Research on Urban Transportation Sharing Products under the Concept of Human-Oriented Transportation

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Abstract: With the development of urbanization, the increase of urban population will bring great pressure to urban traffic. In order to meet people's traffic demand and the pursuit of their own value, human-oriented transportation has emerged. This paper first introduces the evolution process and experience of urban transportation in western developed countries, and analyzes the current situation of urban road design, construction and management. Secondly, this article takes urban transportation sharing products as the starting point, and analyzes the humanistic concepts and design methods needed for transportation sharing products. Finally, we will study how people-oriented traffic can cooperate with urban transportation sharing products and make reasonable suggestions, thereby creating a city traffic space where people, cars, roads and the environment develop harmoniously.

1. Introduction

The continuous growth of population promotes the steady progress of urbanization. On the one hand, it leads to the geographical and functional differentiation between urban central areas and marginal areas and pan-urbanization forces the continuous improvement and maturity of urban transportation infrastructure construction. Private transportation means--private cars are widely used. "Vehicle-oriented principle" occupies the mainstream of the shaping of urban spatial structure in the early stage. Additionally, congestion in main urban areas and lagging and imperfect road construction in suburban areas lead to the decline of transportation efficiency. It is urgent to change the road design concept which can not satisfy people's pursuit of travel quality and life quality.

On the other hand, different countries create different spatial organization due to different city sizes and spatial structures. A single mode of transport cannot meet the urban transport needs of modern society, the rise of public transport alleviates traffic pressure from a certain perspective.

The background of humanistic transportation is the return of humanism in human society.
2. **European and American countries' urban transportation development history**

The development of urban transportation in western countries has experienced four stages: carriage, railway, automobile and comprehensive transportation network. The development of the corresponding urban pattern has experienced four processes: small and absolutely concentrated, relatively concentrated, relatively dispersed central area and suburban area stratified development, and absolutely dispersed. The urban structure has experienced single core, center-edge, and evolved into the urban structure layout with multiple cores and dispersed coexistence.

Before the concept of human-oriented transportation appeared, there were two main modes of transportation in the world:

2.1 **the United States: the automobile transportation mode**

After the Second World War, the car became the main body of urban passenger transportation in the United States. The "complete motorization strategy" and the "weak center strategy" were the main contents of the urban design at that time. The connection between cities relies mainly on cars, so road planning is based on cars. Since then, the status of private transportation has increased and the continuity of urban transportation planning has received attention. With the maturity of geographic information systems (GIS) and intelligent road transportation systems (ITS), the idea of public transportation to guide land development has been proposed, and urban bus lanes have received people's attention.

2.2 **Western European countries: the development of urban public transportation and automobile transportation competition**

Rapid rail transit and subway construction are the key points in the construction of traffic in Western European countries. These rail transits constitute the passenger transport skeleton between urban nodes. They echo the automobile roads and are the main development points of urban planning[3].

According to the above two modes, we can find that the previous traffic planning is mainly centered on motor vehicle traffic. Insufficient facilities, not only can not guarantee that every citizen has equal access to the right to use the road, but also the phenomenon of traffic congestion and other violations of the original intention of the planner.

3. **Urban Transportation Sharing Product Research**

3.1 **Introduction to shared transportation products**

Shared products are emerging economic models in the context of information development, which have a huge impact on urban transportation planning and product design. In recent years, China's shared transportation products have affected people's travel patterns and facilitated people's work and life.

Today's shared transportation products are mainly shared cars and shared bicycles. The design ideas of such products are derived from "humanism", which has changed the way of pursuing economic benefits in the past and transformed into design practices that consider sustainable development.

3.2 **Current problems with urban transportation sharing products**

Due to the short history of urban traffic sharing products and the lack of experience of designers of shared products, people-oriented traffic has not started very fast, so there have been phenomena that have never appeared before in the development process: for example, shared product damage, uneven distribution, traffic roads, the lack of facilities and many other reconsideration issues.

3.3 **Research on the relationship between transportation sharing products and human-oriented transportation**

With the maturity of traffic sharing products and the increasing number of users, traffic designers will consider people's equal travel rights more in road planning, thus counteracting the development of people-oriented traffic and promoting urban roads to consider "human" factor".
4. Research on how human-oriented traffic can cooperate with urban transportation sharing products

In the people-oriented traffic system, the urban traffic sharing product and the people-oriented design method cooperate with each other. People can not only realize the material displacement, but also meet the social and personal needs of humanistic care when using the urban traffic sharing product. Sharing products provide low-cost, high and convenient means of travel for vehicle users, while people-oriented transportation design concept makes personalized transportation increase the consumer surplus of individuals and society, and improve the overall social welfare level.

![Figure 1](image.png)

Figure 1. Changes in consumer surplus due to infrastructure improvements

In the process of cooperating with urban transportation sharing products, the perfect system concept is the most powerful factor to cooperate with the development of urban transportation sharing products, which we consider from five aspects: the line planning, urban traffic share the products and supporting facilities and the allocation of resources, urban public transport system of multi-modal transport, road maintenance and guarantee, the cost control in five aspects into consideration.

4.1 Layered urban route, realizing smooth traffic between people and vehicles

Based on the concept of "people's transportation", the city traffic route, not only has to achieve basic displacement and transportation functions, but also to divide and contact the city's public Spaces, to adapt to the transportation and space structure, to optimize the living conditions of the residents, to provide safety and security. Urban routes are mainly divided into express roads, traffic trunk roads, secondary trunk roads, active trunk roads, trunk roads, market roads and leisure roads. The six components are from fast to slow, and the accessibility is gradually reduced. The route gradually enriches regional functions, which makes the stratified boundaries of transportation tools and non-motorized lanes and pedestrian passages blurred or even mixed, and increases the flexibility of displacement and parking. The flow of traffic is decreasing from top to bottom, and the momentum of the population is rising, so that there is sufficient space for the people to transport the traffic. The required road width and corresponding public space are different, so that the division of the area of motor vehicle, non-motor vehicle area, pedestrian area and the resting area shall be fully considered. And the city's functional areas are divided into living areas, businesses, industrial areas, warehouse districts, and the suburbs, and they need to be connected in different ways.

In order to achieve further stratification effect, we can adopt the "road cross section" model, which divides the urban space into two types of open and closed areas, which are excessive from the fast road to the leisure road. Open area refers to the integration and connection of various road systems without physical barriers. Closed area is divided into different travel modes, activity Spaces, residential areas, buildings and streets by walls, fences or other forms. Its purpose is to shape a good living space, play a role in limiting traffic and safety.
4.2 Implements a sound management system for the allocation of public transportation resources in road space

Since bus routes can only cover urban areas and cannot meet the travel needs of all citizens, traffic-sharing products can just make up for this shortcoming. Therefore, in the design of bus lines, it is necessary to evaluate the bus line, platform position and traffic density, and fully guarantee the travel of people using traffic sharing products under the premise of ensuring “bus priority”.

Figure 2. Model of road cross-section

Figure 3. Route design process optimization

1. Contents required in the provisions on the preparation depth of municipal public engineering design documents.
2. The flow of motor vehicles, non-motor vehicles and pedestrians, the degree of comfort and convenience and the connection with important nodes.
3. Design considerations for public transport.
4. The demand and usage mode for the road around the project includes parking, spaces for passengers, passengers and pedestrians, etc.
5. Demand for road public space and utilities.

1. Contents required in the provisions on the preparation depth of municipal public engineering design documents
2. Design of public transportation, including bus stations, subway entrances and exits, public bikes, etc
3. Design of road public space and ancillary facilities
4. Road stability design
4.3 Different levels of roads require inspect and update in different cycles. Because the level of different roads and the density of people and vehicles are different, the government needs to conduct normalization, inspection, maintenance and maintenance of road traffic facilities on the basis of multi-sector collaboration. Maintenance of the road takes time, which affects pedestrians and vehicles passing through the road, so it is necessary to notify one week or more in advance. For pedestrians who have already passed this road, they can shorten the time of bypass by using traffic sharing products, thus effectively protecting the right of pedestrians to travel.

4.4 Learn from multi-modal transport in urban transportation system, and construct integrated traffic system. Multimodal transport is widely used in freight transport, especially in seaport. Through the expansion of the hinterland of the seaport, and the continuous transportation system of various vehicles is completed. Due to the combination of numerous functional areas and huge traffic volume, short distance combined transportation plays a strong role in transportation planning, which can improve travel customization and reduce traffic congestion to a certain extent.

4.5 The break-even point is used to simply analyze cost control. What public transportation pursues is not the maximization of profit, but the return of social investment of the whole society. There reminds a question: is the planning and construction of road infrastructure beneficial to the overall interests of the whole society? Therefore, we calculate at the break-even point and analyze the cost equal to the transportation value of the society in this section. Set: unit price :p, B: returns, C: costs, F: fixed costs, V: unit variable costs, R: unit tax, fixed costs including path planning cost, design, build, road building, the damages of the road facilities costs, repair maintenance, road safety, security personnel, law enforcement personnel, cleaning personnel salary, etc.

\[
B = P \cdot \text{BEP} \\
C = F + V \cdot \text{BEP} + R \cdot \text{BEP} \\
P \cdot \text{BEP} = F + V \cdot \text{BEP} + R \cdot \text{BEP} \\
\text{BEP} = F / (P - R - V)
\]  

In order to reduce the breakeven point and reduce the risk caused by the uncertainty caused by road construction, the best way to reduce the fixed costs in public roads is to reduce the fixed costs.

5. Conclusion
With the gradual development of society, people's values have been re-recognized, and the trend of cities moving from "carriageism" to "humanism" is irreversible. Among them, the emergence of urban shared transportation products has had a huge impact on urban transportation planning and product design. Urban shared transportation products can supplement the original public lines and further protect people's travel rights. However, due to the emergence of urban shared transportation products, there are many problems such as uneven distribution, lack of traffic and road facilities, etc. In order to solve such problems, create urban transportation space with harmonious development of people, vehicles, roads and environment. The paper puts forward four suggestions for reasonable evaluation of urban routes, improvement of public transportation resource allocation management system for road space, implementation of inspection and renewal of different cycles, and guarantee of travel and parking of urban traffic sharing products.

Acknowledgments
We live in cities, and we rely on transportation systems and road networks, and we hope to be able to express the hope of building people's transportation, making it be more friendly and easier to travel. The key to achieving human traffic is to start with the construction of the road, and to focus on the details of the foundation, combining the two of them together. The government should also play a role in this, to make the development of the traffic not just the hardware, but also the needs and culture of the people.
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