

COALITION PARTITION LIEDER PROBLEM

Abstract

Gusev, V.V., Zhukov I.V.

Human's social nature causes the need to establish a sustainable social order, where everyone understands his role and the place in the hierarchy formed. On the other hand, being a rational creature, individuals wish to have the highest status in this social order that, in turn, allows them to provide a competitive advantage. In addition, in actual life society is divided among different groups, where participants also compete for leader's status. Social behavior mathematical models have a great importance for economic and political studies, shaping the basis for decision making in these fields. The main question related is existence of stable coalition partition itself, considering the common aspiration to become a leader inside the coalition.

Object of the research is coalition partition lider problem.

Subject of the research is existence of stable coalition partition in the problem.

This study aims to prove/refute the existence of stable coalition partitions in the coalition partition in the problem.

In order to reach the aim described it is required to:

- analyze the rang function case,
- analyze the weight function case,
- analyze different types of equilibria in the game.

The empirical basis of a study is a social behavior models with hierarchical structure. The investigation of these models allows us to formulate a series of states in a field of game theory.

The result expected is proof/refutation of existence of equilibria in the problem.

The sphere of application for the results is economic and political sciences.

Results of the work: a proof of the existence of a Nash-stable coalitional partition in the game is given, where, according to the weight rule, the leading coalition is first chosen, and then the leader of the whole game. This model shows the existence of optimal weights that allow first maximizing the probability of leadership of a coalition of players, and then the probability of leadership of a player in a given partition. A proof of the existence of an equilibrium in the modification of the game, where the players have two weights, is given. For a model where the leader of each coalition is selected first in the partition, and then the leader among them, the existence of a stable partition is shown for the case when the weights of the players are equal. The existence of a stable coalition partition in games with a rank function with a number of specified properties is shown.

The existing research is based on the results obtained in the article by Piconne & Razin (2009) "Coalition formation under power relations", where the existence of an equilibrium for games with

an order function is proved, and the question of the existence of a core in such models is also studied. The results of other scientists should be mentioned, for example, Cechlárová&Medina (2001) proposed an algorithm for finding stable coalition partitions with respect to the core of a cooperative game; Alison Watts (2006) in the article "Formation of Segregated and Integrated Groups" analyzes a model where a player can join a coalition if the coalition approves of his entry; Acemoglu, Egorov & Sonin (2008) presented results in games simulating the formation of a ruling coalition in non-democratic societies.