

Bengbu City's Parking: A Policy (Re)Design Project

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Abstract

In developed countries, parking has been a widespread problem for a long time. In China, its growing population has put its public transportation system under a lot of pressure, with the increasing car ownership in its big and small cities expanding the size of urban centres which in turn increases the demand for faster movement and mobility. As researchers based in Bengbu, a city in Anhui province, China, we observe that presently the phenomenon of disorderly parking and traffic congestion on urban roads is serious in the city. Recruited by the local government, we propose a project on policy (re)designing for Bengbu's on-street parking in particular, and parking management in general. This paper provides a background and positioning of the proposed project, summarising its viewpoints and recommendations for policy-making.

Keywords

China, Bengbu, Parking, Policy, Project

Introduction

The world's population has been growing for decades now, where the urbanisation processes have been taking place in many parts of the developing world, especially China. The growing population in China has put its public transportation system under a lot of pressure, with the increasing car ownership in its big and small cities expanding the size of urban centres which in turn increases the demand for faster movement and mobility. This is intensified by the busy lifestyle in China, in light of its continuous economic growths during the past decades. With more people going into cities in search of convenience, better lives and more opportunities for employment, traffic congestion in cities has become an increasingly difficult or even intolerable problem for many places in China which increases travel time and decreases productivity and the effective use of time.

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In more developed world, parking has been a problem since (for example, see Shoup & Pickrell, 1974; Ligocki & Zonn, 1984). More recently, parking has become a particularly challenging problem to tackle in China (Liu et al., 2012; Qin et al., 2011, Shang et al., 2007) and elsewhere (Alkheder et al., 2016; Osoba, 2012; Aderamo & Salau, 2013). Parking problems in China are further accelerated by motorisation (Wang & Yuan, 2013) and the rise of land prices in cities accompanying economic growths and urbanisation processes in China, which gradually takes away the probability of building both convenient and affordable parking spaces in busy districts in a city where the land can be very expensive.

As researchers based in Bengbu, a city in Anhui province, China, we observe that presently the phenomenon of disorderly parking and traffic congestion on urban roads is serious in the city. Nonetheless, how to regulate and manage on-street parking to effectively solve the problem of 'parking difficulties' that make Bengbu residents' lives inconvenient has not been addressed by the policymakers adequately. In that light, this paper proposes a policy (re)design project that focuses on promoting on-street parking in Bengbu. The following section summarises the existing research literature of on-street parking, before the next section which explains the positioning of the project with details. We conclude this paper by making some policy-level recommendations.

On-street Parking

While there has been a large and growing literature on parking strategies, plans and management, we focus on the below three aspects of the literature which are deemed to be relevant to the proposed project.

Influence of charging for on street parking on travel choice

The idea that charging for on-street parking would contribute to the improvement of social benefits as a whole emerged during the 1950s (e.g., Vickery, 1959). Scholars used logit models to study the travel choice of commuters and found that parking costs have a significant negative correlation with car travel, leading some self-driving vehicles turn to public transport (Willson, 1992; Daniel, 2001). Furthermore, the higher the parking charge, the lower the proportion of car travellers (Kelly & Clinch, 2006). If on street parking price is lower than social opportunity cost and/or auxiliary parking facilities cost, traffic congestion will be caused (Arnott and Inci, 2006). In addition, adjusting on street parking price will affect both total parking time and revenue (Arnott & Rowse, 2009). In China, it has been found that increasing on street parking price in the central urban area and improving the public transport service level may make a large proportion of car travellers consider switching to public transport (Ge et al., 2010; Wang et al., 2018).

On street parking pricing strategies

The price of on street parking should be determined by the degree of congestion. Since the beginning of the idea of charging for on-street parking, the assumption has been that more serious the congestion is, the higher the charge should be, and a certain vacancy rate of on street parking spaces should be ensured (Vickery, 1959). The optimal on-street parking pricing should be equal to the searching cost for other parking. The larger the marginal external cost caused by on street

parking near the central area, the higher the on-street parking charge. Furthermore, the price of parking spaces decreases with the increase of the distance travelling from central areas (Lan, 1986; Anderson & Palma, 2002). In the Chinese context, Zou et al. (2017) has recently proposed the implementation of regionally differentiated charging strategy. Due to the different sensitivities of people to different parking rates, Pierce and Shoup (2013) propose a performance pricing strategy by adjusting parking prices based on the occupancy rate of roadside parking spaces, and according to different urban districts and parking periods. In China, Lu and Lv (2016) recently suggest a pricing strategy to balance on-street parking charges in Shenzhen, factoring both on-street and off-road parking spaces, regional differences, and time-sharing differences. Finally, Ran (2017) finds that making the parking rate variable to parking duration can adjust the use of parking lots and balance the flow of road networks, while improving comprehensive social benefits in China.

Influence of on street parking on traffic and safety

Webster (1968, 1969) was one of the earliest scholars who studied the influence of on-street parking regarding vehicle travel delay, who also established a simulation model of on-street parking. Later, a report in 1978 analysed the safety impact of on-street parking with regard to parked vehicles, vehicles on the road and pedestrians, while Hunter and Stewart (1999) compared and analysed the impact of on-street parking on the width and driving safety of bicycle lanes. On average, 17% of traffic accidents were caused by on-street parking, and the proportion of accidents on main roads was greater than that on secondary trunk roads, while the proportion of accidents on secondary trunk roads was slightly higher. In the Chinese context, according to Pei and Yang (2003) and Dai et al. (2014), setting up on-street parking will have an important impact on road conditions, traffic conditions, and road traffic safety. In summary, on the one hand, strict parking supply and demand management can alleviate traffic congestion to a certain extent, and on the other hand, the effect of on-street parking management largely depends on the price of on street parking.

The Proposed Project for Bengbu

In this section, we first provide the background of the proposed project, followed by positioning it to pave our way to the next section on the main viewpoints of the project.

Project background

Since Bengbu is being positioned as a national regional centre and a national comprehensive transportation hub city, it is very important that we improve the basic conditions of its infrastructure and development opportunities, with future planning under consideration. It is of great practical significance to alleviate traffic congestion, improve the quality of the living environment in the city, and improve the well-being of people's livelihood. Accordingly, the local government of Bengbu has recruited us under its Social Science Planning Project, in order to study industrialisation countermeasures regarding Bengbu's roads temporary parking strategies.

Positioning the project

In this study, we position Bengbu's on the road parking management as the research object. Given the practical nature of our project intention especially on policy-making, we propose adopting a pragmatic approach for the project, including steps such as: put forward the problem → analyze

the problem → solve the problem. First of all, relevant public policies, social governance theory, and the literature on comparative analysis should be reviewed, as well as learning from international and domestic advanced on street parking management case experiences. The project will proceed with an investigation of the current situation of Bengbu's roadside parking and its residents' parking demands. In light of methods of the investigation, we propose that the main research methods used for this proposed project should include questionnaire surveys, participatory observations, structured interviews, and comparative case analysis.

Ideally, the project should put forward the strategic positioning, objectives, principles, plans and safeguard measures for Bengbu's on-street parking management, forming an action plan to guide policy and practice. To achieve this aim, the project should first examine elements in basic theories which can be complex by origins. For example, on-street parking is a subject that involves sociology, economics, management, law, and urban planning. Despite this multidisciplinary nature of on-street parking, we suggest to focus and base the project on social governance theory, public policy theory, and public goods and traffic demand management theory. These basic theories should guide the project throughout, in guiding the construction objectives, basic principles and responsibility structure of on street parking system.

In addition, the project should also compare and analyse the characteristics and advanced experiences of parking management system in the United States and Japan, and domestically, benchmarking Beijing, Shenzhen and other developed cities. This is to provide an experience-based and practical view for the construction of parking management system in Bengbu. Such comparative analyses will help further design research methods of this project. Ideally, through participatory observations, structured interviews and questionnaire surveys, we can obtain deeper understanding of the current situation and problems regarding on street parking in Bengbu, along with better understanding of the parking demand and cognition conditions.

The project should also investigate the attitudes of different residents regarding parking problems and traffic congestion, in order to provide a realistic basis for the construction of on-street parking management system in Bengbu. Finally, in planning and managing on-street parking in Bengbu, the proposed project should keep in mind its strategic positioning, objectives, basic principles, implementation plans, and safeguard measures of on street parking in Bengbu, which will provide practical guidance for the planning and management of the project. From the government's perspectives while incorporating views from experts and public, the proposed project aims to comprehensively investigate and analyse the current cognition conditions, demands and residents' satisfaction with regard to on street parking. This is essential since public opinion is the basis for constructing on-street parking planning and management system in Bengbu.

Key viewpoints

Some difficulties may be expected especially regarding the adjustment between individual parking demands, parking revenue, and public interest. Nonetheless, we argue that on-street parking is first and foremost for the benefit of the public and residents, and both dynamic and static traffic coordination mechanisms should be in place for both on-street and off road parking. Furthermore, when establishing pricing mechanisms for Bengbu's parking, the design of parking management should not pursue the maximisation of parking revenue. In fact, on the premise of smooth and safe

traffic, the parking revenue should feed back to communities and to improve the level of public services including public transportation. Nonetheless, it might be workable to implement variable charging schemes involving a dynamic system. Finally, we argue that parking management in Bengbu should engage big data for information support which may in turn refine the parking management system.

Policy Recommendations

Preliminary, we shall make five policy level recommendations. First the planning of on-street parking space should be synchronised with the planning and construction of pedestrian roads and bicycle lane facilities to ensure the smooth and safe of slow traffic system. Second, the implementation of refined price system should reflect differentiated pricing by region, parking duration, using parking permit systems for on-street parking spaces within residential communities, while regulating price mechanisms based on comprehensive utilisation strategies of on-street parking spaces. Third, in building smart parking cloud platform based on big data technology, Bengbu government's relevant bodies should establish electronic file system for on-street parking and surrounding off road parking, which will help in selecting appropriate paths for the establishment of electronic toll collection systems, destination guided parking data systems, big data system for dynamic analysis of parking space utilisation. Fourth, the government should enhance publicity of on-street parking, promoting driving and parking safely and politely, while providing legislative guarantees such as relevant regulations on parking management. Finally, on-street parking revenue should be used for public transport system optimisation and pub services improvement.

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