Feasibility Analysis on ULS-based Rapid Logistics System in Wuhan City of China

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Abstract: Logistics distribution system is the bottleneck restricting the rapid development of urban economy, how to establish a modern, rapid and efficient information distribution system of three-dimensional is the key to resolve the problem. In this paper, the research and construction of underground logistics system in some developed countries was analyzed. Meanwhile, based on ULS construction feasibility of modern urban three-dimensional transport, and the corresponding countermeasures are given from the different perspective, such as the environmental feasibility, investment costs, technical feasibility, operational methods and means of financing.
Key words: Rapid logistics system; Underground logistics system (ULS); Feasibility analysis; Wuhan City

1 Introduction

With the rapid development of our economy, many large and medium-sized cities are increasingly severe pressure on the ground transportation. Domestic and foreign scholars have proposed many solutions. central city of Wuhan in central China propose countermeasure such as speed up the construction of rail transportation, implementation of odd and even number lines of vehicles and building the distribution center, the construction of the real-time video traffic, fast bus system, the road traffic posts, etc. Although these measures will relief the pressure of city traffic, but because of rapid expansion and high concentration of urban and population, and with the intensified conflicts between the surge in demand for urban transport and the growing tension of demand for urban building site, then these factors will encourage the utilization of floor space to close to the ceiling. Therefore, not only requires the construction of rapid logistics system to develop the surface and airborne, but also find available the “Third space”. That means surface traffic is transferred to underground, to achieve the stereoscopic transport operations and organization at three levels. In recently years, one of underground rail traffic similar to the MTR quietly ascended the stage of history.

Underground Logistics System, ULS, will be out of the goods by all the way to the city of the airport railway, the freight station of highway or Railway, Logistics Park. Been processed into ULS and by ULS to the various customer (in the supermarket, hotels and warehouses and factories distribution center).

The concept of urban underground logistics system and the construction was originated in Europe. After more than a hundred years, the logistics system has seen considerable expansion. Remarkably, Belgium and the Netherlands provided some successful case were provided in the aspect of the practical application of underground logistics, and the large cities in China were given some examples of reference in the building of ULS. In Belgian, domestic container transport is issued in Antwerp, the foregone container transport cannot satisfy the transport demand. Therefore, the local authorities wanted to tackle the problem of tension, so that built underground logistics system to make the port transport has been stable and sustainable development. Since 1996, in the Holland feasibility study was launched and development of logistics system can connect the Amsterdam Schiphol airport to Aslsmeer flower market and Hoofddorp rail transit point so that the goods of up-to-date flowers could be transport by using such rapid logistics system.

In the same time China's research is related to the theory research and approved the application of specific facilities. For example, the value of the project, admission logistics mode and using SLP methods to decorate distribution center and node choices, etc . Notable among them is Professor Guo Dongjun represented on the Beijing Underground Logistics System for Construction and Planning.

2 Development of ULS on the Role of Rapid Development of Logistics

ULS is undoubtedly the development of a solution to urban transport and city logistics system, a

new idea. Through the implementation of the ULS can rise to a series of role. (1) Easing pressure on surface traffic congestion and improving transport accessibility of urban logistics. (2) To save costs, implementing an enterprise common distribution and zero stock storage. (3) To achieve the direct distribution of goods, such as in Wusheng Rode the Carrefour supermarket. Through business connected with the underground logistics system can make a big supermarket in downtown to be the terminal of urban underground logistics system, and then, companies and supermarkets, distribution centers and supermarkets can be realized between the direct distributions. (4) Promoting e-business and internet shopping development.

Town of the logistic system itself, it compared with other transport means the existence of some advantage. (1) Reducing traffic accident rate and the urban air pollution, alleviating noise nuisance, and improving quality of urban life. (2) Intelligent automatic operation can be realized and can operate continuously and steadily. (3) It can fast, on time and safe operation, and free from the impact of climate and environment, thereby improving the efficiency of urban logistics. (4) Optimizing urban economic structure, so as to broaden the urban underground space development and utilization adequately, at the same time also save on surface of land resources.

3 The Regional Status and Problems of Urban Roads in Wuhan

The Twelfth Five-year Program to Wuhan, expressed as "the central city of Central China", which makes the city of Wuhan has been significantly improved positioning.

In recent years, although the surrounding nodes of these modern logistics facilities planning and construction has made great progress in Wuhan City, including logistics center and a logistics park, meanwhile, the facilities of Logistics channel of supporting the logistics nodes also have formed a basic road and rail network, but these only limited to the round-the-city road, and the urban facilities has lagged obviously.

Since the reform and opening up, the urbanization of Wuhan city has been rapid developing, that the city size and population continued to expand, however, the construction of urban roads cannot keep up with the rate of increase in non-operating motor vehicles. Then urban traffic trouble will be the issues of urban and logistics development.

For the construction of Wuhan Urban Transport Planning, I put forward several aspects. (1) As the old town road layout and geographical constraints, and coupled with the lack of scientific planning of urban road system, these cause easily lead to more jamming point. For instance, Xudong Road, Wuhan and other parts of the crossroads lack turn waiting areas, the vehicle through the inefficient, that results in inefficient vehicular traffic. In addition, as the special environment of traditional commodity distribution center that mixed a variety of passenger and cargo flows. Under the direction of Hankou of the Jijiazhui – Qingchuan Brigde stranded recurrent phenomenon of traffic. (2) The slow construction of urban road construction is brought on lack of coordination between the municipal sector. For instance, the schedule of overpass construction on part of Wuluo Road was been delaying, so that seriously affected the way patency. (3) Construction and operation of the road is devoid of perspectiveness. The construction and route options of Line 1 of light rail are problematic in Wuhan. There are also more serious problems in the operational management and conversion of among of public transport such as light rail and bus.

Moreover, in Wuhan, urban transport problems have produced a lot of "derivative problem". (1) As the transport efficiency of the supply raw materials or products of is low, resulting in the production efficiency and lower consumer satisfaction, such as urban transport of goods to the supermarket. (2) Accidents occur frequently can also result in the crowded surface roads. (3) Provincial goods cannot be directly at certain times transited the urban, just to wait for the vehicle period, thus affecting the overall logistics efficiency.

These issues for the future will undoubtedly bring adverse effect of long-term development, so that building a rapid logistic system is imperative.

4 Feasibility Analyses on Construction of ULS Rapid Logistics System in Wuhan

Based on the above issues raised, the author proposed the construction of Wuhan City underground logistics system to make analysis and countermeasures.

4.1 Environmental feasibility

Wuhan has a superior geographic advantage what is the country's one of major distribution center for goods. In Wuhan city circle, covering over 12 billion dollar GDP of the city, Wuhan of the core

region is an important old industrial base. In aspect of business environment, these are 10 chain businesses of ownership of state-owned, foreign or private. for 3 consecutive years of net currency withdrawn from circulation more than 200 billion Yuan. It is a large-scale flow of commerce. In aspect of financial environment, 1996 to 2007, average deposits increased 19.89%, average loans increased 15.27%. In aspect of regional logistics industry, it existed the integrational logistics model of the regional supply chain based on the industry (cluster), such as Wuhan Iron and Steel – North Lake logistics center.

4.2 Investment cost analysis

Currently, it is different in construction standards and means of transport of ULS, so that leads to different cost of building. However, as the surface logistics systems, the costs of pre-investment construction are higher. For example, elevated roads, the average cost is 1.3 to 2.2 (million / km); light rail, the average cost is 2.4 to 4.5 (million / km); subway, the average cost is 5.9 to 7.9 (million / km); underground logistics channel, the average cost is 2.6 to 4.3 (million / km). It follows that the cost of underground logistics channel relative to the subway is low. However, the use of ground transportation logistics channels is limited, so the investment recovery period is rather long. But from the long-term benefits for the urban ecological construction and sustainable development, the system could generate social and ecological benefits that are more meaningful.

4.3 Technical feasibility analysis

At present, metro projects have been built or under construction in many large cities, including the Wuhan City has begun the subway, light rail and other rail transportation and construction is expected in 2012 will be built and opened subway line, the ground floor of Wuhan Urban Construction Logistics system has laid a solid technical foundation. At the same time the construction technology also has improved since the under-river tunnel in Wuhan was built, and it provide related experience. Therefore, in building technology, there are no major obstacles. In addition, most operations of ground transport are relying on information and control of photovoltaic systems. And as Optics Valley of China, it has a leading information technology and large-scale optoelectronics business. Especially in optical communications, lasers, remote sensing, GIS, GPS technology and other fields, it has been close or partially reached the international advanced level.

4.4 Operating mode

In the process of system operation, the relevant construction administration department in Wuhan city or authorized management company may establish Virtual Supply Chain (VSC) that is a data based on information management and control by integrating virtual and logistics information. Every link of the whole supply chain is connected as a flexible and dynamic enterprise cooperation organization.

Building a VSC network business platform requires that enterprise or individual in the logistics system can publish information in the professional web sites and that workers refresh and integrate the current information. For example, it can also be supplied for customer information and business inquiries and to undertake the individual business's fragmented delivery of goods in high-density rural fairs such as Hanzhengjie. Each enterprise joins them as a member. Thus it can improve the system use efficiency and increase the operating profit point.

4.5 Financing mode

Currently, Wuhan is spending a lot of money in the municipal infrastructure. We can see in the future construction of Wuhan city underground logistic system have certain financing basis. With the increasingly perfect commercialization, the sources of project funding have turned to diversified financing mode, using investment cost way. It mainly includes the following ways: (1) Financial investment, it was usually based on all levels of government funding, authorization, or the formation of a unit of construction of infrastructure projects, sponsor can also apply the right amount of issue of government bonds. It was useful to strengthen the credit and financing capability of construction project. (2) In the aspect of Social funding, in the principle of "who investment, who benefit", granted the right to operate the project's future is the most major way. It's mainly through two ways: ①BOT(Build operate transfer), Construction—administration—convey ,namely the project assets or expected returns as mortgages was used for debt retirement. ② ABS financing（Asset Aecuritifigation, Asset securitization, is namely a procedure that means to convert the assets of the project yet to be built of predictable cash income into the securities that can be sold and flow in financial markets. Because the government haven't to pay for the project investment costs, also need not directly bear the various risks of the construction period, thereby helping to reduce the government's financial risk.

5 Conclusion

With the region of Wuhan and national status improving, the transport facilities in Wuhan city have to expedite its construction, especially the rapid development of logistics system. Not only this can meet the increasing demand for cargo flow and circle population in Wuhan city, but also improves the service capabilities of logistics systems that is considered to measure the integrated strength of the city an important criterion. Depends on the current situation of the pressure of the earth 's surface and use the successful example of rapid logistics solution from other's country, the essay is that in view of feasibility analysis about build a speedily logistics system which base on underground feasibility system of Wuhan city.

The related research on underground logistics system in China was just come into being, in the actual planning and construction of the system need to be more profound on the demonstration and analysis to improve the practical level. Thus the modernization of logistics systems in Wuhan will be realized at an early date, which is consistent with the requirements of two-oriented society.

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