

Discuss the feasibility of carpooling for office workers in business areas

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ABSTRACT

from the perspective of commuting traffic demand, through the form of questionnaire, the office area workers neighborhood carpool feasibility of travel, and predict the results, points out that under huge urban pressure, take the form of carpooling travel not only reduce the traffic congestion, reduce the air pollution, and save the time and economic cost.

KEYWORDS

neighborhood carpool travel; economic benefit; implementation effect

1 Introduction

In the process of the coordinated development of globalization and urbanization, urban commercial areas (commercial areas), as the core hub of economic activities, present an unprecedented prosperity scene. The business district is full of tall buildings, with a large number of enterprises, office buildings and commercial facilities, attracting tens of thousands of office workers to commute every day. This highly concentrated economic activity pattern not only creates great wealth and employment opportunities for the city, but also also brings a heavy burden to the urban transportation system. With the continuous growth of urban population and the improvement of peoples living standards, the number of private cars has increased sharply. In the road network around the business district, vehicles surge during the morning and evening rush hours. The contradiction between road capacity and traffic flow is becoming more and more acute, and traffic congestion has become the norm. At the same time, the cost of commuting is becoming increasingly prominent. For office workers who choose private cars to commute, the fluctuation of fuel prices, high parking fees and vehicle maintenance costs make the monthly transportation expenditure become a big burden.

In this context, ride-sharing travel as an innovative transportation solution began to receive widespread attention. For office workers in business areas, car-sharing may be an effective way to ease traffic congestion and reduce commuting costs. However, the feasibility in the actual implementation process still needs to be deeply discussed from many perspectives, including economy, time efficiency, society and environment, which is also the core of this paper.

2 Investigation Method

This survey used an online questionnaire method. The online questionnaire was published on the social media platforms, workplace forums and related transportation APP commonly used by office workers in business areas, and a total of 200 valid questionnaires were collected.

3 Analysis of the commuting status quo of office workers in the business area

3.1 Traffic congestion situation

Commercial district is usually located in the core of the city, the surrounding road network is complex, but the traffic flow is great. During the morning and evening rush hours, a large number of private cars, buses, taxis and delivery vehicles converge, overloading the roads. Take the Futian Business District of Shenzhen as an example, during the morning rush hour, the traffic flow on the main road can reach thousands of vehicles per hour, and the road capacity is seriously reduced. This congestion is not only limited to the main roads, but also affects the surrounding branches and streets, forming a large area of congestion. Traffic congestion makes the commuting time of office workers extremely unstable, and it often causes long delays, which seriously affects their normal work arrangement and pace of life.

3.2 Analysis of commuting cost

3.2.1 Commuting cost of private cars

For the office workers who rely on private cars to commute, the cost composition is more complex. The fluctuation of fuel price directly affects the monthly fuel cost. Generally, the cost of medium-sized private cars filling up a tank of oil is about 300-500 yuan. If refueling 1-2 times a week, the fuel cost of a month may be 1000-2000 yuan. Parking fee is a big expense in the commercial area. The monthly fee of underground parking lot is generally 800-1500 yuan, and the parking fee near some high-end office buildings is even higher. In addition, the regular maintenance, repair and insurance costs of the vehicle, evenly spread to hundreds of yuan every month. These costs together make private car commuting a high-cost way to travel.

3.2.2 Commuting costs of public transportation

Although office workers who choose public transportation are relatively economical, they also face some problems. Take buses and subways as an example, the fare for a single time is generally around 2-10 yuan, but if a transfer is needed, the cost may be increased. Moreover, the congestion of public transport is very high during peak hours, and passengers often need to stand in crowded carriages for long hours, with an extremely low comfort level. In addition, because the route setting of public transportation may not fully meet the needs of office workers, some people may need to walk long distances or combine with other modes of transportation, which also increases the cost of commuting and time cost to some extent.

4 The feasibility of carpooling to travel

4.1 Economic feasibility

through private cars to and from school a lot of people, and this way of transportation will bring great traffic pressure, at the same time, carbon emissions is amazing neighborhood collaboration carpooling work travel way will greatly reduce carbon emissions, also reduce the private cars in the rush hour travel brings great pressure to urban traffic.

4.2 Time-efficiency feasibility

Route optimization carpooling office workers usually have similar commuting start and end

points, which provides the possibility of route optimization. Drivers can comprehensively consider the working place of each passenger and choose the best driving place

4 Many cities have set up high ride lanes (HOV lanes) to encourage carpooling. Carpooling vehicles meet the high passenger load requirements and can use these lanes^[1].

4.3 Social feasibility

Car-sharing creates a unique social space for office workers. During the commute, colleagues can get to know each other better, and office workers from different companies will have the opportunity to meet new friends. This kind of social interaction can help to relieve the work pressure and enrich the social life of office workers^[2].

Carpooling embodies the spirit of resource sharing and mutual assistance. In the same car, passengers can help each other, such as sharing umbrellas, emergency medicine, etc. In case of an emergency, such as vehicle failure or temporary road control, ride-sharing members can negotiate a solution together. This kind of mutual aid atmosphere is conducive to cultivating a good social atmosphere and enhancing the sense of community..

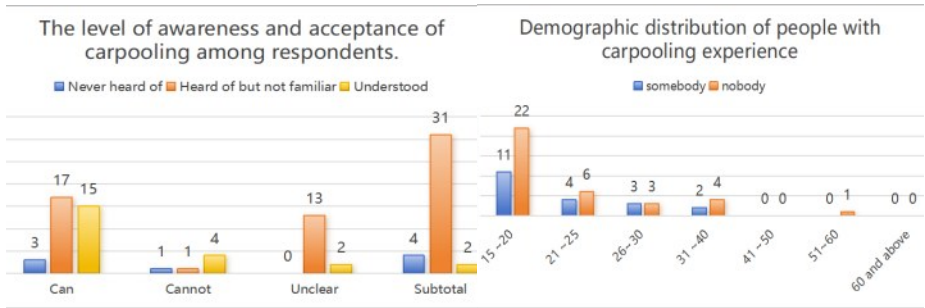
4.4 Environmental feasibility

Car-sharing can effectively reduce the number of vehicles on the road, thus reducing exhaust emissions

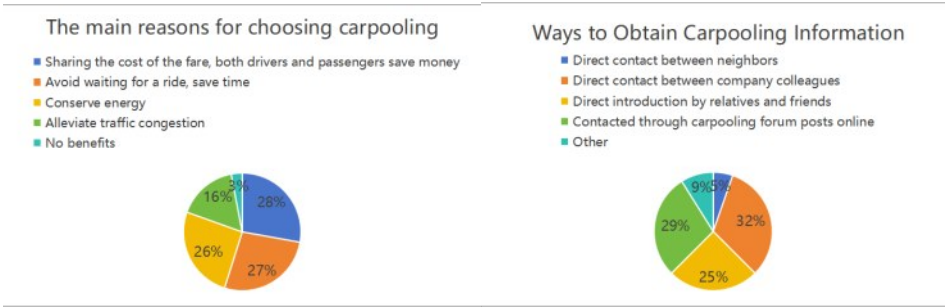
Carpooling reduces urban energy pressure by reducing vehicle mileage and reducing fuel consumption^[3].

5 Implementation effect

5.1 Using the questionnaire survey, to conduct the analysis



Conclusion shows that most people know and accept carpooling; mostly young people.



The conclusion shows that the main reasons why most people choose carpooling are economic and temporal reasons;

Get carpool information mainly through neighborhood contact, contact with friends and colleagues.

5.2 Implementation form



Figure 1 schematic diagram of the round-trip process for office workers

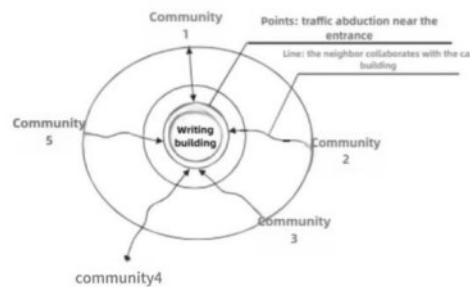


Figure 2 diagram of dot structure

5.3 Effect prediction

There are a lot of people who go to school through private cars, and such a transportation mode will bring great traffic pressure to the city, and the carbon emissions are also amazing.

After gasoline combustion, the tail gas is mainly CO, and trace harmful gas, harmful gas containing C elements for CO, and hydrocarbons, trace, as all produce CO₂. While the conversion molecular formula of gasoline is CH₄, the equivalent weight is 114, and the molecular weight of CO₂ is 44. The density of gasoline number 93 is about 0.754. Then the ideal state of no. 93 gasoline after combustion is: $2 \text{ CgH } 1\text{s} + 25\text{O}_2 = 16\text{CO}_2 + 18\text{H}_2\text{O}$. We can calculate the following calculation of the CO₂ produced after combustion of 1L93 gasoline: $7541644 / (1142) = 2300 \text{ g}$. It can be seen that the complete combustion of 1L93 gasoline will produce 2.3 kg of CO₂.

Assuming that the household car consumes 8L of fuel per 100 km, then the 1km fuel consumption is 0.08L, so the household car emits 0.184 kg of CO₂ per 1km. So we can get the following formula: carbon emissions from a family car = kilometers of carbon emissions per kilometer^[4].

6 Conclusion

To sum up, it can be seen from this survey that carpooling for office workers has high feasibility in terms of economy, time efficiency, society and environment. Reducing commuting costs through cost-sharing, optimizing routes and using HOV lanes to improve time efficiency, promoting social and mutual assistance, and reducing exhaust emissions and energy consumption have all shown positive results. However, there are also challenges to trust and safety, itinerary coordination, and laws and regulations during implementation. These challenges can be effectively addressed by establishing strict certification mechanisms, using smart applications to coordinate travel schedules, and improving laws, regulations and insurance mechanisms. In the process of urban development, the promotion of the car-sharing mode of office workers in commercial areas is of great significance

to alleviate traffic congestion, reduce commuting costs, and promote harmonious social development and environmental protection, which deserves further exploration and practice^[5].

Funding

This paper is supported by Hubei Provincial College Students Innovation and Entrepreneurship Training Program Project Fund:Neighborhood Help with daily commute(Project Number: S202311654033X)

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References

- [1] ang Yu, Li Yong. Analysis of the comprehensive benefit of HOV lanes based on the fuzzy comprehensive evaluation [J]. Highway Traffic Technology, 2020,37(9): 148-158.
- [2] Cao Kuang, Jia Tao. A dynamic shared mobility modeling approach that considers the willingness to carpool [J]. Mapping and geographic information, 2024,49(5):97-103.
- [3] Song Yi, Liu Chen. Discuss the feasibility of ride-sharing for white-collar workers in Hefei [J]. Shanxi Architecture, 2014,40(22):280-282.
- [4] Fu Quan lu, Xiao Lin, field, et on. Evolution of long-term carpooling decision and irrational behavior based on interaction experiment [J / OL]. Journal of Transportation Engineering and Informatics, 1-19 [2024-10-28]. <https://doi.org/10.19961/j.cnki.1672-4747.2024.08.015>.
- [5] Zhang Yutong, Wang Jiahe, Wang Jincheng, et al. Study on carpooling willingness based on a structural equation model [J]. Chinas collective Economy, 2023(13): 70-73.