is also reasonable because the utilization efficiency of vehicles without sharing is not as high as the utilization efficiency of vehicles with shared travel, so only allowing more efficient vehicles to enter the congested road can effectively reduce traffic congestion.

For economic factors, our model is economically motivated for both the driver and the passenger. Compared with before, the passenger will need to pay less fee to the platform for a shared ride because it is an on-demand travel. Therefore, adopting this platform is economically motivated for the consumers. Moreover, the drivers, the car owners, can get extra earnings from this platform too. Many drivers currently have transportation needs, and their everyday transportation has a fixed cost. These extra share-ride actions will not affect their fixed cost much, but they will bring them extra earnings. Therefore, it is also economically appealing for car owners. In addition, the government can also use the traditional tax subsidy means to make the platform more competitive. Compared with shared mobility cars, it is necessary for the government to tax unshared cars, because they transport fewer passengers in the same transportation resources, and these taxes can, in turn, subsidize the drivers on the platform, making our shared mobility platform more attractive economically.

3.4. Frictions that Slow down the Transition to Our Model

Although the model's advantages are clear, there are still various frictions that slow down the transition toward a market that has the characteristics of our model. This work identified four different frictions between the government and different entities, with the recommended solution.

DOI: 10.54254/2754-1169/97/20231556

3.4.1. Friction between government and platform

The frictions between platforms and government regulation in China are manifold. Mainly, they can be summarized as follows:

The first friction is between the government's efforts to maintain market order and the platform's pursuit of interests.

For example, Chinese ride-hailing platform companies, in order to survive in the bilateral market, have resorted to subsidizing drivers and customers through low-priced sales. This has not only led to malicious market capture but also resulted in issues such as drivers engaging in fake orders and midway cancellations for the sake of subsidies, distorting the demand for public transportation[23]. In response, the Chinese government has criticized and imposed strict fines.

The work's proposed solution is twofold. On the one hand, the government should mandate companies to open-source code to a government-unified data platform for effectively monitoring prices. On the other hand, the government should optimize the control of competition intensity in the bilateral market, relax industry entry barriers, and leverage the platform's openness to counterbalance its monopolistic tendencies. This way, China's government can better create a centralized database and enhance its leadership.

The second friction is that the government's regulatory requirements exceed the actual capabilities of the platform.

For instance, the government has mandated that drivers of ride-hailing platforms must possess a platform certificate, a transportation permit, and a driver's license. This requirement has significantly impacted leading ride-hailing platforms such as Didi. Faced with most drivers who did not meet the qualifications, Didi had to simultaneously claim that holding the three types of certificates was not a strict requirement, pay fines to the government, and indirectly compel drivers to obtain the necessary permits through the reimbursement process [23].

To address this issue, this work proposes three suggestions. Firstly, the government and platforms should be more sensitive to the needs of drivers and customers, making the rules more realistic. For example, the government can encourage platforms to establish independent forums for buyers and sellers to collect information from both sides, thereby establishing reasonable buyer and seller admission criteria and reducing information asymmetry. Secondly, the government should focus on local industries, cultural characteristics, and social development changes, moving away from the regulatory model based on traditional taxis. Thirdly, it is important to improve the "government regulations, platform implementation" model by increasing the acceptance of platform management by both buyers and sellers. Platforms should clarify the legal relationship between the platform and buyers and sellers, and enhance control over transaction fulfillment and product pricing. The government, on the other hand, should fill the gaps in governance, reduce the exploitation of sellers by platforms, assist platforms in determining sellers' welfare based on their participation, and promote sellers' adherence to reasonable platform decisions. With the measures above, the government can improve its role in leading based on efficient regulation and convincing management, getting a more stable unified platform in the future.

As for the third friction, the platforms' control over personal and information security does not meet government requirements.

For example, platforms mainly regulate the age limit of vehicles without conducting further safety inspections. Numerous serious accidents involving ride-hailing vehicles have been attributed to vehicle performance deficiencies [24]. Additionally, Didi's Hitch service allows drivers to access passengers' age, gender, and appearance, exposing user privacy without strong regulatory measures.

To address this, a proposed approach is to optimize multi-party governance and gradually increase government intervention to provide a buffer for implementing the model. This can start by drawing

DOI: 10.54254/2754-1169/97/20231556

lessons from the self-discipline of the ride-hailing industry in other countries, where self-regulation is the main focus, and administrative regulation plays a complementary role [25]. And gradually, the government should increase its control, not only focusing on market entry barriers but also supervising the specific operations of companies. This can be achieved by establishing a unified platform for ride-hailing management, enabling collaboration among transportation, banking, public security, and other departments. Additionally, specialized government inspection departments, in cooperation with third-party inspection bodies, can better focus on leading the sharing transportation industries, which should conduct periodic checks on vehicle registration, driver's licenses, driving experience, criminal records, and other information [26]. Also, Promoting the sharing of resources between the government and companies is essential. For example, Didi's collaboration with local governments to launch the Intelligent Transportation Information Platform, where the company provides location and route information resources to assist the government in optimizing transportation governance, is a good example that facilitates the government adapting to instruct the platform's high-tech development.

3.4.2. Friction between government and government

Even though the new platform in the model is a state-owned enterprise and its ownership is vested in the government, it is still essentially a firm in the market and, therefore, needs to be regulated by the government. Therefore, in order to make this platform work better, the government needs to make more efforts to regulate the market order, set regulatory standards, and clarify the division of responsibilities. However, there are still some problems with local government regulation of the shared mobility industry that constrain the development of shared mobility. This intra-governmental friction is mainly reflected in the lack of uniformity in governmental regulatory standards for the shared mobility industry and the unclear division of regulatory responsibilities among government departments.

In the process of developing shared mobility, the central government has gradually decentralized the function of regulation to local governments at all levels in order to improve the vitality of the industry, which has led to inconsistencies in the regulatory standards introduced by each local government. The regulatory policies in some regions are too strict, such as Beijing, Shanghai, Guangzhou, and other developed regions, which strictly regulate the regulation of online car-sharing by limiting the number of carpooling rides in a single day and restricting the scope of carpooling and hitchhiking orders [27]. Although this regulatory model has effectively regulated the operational order of the industry, the lack of freedom for enterprises has limited the vitality of the development of the online car-sharing industry. At the same time, the regulatory standards in some areas are too loose, making some drivers upload false identity information on the platform or allowing some vehicles with excessive emissions and poor safety to enter the market, which increases the pressure on the environment and threatens travel safety at the same time [27].

In the future regulation of the industry, the higher-level government needs to introduce policies to improve the framework of shared mobility industry regulation and develop unified regulatory standards. The local government needs to conduct research on the shared mobility industry and share more information with enterprises in order to determine the regulatory approach that is most in line with the current state of development of the industry in the local area so as to achieve a good regulatory effect while retaining a certain degree of autonomy for the platforms. At the same time, due to the rapid changes and updates in the shared mobility industry, the government is required to establish a dynamic regulatory system, adjusting the regulatory methods and standards at any time according to the current state of the market, in order to make the government regulation in the long term in line with the development of the industry.

DOI: 10.54254/2754-1169/97/20231556

The government's existing management system is often sector-based, but because the concept of car-sharing is vague and breaks through the paradigm standards of the existing industry, with the characteristics of transportation, information, and other industries, it makes it difficult for government departments to clarify the attribution of responsibility when regulating. It is easy to generate the phenomenon of shirking responsibility between government departments and reduce the effectiveness and efficiency of regulation.

In future government regulation, the Chinese government can learn from the advanced foreign models of regulating online car rentals. In the United States, when regulating the online car rental industry, the Bureau of Transportation Networks was established to regulate the entire online car rental industry, which has achieved better results [27]. Based on this, in the future regulation of shared mobility, the government can integrate the regulatory responsibilities and resources scattered in various government departments and set up a government department specifically responsible for the regulation of the shared mobility industry so as to realize the centralization of the regulatory authority, and to avoid regulatory deficiencies and overlaps. At the same time, the government should clarify the division of rights and responsibilities among different departments and establish a cooperation mechanism to improve the efficiency of different departments in cooperative regulation.

3.4.3. Friction between government and driver

The advent of autonomous vehicles has revealed a regulatory disparity between traditional driving professions and self-driving platforms, instigating friction manifested as unemployment among drivers. Historically, the conventional transportation sector, including taxi and truck drivers, has been subject to rigorous regulations, imposing high standards and substantial entry barriers on drivers. These encompass extensive licensure procedures, vehicle inspections, insurance mandates, and in certain cases, geographical aptitude assessments. Conversely, with the emergence of autonomous vehicle platforms, a novel paradigm, often utilizing driverless technology to provide services, has permeated the transportation market, circumventing the regulatory restrictions traditionally imposed upon their human-driving counterparts. Autonomous vehicle companies like Waymo, Cruise, and others typically eschew acquiring these government-issued licenses for individual drivers[28].

This regulatory dichotomy has engendered an inequitable competitive landscape, inciting unemployment issues among traditional drivers. In 2016, approximately 13,000 drivers initiated a strike, advocating for reducing the prohibitive fees imposed by local government-endorsed transportation corporations [29]. Drivers contended that governmental support for the burgeoning autonomous vehicle industry jeopardized their livelihoods. They argued that self-driving services, unbound by identical regulatory standards, harbored an unjust advantage, enabling them to proffer services at a diminished cost.

It is often posited that the proliferation of autonomous vehicles has precipitated an oversupply of transportation services, thereby diminishing traditional drivers' revenue stream and exacerbating unemployment rates. The existence of these platforms doesn’t mean that the current shared transportation industry will be completely merged, but they will meet the demands of those people who can’t find a person who shares the same path as them. It's further contended that the government's rigid vehicular prerequisites for human operators further erode the economic interests of these drivers, placing an undue financial burden on those with lower incomes and rendering them incapable of maintaining a sustainable livelihood.

The protest movements in NanJing epitomize the broader societal implications engendered by technological disruption, underscoring the imperative for efficacious governmental regulatory responses. Furthermore, these incidents embody a pervasive dilemma confronting numerous global societies: how to reconcile the benefits of technological innovation with the needs and rights of individuals displaced by these novel technologies.

DOI: 10.54254/2754-1169/97/20231556

The government possesses potential ameliorative strategies for the discord and contention engendered within the autonomous vehicle industry. Initially, an equitable competitive environment needs to be established between conventional driving professions and autonomous vehicle platforms. This may entail a comprehensive review and subsequent amendment of extant regulations impacting traditional human drivers, such as the attenuation of barriers to entry and the provision for enhanced pricing dynamism. Conversely, it might also necessitate the intensification of regulation pertaining to autonomous vehicles, which could incorporate mandatory vehicle inspections, stipulated insurance prerequisites, and rigorous safety certifications.

Subsequently, the government might deliberate on the provision of support for unemployed drivers, which could include the implementation of retraining initiatives intended to facilitate their transition to novel roles both within the transportation industry and beyond. Citing Xi'an as a case study, these programs might feature digital literacy training, thereby empowering drivers to integrate into the autonomous vehicle industry or aiding them in acquiring new skills applicable within disparate industries.

Finally, encouraging dialogue and cooperation between traditional driving professions, autonomous vehicle companies, and the government is crucial. Creating a platform for these stakeholders to discuss their concerns and strive for mutually beneficial solutions can greatly help in resolving conflicts, ensuring the harmonious coexistence of traditional human-operated vehicles and autonomous vehicles.

3.4.4. Friction between Government and Consumer

The fourth friction is the low willingness of the public to participate and use this unified platform. Chinese transportation consumers may have concerns about the safety issue of share-ride services and refuse to use this platform. This is a crucial friction that slows down the transition to our optimal model because, without being widely used by the consumer, the network effect of this unified platform would not be big enough to cover the additional time consumption due to the shared ride[22]. Although the Chinese public's resistance to this issue has become less high over time, it is still necessary to strengthen the public's trust in shared travel to avoid possible resistance in the future and to make our travel platform more competitive than existing ride-hailing platforms.

The lack of trust in ride drivers not only came from the natural distrust towards strangers but also because of several cases that happened in 2018. On May 5, 2018, a flight assistant was killed during Didi's share ride services at night, and another 20-year-old female using Didi's share ride service was killed during the trip as well on August 24 [30]. These shocking incidents have greatly reduced the acceptance of shared rides among Chinese people and raised questions about the safety of shared rides, which has led to doubts about whether to continue using such services [31]. Therefore, in order to avoid similar incidents from happening again and to eliminate the unknown feelings of consumers for the upcoming online car drivers, it is necessary for the government to enhance consumers' understanding of drivers in order to increase trust between the two sides.

As Jiang et al. argued in their work, the trust of the consumer came from two perspectives: the trust in the platform and the trust in the driver [32]. So, the strategies that governments can adopt are those that increase trust between passengers and drivers or between passengers and platforms.

The first strategy the government can use is creating a credit system for the driver, which eventually creates trust between the driver and the passenger. This kind of strategy appeared in similar platforms like Airbnb, for people to report on the actual quality of the house. People can post their feelings towards their host in the community, which is an important factor for others to choose whether stay in this house or not [33]. Similarly, in the sharing transportation industry, digital trust can be created through mutual peer ratings [34,35]. Moreover, the government could connect the platform to the Social Credit System that is currently being developed, which means people can

DOI: 10.54254/2754-1169/97/20231556

review the credit of a person based on their “societal honesty” score in this system [36]. By creating this combined online scoring system for a driver through these two sources, the consumer can know whether this driver can be trusted before they enter the car, and the platform can forbid some low-credit drivers. When consumers have the ability to discern the credibility of a driver, the natural distrust of strangers will be alleviated, leading consumers to be more willing to trust the driver.

Secondly, the government can also enhance trust between the passenger and the platform by adopting some safety features. Functions like the “one button alarm" that the current Didi platform could greatly reduce people’s anxiety towards this risk, so they would trust and use these services [31]. These improvements would give the passenger an impression that the platform cares about their safety, and they would be able to rely on the features provided by the platform in the future. Therefore, the trust could be repaired between the platform and the consumer.

In general, there is potential friction between the government and consumers. Through the above two proposed policies, the government can better promote public trust in the platform and ultimately make the platform under construction more competitive than the existing platform. Over time, the services people receive on the same platform give them positive feedback, making them more willing to trust strangers in society. This sense of trust built up in the community feeds into the platform's development, ultimately entering a virtuous cycle.

4. Conclusion

This paper explores the transformation of urban transportation in China through the lens of shared mobility, offering insights not only for China but also for a global audience. Despite being rooted in China's specific socio-economic conditions, the challenges and opportunities unraveled in this study are universal. They extend to the broader context of urban mobility worldwide and provide valuable lessons for policymakers and regulators globally.

As the research has demonstrated:

a. Shared mobility services, while having a transformative impact in China, hold universal relevance. They provide globally applicable solutions for flexible, affordable, and sustainable urban transportation.

b. Challenges arising from shared mobility, such as disorderly parking and questionable business models, are not unique to China. They serve as a warning for all urban centers globally, highlighting the need for robust government regulation.

c. The lessons from China's regulatory approaches, including supply-side reforms, adaptation to internal and external factors, and innovation, can inform policy-making in other countries grappling with similar issues.

d. The identified gaps in the literature and the need for further research are not limited to the Chinese context. They signal a universal need to deepen our understanding of shared mobility and its regulation across different geographies and contexts.

Acknowledgement

Yang Zhang, Yuxuan Zhang, Qiyu Ji, and Xiheng Qian contributed equally to this work and should be considered co-first authors.

References

[1] *Liu S.Y. ,Zhang B. (2020). Modernization Transformation of Urban Transformation Management in China. Urban Transportation, 18(1), 59–64.*

[2] *Qin, J. (2022). Shared Mobility on Urban Traffic Study on the Alleviating Effect of Congestion[D]. Harbin Institute of Technology.*

[3] *Autonavi Holdings Limited.(2023). 2023 Amap Traffic Health Index of major. https://trp.autonavi.com/index.do*

DOI: 10.54254/2754-1169/97/20231556

[4] National Bureau of Statistics of China. (2020). Statistical Bulletin of the People's Republic of China on National Economic and Social Development for 2020. https://www.gov.cn/xinwen/2020-07/18/content_5528056.htm
[5] Yao D., Xu L.Q., Li J.P. (2020) Transit Service Level, Traffic Demand Management and Public Transit Attraction: A Dual Test Based on Objective Choice and Subjective Will[J]. Journal of System Management, 2020,29(01): 31-40.
[6] Cui M.X., Wang E.Z. (2018). Government Governance of Sharing Economy. Studies in Technical Economics and Management (10), 83-89.
[7] Wang, J., Huang, J., & Dunford, M. (2019). Rethinking the Utility of Public Bicycles: The Development and Challenges of Station-Less Bike Sharing in China. Sustainability, 11(6), Article 6. https://doi.org/10.3390/su11061539
[8] Zhang, L., Zhang, J., Duan, Z., & Bryde, D. (2015). Sustainable bike-sharing systems: Characteristics and commonalities across cases in urban China. Journal of Cleaner Production, 97, 124–133. https://doi.org/10.1016/j.jclepro.2014.04.006
[9] Shaheen, S., Sperling, D., & Wagner, C. (n.d.). Carsharing and partnership management: An international ... - sage journals. https://journals.sagepub.com/doi/10.3141/1666-14
[10] Wang J.H. (2021). The Theoretical System of Government Regulation with Chinese Characteristics: Demand Analysis, Constructive Orientations, and Overall Framework. Management World, 37(2), 148-164+184+11.
[11] Zhou J. , Chen X.F., Ma L., et al. (2022). 2021/2022 China Urban Transportation Planning Annual Meeting 2021/2022 [J]. Urban Transportation,2022,20(06):113-121.
[12] Quan, Y.S., Pan Z.Y. (2017). Supply-Side Structural Reform of Urban Transportation. Urban Transportation, 15(5), 1-7+11.
[13] Cohen, T. , Cavoli, Clémence. (2018). Automated vehicles: exploring possible consequences of government (non)intervention for congestion and accessibility. Transport Reviews, 1-23.
[14] Ma D.L. (2021). Comprehensive Approach to Improving the Capacity and Level of Transportation Mangagement[J]. Macroeconomic Management,(05):28-35+45.
[15] Harrison, G., Grant-Muller, S. M., Hodgson, F. C. (2020). New and emerging data forms in transportation planning and policy: Opportunities and challenges for "Track and Trace" data. Transportation Research Part C: Emerging Technologies, 117, 102672.
[16] Arthurs, H., Tremblay-Huet, S. (2018). The False Promise of the Sharing Economy. In D. McKee, F. Makela, & T. Scassa (Eds.), Law and the "Sharing Economy". University of Ottawa Press. pp. 55–7.
[17] Xiang A.B., He S.W., Song R. (2023). Achievements, Evolution Logic, and Basic Experience of a Century-old Traffic and Transportation Development in China[J]. Journal of Beijing Jiaotong University (Social Sciences Edition), 22(2), 63–72.
[18] Henisz, W.J. and Zelner, B.A. (2005), "Legitimacy, interest group pressures, and change in emergent institutions: the case of foreign investors and host country governments", Academy of Management Review, Vol. 30 No. 2, pp. 361-382.
[19] Fishman, E. (2015). Bikeshare: A Review of Recent Literature. Transport Reviews, 36. https://doi.org/10.1080/01441647.2015.1033036
[20] Fan, Y., 2018. The improvement of local laws and regulations on bike-sharing: a casestudy of normative documents in nine cities including Beijing. Adm. Reform 10,52-56.*
[21] Chen, R., 2019. "Bike litter and obligations of the platform operators: lessons fromChina's dockless sharing bikes. Comput, Law Secur. Rep. 35, 105317.
[22] Alisoltani, N., Leclercq, L., & Zargayouna, M. (2021). Can dynamic ride-sharing reduce traffic congestion? Transportation Research Part B: Methodological, 145, 212–246. https://doi.org/10.1016/j.trb.2021.01.004
[23] Chen G. (2019) . Legal Dilemma and Countermeasure of Online Car-hailing Supervision Subject[D]. SouthEast University.
[24] Fu C.B., Jiang W.H. (2022) . Rule of law thinking on the regulation of online dating car under the perspective of social security[J]. Journal of Liaoning University of Technology (Social Science Edition),24(06):17-20.
[25] Ni J.W. (2018). Research on the Legal System of Supervision of Internet Booking Vehicle Platform. Tianjin University of Finance and Economics.
[26] Zhang S.M. Research on the Improvement of the Regulatory System of Online Vehicle Platform-Taking the Governance of Shunfeng Vehicles as an Example[J]. Journal of Hubei University of Economics (Humanities and Social Sciences Edition),2018,15(12):84-87.
[27] Jun Cao, Jason Prior, Claudine Moutou,The governance of dockless bike-sharing schemes: A systemic review of peer-reviewed academic journal papers between 2016 and 2019,Cleaner Engineering and Technology,Volume 4,2021,100140,ISSN 2666-7908. https://doi.org/10.1016/j.clet.2021.100140

DOI: 10.54254/2754-1169/97/20231556

[28] 2016, 13 January. (n.d.-a). Thousands of taxi drivers in several major cities strike over fees, unfair competition. China Labour Bulletin. https://clb.org.hk/en/content/thousands-taxi-drivers-several-major-cities-strike-over-fees-unfair-competition

[29] Horpedahl, J. (1970, January 1). Ideology Ãœber Alles? economics bloggers on uber, lyft, and other transportation network companies. Econ Journal Watch. https://econpapers.repec.org/RePEc:ejw:journl:v:12:y:2015:i:3:p:360-374

[30] Ye, Q., Chen, X., Ozbay, K., & Wang, Y. (2020). How People View and Respond to Special Events in Shared Mobility: Case Study of Two Didi Safety Incidents via Sina Weibo. CICTP 2020, 3229–3240. https://doi.org/10.1061/9780784482933.278

[31] Ma, L., Zhang, X., Ding, X., & Wang, G. (2019). Risk perception and intention to discontinue use of ride-hailing services in China: Taking the example of DiDi Chuxing. Transportation Research Part F: Traffic Psychology and Behaviour, 66, 459–470. https://doi.org/10.1016/j.trf.2019.09.021

[32] Jiang, Y., & Lau, A. K. W. (2021). Roles of consumer trust and risks on continuance intention in the sharing economy: An empirical investigation. Electronic Commerce Research and Applications, 47, 101050. https://doi.org/10.1016/j.elerap.2021.101050

[33] Cheng, M., & Jin, X. (2019). What do Airbnb users care about? An analysis of online review comments. International Journal of Hospitality Management, 76, 58–70. https://doi.org/10.1016/j.ijhm.2018.04.004

[34] Bolton, G., Greiner, B., & Ockenfels, A. (2013). Engineering Trust: Reciprocity in the Production of Reputation Information. Management Science, 59(2), 265–285. https://doi.org/10.1287/mnsc.1120.1609

[35] Zervas, G., Proserpio, D., & Byers, J. W. (2017). The Rise of the Sharing Economy: Estimating the Impact of Airbnb on the Hotel Industry. Journal of Marketing Research, 54(5), 687–705. https://doi.org/10.1509/jmr.15.0204

[36] Ding, X., & Zhong, D. Y. (2021). Rethinking China's Social Credit System: A Long Road to Establishing Trust in Chinese Society. Journal of Contemporary China, 30(130), 630–644. https://doi.org/10.1080/10670564.2020.1852738