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Parcels and mail by high speed rail—A comparative analysis of Germany, France and China

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ABSTRACT

As rail freight reform develops further, parcels transport by the high speed rail network is expanding in China. We explore the optimal operational method through case studies. Both France and Germany have operated parcels trains on their high speed networks, at a speed of 270 km/h and 160 km/h respectively; following the literature we consider both as high speed freight trains. The business model, transportation organization and performance are compared between Germany, France and China. The findings of our analysis suggest dedicated high speed freight trains are better than mixed trains at exploiting advantages of high speed railways and achieving economies of scale. However, the sensitivity analysis tells us the dedicated high speed freight train in China will require at least 5% mode share on the busiest routes like Beijing-Shanghai and Guangzhou-Shanghai and over 30% on less busy routes like Chengdu-Changsha. From German and French experience, volume guarantees seem crucial for the operation of high speed freight trains. Competitive price is also important to attract enough volume. The construction of a limited high speed rail freight network on key routes will permit exploitation of economies of scale. Also night trains are a better choice for parcels and mail delivery companies.

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1. Introduction

With the wide take-up of internet, customers' shopping habits have changed tremendously over the last decade. E-commerce and mobile shopping market developed very fast and the market size is increasing. The Global Express Association (GEA) expected e-commerce to continue to grow substantially in the future with double-digit growth to be the norm (GEA, 2015). iResearch, a famous research corporation in China, also reported that the Chinese online shopping market reached 2.8 trillion CNY (China Yuan) in 2014 with an annual growth rate of 48.7% (iResearch, 2014). According to the European Express Association, 16% of EU companies' sales revenues are dependent on express deliveries (expected to increase to 21% in 2020) and 30.3% of E-commerce sales revenue of EU-6 countries (including UK, France, Germany, Italy, Netherlands and Poland) are dependent on express delivery services (EEA, 2011, 2012). The express delivery industry is becoming one of the fastest growing industries in China. From 2011 to 2014, the annual growth rate of express deliveries in China has been consecutively over 50%.

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Meanwhile, most express delivery companies rely mainly on road and air transportation because of their reliability and flexibility. Therefore, the fast development of the express delivery business has increased the demand for speedy transport especially air express freight (Zhang and Zhang, 2002). Much cargo is carried on overnight flights when there is capacity at airports. But increasing airport congestion and restrictions on night flights, adverse effects of noise in the vicinity of airports, as well as concerns about the rising cost of fuel and restrictions on carbon emissions limit the development of air freight (Basner and Samel, 2006; Chapman, 2007). In terms of road transportation, congestion is increasingly severe. Truck transportation is not fast enough over long distances and can adversely affect the environment with high energy consumption (Forkenbrock, 2001; WBCSD, 2001; Ohnell and Woxenius, 2003; Chapman, 2007). In contrast, railways, especially high speed rail (HSR), run faster than road but are cheaper than air. Trains will emit less carbon dioxide than the combined road and air services currently operated and will also create less noise than lorries and planes (WBCSD, 2001; Shaw et al., 2003; Bonnafous and Raux, 2003; Chapman, 2007). Furthermore, over long-distance transport, HSR can achieve overnight delivery which is unachievable by road. HSR offer a viable alternative for express delivery companies under fluctuating fuel prices and limited night flights (highspeedmix project, summary report, 2000).

Both France and Germany have operated parcels trains on their high speed networks, at a speed of 270 km/h in France and 160 km/h in Germany; following the literature we consider both as high speed freight trains. Parcels and mail with high value and time sensitivity from mail and express delivery companies are the major source of HSR freight in these countries. Therefore, our focus of HSR freight is mainly on parcels and mail transport by HSR. In this business, different railway companies, terminal operators and parcels and mail delivery companies are included, such as SNCF, La Poste, DB AG, Deutsche Post, UPS and TNT etc., Transporting parcels and mail by HSR began from 2012 in China. The dynamic inspecting train (a normal HSR passenger train which is run without passengers in advance of the first passenger train each day to test the tracks) and passenger Electric Multiple Units (EMUs, carrying parcels placed in luggage storage while carrying passengers) are the two main approaches for this new business. Currently, less than 5% of express parcels are transported by railway which means great potential for rail in the express delivery market (Gausemeier, et al., 2001; Gong, 2011; Lin and Yu, 2012). Transporting parcels and mail by HSR has received the attention of both the academic and industrial community. HSR freight in China is still at an initial stage and has lots of shortcomings in terms of transport vehicles, transportation organization and cooperation between different companies. Studying parcels and mail by HSR in Germany, France and China is thus of great theoretical and practical significance.

There are four reasons that explain why we choose Germany and France as comparison subjects. The first one is it has been over 30 years since France introduced TGV La Poste business and over 20 years since Germany introduced express freight trains, which could provide some lessons. The higher degree of liberalization of rail freight transport in Germany and France is another reason. According to the Rail Liberalisation Index, 2011, Germany ranked fourth in European countries in liberalization of rail freight transport (Rail Liberalisation Index, 2011). The liberalization index includes two sub-indices: Access index (practical market access barriers) and LEX index (legal requirements). Higher liberalization index means an easier access to the infrastructure in the rail freight market for shippers, third party operators etc., The third reason is that Germany constructed HSR for the purpose of serving both passenger and freight transport to offset the high investments in new infrastructure which is quite different from the Japanese and French models (Dunn and Perl, 1994; Ebeling, 2005; Campos and De Rus, 2009; Albalade and Bel, 2012). The China Railway Corporation obtained a large portion of its income (over 50%) from freight traffic too and also needs to offset the high investments in HSR by serving freight traffic as well. The fourth reason is that there was a business suspension both in Germany and France because of insufficient volume, which could provide useful lessons for countries practicing high speed freight business.

Before we start our research, we need firstly to define the concept of HSR freight to which category parcels and mail by HSR belongs and understand the different standards of Germany, France and China. Actually HSR freight is not clearly defined since high speed is primarily associated with passenger transport. But since 1980s, HSR freight began to attract the attention of scholars at home and abroad with the opening of TGV La Poste (Troche, 2005; Tan and Zhang, 2014). When defining HSR freight, all the factors including technology, operation and character of goods should be considered. Ellwanger and Wilckens (1994) believe that the speed should be over 200 km/h and trains should be operated on high speed railways. Troche then presented a general definition of HSR freight by considering different reference speeds for passenger and freight transport. He divided railway freight into three levels: HSR freight with speed over 200 km/h, semi HSR freight with speed from 140 km/h to 200 km/h and conventional rail freight with speed less than 140 km/h. The term HSR freight is normally understood in a broader sense and includes semi-HSR freight (Troche, 2005). In this paper, we adopt the broader sense. In the following, the term HSR freight includes semi-HSR. These trains for parcel intercity service with 160 km/h are the fastest freight trains in Germany and they run on the high speed railways. That is why we consider the freight train delivering parcels and mail with speed of 160 km/h in Germany as high speed freight.

The paper is organized as follows: section 2 explains the research methodology; section 3 and section 4 present the comparative analysis from business model and transportation organization aspects. Section 5 includes a performance comparison and discussion. Section 6 presents conclusions and policy implications.

2. Methodology

This paper researches parcels and mail by HSR in Germany, France and China from business model, transportation vehicle and transportation organization aspects. The choice among different research methods including the case study method

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