Chapter 6
Cooperative Grey Games: An Application on Transportation Situations

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ABSTRACT

In this chapter, the authors extend transportation situations under uncertainty by using grey numbers. Further, they try in this research building models for grey game problems on transportation situations proposing the ideas of grey solutions and their corresponding structures. They introduce cooperative grey games and grey solutions. They focus on the grey Shapley value and the grey core of the modeled game arising from transportation situations. Moreover, they prove the nonemptiness of the grey core for the transportation grey games, and some results on the relationship between the grey core.

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INTRODUCTION

Game theory is a modern section of decision theory, having various applications in socio-economic, political, organizational, ecological processes. The subject of this study is conflict and cooperation. The situations in which the interests of participants collide. Essentially all aspects of human activities affect to some extent the interests of different parties and therefore belong to the field of game theory. However, at present methods theory of games in real control procedures (primarily in the construction of organizational systems, the formation of economic mechanism and procedures political negotiations, socio-economic planning and forecasting) are not widely used. This is due to both the lack of theoretical and game training of management experts, and the fact that classic game models are too abstract and difficult to adapt to real processes of management and decision-making. Currently, various sections of the theory of games are included in the programs compulsory and special courses of many higher educational institutions. The study and teaching of this discipline entail serious difficulties, associated with a lack of necessary literature. This report is an exposition of transportation situations under grey games. By and large, makers and retailers are going to minimize their costs or maximizing their benefits. Makers and retailers can shape coalitions to get however much as possible. Constitutionally, a transportation situation comprises two sets of agents called makers and retailers which deliver/request merchandises. The transport of the merchandise from the makers to the retailers must be beneficial. Thusly, the primary goal is to transport the products from the makers to the retailers at greatest benefit (Aparicio et al. 2010). Such a participation can happen in transportation situations (Aziz et al. 2014; Frisk et al. 2010; Zener and Ergun 2008; Snchez-Soriano 2006; Snchez-Soriano et al. 2002, 2001; Soons 2011; Theys et al. 2008). Be that as it may, when the agents included concurring on a coalition, the subject of conveying the acquired benefit or expenses among the specialists emerges. The cooperative game theory is broadly utilized on intriguing sharing cost/benefit issues in numerous regions of Operational Research, for example, association, steering, planning, creation, stock, transportation, and so forth. (See Borm et al. 2001 for a survey on Operational Research Games). Transportation games are inspected in Sanchez-Soriano et al. (2001). Our paper studies the core of the transportation games and illustrates the non-emptiness of the core of transportation games. Also, Sanchez-Soriano et al. (2001) give a few outcomes about the connection between the core and dual optimal solutions of the transportation issue. The paper Sanchez-Soriano (2003) presents a specially appointed solution idea for transportation games called the pairwise