A cost allocation problem in urban solid wastes collection and disposal

Vito Fragnelli - Anna Iandolino

Speaker: VitoFragnelli
e-mail: fragnell@mfn.unipmn.it
University of Eastern Piedmont, Dipartimento di Scienze e Tecnologie Avanzate
Alessandria, ITALY

KeyWords:Cost allocation problem, Infrastructure cost game, Owen value

ABSTRACT

We consider a cost allocation problem arising from a consortium for urban solid waste collection and disposal.
A classical allocation rule is the proportional division according to the volume of waste collected. For example in Italy this is the proposal of the so-called “Decreto Ronchi” (a collection of laws that rule this topic).
We propose a different allocation method rooted in game theory. The main idea is to apply a model developed for a situation in which the different agents, using the same kind of infrastructure, can be grouped according their necessities and requests (Fragnelli et al., 1999).
The grouping rule for our situation was suggested by a document of Federambiente (1998), an Italian environmental agency, that assigns to each municipality an average per capita production of solid waste depending only on the number of inhabitants.
In Fragnelli et al. (1999) the solution proposed was the Shapley value, for its characteristics of additivity and for which a simple formula is available; exploiting the classification of Federambiente and the characteristic of the model we are able to solve the problem having as players the municipalities participating in the consortium or directly the inhabitants.
In particular we apply this model to the data for 1998 of the consortium Ovadese - Valle Scrivia, that includes 61 municipalities with a total of 170154 inhabitants. We compare our results with the actual ones.
Finally we analyze a negative feature of the Shapley value that shows up in case of proportional growth of the number of players in each group, as it may happen when the population increases. In particular the cost paid by each player converges to a unique value for all the players, while the Owen value remains stable in case of proportional growth.