

Research on Public Transport Congestion and Its Management in China

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Abstract

In China, people are more familiar with traffic congestion, but people have a relatively superficial understanding of public transport congestion. The insufficient current study of public transport congestion is firstly showed through the literatures, and then the importance of paying attention to and solving public transport congestion is discussed. After that, the understandings on public transport congestion in the literatures are introduced in detail. Then, the congestion problems and their management are analyzed from the aspects of ground public transport, rail transit and so on. To solve the problem of traffic congestion, the first is to solve the problem of public transport congestion, in which the problem of ground bus congestion is the core.

Keywords

Public Transport, Congestion, Management, Punctual Arrival, Bus First

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1. Introduction

A lot of people will say, public transport congestion is public transport crowding and blocking only, it is not necessary to be explained and discussed, even it is not necessary to be studied. Indeed, public transport congestion is public transport crowding and blocking literally, which is known to everyone. But it is definitely not what some people think it is not necessary to be discussed and studied, in fact, it can be said that the study in China is still blank. According to the exact expression, it exists in the earliest literature “Study on solving urban public traffic congestion countermeasure” published by Aoxiang Luo in the *Proceedings of Twenty-first Cross-strait Urban Transportation Symposium* in August 2013 [1], followed by “Situation and countermeasures of urban public transport congestion” published by Yin Li in *Transpo World* in December 2013 [2], “Law thinking of solving public transport congestion” published by Shouqiu Cai in *Academic Journal of Zhongzhou* in October 2014 [3], “Situation of urban public transport congestion and urban

oriental logo design” published by Qinchuan Zhan, Na Liu, Xiaoyan Yang in *Art Education Research* in November 2014 [4], “Study of urban public traffic congestion management taking Shanghai as an example” as Jiani Xu’s Master’s Thesis in East China University of Political Science and Law in April 2016 [5], “Law thinking of solving public transport congestion” published by Lili Zhang in *Legal System and Society* in July 2016 [6]. According to the inexact expression, the earliest literature is “Bus congestion leads to priority expectations” published by Yongwei Liu, Minfei Fan in the *Shanxi Daily* in April 2004 [7], followed by “Break the bus congestion” published by Wei Chen, Lili Xu in the *Chengdu Daily* in December 2006 [8], “Love card should be time threshold” published by Shuyu Chen, Erxi Fu, Wei Zong in the *Kunming Daily* in April 2010 [9], “Bus congestion will be timely rescued” published by Xina Lu in *Binhai Times* in September 2010 [10], “The establishment of BRT system is an effective way to solve the Urumqi bus congestion” published by An Pan in *China Urban Economy* in February 2011 [11]. In some cities, public transport congestion is bus congestion, but in other cities, public transport congestion

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includes bus congestion, subway congestion and so on. Even if bus congestion is contained, the literature is not much. Actually literature on subway congestion has also a few articles, only 8 articles, among them, 1 article on subway's crowded stampede accident risk, because there is not a subway in many cities, it is understandable, but the bus is universal, almost congested everywhere. Research on other public transport congestion is even fewer. Public transport congestion mainly refers to bus congestion, subway congestion only in some cities, other public transport congestion in different cities have different definitions. It might be said, since no one studies that, nothing of value; if it really has the research value, there are certainly a lot of researches, Chinese people are so much. Is that really true? That is definitely not the real answer. On the one hand, it is the real value, which is certainly no doubt. Its theoretical value, on the one hand, is reflected in the existing researches above; on the other hand, that Beijing Natural Science Fund Guide contains this topic of "Research on management theory and technology of Beijing easing public transport congestion" this year is evident, which maybe first directly relates to public transport congestion in the official project guide.

Why public transport congestion has not been valued, this is the idea of the problem. Previously people only saw traffic congestion (congestion literature: 4523 articles, among 1589 journal articles; traffic congestion literature: 2483 articles, 1061 journal articles), especially non public transport congestion, it is thought that non public transport congestion leads to traffic congestion, leads to public transport congestion, and that as long as traffic congestion is solved, or non public transport congestion is solved, public transport congestion is on the natural solution. The fact tells us that is not the case. First, with regard to Beijing, subway doesn't suffer from the influence of non public transport, but subway sometimes is full of congestion, mainly is crowded, occasionally blocked for some reason. Of course, some people still say that subway congestion is caused by traffic congestion, which led to the crowd to the subway. Finding an excuse is easy, as far as people on subway are concerned, if subway management is good, what is it? Secondly, even when the odd and even number is practiced in Beijing, in fact, only non public transport is less congested, traffic is less congested, public transport is not so congested, accurately speaking, it is not blocked, but it is a bit crowded. Though public transport has improved, the problem is still a lot. That non public transport is not so congested represents partly that the traffic is not so congested, but does definitely not mean that public transport is not so congested. Non public transportation is a part of the traffic, but it has a mutual influence, but it is also mutually exclusive with public

transport. In fact, even if all of non public transport stops, the traffic will improve very well, but public transport congestion will be the same as traffic congestion, because current public transport management is too poor. Of course, some people would say, if all non public transport are stopped, public transport management is simple, and congestion does not exist. In fact, this is only an illusion. In fact, there is non public transport or not, how many there are non public transport, public transport management is with no half dime. Now, public transport congestion is taking non public transport as an excuse, as a shield, is finding reasons for their poor public transport management. Many cities with high traffic satisfaction are those cities for good public transport management. Non public transport is in complement to the lack of public transport, otherwise public transport may keep more congestion, exactly said is not blocked but more crowded. If all people in non public transport take public transport, public transport maybe keep some paralysis, and congestion is not as simple as that. Foreign experience shows that: to solve the traffic congestion, the first priority is to solve the problem of public transport congestion. If public transport congestion cannot be solved fundamentally, the restrictions on non public transport will bring greater inconvenience to people's travel and life, and have a significant impact on normal operation of the city.

2. Related Works

The bus congestion leads to priority expectations. Every day 0.8 million bus passengers in the provincial capital may experience congestion at any time, people's complaint also produce a strong desire: can let the bus go ahead or not?! To solve urban traffic congestion, a reached consensus is to promote public transport priority. About traffic congestion, the reason is nothing more than two: the first is that the growth of vehicles is fast, the second is that the roads are repaired slowly. Development of public transport can not only facilitate the masses, but also be a good solution to the problem of urban traffic congestion [7].

In the city, bus punctuality rate are not enough, the main lines are in congestion. Bus rapid transit is a kind of experience that is used by many western countries to solve the problem of urban traffic congestion, which is to isolate the special road in the city road, for the bus to achieve rapid transit without obstacles. With the development of urbanization, urban traffic congestion, environmental pollution and energy consumption are becoming more and more prominent, and the priority of public transport is the fundamental way to solve these problems [8].

That public transport love cards brush 400 thousand times during a quarter of a year leads to public transport congestion,

the public advise to learn more about far Shanghai and near Anning. For the situation where love card brush causes bus congestion, some people suggest following the practice of Shanghai: 70 years old or older people can get the card with the “non peak travel” provisions [9].

Bus congestion will be timely rescued. The dispatchers can learn the real-time number of people waiting for the bus and riding on the bus, and schedule in real time according to the line congestion; once the bus is in driving accidents, or meets the road congestion, dispatchers can also timely implement line adjustment [10].

The establishment of BRT system is an effective way to solve the congestion of Urumqi public transport. Urumqi urban traffic system faces more and more serious challenges, mainly in the serious road traffic congestion, and common bus in the single form, low service level to lead people to travel for a long time, decline the attractiveness of public transport. “Hard journeying and difficult travel” has become a more attention to the general public [11].

Along with the development of society and economy, the continuous expansion of the scale of city, the quantity of motor vehicle increases sharply (as of 2012 the quantity of national cars has already exceeded 0.1 billion, ranking second in the world), serious traffic congestion phenomenon exists in a large city with populations of more than a million in China, public transport congestion has become the bottleneck which restrains the city running speed and economic development. In the face of this “urban disease” to influence the healthy development of the city, in recent years, aiming at the problem of urban traffic congestion of the different perspectives, a congestion charge angle research continues to emerge, but the solution to the current China’s urban public traffic jams only by charging congestion has certain limitations [1].

With rapid economy development in China, people’s living standards have greatly improved, in order to work, travel and do other activities; many people increase their purchase car desire, so that private cars are more and more. According to incomplete statistics, nearly five years private cars in China keep an average of 28% speed growth per year, the urban traffic road carrying increase the pressure, and large quantities of private cars on the road obviously lengthen, the private cars occupy the public vehicle road to a large extent, causing the public transport congestion [2].

Through the governance of urban public transport congestion and to improve the traffic resource utilization and save travel costs, reduce environmental pollution, improve people’s living environment, and to enhance the overall function of the city layout, the integration of urban and rural development, construction resources saving, environmental friendly society and the sustainable development of the city has important

strategic significance [5].

Construction and development of public road management and service should strengthen the management and maintenance of public shared Road, which is also an important measure to solve the problem of public transport congestion [6].

3. Managing Public Transport Congestion

3.1. Define Public Transport

Here, first defined as urban public transport. Urban public transport is a kind of service which is specially designed for urban residents’ travel activities (production, work, study, life, etc.), which is the main body of urban passenger transport. Urban public transport, in general, includes ground transport (bus, tram), rail transit (light rail and subway), taxi, little bus and ferry.

3.2. Public Transport Congestion Management

From the above we can see that public transport is a big concept, public transport congestion in some cities is general, but in some cities, it is very serious. For example, for small and medium-sized cities, public transport congestion may mainly refers to bus congestion, with no rail and ferry, no little bus, the small size of the taxi, or management can also be good, even some cities did not take taxi as public transport, because don’t affect people’s travel. And some cities like Shanghai have ferry, the stream of people taking the ferry is sometimes great, but for safety, by strictly limiting the number, ferry itself is not congested. Therefore, for a specific city, public transport congestion should adopt specific analysis and classification management, but also coordinate the relationship between the various types of public transport.

3.2.1. Ground Public Transport

(i). Bus

Bus is the main force of public transport congestion. In the era when non public transport is not developed, the bus mainly bear the city’s passenger transport task, the proportion is very high. With the rapid increase of non public transport, it not only shares the bus passenger traffic, but also causes bus congestion. This is both the increase in non public transport and its own reasons caused by bus, but many local governments are not willing to admit their own reasons, even exaggerate reason of non public transport, not actively seek solutions, but wait for the situation so as to continue to deteriorate. Some local governments pay special attention to the role of public transport and the impact on the city, and

take a variety of positive measures to ensure the normal operation of the bus. Luoyang is an ancient city, the road in the center of the old town also has only two-way four lanes, Luoyang bus mainly includes trams and ordinary bus, Luoyang manages trams and ordinary bus to ensure they start on time, depart on time and timely arrive as the basic principle, when a car block them, trams and ordinary bus will remind other vehicles, other vehicles usually give way. With the increase of the non public transport, sometimes by warning other vehicles, trams and ordinary bus often can't arrive on time at the stop caused by the limited space. Luoyang determined to take the center road limit line for other vehicles, including taxis, the measures to ensure the tram and ordinary bus line space in time by warning other vehicles. The total running time of each tram and ordinary bus and the approximate time of arrival at each stop in Luoyang are required. Luoyang also prohibits honking when entering the city zone. In order to ensure that the tram and the bus can operate in accordance with the provisions of the time, Luoyang has taken a lot of positive measures, including the limit line, and timely adjustment.

Bus congestion management is the core of public transport congestion management. But many governments don't know what is the key to bus congestion management, where is the breakthrough, so they are afraid of the start and the end, wait, escape their responsibility, the victim is the majority of people, including themselves. The key of bus management is to start on time, arrive on time, and get out of the stop on time. Simple to say, it is just on time.

To do this looking as that punctuality is simple, and is not simple, first of all is vehicles guarantee, the first is guaranteed to buy vehicles, the second is guaranteed during the operation of vehicles; vehicles often in fault is certainly not up to the requirements.

Second is our reliable drivers and conductors, the first is with the driving qualification by the provisions, the second is responsible; this under the guarantee of the vehicle, is very important, that drivers and conductors do not conform to the regulations may lead to accident, drivers and conductors with no responsibility can't lead to starting on time, entering into the stop on time, getting out of the stop on time. All these will not lead to reaching the basic requirements.

Third is to ensure the road, by clearing obstacles to bus start on time, on time arrival, on time being out of stop. First, we should according to the road conditions set line total running time and the arrival time, and secondly remove barriers to affect the normal operation of the bus and guide and strictly implement. For instance, pedestrians and non motor don't affect bus, road construction is not allowed in public transport operation time, and different management is

implemented according to different road conditions, such as a one-way street.

Fourth, passengers should comply with regulations, such as queuing on the bus, tickets in advance, in advance preparing for change, being ready to bus card, paying attention to health, no eating things in the car and other civilizations.

The fifth and last, a good social atmosphere, maintenance of public transport order is everyone's responsibility, everyone should act against and resolutely combat the destruction of public transport order. Bus Company should assume the responsibility to protect; different bus companies should be in good coordination, and jointly do a good job in bus service. Relevant departments should perform their respective duties and do their work to provide guarantee for the normal operation of the bus; governments should play the role of support, coordination and supervision responsibilities.

Speed is not the first, but many people focus on running speed, which leads to great misunderstanding, but a basic, reasonable speed is the most scientific and effective, depending on the vehicle and the road. If the urban bus can be like Australia and Singapore as setting bus line and the line between the vehicle reached the time to coordinate, to ensure the same time can only have a bus into the same stop, bus not only with no congestion, more in line with people's expectation, and attract people preferred choice.

In order to ensure the bus on time, bus priority is essential, such as Sydney with other conscious vehicles, Luoyang with consciousness and reminding, and some cities with installing the camera device in the bus to record traffic violations (blocking the bus). For more serious blocking behaviour can be taken a more severe punishment and enforcement measures, which can be defined by laws, rules and regulations.

But a lot of people don't know the essential meaning of bus priority, but take vigorously developing the public transportation first in public transport priority, the results become public traffic more crowded, because the management is lag, cannot keep up, master effective management methods and measures, the basic purpose of the management is not clear.

(ii). Public Tram

The general public tram is a tram leading in the air, and some trams are leading in the air and on the ground. Because of the restriction of the track, the public tram is different from the ordinary bus, but the basic requirements are the same. The only difference could be that pedestrians, non motor vehicles and motor vehicles will more conscious to give way to public tram, because once public teams derail, consequences will be relatively serious. This is the reason why some cities keep or

build public electric trams. With the development of science and technology and environmental protection requirements, the trolleybus may replace part of the tram with track and ordinary bus, must follow the basic requirements as same as ordinary bus, also should have the same guarantee to do basic requirements: start on time, timely arrival, o being out of the stop on time.

Only the basic requirements and basic security of bus management are met, ground public transport can meet the requirements of people's travel, can become satisfied, and can help the development of the city.

3.2.2. Rail Transit

(i). Light Rail

Light rail in various countries are different, also expressed different in the country. It is different from the public tram, subway, the MTR, urban railway. Light rail generally does not appear congestion, unless the outage of failure or other reasons. In general, the advance tickets, limiting the number of riding people are used.

(ii). Subway

Subway, as its name implies, is the underground railway, and the nature of the railway is basically the same. In some cities, urban railway is classified as a class of subway. But in some cities, subway will also return to the urban railway class. With the increase in the number of people taking the subway, the subway congestion appears in some cities. The surface cause of the congestion is caused by traffic congestion or the diversion of persons caused by traffic congestion, in fact, is caused by the lag of the subway management. In any city, the bus is irreplaceable; the subway is just an alternative to public transport with other uses. If bus is not congested, a lot of people do not choose the subway, therefore, to improve the bus congestion can improve, to a certain extent, subway congestion. The purpose of the construction of the subway, to a certain extent, is to spread the capacity of public transport, it is more important to improve the environment and play the role that other public transport cannot replace. Now riding environment on the subway and the bus is the same, the original meaning of the subway is weakened. Subway congestion management is much simpler than bus congestion management, through fare mechanism to scatter people in foreign cities. In fact, in many cities of our country, except the price mechanism, there are a lot of simple and easy ways, such as limiting riding at the originating station, limiting the boarded number at transfer station. In China, there are many aspects on subway management contrary to the laws of science and economy such as a door used to get on and get off at the same time, past cheap ticket price, which is also an important improvement aspect of the impact of subway

operations and congestion.

3.2.3. Taxi

As mentioned above, some local taxi is not public transport. Taxi congestion is mainly managed in the taxi company for the management of the taxi. Taxi congestion is mainly manifested in the uneven distribution, reasonable scheduling and reasonable demand prediction is the key. To strengthen the supervision and management of taxi companies is the most important improvement. With the development of modern science and technology, the modernization of taxi management is an important aspect to solve the congestion of taxi itself. The chauffeured car will greatly alleviate taxi congestion, but also increase the traffic capacity. The government should as soon as possible develop a reasonable approach to management to guide taxi and chauffeured car to standardize operations to achieve uniform distribution and facilitate the needs of different groups of people, rather than high concentration to lead to traffic congestion in some hot spots.

3.2.4. Little Bus

In some cities, there is still a little bus or a little bus as the base, with management as same as the bus. In fact, for branch roads in a number of major cities, taking a little bus or a mini bus to supplement will share public transport pressure, reduce waste of resources as an attempt to choose.

3.2.5. Ferry

Ferry is in very few cities, there is little congestion, and there are strict limits on the number of people. If there is no strict limit in the number of people, the management is more chaotic, it is not congestion, but an accident or a major accident. Experience shows that the ferry accident is more concerned with the overrun number and quality of the ferry itself.

These are analysis from the perspective of public transport, factors influencing public transport congestion are certainly more than traffic tools, but traffic tools of quality and management must be first, of course, the certain laws, rules and regulations to ensure management are also necessary. Other aspects of management also need laws, rules and regulations for the protection. But in some cities, governments let these laws, regulations and rules restrict their acts, rather than utilize laws, rules and regulations as well as possible. Secondly, all kinds of people participating in the traffic should study by laws, rules and regulations and various publicity and education to know the importance of public transport for the city and for everyone, so that giving way to public transport, taking public transport, using public transport together create and maintain good public transport order and environment. The service in public transport facilities, the construction and maintenance must be guaranteed and kept up, which requires the government, the relevant government staff and the actual

staff to fulfil their duties. Finally, doing a good job of transfer convergence and coordination between various forms of public transport is to solve public traffic congestion. Experience shows that: the best transfer distance is not more than 200 meters; zero distance transfer is the best.

4. Conclusion

People are very concerned about traffic congestion and non public transport congestion, but the awareness of public transport congestion is superficial. The successful experience of foreign countries has shown that solving public transport congestion is the key to solve traffic congestion. So the government and people should change the idea from solving traffic congestion to solving public transport congestion so as to form a virtuous cycle, otherwise it will form a vicious circle, traffic and public transport will become more and more worse, lead to a series of serious consequences. Bus congestion in traffic congestion is the most critical, must be put in the first solution. Only the idea is correct, the method is proper to solve. As long as people manage to solve, there is no difficulty, but the complexity is relatively high, because it involves many aspects. Other congestion is with no difficulty and complexity, as long as a little improvement can smoothly and easily solve the problem.

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