



ENHANCING COMPETITIVENESS OF INTERNATIONAL RAILWAY FREIGHT CORRIDORS THROUGH A COOPERATIVE GAME APPROACH

Miroslav PROKIĆ¹ [0009-0001-6720-4986]

Abstract – This research addresses the problem of governance of European rail freight corridors through the formulation of an economic model of intergovernmental cooperation along the corridors, based on the application of cooperative game theory. The main aim of the research is to develop a model demonstrating that a cooperative approach can enhance the efficiency and competitiveness of rail freight corridors in Europe. By applying cooperative games, the research seeks to define a fair and stable mechanism for distributing the benefits that arise from joint governance and coordinated policy implementation along the corridors. The core objectives of the research are to formulate an economic model that integrates a transport demand model with a cooperative game among states, to develop new solution concepts for benefit allocation, and to assess their applicability in the real operating environment of rail freight corridors. Three solution concepts are applied: the Shapley value, as a theoretically grounded and widely accepted approach, and two newly developed concepts specifically tailored to the characteristics of rail corridors termed as the Proportional Rule and the Adjusted Proportional Rule. The applicability of the proposed model is demonstrated through the Alpine–Western Balkan Rail Freight Corridor, which connects Austria, Slovenia, Croatia, Serbia, and Bulgaria. Based on a transport demand model calibrated with real corridor data, it was established that the joint implementation of measures defined through a cooperation strategy could increase freight volume by 43%. The analysis of 32 possible state coalitions showed that the Shapley Value and the Proportional Rule led to stable outcomes in which no country has an incentive to leave the grand coalition, whereas the Adjusted Proportional Rule reveals that, in certain smaller coalitions, some countries may achieve higher individual payoffs. However, given the strategic nature of rail freight corridors, such shortcomings can be overcome through political negotiations and intergovernmental compromises. The findings confirm that cooperative games represent an effective analytical instrument for improving the governance of rail freight corridors, as they provide an objective means of measuring the effects of cooperation and developing equitable benefit-sharing mechanisms. At the same time, the proposed model demonstrates potential for application beyond the European context, particularly on Eurasian corridors connecting China and Europe, where institutional mechanisms of cooperation have not yet been fully established.

Keywords – rail freight corridors; competitiveness; cooperative games; Shapley value; benefit allocation.

¹ Faculty of Transport and Traffic engineering - University of Belgrade, Vojvode Stepe 305, Belgrade, Serbia
miroslav.prokic@yahoo.com

