Transportation Research Part A 73 (2015) 70–79

Contents lists available at ScienceDirect

Transportation Research Part A

journal homepage: www.elsevier.com/locate/tra

Challenges raised by freight for the operations planning of a shared-use rail network. A French perspective

Camille Morvant *

Université Paris-Est, French Institute of Science and Technology for Transport, Development and Networks (IFSTTAR), AME/SPLOTT, 14-20 Boulevard Newton, Cité Descartes, 77447 Marne la Vallée Cedex 2, France

ARTICLE INFO

Article history:
Received 11 April 2014
Received in revised form 13 December 2014
Accepted 17 December 2014
Available online 6 February 2015

Keywords:
Rail freight
Infrastructure manager
Capacity
Timetabling
Shared-use network

ABSTRACT

Operating rail infrastructures that are shared among different uses is complex. In Western Europe, the predominance of passenger traffic over freight has traditionally led to thorough scheduling of capacity use, with an increasing tendency to anticipate through the design of regular-interval timetables. The paper discusses the specific challenges posed by fitting freight into the timetabling process for a mixed-use rail network, based on current French experience. The analysis is carried out from the perspective of the infrastructure manager. It is mainly supported by the results of a series of about 30 interviews, carried out in 2012 and 2013 with the parties involved in the timetabling process. The paper provides a comprehensive understanding of the process in terms of organization, rules and practices, with an emphasis on the characteristics of freight traffic compared with passenger traffic. The author highlights three key management issues for the French infrastructure manager when dealing with freight: (1) the uncertainty surrounding the mid-long term development of the rail freight market at the national level; (2) the heterogeneity resulting from the diversity of commodities, convoys and profiles and behaviors of the capacity applicants; (3) the volatility of some freight traffic resulting in a great amount of activity in the later stages of the timetabling process. If uncertainty about the future appears to be a highly sensitive issue in the French context, heterogeneity and volatility of freight traffic can be perceived as management challenges that may be experienced, to a greater or lesser degree, on other rail networks.

1. Introduction

Several demands, such as passenger traffic, freight and maintenance works, are competing for a portion of a shared and scarce resource: available railway infrastructure. This issue affects a large number of rail networks, worldwide, and raises specific problems since it requires the infrastructure manager to deal with heterogeneous and possibly conflicting demands for capacity. A considerable literature, based on international experience, deals with the various challenges related to the operation of mixed-use rail infrastructures: the impacts of train characteristics (Pyrgidis and Christogiannis, 2012), infrastructure use charges (Calvo et al., 2007), capacity determination (Pouryousef et al., 2013), train performance and delays (Martland, 2008; Krier et al., 2014), maintenance planning (Saat and Barkan, 2013) and "*operating strategies*" (train scheduling and dispatching) (Nash, 2003). This paper addresses the issue of train scheduling and is concerned with

* Tel.: +33 1 81 66 87 79.
E-mail address: camille.morvant@ifsttar.fr

http://dx.doi.org/10.1016/j.tra.2014.12.003
0965-8564/

timetable-based operations (as opposed to "*improvised operations*") (Pouryousef et al., 2013). In Western Europe, recent decades have been marked by a tendency to favor the scheduling of train paths (also called "slots" in the literature) based on a regular-interval timetable. France has recently adopted this planning approach for the sake of a more efficient use of capacity.

The paper focuses on the challenges freight poses for the operations planning of a shared-use rail network. It analyses the changes in the timetabling process of the French rail network, as seen from the infrastructure manager's perspective. The French case illustrates the difficulties raised by the transition from one scheduling method to another in a context that has been undergoing profound changes due to the recent opening of the rail freight market to competition. Special attention is given to freight, as this has rarely been the main focus of the literature on rail capacity allocation, at least of the European literature because of the preponderance and dynamism of passenger traffic.

The paper starts by outlining the organization of the French timetabling process. It explains the reasons for the shift to the regular-interval planning of train paths. The principles, calendar and stakeholders are briefly described. The end of the second section discusses the position of freight throughout the process and explains the key differences between passenger and freight traffic with regard to capacity. The third section is structured around the current challenges faced by the French infrastructure manager when dealing with freight in the new framework of a regular-interval timetable approach. Contextual information is given about recent developments in the French rail freight market. Three main management issues are highlighted: uncertainty, heterogeneity and volatility. Each issue can be analyzed as emblematic of what is at stake at the different planning time horizons associated with the different stages of the timetabling process. Section 4 concludes.

The analysis is mainly based on the results of a series of about 30 interviews carried out between June 2012 and April 2013. These interviews with practitioners (timetable planners (11), train dispatchers (4) and customer relations staff (8)) and executive managers/experts (10) lasted between one and four hours. Public and internal reference documents from the French infrastructure manager were also investigated. Cross-analysis has provided a unique and comprehensive understanding of the process and given valuable insight into the differences between practice and theory. In addition, the paper provides a quantitative perspective with data relating to the current situation with regard to the French rail freight market. 2012 is used as the reference year.

2. Overview of the french timetabling process

2.1. Parties involved in the process

The process of infrastructure capacity allocation for the French rail network is led by two main stakeholders: SNCF, the historic state-owned railway company and Réseau Ferré de France (RFF), the infrastructure manager (hereinafter IM), a public entity created in 1997. Their respective roles reflect the ambiguous way the French government has implemented the European Directive 91/440 which made it necessary to separate "*the management of railway operation and infrastructure from the provision of railway transport*" (European Council, 1991). Whereas RFF has officially been responsible for capacity allocation since 2003, the reality is that most of the staff who are in charge of the process act on behalf of RFF while still being employed by SNCF. RFF defines the guiding principles and procedures (compiled in an annual *Network Statement* (Réseau Ferré de France, 2013)) and sells the train paths, while SNCF staff build the timetable. In practical terms, the latter design the distance-time graph which positions paths in relation to each other on the network throughout the day.

This somewhat confusing situation led, at the end of 2009, to the creation of an independent body within SNCF, the so-called "Direction de la Circulation Ferroviaire" (DCF). This brings together some 14,000 SNCF employees working as timetable planners, train dispatchers and signalmen. The aim was to guarantee fair network access to recent (and future) new entrants, in accordance with European prescriptions. At the same time, over the second half of the 2000s, RFF increased its staff in order to assert itself as allocation body. In February 2013, a further step was taken with the physical merger of national teams of timetable planners[1] (some 300 employees from the DCF and RFF) in order to enhance cooperation and emulation. Nevertheless, the allocation capacity process is still carried out by two distinct entities. Employees from both RFF and DCF were interviewed (65%/35%).

In 2009, a French railway activities regulator (ARAF) was added to the system. This is an independent public entity. Its tasks include resolving possible disputes concerning capacity allocation between capacity applicants (railway companies or so-called "authorized applicants" which have the right to order train paths) and the two aforementioned entities. "Authorized applicants" are intermodal transportation companies and public entities organizing freight or passenger services such as port authorities and regional governments.

2.2. From one timetabling method to another: the origins of an incomplete "regular-interval timetable revolution"

The capacity allocation process results in the production of a core deliverable: the "*working timetable*". This contains "*the data defining all planned train and rolling-stock movements which will take place on the relevant infrastructure during the period for which it is in force*" (European Parliament and Council, 2001). According to the European Directive 2001/14, it is drawn up once per calendar year. The annual change of timetable occurs on the second Saturday in December.

[1] The national teams, based in Paris, are in charge of the main lines of the network. Branch lines are handled at the regional scale.