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LONG LINES NOT SO PRACTICAL IN CHINA WHILE SMALL AND MEDIUM SIZED LINES FAVORED

ABSTRACT

Maglev railroads have taken actual steps in China since the cooperation work between Germany and China, which brings more prospects to this technology. However, due to various reasons, large-scaled long lines seem to be not so practical at present in China, while the small and medium space scaled lines may be the initial alternatives with the booming of three super-metropolis groups in China, namely, the Zhujiang River Delta, the "Grand Beijing" area and the Yangtze River Delta.

KEY WORDS

Maglev railroads in China, large-scaled long lines, Zhujiang River Delta, "Grand Beijing" area, Yangtze River Delta

1. INTRODUCTION

With the construction of Shanghai Pudong Maglev Railroad, the world's fastest and most advanced German maglev railroad system first found its business operation in China. At the same time, fierce dispute on what technology – the traditional and matured on-the-trail or the most advanced maglev system – should be applied in the China's first high-speed railroad, the 1300 km-long Beijing-Shanghai high-speed railroad, has been going on ever since the late 1990s, which even delayed its real construction. China seeks to boom in all aspects and transportation is no exception. However, both the technology and the capacity of China's transportation are rather lagging behind. Will maglev trains bring about revolutionary renovation to the transportation? What will be the future of this most advanced technology in China? This paper attempts to demonstrate the prospects of maglev railroad system in China by analyzing China's cultural background, social and economic development as well as transportation, etc.

2. EXPERIMENTS OF MAGLEV RAILROADS IN CHINA

2.1. Experiments and current situations

China is a country of rather strong official consciousness. With the vigorous promotion of the Prime Minister Zhu Rong-ji, China compared the maglev technology developed by Germany and by Japan and negotiated with them. The final decision was made that the conservative minds of Japan, an island country, had prevented its advanced technology from being introduced into China, while German's concepts of progressing with times and profiting from China's giant potential market helped facilitate the cooperation in Pudong, Shanghai, between the two countries.

The Shanghai Pudong Maglev Railroad demonstration line has been designed to be 31.172 km long from Longyang subway station in the West to Pudong International Airport in the East and run at a speed of 430 km/h with the whole investment of 8.9 billion yuan RMB (approximately one billion Euros). The business operation is planned to start in March 2003. If it operates well, China may further the experiment and expand this technology in the country's high-speed transportation construction on a large scale.

Pudong Maglev Railroad project once more enlightens China's transportation prospects. Soon, with the construction, much more demonstration work was done to more maglev railroads, e.g., the feasibility demonstration of maglev railroad between Beijing and Tianjin, Hong King's demonstration on the feasibility of constructing Beijing-Hong Kong and Shanghai-Hong Kong maglev railroads, as well as some regional short line demonstrations and constructions such as Beijing Airport railway and Qingchengshan Tourist Resort Maglev line in Sichuan Province, etc. Furthermore, there is also the American maglev plan technology. Meanwhile, China is speeding up the study on the maglev technology so that she finished her first maglev train in Changchun, capital city of one

of China's north-east provinces in August 2001, though the speed is only 100 km/h. In a word, the success or failure of the Pudong Maglev line will become an important factor in determining the future of maglev railroads in China.

2.2. Relatively long period expected for maglev train experiments

The over 2,000-year-old agricultural society leads to China's super-stable social structure and the conservative minds of contentment with only limited wealth. Although China has been carrying out the reforms and open policies for more than 20 years and exploitation and creation have been advocated, the great inertia of maintaining stability and demanding no changes that has existed in the traditional Chinese culture still strongly affect those local government officials. However, once Pudong Maglev Railroad achieves complete success, some local officials will blindly construct the maglev railroad while neglecting the actual effects for pursuing office deeds in position, which will inevitably result in great waste. At the same time, the current regionalism formed in hundreds of years long tradition and local protectionism may prohibit economy extraversion and inter-regional cooperation so as to bring about the construction barriers.

Though China has gradually realized the above-mentioned problems and is on the way to make reforms, we still reasonably believe that since the civilization of industry has existed for a very short time yet in China and is far from maturity, whereas information technology at the same time has filtered into all walks of life, the regional imbalance and the above-mentioned phenomena will exist for a rather long period. Therefore, the overall introduction and acceptance of maglev railroad technology, including the understanding, application all the way to the investment and construction will still last for a long time.

3. PROSPECTS OF MAGLEV RAILROAD CONSTRUCTION IN DIFFERENT SPACE SCALES IN CHINA

Generally speaking, maglev railroads can be constructed effectively in two space scales. One is the large-scaled long line of over 800 km, which is originally suitable for air transportation and takes a maglev train two hours and more to cover. The second are the small and medium scaled lines where there are high density of cities and population. In this aspect, this paper mainly focuses on the space scale within about 300 km.

3.1. Large-scaled long lines

The first high-speed railroad planned to be constructed in China is the over 1300 km long Beijing - Shanghai railroad that traverses the most important and economically developed parts in the eastern coastal areas. Another important long line in China is the Beijing - Hong Kong railroad that goes north and south through the central part of China - another start-to-boom area. At present, it takes about 30h ride to cover the 2000 km long railroad from Hong Kong SAR (Special Administration Region) to Beijing. With the increasingly close relationship between Hong Kong and the interior mainland, Hong Kong Communications Bureau is studying the possibility of advancing the maglev technology. At the same time, China's Ministry of Communications has long desired to expand the capacity of this central artery and raise its efficiency for the sake of this long-term choke-point communication. The above-mentioned two lines respectively traverse over five cities with a population of more than one million where economy is highly developed, population flows large, land-use very tight and transportation capacity in severe shortage. Therefore, the two lines can be the prime choices of China's high-speed railroad construction.

Then, will maglev technology be applied? Many more experts are getting involved in the argument. First of all, the long lines inevitably lead to excessively large projects so that huge investments are needed. And the feasibility and design demand long-term demonstration. What's more important, there's still no previous successful example in the world for such long lines. Another important restriction is the above-mentioned China's thousands-year-long conservative inertia that blocks inter-regional cooperation and coherence among different administration regions so that the national government has to invest great efforts as well as promote a very effective financing plan. Hereby, the possibility of constructing maglev railroads in China in a large-scaled space still waits for further demonstrations. It seems that only with China's economy power greatly strengthened, maglev technology really matured, the operation and management feasibility really recognized, plus people's traditional consciousness further improved, can such large-scaled construction be implemented.

3.2. Small and medium space scaled lines

Maglev railroads in small and medium sized space can be best constructed to connect central cities within close distances as well as the city centre with the surrounding areas of large population flow, e.g. from city

proper to airport, to tourist highlights, to its satellite cities, etc. In today's China, there are two prominent examples. One is the currently constructed Pudong airport maglev railroad; the other is that many more citizens in Hong Kong now choose to reside and work in Shenzhen where residence cost is much lower with better living conditions.

As China is developing rapidly, there should be efficient regional cooperation and development strategies to achieve multi-benefits. At present, there are three strategic super-metropolises groups in China, namely, the Zhujiang River Delta in the South, the Yangtze River Delta in the East China and the "Grand Beijing" area in the North. They are the cream of China's east coastal area and bear the prospects of becoming metropolises at the world's level which therefore bring about highlights to develop maglev railroads in the three prosperous areas.

3.2.1. Zhujiang River Delta

Zhujiang River Delta hosts China's most significant processing industry and multi-funded enterprises, where three key metropolitan centres, Guangzhou-Foshan, Hong Kong-Shenzhen and Macao-Zhuhai, have gradually taken shape, thus forming a triangle with each line of about 100 km. The urbanization and transportation are developing dramatically and a super-metropolitan area is thus formed with a population of tens of millions.

At present, maglev railroad sees its greatest possibility of connecting Hong Kong and its close neighbours Guangzhou and Shenzhen. First, there is an increasingly strengthened relationship between Hong Kong and the Mainland. According to statistics, in 2001, about 205,000 Hong Kong citizens headed for the Mainland at least once a week on business. About 12,500 Hong Kong citizens residing in Shenzhen and the nearby cities go to work to Hong Kong every day and about 7,000 people go to work from Hong Kong to the Canton Province. Comparing the figures in 1999, these have respectively increased by 1.1 and 3.2 times. This shows that in less than five years after China resumed sovereignty over Hong Kong, the gap in economy and social life between Hong Kong and the Mainland has gradually narrowed and the exchanges are in steady growth. At the same time, as China's south gate and one of the fastest developed metropolises, Guangzhou attracts tens of millions visitors, many of whom enter Hong Kong via Guangzhou since China has much eliminated the barriers to this special administration region. Furthermore, considering another Disney World to be built in Hong Kong, there should be great potential of visitors from the Mainland. Thus, maglev railroad will not only be an efficient transportation means, but also an attractive

tourism resource. In this prospect, led off by China National Ministry of Railway, the central government and Hong Kong SAR government have achieved certain agreement to construct the regional express railroads connecting Guangzhou, Shenzhen and Hong Kong. There is a possibility of adopting maglev railroad system and the construction fee is approximately 52.5 billion yuan RMB (approximately 5.8 billion Euros).

3.2.2. "Grand Beijing" Region

The government-sponsored "Grand Beijing" Program is proposed and chaired by Prof. Wu Liangyong from Tsinghua University, the best university in China. The Grand Beijing Program covers the territory that centres the 100 km long Beijing - Tianjin axis with another two important points, Tangshan and Baoding, respectively to its North and South. The population is about 40 million. With several central cities, this program targets to establish an inter-city network so as to make full use of the regional resources in an integrated way. With Beijing and Tianjin, two of the four central government municipalities, this region hosts China's political centre and the centre of economy and communication. The strength of the industry and sci-tech are extremely prominent among the top of the nation. Currently, one of the most pressing transportation problems in this area is the lack of capacity of Beijing airport since it can hardly satisfy the continuously increasing number of passengers which is predicted to increase to 27 million in 2002. Tianjin airport is 137 km away from the airport in Beijing so that constructing a maglev railroad connecting the two airports would become practical. At present, the maglev railroad construction plan is being actively discussed under the supervision of Prof. Wu Liangyong. The hosting of 2008 Olympic Games in Beijing would indeed accelerate the demonstration.

The construction of the maglev railroad to join the two airports is only the first step. Taking the privilege of 2008 Olympic Games and the Grand Beijing Program, the maglev railroad can significantly improve transportation, urban conditions and human life in this area. First, the over 400 km/h maglev railroad can help people travel to Beijing at daytime and reside in Tianjin or other nearby cities, which will greatly alleviate the predictable too heavy population burden with Beijing's seemingly endless expansion and the coming of the 2008 Olympic Games. Secondly, in the long run, Beijing has been much overloaded with too many difficult-to-solve problems, such as the excessive population, resource shortage, deteriorated environment, high cost of residence and the imbalance between regional development in economy and technology, etc. Further construction of maglev railroad might be

somewhat efficient in helping to solve the problem. People can travel further away from Beijing for better working opportunities and personal development. With information technology and office automation realized at home, people will select the best suitable cities around Beijing to live in.

3.2.3. Yangtze River Delta

Sci-tech and agriculture in this area boast of extremely solid strength. Accounting for a significant part of China's GDP, this region is developing fast in the foreign trade and investment and township enterprises. Among the cities gathered in this area, Shanghai shines brilliantly as one of China's most important centres of national and international finances, communication, commerce and trade. At present, this area of the Yangtze River Delta has shaped a triangle by taking Shanghai as the leading power, while Nanjing and Hangzhou, the capital cities of China's most developed provinces – Jiangsu and Zhejiang, respectively, represent the other two vertexes. Each side of the triangle is about 300 km. The population here is nearly 100 million with extremely dense cities and towns and economy evenly developed. The ongoing Shanghai Pudong Maglev Railroad will not only bring about economic benefit but it can also help achieve the effects of project demonstration and experience accumulation.

Transportation in this delta region is fairly well developed with Shanghai - Nanjing and Shanghai - Hangzhou expressways as well as traditional railways that string a number of large and medium sized cities, each about 50 km to 100 km apart. However, there are still no direct expressways or railways connecting Nanjing and Hangzhou, which then spares one side of the triangle in transport. As result, people have to make detours via Shanghai or take about six hours to travel the 315 km Nanjing - Hangzhou road to either city, thus inevitably weakening exchanges in this region. Guaranteed by the large population, the developed economy plus the very limited land resources, the construction of maglev railroads in a triangular round way with the three cities as the vertexes and joining the cities along the way will surely achieve better overall results in this region.

Beside the three most prosperous metropolis groups, there is still another on-booming triangle – Central China Triangle which centres Wuhan, Changsha and Nanchang, the three provincial capital cities gathering around the beginning of the lower reach of the Yangtze River. The writer has indicated the possibility and necessity of the maglev railroad constricted along the Yangtze River in this area in the previous paper in the last edition.

4. CONCLUSION

1. With the first maglev railroad being constructed in Pudong, Shanghai as well as the current demonstration work done in China, the maglev railroad construction in China has been brought to agenda and is expected to have relatively bright prospects.
2. Although there is long-term dispute on whether Beijing - Shanghai high-speed railroad will adopt maglev technology and the government tends to take the world's most advanced technology, it seems that currently it is rather difficult to invest huge capital and take risks to construct large-scale long maglev railroads and there should be more experiments and they should take longer. Moreover, more experts strongly believe that the dispute regarding what technology should be applied, should be stopped promptly, and energy should be focused on implementing the actual construction of the China's first high-speed railroad.
3. Considering investment, technology maturity as well as China's current regional economic development and urbanization, it is more practical to construct maglev railroad on small and medium space scales. The extremely rapid growth of the Zhujiang River Delta, the Grand Beijing area and the Yangtze River Delta brings about the possibility of constructing maglev system railroads and relevant feasibility demonstrations are actively carried out.
4. China and Germany will get mutual benefits in the process of cooperation, and China will strengthen the investment in researching the technology and operation. China will first take imported facilities and technology, but in the long run, she will try to produce more in China so as to reduce greatly the cost and to construct the maglev railroads adjusted to the national situation.
5. Though maglev railroad is very expensive to construct at present, which seemingly holds back the current application of the technology in the world, it is predictable that with scientific research and technology getting matured and the worldwide cooperation, the cost will be greatly reduced in the future similarly to the law of any other science and technology.

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