



World Conference on Transport Research - WCTR 2016 Shanghai. 10-15 July 2016

# Should upstream merger be regulated in a railway system with monopolistic operator

Gang Xie\*, Ning Zhang, Shouyang Wang

*Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing 100190, China*

---

## Abstract

This study examines the impact of the merger of two upstream manufacturers on the railway system performance, including quality of service, pricing, profits and consumer surplus. Two scenarios of analysis are investigated, and the equilibrium solutions for quality and price of service are derived, respectively. Experimental analysis shows that the upstream merger of the manufacturers leads to higher price of service and industry profit, but lower quality of service and consumer surplus. The results suggest that there exists a tradeoff between industry profit and consumer surplus to the policy maker, who should regulate the merger and prevent the railway system from drastically lowering quality of service.

© 2017 The Authors. Published by Elsevier B.V.

Peer-review under responsibility of WORLD CONFERENCE ON TRANSPORT RESEARCH SOCIETY.

*Keywords:* Railway system; Monopolistic operator; Merger; Upstream sector

---

## 1. Introduction

In global railway industry, train makers are subjected to increasingly competition, and some of manufacturers seek mergers for more competitive. For instance, China CNR and China CSR merged in 2015 in order to compete with giants like Canada's Bombardier and Germany's Siemens (Railway-technology, 2015). The merger is expected to improve the operating efficiency in the use of resources, effectively reduce costs and realize the internationalization strategy, thereby promoting competition globally (BBC news, 2014). By contrast, the policy maker once reformed to introduce competition into Chinese railways more than a decade ago (Rong and Bouf, 2005). Therefore, it is valuable

---

\* Corresponding author. Tel.: +86-10-82541368; fax: +86-10-62541823.

*E-mail address:* [gxie@amss.ac.cn](mailto:gxie@amss.ac.cn)

to investigate the impact of the merger on railway system performance and give managerial insights for the policy maker.

For railway systems, mergers may cause lack of inner competition, higher price and lower quality of service (Larson, 2013). After the 1995 consolidation of the Atchison, Topeka & Santa Fe and Burlington Northern (BN) into BNSF, and the 1996 merger of Southern Pacific (SP) into Union Pacific (UP), only two major railroads remained in the West America (Wilner, 1997). Meanwhile, in the East America, two large railroads controlled most traffic following the division of Conrail between Norfolk Southern and CSX. The three mega-mergers of the 1990s have all been plagued with problems. It took BNSF much longer than expected to operationally merge the two railroads. BNSF had trouble consolidating dispatching operations, handling delays in information system integration, and avoiding shortages of locomotive power (Welty, 1997). These problems were blamed on everything from poor customer service to bad weather (Bradley, 1997). However, existing literature has not yet investigated the impact of the merger on railway system performance.

In this study, firstly, we describe the managerial decision-making processes of a railway system. Then, decisions of a railway system are investigated in two scenarios of analysis. Experimental analysis is implemented to illustrate the impacts of competition intensity on railway system performance. Finally, conclusions are drawn, and topics for future work are suggested.

The remainder of this paper is organized as follows. In Section 2, we describe the managerial decision-making processes of a railway system. Then, decisions of a railway system are investigated in two scenarios of analysis in Section 3. In Section 4, experimental analysis is implemented to illustrate the impacts of competition intensity on railway system performance. Section 5 reveals our conclusions and suggests possible directions for future studies.

## 2. Managerial decision-making for a railway system

To a railway system, manufacturing industry is the upstream sector, where manufacturers provide locomotives to operators. When there are several manufacturers but only one monopolistic operator, they compete for orders placed from operators with respect to quality characteristics, including travel speeds, travelling comforts, reliability, security, etc. In the railway system, the decision process of the manufacturers and the monopolistic operator is as follows: Initially, the manufacturers offer the quality and the wholesale price of sample locomotives. Then, the operator inspects the sample, and signs a contract with the manufacturers on the amount of the locomotives and the wholesale price.

The following notations are used in the model:

- $s$  The scenarios of relationship between the manufacturer(s) and the operator ( $s = NN, N$ );
- $x_i^s$  The quality of service provided by the  $i$  th manufacturer within ( $i, j=1, 2, i \neq j$ );
- $p$  Price of service per unit of trains in the railway transport market;
- $w_i$  Wholesale price per unit of trains to the  $i$  th manufacturer;
- $v_M$  The manufacturers' variable production cost per unit of trains;
- $v_O$  The operator's variable operating cost per unit of trains;
- $\varepsilon$  A manufacturer's variable cost related to quality of service;
- $c$  A manufacturer's fixed cost related to quality of service;
- $k_i$  Share of the intrinsic demand potential for the  $i$  th manufacturer;
- $\alpha$  Demand sensitivity of the  $i$  th manufacturer;
- $\beta$  Competition intensity denoting the competitive effects of quality of service for the manufacturer pair ( $i, j$ ).

In this study,  $x_i^s$  and  $x_j^s$  are decision variables; other variables are exogenous variables, which are known to both the manufacturers and the operator in the railway system.

**Assumption 1.**  $p > w_i + v_O$  and  $w_i > v_M + \varepsilon x_i^s$ . The inequalities ensure that each player in the railway system makes a positive profit.

**Assumption 2.** In the market, the operator adopts the same price of tickets, though there is a difference in the quality of service provided by the two manufacturers. This is reasonable when the operator is monopolistic.

**Assumption 3.** The quality of service can be recognized by both the operator and consumers. This assumption is also reasonable, because the operator can acquire the quality of service via sample inspections, and the quality characteristics of trains is usually introduced to consumers in advertise.

Download English Version:

<https://daneshyari.com/en/article/5125175>

Download Persian Version:

<https://daneshyari.com/article/5125175>

[Daneshyari.com](https://daneshyari.com)