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"Bike litter" and obligations of the platform operators: Lessons from China's dockless sharing bikes☆

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ABSTRACT

The boom of dockless share bikes in China has brought about enormous private benefits and social benefits. However, it has also imposed upon the public a new cost which can be termed as "bike litter"[1]: share bikes parked or abandoned in pathways, rivers and other public spaces. It has not only damaged the aesthetic value of cities but has created serious safety hazards and public nuisances. None of the conventional methods of regulating road and traffic safety hazards, such as private actions, public enforcement and self-regulation, seem to have stopped bike-litter without also stopping dockless bike services. Without having to stop such services, or overly burdening their operators, it is proposed here that certain obligations should be imposed upon the operators of dockless bike services. Unlike tort-related obligations that focus on results (e.g., the reduction or sanction of bike litter), these new obligations compel operators to establish systems for monitoring the behaviors of bike users. In short, these obligations are as follows: (1) an obligation for operators to mandatorily include provisions in their terms of service to allow the operators to monitor, sanction and rewards certain parking behavior of users of the service; (2) an obligation for operators to create and maintain monitoring systems to detect bike littering and to enforce the user agreements; and (3) an obligation for operators to report on, and disclose, details regarding the operation and effectiveness of these systems. The mandatory disclosure obligation of operators, however, should be strictly subject to the protection of privacy rights of bike riders and the protection of fair competition between different platforms. It is also proposed that these obligations should be created through voluntary agreements between the government regulator and operators under a permit system, rather than by creating new statutory obligations, as the former is much more flexible and allows for the adoption of various incentive schemes. Such an approach may also help regulate torts incidence in other types of platform economies.

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[1] I borrowed the term of "bike litter" from Matt Teffer, 'Dockless Share Bikes Are the Frontline of A Battle Between Chinese Tech Giants', *The Financial Review*, 27 April 2018. <https://www.afr.com/lifestyle/cars-bikes-and-boats/cycling/dockless-bikes-are-part-of-a-battle-between-chinese-tech-giants-20180420-h0z1m8>.

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1. Introduction

Sharing bikes serve as one of the best examples of contemporary technology providing enormous benefits to individuals, the wider public and the environment. Globally, the emission of pollutants reduced by the use of sharing bikes is equivalent to the annual amount of emissions discharged by 170,000 automobiles.[2] In most cities sharing bikes have been run via a public model of station-based sharing. These have often been fraught with conflicts,[3] because governments are not often good at either understanding technology or the complicated management of capital and assets. A docklesss system of sharing bikes financed and operated by private parties seems a promising alternative. In China, this new model proved a huge success within a very short period: the market value of sharing bikes in China reached more than RMB1.2 billion in 2016 and is estimated to reach RMB10 billion in 2017.[4] Close to 300million users registered with sharing bike systems in 2016 and more than 4 million sharing bikes have been made available in more than 40 cities in China.[5] While New York City has about 120,000 sharing bikes and over 750 docking stations[6] to serve a population of 8.5million people,[7] about 71 people sharing one bike; while Beijing has over 2milion sharing bikes to serve a population of over 20 million people, only 10 people have to share one bike. If one considers the flexibility in parking and pick up the sharing bikes anywhere suitable instead of finding a docking station, the additional value brought about to bike riders by the dockless system is even more substantial.

However, the realization of such great consumer welfare and environmental benefits seems much slower, or even completely nonexistent, outside of China. Irresponsible parking of dockless sharing bikes in public spaces, the so-called "bike littering", is apparently the explanation for this. Bike litter causes both public nuisances from an aesthetic perspective, and safety hazards to certain members of the public, particularly pedestrians using wheelchairs and those with impaired vision.[8] For example, in Sydney and Melbourne, the city governments introduced multiple players of dockless sharing bike operators with high hope, but some of them already pulled out of the market, partly due to public resentment.[9] In Seattle and Washington, the only two cities in the US that have adopted dockless bikes so far, improperly parked bikes have obstructed pedestrians and wheelchair paths, creating substantial concerns for the governments of the two cities in relation to whether they should allow the expansion of their share bike fleets.[10]

It certainly appears that conventional methods of regulating traffic and public transportation, namely public enforcement, private actions by victims, and self-regulation by operators of sharing bike systems do not seem to have stopped bike littering. For police and other regulators of public traffic, it proves too expensive and logistically challenging to tow bikes inappropriately parked: there are just too many bikes and they been move around much too frequently, particularly when compared to automobiles. For example, when the government in the City of Melbourne took the extreme form of imposing a fine of AUD$3000 every time a bike-operator fails to take away dumped bike within 24 h, this operator pulled out of the market right afterwards.[11] For individual victims and the public to take private actions, serious problems traditionally associated with collective actions tend to arise. For instance, the benefits of pursuing such actions are often too little to justify the high private costs that preventing or clearing bike litter would incur. While self-regulation seems the promising way out of many problems that occur in relation to technology-based platforms, such as the dockless bike system, it has proved ineffective in reducing bike litter so far.[12] While none of the parties involved (bike users, the city government, the system operators and private investors) are addressing public nuisance caused by bike litter, they have strong incentives to further expand the bike fleet, which would in turn generate more bike litter and cause more public nuisances, unless something else happens.

To resolve the above dilemma, it is proposed in this paper that a new set of obligations be imposed upon the operators of dockless bike systems. Under these obligations, operators would be responsible for incorporating certain mandatory provisions in their user agreements which allow them to monitor, reward and sanction the parking behaviors of bike users. To ensure that these provisions are enforced, the operators would be obliged to implement a system of monitoring

[2] Ibid.

[3] Boyd Cohen and Jan Kietzmann, 'Ride On! Mobility Business Models for the Sharing Economy' (2014) 27(3) *Organization & Environment* 279.

[4] IIMedia Research (艾瑞咨询), '2017 Q1 China Sharing Bike Market Report' (《2017 Q1 中国共享单车市场报告》) <http://www.iimedia.cn/50357.html> accessed 7 March 2018.

[5] Ibid.

[6] See data on the official website of Citi Bike of New York City: <https://www.citibikenyc.com.>

[7] See data on the official website of the government of New York City: <https://www1.nyc.gov/site/planning/data-maps/nyc-population/population-facts.page.>

[8] Jenny Noyas, 'It's definitely escalated: The Unseen Danger of Share Bikes', *Sydney Morning Herald*, 15 March 2018 <https://www.smh.com.au/national/nsw/it-s-definitely-escalated-the-unseen-danger-of-share-bikes-20180315-p4z4kc.html.>

[9] Megan Gorrey, 'Bump in the Road as Bike Share Operators Reddy Go, Ofo Quit Sydney', *Sydney Morning Herald* <https://www.smh.com.au/national/nsw/bump-in-the-road-as-bike-share-operators-reddy-go-ofo-quit-sydney-20180710-p4zqm1.html.

[10] Gabriel Campanario, 'Look at some of the weird places people put shared bikes in Seattle', *The Seattle Times*, <https://www.seattletimes.com/seattle-news/look-at-some-of-the-weird-places-people-put-shared-bikes-in-seattle/> accessed 7 March 2018.
Luz Lazo, 'Hey, You Can't Park There! Dockless bike-share Ending Up in Inappropriate Places', *The Washington Post*, <https://www.washingtonpost.com/news/dr-gridlock/wp/2017/10/05/abandoned-vandalized-and-illegally-parked-bike-share-bikes-now-a-d-c-problem> accessed 7 March 2018.

[11] Nick Sas, 'Bike-sharing Phenomenon Sets to Stay in Sydney, but for How Long?', *ABC News*, <https://www.abc.net.au/news/2018-06-27/bike-sharing-still-going-in-sydney-but-for-how-long/9910914> assessed 21 October 2018.

[12] It has been reported that Mobile and Ofo have adopted system to reward bike users, but there's no evidence of actual enforcement of these terms.

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parking behaviors and make regular reports on the operation and effectiveness of this system. Crucially, however, these obligations should not be used as a mechanism through which government bodies can intrude on the privacy of bike users or interfere with competition between different operators.

When compared to conventional torts liabilities, these obligations are novel for two reasons: their contents and the method behind their creation. First, the new obligations focus on the establishment and proper operation of an organized system, instead of any intended consequences, because holding dockless bike operators accountable for every single instance of bike litter would be to impose too heavy a burden, which runs the risk of dooming the whole industry. The purpose of this new solution is to make the dockless bike system sustainable in more cities in the long term, instead of crushing it with heavy costs and extensive legal obligations. Furthermore, it is more advantageous to create these obligations through voluntary agreements made between the operators of such services and government regulators as part of a permit regime, rather than through creating statutory obligations. Such an approach would help avoid legal uncertainties that may arise because of creating new legislation. More importantly, the creation of obligations via voluntary agreements would provide more flexibility to adopt various incentive regimes for operators, and for operators to utilize emerging technologies. The proposal therefore leaves ample space for private operators to explore the most cost-effective solutions based upon their own technological and managerial expertise, very much like the flexibility provided by "cap-and-trade" systems in environmental regulation.[13]

The rest of the paper is organized as follows. Section 2 presents the way in which all the parties involved in the dockless bike system have strong interests in the expansion of the sharing bike network. Section 3 explains that conventional legal approaches to the prevention and sanction of irresponsible parking act as a barrier to the expansion of dockless bike sharing systems. Section 4 explains why the operators of such systems are better situated than government bodies to monitor and direct bike riders' behavior. Section 5 outlines the proposed new obligations for operators and the need to protect the privacy of bike riders. Section 6 proposes that, to serve all the above purposes, it is better to create these obligations through a permit system and voluntary contractual arrangements between operators and government bodies and sets out the details of the enforcement mechanism. A brief conclusion follows at the end.

2. Benefits and costs of expansion of the dockless share bikes

Sharing bikes littered by irresponsible users have apparently imposed substantial costs on the public, even though in a highly dispersed fashion. These costs can be categorized as the safety hazards imposed on footpath and streets to certain vulnerable groups of people, costs of removal of littered bikes to remain safety and tidiness in public space and the costs in collecting and recycling sharing bikes (if possible, at all).

Bikes littered in footpaths and streets could impose serious hazards and even dangers to wheelchair users and people with impaired visions. If these hazards or dangers were not eliminated quickly, they could cause real damage to the health and life of these vulnerable groups of individuals, leading to ancillary costs, such as medical bills, expenses for caretakers and loss of labor. Even though not everyone on the footpath uses wheelchair or has impaired vision, the littered bikes at least cause some level of inconvenience to the regular use of footpath. To be sure, as the damage to the aesthetic value of the public caused by bikes littered in unexpected places such as rivers and trees, it is hard to attach a monetary value to such inconvenience caused to the regular use of the sidewalk. However, both public and private entities do incur costs in maintaining a clean, tidy and user-friendly environment in both private space and public space, by purchasing various tools and paying people to clean and to tidy things up. Such costs and expenses in the maintenance of public space are, however, indispensable and easy to calculate in monetary terms. The fact that OBike pulled out of the city of Melbourne when the government there stepped up on imposing fines and other penalties on littered bikes of this company[14] seems a strong signal that such costs are not a small amount for private operators to swallow. Since the sharing bikes have been tailor-made for cities with relatively short-rides, it seems much harder than we think to recycle them for uses in poor countries and in cities that are less well built.[15] Moreover, it is part of the business model for the dockless system operators not to recycle the sharing bikes and instead to build new ones,[16] which apparently imply that recycling is costly, much more than building or purchasing new ones.

To summarize, the littering of sharing bikes by users has imposed upon the public various costs in the form of safety hazards, cleaning up costs and potential pollution to the environment, which are apparently not properly paid for by beneficiaries of the dockless sharing bikes, i.e.: the bike users, the operators of the sharing bike systems, the investors and the local government. Without having to bear all the full costs on the public, each of the parties involved in the dockless sharing bike network has strong incentives to favor the expansion of the network. Even though the increased number of bikes would impose even higher costs on the public, none of these parties seems to have strong incentives to tackle these costs on the public.

For users, the dockless system provides a far superior solution to the "last-mile problem" which can arise when

[13] Michael Greenstone, Cass Sunstein and Sam Ori, The Next Generation of Transportation Policy Harvard Public Law Working Paper No. 17-27, 29 March 2017 <https://ssrn.com/abstract=2943551 or http://dx.doi.org/10.2139/ssrn.2943551>.

[14] ABC News, '*Obike to leave Melbourne after crackdown on bicycle share company*', https://www.abc.net.au/news/2018-06-12/obike-dockless-bicycle-scheme-to-leave-melbourne/9860314, last assessed on 20th October 2018.

[15] Jenna Fortunati, 'Recycling the abandoned doc less share bikes in China is harder than you think', *Mobility Lab*, https://mobilitylab.org/2018/04/13/recycling-the-abandoned-dockless-bikes-in-china-is-harder-than-you-think/, assessed on 20th October 2018.

[16] Fortunati, *Ibid*.

using public transportation.[17] Moreover, the network of dockless share bikes is one with a strong positive network externality in the sense that the more sharing bikes a network has, the more marginal benefits each user within the network will be able to enjoy.[18] Dockless systems accommodate many more bikes than stationed bike sharing systems, and thus render a much more positive network externality to users. Another difference between the dockless system and the conventional stationed share bike is that the former can accommodate multiple operators while the latter will usually be the under the exclusive control of a single operator in any given city. The emergence of more operators of bike networks should engender more competition, and thus put downward pressure on the price paid by users.

Another benefit that bike riders have obtained because of the rapid growth of the network of sharing bikes is being able to enjoy a deposit-free service.[19] Users are typically required to pay a deposit ranging from RMB99 to RMB299 when opening a user account with bike operators.[20] This tends to be refundable in a few days after their use of the sharing bike has concluded.[21] The total value of such deposits was reported to have reached RMB 6 billion at one point.[22] This gigantic pool of cash created huge moral hazards. In possession of such a huge pool of money belonging to other people, there is a risk that bike operators may take excessive risks in managing the deposit or even steal or embezzle money from the deposits, which could lead to serious losses and trigger a flood of requests to withdraw the deposits. If too many withdrawal requests occurred simultaneously, the operators would face serious liquidity problems and cause financial losses for the users of share bikes. For example, Xiaoming Bike, a notable bike share operator in China, was reported to have only repaid deposits to 270,000 of the 320,000 users who requested a refund of deposits during the firm's bankruptcy proceedings.[23] Such risks are apparently much higher for dockless systems than for conventional stationed systems, simply because dockless systems have more users as well as more operators, hence a bigger pool, or pools, of deposits. Exactly because of these increased levels of risk, local governments have been pushing bike operators to eliminate the requirement for the payment of deposits, leading to several bike operators starting to provide deposit-free services. In the absence of a sudden expansion of dockless system bike fleets, it would be impossible for bike riders to receive such favourable treatment.

For operators, to have more bikes in any given operating system would increase the competitiveness of the network in several ways. Firstly, it would create more network effect for its users, thus increasing the loyalty of its users. Secondly, it would create more economies of scale, driving down the marginal costs of operation, allowing operators to offer more attractive prices to their users. At the same time, both network effects and the economies of scale would raise the costs required for new entrants to enter into the market and for other incumbents to be competitive. Another incentive for operators to expand is of course the possibility of managing the huge pool of cash deposits paid by bike riders which, as noted above, is reported to be approximately RMB 6 billion.[24] The popularity of dockless sharing bikes among users has naturally attracted the interests of investors. Increasing users of bikes are attractive to investors for one more reason: the transportation data of users, and the possibility of advertising to said users, are both extremely valuable. Such value also has apparent economy of scale, further pushing investors towards expanding the network of sharing bikes. The large cash pools consist of deposits from users added yet another level of attractiveness to investors: users of the service are essentially financing the business while purchasing the service. It is hence no wonder that Ofo has $1.2bilion investment, Mobike has $1billion investment and Limebike received $62million investment.[25] All the above types of value of the dockless system have apparent economy of scale, hence pushing investors towards expanding the network of sharing bikes even further.

However, the switch from station-based bike-sharing systems to dockless systems, and the following expansion of the fleet of bikes, would not have occurred if local governments had not found this beneficial. For decades since station-based sharing bikes first appeared in the Netherlands, many municipal governments have struggled to maintain station-based bikes, and some have simply failed to maintain such systems at all, as has been the case in several cities in China. The first challenge is of course the heavy financial

[17] In the literature of transport, the term "the last mile" refers to access to and from high-quality transit and the "last-mile problem" referred to the fact that experience in "the last mile" strongly shapes people's propensity to use the transit mode, transit that offers frequent and rapid service along the main lines but leaves the travelers a mile, more or less, from their destinations with poor connecting options is rarely the mode of choice. See Moria Zellner, Dean Massey, Yoram Shiftan, Jonathan Levine and Maria Josefa Arquero 'Overcoming the last-mile problem with transportation and land-use improvements: an agent-based approach', 4(1) INT. J. TRANSPORT (2016), pp. 1–26.

[18] The term is defined in Michael L. Katz and Carl Shapiro, 'Network Externalities, Competition, and Compatibility', *75(3) THE AMER. ECON. REV. 424 (1985)*.

[19] Yingzhi Yang, 'China's Bike-sharing War Seen Entering Crucial State with Mobike Going Deposit Free', South China Morning Post, 6 July 2018 < https://www.scmp.com/tech/article/2153959/mobikes-dockless-move-increases-pressure-ofo-bike-sharing-race-enters-critical>

[20] See 'Ofo Demanded User Deposit be Increased from RMB99 to RMB199: Existing Users Do Not Need to Make up for the Discrepancy', *Tencent Technology*, (腾讯科技, 'Ofo 押金由 99 上涨至 199 元, 老用户无需补齐押金差价) <http://tech.qq.com/a/20170620/016537.htm.>

[21] For example, users must wait for seven to ten business days, according to the user agreement of Mobike.

[22] Tao Wu (吴涛), 'The Second Half of the Game of Share Bikes: How to Secure the Tens of Billions of Yuan Deposit by Hundreds of Thousands of Share Bike riders? (共享单车进入下半场:上亿用户超百亿押金如何保障?)' , *Chinanews*, <www.chinanews.com/cj/2017/12-22/8406356.shtml> accessed 7 March 2018.

[23] Xinhua News Agency, China Bike-Sharing Firm Loses Law Suits over Deposit Refunds, *China Daily*, 23 March 2018 <http://www.chinadaily.com.cn/a/201803/23/WS5ab49d67a3105cdcf6513de6.html.>

[24] Tao Wu, Footnote 22.

[25] Rebecca Fanning, 'Silicon Valley's LimeBike Faces Off Against China's Bike-Sharing Power Player', CNBC, 16 Oct 2017, <https://www.cnbc.com/2017/10/16/silicon-valley-start-up-rival-chinese-to-capture-bike-sharing-market.html>.

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commitment required to build and maintain a fleet of sharing bikes and bike stations. It is estimated that it costs a city about RMB1000 per bike to invest, maintain and operate under a station-based system.[26] In contrast, the dockless system can relieve municipal governments of such heavy financial burdens, but can allow a city to keep the service of share bikes, thanks to large private investments and the managerial expertise of entrepreneurs who have invested in the dockless systems. The expanded system of sharing bikes has also brought about political credit to local government. For example, an annual report about the share bike industry published in China presents a ranking of cities measured by the usage of sharing bikes.[27] Those with higher rankings apparently enjoy some political benefits, and it is not difficult to imagine such a reputational mechanism working on a world-wide scale. Finally, the dockless system has turned government bodies from owners and operators of sharing bike systems, with huge financial and managerial responsibilities, to a different role: a regulator of an ever-expanding network of bikes, operating systems, financial investments, and bike riders. The fast growth of the dockelss sharing bike market is naturally followed by the expansion of the government's regulatory power, which coalesces perfectly with the general tendency of governments to self-expand.[28]

To be sure, not every member of the public uses sharing bikes. For example, elderly people, people with disabilities, and people who always drive or ride in cars. But these members of the public also derive substantial indirect benefits from the use of share bikes, such as reduced traffic, lower carbon emissions, and less crowded buses and subway trains. All these benefits, however, have come at a substantial cost to the public: public spaces being occupied by irresponsible share bike parking, imposing safety risks, additional costs of cleaning public space and threat to the environment. The damage to the aesthetic value of public spaces, and safety hazards created on pathways and public highways by irresponsible parking, has become the most controversial issue regarding the dockless bike sharing system, hindering its further expansion in China and its introduction to cities in other nations. So far, a successful regulatory regime, capable of keeping the abovementioned public costs under control and, simultaneously, implementing successful measures relating to roads, traffic regulation, and safety hazards does not seem to have emerged.

3. Failure of conventional approaches

In regulating roads and traffic, especially irresponsible parking by vehicles, the conventional approach is for local governments to issue relevant rules and then enforce these rules against drivers. Sanctions take the forms of fines, the suspension of licenses, the reduction of driving points, the revocation of licenses, and even criminal convictions. Similarly, a small number of local governments in China have issued rules specifically requiring appropriate parking of dockless sharing bikes.[29] Some of these rules have attempted to allow local police forces, the conventional regulator of traffic, to regulate parking of sharing bikes. Presumably, these rules allow police officers to order the removal of inappropriately parked bikes, park them properly, and to impose penalties upon any wrongdoers. However, official reports of government bodies enforcing these rules vigorously against individual bike riders have not been forthcoming. Similarly, it is not difficult to imagine pedestrians, other bike riders, and drivers who have suffered from the inconveniences and safety hazards caused by wrongly parked bikes, trying to stop or shame wrongdoers themselves, particularly through the taking of private actions against illegal driving by other drivers, or pedestrians on the road. Again, there appear to have been no official reports of any such private actions.

The following analysis shows that these passive attitudes are likely to be the result of rational choices of the involved parties, as the potential costs of both public and private actions against irresponsible parking go far beyond the potential benefits they may accrue.

3.1. *Potential costs of public enforcement*

Law enforcement is costly.[30] The potential costs of public enforcement by government bodies against bike riders have at least three dimensions: technical difficulties and financial costs, legal costs, and reputational costs.

Compared to the traditional regulation of traffic and roads, government regulation of "bike litter" faces new technical challenges. Firstly, bike riders are not required to hold a registered license in the same way an automobile driver is required, and share bikes are not registered with a unique license plate number like automobiles. Therefore, it is more difficult for traffic cameras on the roads to catch irresponsible bike park-

[26] Jing Ma (马婧), Suspicion over the Practice of Only 50 Employees Managing Hundreds of Thousands of Share Bikes: Past Advantages of Mobike and Ofo turned into Disadvantages (十万辆共享单车仅五十人管理遭质疑：摩拜 Ofo 优势变劣势), *Xinhua News Agency* (转自新京报), <http://www.xinhuanet.com/fortune/2017-03/22/c_129514983.htm> accessed 7 March 2018.

[27] IIMedia Research, Footnote 4.

[28] Kevin Murphy, Andrei Schleifer, and Robert Vishny, 'Why is Rent Seeking so Costly to Growth?' *(1993) 83 AM. ECON. REV. 409.*

[29] See Article 1 (3) of the Beijing Municipal Government Guiding Opinions on Encouraging Regulated Development of Sharing Bikes (《北京市鼓励规范发展共享自行车的指导意见 (试行)》一 (三)): The rules of parking in public areas are the same for sharing bikes and regulator bikes. The Enterprise and the Riders of Bikes shall each undertake their respective responsibilities with respect to regulation of parking of sharing bikes. Also see Article 7 of the Shenzhen Municipal Government Opinions on Encouraging Regulated Development of Internet Bikes (《关于鼓励规范互联网自行车的若干意见》): With respect to parking of bikes in breach of relevant transportation regulations, the public police and the urban administrative authorities are entitled to impose penalty according to law and the record of such a breach will be written into the social credit record of the relevant individuals. Article 4(5) of the Shanghai Guiding Opinions on Encouraging and Regulation of the Development of Internet Rental Bikes (Tentative) (《上海市鼓励和规范互联网租赁自行车发展的指导意见(试行)》): Users of Internet Rental Bikes shall comply with law, administrative rules, urban regulatory rules and the service agreement with respect to riding and parking.

[30] Gary S. Becker and George J. Stigler, 'Law Enforcement, Malfeasance, and Compensation of Enforcers' *(1974) 3, J. Legal Stud. 1*

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ing than it is for them to catch the automobile equivalent. Even though the identities of bike riders can be determined through the information they provide to share bike operators, or even by using facial-recognition technology, accessing and making use of such information is likely to be technologically challenging and time-consuming. The fact that sharing bikes are generally only used for short distances, but are used very frequently, further complicates the technical challenge of identifying individual instances of "bike littering". The notion of utilizing such technology against bike riders also brings about concerns regarding the protection of privacy.

To be sure, these technical difficulties may be overcome with further technological development in the future. However, resolving these difficulties either now or in the future will require the heavy spending of public money. Moreover, these technical difficulties and financial costs are further exacerbated by the increasing number of bikes in the dockless fleets, and the frequency and volume of their use. To be sure, based upon the public good theory, it is reasonable to believe that some forms of public-and-private partnerships may emerge to ease these technical and financial burdens on government bodies, as has happened in the context of stationed share bikes and government regulation of pollution and food safety. While the financial participation of private sector organization in the provision of public goods is a common trend, the cooperation between public and private sector organizations in terms of accessing mass data on individual identity and behavior raises substantial legal concerns.

Other than the above legal uncertainty regarding data access and usage, there are other sources of legal uncertainty that local governments must face when dealing with the "bike litter". As mentioned earlier, some local governments in China issued various rules and policies regarding sharing bike systems. However, as a legal matter, it is unclear whether these rules have binding force, and whether there is enough legal basis for local governments to stop bike riders, or to impose sanctions in the event of serious breaches of these rules. Such legal uncertainty thus renders it too costly for local police forces to take actions to enforce these rules, due to the possibility of being sued for acting illegally, and the associated exposure leading to the payment of state compensation.[31] In other settings, such legal risks and the legal liability of local police forces can translate into legal liabilities, or financial burdens, for individual police officers.[32]

Another type of cost that law enforcement bodies must bear in catching wrongdoers on the spot, is high reputational costs, especially in an era of social media. In China, sharing bike riders tend to be young people who belong to lower-income groups.[33] Local police forces attempting to stop or punish individual riders on roads or pavements can thus be a particularly sensitive issue. If conflicts were to escalate, they could easily turn into eye-catching news items on social media, leading to heavy reputational costs for the police. Such risks also impose potential costs on individual police officers in terms of their career prospects, thereby reducing their incentives to take actions against bike riders or operators. The possible reputational and political costs risked by local law enforcement bodies and their agents are of course hard to quantify. However, such costs are clearly the driving force for an increasing reliance upon video cameras for monitoring traffic and other vehicular issues. It is therefore reasonable to believe that the same costs are likely to deter local police forces from sending their officers to deal with individual bike riders.

To be sure, not every encounter between bike riders and police forces would lead to conflicts that affect the reputation of the police or career of individual police officers. Any negative consequences would likely be proportionate to the seriousness of any arising conflicts and their specific circumstances. We can even imagine that, under orders or guidance from local police forces, some bike riders may quietly remove bikes from inappropriate spots and change their behavior in the future. But the size of a police force in any city is likely to be dwarfed by the number of bike riders. Local police are thus unlikely to be a reliable means through which "bike littering" can be reduced.

When the costs for public enforcement become too high, government is likely to try to pass on the costs to private parties by imposing fines and other monetary penalties. If the private parties are unwilling or unable to undertake such costs, they may need to give up the business, like OBike chose to do in front of the crackdown on bike operators launched by the government in the city of Melbourne.[34]

3.2. *Costs of private action by victims and private regulation by bike operators*

Victims of bike litter are another party which may also pursue wrongdoers. However, victims will likely be unable to pursue actions against wrongdoers, or will lack the incentives to do so for the reasons set out below.

Individual victims, such as people using wheelchairs, or those who have impaired vision, often suffer from the consequences of "bike litter" but do not necessarily encounter bike riders on the spot (i.e., at the time of littering). It is, therefore, often extremely difficult for victims to try to identify the wrongdoers who parked the bike improperly. As with any torts claim, the victims must prove harm, and the causation of harm by the wrongdoers, which can be very challenging in case of dockless share bikes. Meanwhile, even though members of the public, in general, suffer from "bike litter", there are serious collective action problems relating to organizational difficulties, especially when the harm is marginal and hard to quantify, and the potential benefits brought about by successful action will be highly dispersed. Even if an individual victim or the public may be able to prevent irresponsible parking or make riders remove their inappropriately parked bikes, they

[31] Article 2 of China State Compensation Act (2012): where the government or government officials infringes the legal interests of citizens, legal persons and other legal organizations, which results in damages to the latter, the victims are entitled under this Act to receive state compensation.)

[32] China State Compensation Act (PRC 2012) Article 16: Following the government shall require the specific officials or institutions or individuals to undertake part of or whole of the compensation amount.

[33] IIMedia Research, Footnote 4.

[34] Fortunati, Footnote 15.

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may not have enough incentive to do so, given that the potential conflicts and associated costs are likely to be substantial, but the private benefits are likely to be marginal and highly dispersed.

Another potential form of private action is the private regulation of bike riders by sharing bike operators through contractual agreements. One of the most notable examples of successful self-regulation is the private regulation by Walmart and Wholefoods of food safety,[35] the merits of which have been well documented.[36] At least one bike operator has adopted a geofence system to alert riders when they try to park bikes in non-designated places.[37] In fact, some of the operators of bike systems have imposed contractual obligations upon riders to park dockless bikes properly.[38] However, enforcement against bike riders for breaching the rules seems unheard of.

Other than the heavy financial costs and high demand for labor input, the most serious risks for operators in the context of exercising regulatory power against bike riders is the potential damage to their relationship with existing customers and its reputation among prospective customers. As competition is so fierce in the dockless share bike market, it is very unlikely that bike operators will be willing to take such risks voluntarily. Finally, under Chinese law, it is unclear whether private parties have the proper authority to impose financial penalties or other forms of sanction through contracts.[39]

Having explained the failure of conventional approaches to regulation in reducing safety hazards on the road, there is clearly a need to develop a new solution to address the fact that the potential costs to government, victims, the public, and service operators to tackle "bike littering" is simply too high.

4. Entities with new responsibility: operators of share bike system vs. government

For a new regime to create both stronger deterrence against "bike litter" and/or strong incentives for bike riders to park with more consideration and care, the first task is to identify the entity which should be responsible for providing the deterrence and/or incentives. The two candidates are the government and the operators of share bike systems. The rest of this section will set out a simple comparison to show that bike operators are in a much better position to take on such responsibility.

4.1. *Government*

Even though the government has stronger motivations to protect public interests, it suffers several disadvantages in terms of information and resources in providing economic incentives or enhancing deterrence. The strong contrast between the failure of government-run stationed share bikes and the huge success of the privately-owned dockless system serves a great example of those disadvantages. Government bodies do not possess the technology, or the ability to apply such technology, which is essential for collecting the information required for enforcement, not to mention the heavy financial burden that would be required to acquire and utilize the technology in the first place. In addition, there are also concerns as to whether it is appropriate for government bodies to collect and to process registered personal information and travel data of bike riders.[40]

At a practical level, for government bodies to operate a system providing economic incentives for individual bike riders, they would also need to create a registration and payment system to create accounts for bike riders. The technological, managerial and financial expertise that would be required for the creation of such a system would be extensive. Government bodies would also face a major challenge when it came to impose economic penalties on bike riders. The absence of an existing payment system to link bike riders leaves government bodies with no leverage against bike riders who would refuse to pay a penalty issued against them. For example, it has been reported that on average seven out of ten toll road fines go unpaid, exacerbating already existing burdens on the court system.[41] There seems no good reason to believe that imposing economic penalties on bike riders would be any easier to enforce. What the government can do under current circumstances is send defaulted wrongdoers into the criminal justice system, which is arguably too harsh and disproportionate to the offence of bike littering.

4.2. *Operators of share bike systems*

The operators of bike systems, in contrast, enjoy apparent advantages in terms of information, expertise and resources. The information required for implementing incentives or deterrence schemes against bike riders is already in possession of the operators. The operators also have the necessary infrastructure to process and analyze such information. Therefore, the marginal costs for operators to collect this information are negligible. Given that private investors have already shouldered the fixed costs for such information processing systems, there is little need for operators to invest in the creation of new deterrence and monitoring systems. To keep user information in the hands of service operators would also eliminate the

[35] See Walmart, Food Safety Requirements for Food and Beverage Suppliers <https://cdn.corporate.walmart.com/6d/f3/05fffa84417f8e89f62ab756c998/2017-supplier-food-safety-requirements.pdf> accessed 8 March 2018.
Also see the Whole Foods, Quality Standards <http://www.wholefoodsmarket.com/quality-standards, accessed 8 March 2018.

[36] Tetty Havinga, 'Private Regulation of Food Safety by Supermarkets', *(2006) 28 LAW and Policy* 515.

[37] Matt Teffer, Footnote 1.

[38] Luz Lazo, Footnote 10.

[39] Cui Jianyuan(崔建远), *Contract Law* (合同法) 5th edition, Law Press China (法律出版社) 2010) pp346.

[40] Neil Richards, 'The Dangers of Surveillance' *126 Harv. L. Rev.1934*.

[41] Benjamin Preiss and Craig Butt, 'More Than Seven Out of Ten Toll Road Fines Go Unpaid, Ending Up in Court', *National Victoria*, 09 July 2017 <https://www.theage.com.au/national/victoria/more-than-seven-out-of-10-toll-road-fines-end-up-in-criminal-justice-system-20170709-gx7pwr.html>.

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concerns for the potential intrusion of government bodies into the privacy of citizens.

Another cost-saving factor for the operators of share bikes is the existence of account and payment systems already established for each individual bike riders, which are necessary for either imposing economic penalties against bike riders, or for rewarding them with economic incentives. While government bodies have little leverage against wrongdoers who refuse to pay financial penalties following wrongdoings, share bike operators have much better leverage: they can threaten the deletion of user accounts and deny users access to their services. A close analogy is the employer's vicarious liability for harm to third parties by its employees within its employment responsibilities. Finally, operators already enjoy rich expertise in terms of the management of the information and payment infrastructure, which would be time-consuming and costly for government officials to acquire. In fact, some operators of share bike systems have already taken steps to incentivize their users to park share bikes appropriately. For example, Mobike has begun to plan how to use geofencing technology to identify appropriate parking of share bikes, and to use records of appropriate parking as a basis for rewarding bike riders.[42]

While all the above advantages make the operator a perfect focal point[43] for coordinating the behavior and choices of other members of society relevant to the sharing bike system, it does not mean that we can completely ignore the private costs that would be imposed upon operators of share bikes. From the viewpoint of a social planner, responsibility and resources should be allocated in such a way to ensure high efficiency and low waste. Under such a guiding principle, responsibility should be allocated to the parties which have the most information, expertise and resources in managing the system, and who may better diversify the risks of losses if the management fails, very much like the way risks experienced by private companies is often allocated between shareholders and creditors.[44] Between the government and the operators of share bikes, the latter is apparently a better candidate to achieve such goals: both the capital market and the service/product market impose disciplines over the operators to utilize the assets of the operators efficiently and to minimize wastes. The financial and managerial expertise of bike share operators may also help maintain efficiency in terms of utilizing assets and implementing an incentive and penalty regime.

5. New obligations of operators of share bikes

To achieve the goal of reducing "bike litter" through deterrence as well as rewards to bike riders, we propose that operators of bike sharing systems shall bear the following obligations: (1) operators must establish a proper monitoring system to detect irresponsible parking and take measures to ensure proper operation of the system; (2) operators must include mandatory provisions in their terms and conditions which require riders to park bikes properly, and confer upon riders rewards as well as penalties; and (3) operators must disclose non-privacy information about the overall operation and effectiveness of the monitoring system.

5.1. *Establishment of a monitoring system and inclusion of mandatory provisions in user agreement*

The costs inflicted upon the public by "bike litter" tend to be marginal. It is hence not cost effective to require operators of dockless bike systems to try to sanction or prevent all instances of "bike litter". Instead, what should be prevented is systematic trespassing on public space. Therefore, the responsibility to be imposed upon bike operators should reflect this objective. A possible analogy are the requirements imposed upon listed companies regarding their internal control: the objective of these requirements is not to prevent any risks, but to prevent major and systematic risks. Therefore, like the requirement for listing companies to establish proper systems of internal control,[45] operators of share bike systems should be required to establish a monitoring system, with available technology and a reasonable level of care, to effectively detect "bike litter", with appropriate sanctions and for those who litter, and rewards for those who do not. Similarly, in their regular reports to government regulators, operators of share bike systems would be required to provide a review of the operation and effectiveness of their monitoring systems, and the effectiveness of their rewards and sanctions schemes. As an interesting point of observation, the Singaporean government has recently required that bike share operators install geofencing device on share bikes.[46]

Mandatory provisions in private agreements are a common method applied by regulators to lower enforcement costs. As noted above, the mandatory articles of association for listed companies is an effective way of ensuring listed companies comply with corporate governance standards.[47] The incorporation of mandatory provisions can, on one hand, reduce costs of drafting and negotiation. But more importantly, it can ensure that the relevant private parties behave in desirable ways and policy goals are achieved. In the scenario of dockless bike-sharing systems, government bodies could dictate that certain mandatory provisions must be included in user agreements between the operators and users of bike share systems regarding parking behaviors, and that these agreements must also include both sanctions and incentives to guide bike riders' behavior.

The placing of such an obligation on operators is particularly necessary in the context of share bikes. For example,

[42] Matt Teffer, Footnote1.
[43] Thomas C. Schelling, *The Strategy of Conflict* (Harvard university press 1960).
[44] Frank H. Easterbrook and Daniel R. Fischel, 'Limited Liability and the Corporation', 52, *U.Chi. L. Rev. 89 (1985)*.
[45] For example, see Appendix 14 Section S of the Listing Rules of the Hong Kong Stock Exchange, <http://en-rules.hkex.com.hk/en/display/display_main.html?rbid=4476&record_id=4859>.
[46] Yingzhi Zhang, 'Singapore Requires "geofencing" for All Bike-sharing Operators in the City by the End of This Year', *South China Morning Post*, 04 June 2018 https://www.scmp.com/tech/enterprises/article/2149218/singapore-requires-geofencing-all-bike-sharing-operators-city-end.
[47] For example, Appendix 3 of the Listing Rules of the Hong Kong Stock Exchange, <http://en-rules.hkex.com.hk/en/display/display_main.html?rbid=4476amp;element_id=3753>.

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regarding Ofo and Mobike, it seems impossible to locate their user agreements via the internet, and that they only appear to be available through the relevant apps of their bike operating systems. Therefore, even if bike operators are obliged to include these provisions in their user agreements, and they may well give covenant to do so, it would be hard to verify that these provisions are indeed part of their user agreements, since the user agreements themselves are difficult to locate. We should also note that such mandatory provisions would only set minimum requirements and would not prevent bike operators from imposing more stringent requirements on a voluntary basis.

For sure, it will be difficult for government to sanction enforcement of these terms by operators against individual users, as this would be both too costly and intrusive for government to do so. Moreover, individual consumers tend to ignore user agreements when they access apps and purchase service or goods from the internet.[48] But the mere existence of these provisions may still serve some educative function, and hence may change the behavior of bike riders in the future.

5.2. *Regular reports by operators: protection of privacy and of fair competition*

To serve the regulatory purpose of the new regime, the operators of bike share systems should report to regulator and confirm compliance such as whether the mandatory provisions indicated above have been included in user agreements, whether the provisions in the user agreements are drafted in plain language and notices of these provisions are accessible to bike users. Such reports from the operators to government also need provide information on (1) whether the operator has adopted the required system of monitoring and regulation of the use of sharing bikes; (2) whether the operator reviews the effectiveness of the system and how often; and (3) whether the operator thinks the effectiveness is adequate or not and the basic reasons for reaching such a conclusion, such as aggregated data on actual breach by bike users, whether "good" bikers have been rewarded, and whether bike users who breached the user agreement received penalties. These reporting obligations are not without precedents in similar circumstances. For example, in most jurisdictions, it is mandatory for listed companies to report on the operation of internal control systems and on the review by directors of such a system in the company.[49]

However, the above reporting obligations of the operators of bike share systems should be imposed and enforced in such a way that it will not interfere with two important principles and values: (1) protection of privacy of users; and (2) protection of fair competition among operators of the bike-sharing system. In general, the performance of these reporting obligations should be subject to any statutory and regulatory protection of individual privacy and competition. For example, China's Internet Security Act prohibits activities breaching the privacy of individuals.[50] For another example, collection, use and transfer of the data would be subject to any statutory obligations that the platform operators may be subject to, such as the EU General Data Protection Regulation (GDPR), effective as of 25 May 2018.

Based upon different theoretical basis, i.e., the right to privacy[51] as opposed to a property-based right,[52] different approaches have been taken by legislators in different jurisdictions.[53] Having said so, in designing the protection of privacy rights of customers in purchasing goods and services via online platforms, some minimal protection needs to be provided to individual bike riders while we try to address the problem of bike litters by creating obligations over the platform operators. Much inspiration can be drawn from GDPR and practice in the United States regarding specific institutional design here.

First, service providers who collect personal data must get explicit consent from individual users. In seeking such consent, full disclosure of the use purposes, scope of data to be collected, among other critical information, should be made by the platform operators. While such an obligation is already imposed in some jurisdictions, such as in China,[54] to specify this obligation of the platform operators would help facilitate effective protection of the privacy rights of bike users. In addition, the consent would be valid only if it is given in an intelligible and easily accessible form, with the purpose of data processing attached to that consent. In addition, the consent should be clear and easy to withdraw as it is to give it.[55]

A further step of protection of privacy of bike-users may be to adopt a similar requirement of "data protection by design and by default" under the GDPR.[56] Under this general obligation, the platform operators shall undertake similar obligations of a "data controller" under the GDPR, such as to limit the scope of data collection such that only the data necessary to fulfill its duty to monitor bike litter will be collected. Similarly, the access of the platform operators to such data shall also be limited and kept to a minimal level that is just necessary to fulfill such obligations. We may also imagine requiring the platform operators to keep such data with a specified period only, mimicking the obligation of the data controller under the GDPR. Again, similar to the obligation imposed upon data controller and data processor under the GDPR,[57] we may imagine requiring the platform operators to ensure the security in processing the data, provided that such obligations are imposed subject to certain factors, such as the state of the art, the costs

[48] Omri Ben-Shahar, 'The Myth of the 'Opportunity to Read' in Contract law', 5 *Euro. Rev. of Cont. Law 1(2009)*.

[49] For example, see Item Q (Risk Management and Internal Control) in Appendix 14 of the Listing Rules of the Main Board of the Hong Kong Stock Exchange: http://en-rules.hkex.com.hk/en/display/display_main.html?rbid=4476&element_id=4809.

[50] Article 12, China's INTERNET SECURITY ACT (Wang Luo An Quan Fa, 网络安全法), effective as of 1st June 2017.

[51] Such as Edward Bloustein, 'Privacy as an Aspect of Human Dignity: An Answer to Dean Prosser', 39, *N.Y.U. L. Rev. 962 (1964)*.

[52] Such as Paul Schwartz, 'Property, Privacy and Personal Data', *117 Harv. L. Rev. 2055 (2004)*.

[53] For example, the GDOR was regarded by scholar as having created property-rule-based remedies, see Jacob Victor, 'The EU General Data Protection Regulation: Toward a Property Regime for Protecting Data Privacy', *123 Yale L. J. 513 (2013)*.

[54] Article 41 & 42, China's Internet Security Act.

[55] Article 7 (3) of the GDPR.

[56] Article 25 of the GDPR.

[57] Article 32 of the GDPR.

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of the implementation by the platform operators and the potential risks to individual bike riders.

For the government regulator to assess the performance of the platform operators in regulating and sanctioning bike litters. To facilitate such an assessment and any potential action to be taken by the government following decisions based upon such assessment, it is inevitable that the platform operators would need to make available to government regulators certain information about the platform operation and incidents of bike litters. Without proper safeguards, such an exercise likely to expose certain intimate information about individual bike-riders to the government and other potential third parties. To serve this purpose, we may consider imposing the following safeguards. On one hand, the scope of the information not be provided by the platform operators to the government should be strictly limited to operational-level data, instead of individual-level data. Meanwhile, such information should be pre-treated to ensure that it is de-identified and pseudonymisation and encryption of personal data are put into place, such that the data set to be shared by the platform operators with the government for regulatory purposes should not allow government to draw conclusion or to make inference about personal preference, choices and patterns of individual bike riders.

In terms of protecting privacy of individual users of sharing bikes, the more challenging task is to enable sharing bike-system operators to decline request from the government regulator for the access to data held by the operators. Such requests are not unheard of. In the United States, for example, in the so called "encryption dispute" between Apple and the FBI, Apple challenged the request form the FBI to change the security setting of individual iPhone to allow the FBI to access data in the individual iPhone device.[58] In China, local government requested Didi Chuxing, the dominant car-hailing-app operator in China, to provide access to its user data and operation data, after a user of the app was murdered by the driver in a hailed-car.[59] Accordingly, the platform operators should be entitled to decline such requests from the regulator without having to be found breaching their legal obligations. In most jurisdictions, when a company has dispute with government about regulatory request from the government, such as to access data held by the operators about individual customers, the operators are usually entitled to litigate such request in court. Such a relatively neutral and effective dispute resolution methenamines may be hard for companies to use in China, given that administrative litigations are still in the early stage and yet to develop. Instead, the new regulations will need to set out specific dispute resolution mechanism for such a purpose, so that companies would feel more comfortable in fighting back when they receive such request from the government regulators.

In imposing such a disclosure obligation, we also need to be aware of the danger of creating perverse incentives among operators, i.e. if we penalize operators who disclose a lot of incidents of irresponsible parking by their users, but who also reported that they failed to address these issues properly, they would have strong incentives not to disclose such information to the government. To reduce and eventually eliminate such a danger, we need to make sure to level the playing field for competitors in the market.

6. Creation and enforcement through voluntary agreement under a permit system

There are usually two paths to creating legal obligation: (1) to pass new legislation which creates statutory obligations and liabilities, and (2) entering a contract and the creation of contractual obligations. If lawmakers are to use the first path to deal with public nuisances, they will enjoy the apparent advantage of avoiding "legitimacy deficits". It is generally thought to be legitimate for legislation to create obligations and liabilities to resolve a public nuisance.[60] In fact, some Chinese city governments have already issued rules with the goal of regulating the proper parking of bikes, such as in Beijing and Shenzhen. However, none of the existing rules governing bike-sharing systems meet the statutory requirements for granting local governments the authority to impose fines or other penalty with respect to bike operators or individual bike riders.[61] In light of such legal uncertainty, many local governments have chosen an informal approach to nudge the choices of bike share operators, such as arranging meetings with senior managers of the operators and seeking the commitment from the meetings' attendees.[62] The same legal uncertainty which renders it too risky for government bodies to take public action against "bike litter" may also prevent the creation of any legally enforceable obligations upon share bike operators. Even if this legal uncertainty could be resolved by the passing of new legislation, it would likely take too long, and

[58] Michael Orcutt, 'The Next Big Encryption Fight', *MIT Technology Review*, https://www.technologyreview.com/s/603534/the-next-big-encryption-fight/, last accessed on 18 October 2018.

[59] Yuan Yang and Xinning Liu, 'China Put Squeeze on Didi Chuxing after Murders', *Financial Times*, https://www.ft.com/content/8fd8b85a-aa9f-11e8-94bd-cba20d67390c, assessed on 17th October, 2018.

[60] Thomas Merrill, 'Is Public Nuisance a Tort?', *4 Journal of Tort Law 2 (2011)*.

[61] Administrative Penalty Law of China (2009) , Article 13: The people's governments of provinces, autonomous regions, and municipalities directly under the Central Government, of the cities where the people's governments of provinces and autonomous regions are located, and of the larger cities approved as such by the State Council may, within the limits of the acts subject to administrative penalty and the types and range of such penalty as prescribed by laws and regulations, formulate specific provisions in the rules they enact.

[62] Such an informal regulatory tool is termed as "Yue Tan(约谈)", referring to informal meetings called for by government regulators before a formal investigation is launched. As documented by a scholar, about 178 sets of local and central government rules referred to this informal tool, see Qianglong, Meng(孟强龙), 'On the Legal Restrictions over Administrative Yue Tan(行政约谈法治化研究)', *6 Administrative L. Research (2015) (行政法学研究)*. For a general comment on this informal regulatory tool, see Ming Hu (胡明), 'On Yue Tan: With the Perspective of Government Interference in Market (论行政约谈: 以政府对市场的干预为视角)', *1 Modern Legal Science (2015) (现代法学)*.

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be too rigid, to amend considering unforeseen challenges that are likely to emerge in the future.

Contracts, meanwhile, serve as a better alternative path for creating obligations that would bind operators of share bikes. To create a contract between government and private parties, one useful method is to do so by granting permit on the condition that the permitted party comply with certain obligations . Provided that the government could create a permit system for bike-sharing systems, these obligations could be attached as conditions to the granting of a permit. A failure to meet these conditions could result in temporary suspension of the permit, or even the revocation of the permit, depending on the nature and seriousness of the breach.

A permit system could achieve similar results without going through the complicated legislation process. In cities where such permit systems already exist, such as in Seattle,[63] the relevant rules have specifically created obligations for operators to regulate the parking of share bikes. For example, Requirement P6 of the Bike Share Permit Requirement issued by the Seattle government provides that the operator shall pay the government the costs of the removal and storage bikes undertaken by government bodies.[64] Requirement O4 of the same set of rules requires each operator to place a bond of US $80 for each free-floating bike with the Seattle government, capped at US $10,000, to cover costs including the removal of improperly parked bikes.[65] This amount may seem small to a substantive operator at first sight, but it creates a form of sanction that the operator must face if the government choses to enforce it. When the breach is too severe, the government is entitled to suspend, or simply revoke, any permits already granted to operators.

To have a permit system in China, however, the government needs to overcome the initial legal hurdle of creating such a permit system through legislation, required under the Administration Permit Law (2003).[66] But so far, no such legislation authorizes a permit system. It is hence impossible for the government to regulate the behavior of operators by using these types of punitive sanctions.[67]

In such a situation, a close substitute is the making of a voluntary agreement between operators and city governments, which could mimic the terms of the potential permit, including obligations being imposed on operators of share bikes, as well as potential incentives and rewards. Even though government bodies cannot really seek any remedy in the event such an agreement is breached by the operator, the flexibility of contractual terms and the potential reputational costs to operators may bring about the desired result of greater levels of responsible parking. The reputational costs of non-performance of the terms of agreement can be exemplified through various methods, such as the publication of non-performance incidents and the ranking of operators. More importantly, the flexibility of such voluntary agreements could also accommodate the provision of potential economic incentives and rewards by government to the operators of share bikes. Currently, in some cities, when bikes are dumped by users and not removed within a given period, usually several days, the bike operators will have to face some form of sanctions, including fines and public shame. While such an "command and control" approach is apparently failing, either sacrificing the public or to force the operators to withdraw from market, a system of economic incentives and rewards might be a more effective alternative, such as some form of credits in winning or keeping the right of operation and credits in the size of bike-fleet run by a given bike-operator. Such economic incentives and rewards may help the private operators better address the technical challenges and better manage the financial burden in reducing bike litters and even in providing compensation to individual victims in the incidents of bike-litter.

Another advantage of a voluntary agreement between the regulator and the bike-operator is that an agreement may potentially create rights for bike operator to turn down the request from the government regulator to access data that are sensitive to individual users, hence better protect the privacy of bike users in the system. Such a function is particularly valuable to countries like China, where there's essentially no legislation granting such entitlement and protection.

Conclusion

Dockless share bike systems, when viewed in comparison to traditional stationed share bike systems, have taken over China with rapid speed due to apparent economies of scale and the way in which they provide improved consumer experiences. However, for China to continue to enjoy the technological and financial advantages of the dockless bike

[63] Seattle Government, 'Bike Share Permit Requirements', 30 July 2017, <http://www.seattle.gov/Documents/Departments/SDOT/BikeProgram/BicycleSharePermitRequirements.pdf> accessed 8 March 2018.

[64] Ibid. 'Requirement P6: Any free-floating bicycle that is parked in one location for more than 7 consecutive days without moving may be removed by City of Seattle crews and taken to a City facility for storage at the expense of the bicycle share operator. SDOT shall invoice the violating opera tor as stated in Requirement O12 below'.

[65] Ibid. 'Requirement O4: All permitted operators shall have a performance bond of $80/bicycle, with a cap of $10,000. The form of the bond shall be approved by SDOT.'

[66] Administrative Permit Law of China (2003), Article 14: As to the matters listed in Article 12 of the present Law, administrative licenses may be established by means of law. Where there is no governing law, administrative licenses may be established by means of administrative regulations. Article 15: If there is no governing law or administrative regulation yet, an administrative license may be established by means of local regulations for any of the matters listed in Article 12 of the present Law; if there is no governing law, administrative regulation and local regulation yet, but it is really necessary to establish an administrative license to conduct administrative management immediately, an temporary administrative license may be established by means of a regulation of the people's government of a province, autonomous region or municipality directly under the Central Government.

[67] Under Chinese law, it begs the question as to whether sharing bike service can be interpreted as "public service" under Article 12(3) of the Administrative Permit Law (2003) (《行政许可法》) and, if so, whether it is one of the categories of public service that the government should delegate to private provider. If the answers to both questions are yes, the government would not have the authority to create a permit regime for operating such a system in a city.

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business model, and for the outside world to share such benefits, we need to resolve the problem of "bike litter" and reduce the costs experienced by the public because of the irresponsible parking of share bikes. Concurrently, there are compelling reasons for both government bodies and private sector organizations to further expanding the network of dockless share bikes. This, however, would inflict even more costs on the public, given the costs already experienced by victims who wish to pursue actions against bike riders and the public.

Given the failure of both public enforcement and private actions to deter "bike litter", and the problems experienced by share bike operators themselves in the context of attempting to regulate bike riders voluntarily, a new solution needed before it becomes too late to save dockless share bikes systems before they become sunk in a sea of "bike litter". The dockless share bike system is the product of advanced technology, a passion for protecting the environment, sophisticated managerial skills, and the strong commitment of investors. Therefore, the solutions proposed by this paper, to provide incentives to preserve and nourish such fruits should not repress these services, but unleash the power of innovation, capital and expertise latent in the private sector. When government bodies act to resolve collective action problems that hinder the protection of public interests, and the interests of vulnerable parties, the privacy and other basic entitlement of individuals should not be sacrificed. Similarly, government regulation of sharing bike systems, including access to and use of operational data held by the operators should not distort market competition. All operators and investors should be competing on leveling plain fields.

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