Goodwill hunting: how to allocate bads or disagreeable chores

Lorenzo Cioni[(1)]*, Giorgio Gallo*

Computer Science Department, University of Pisa
largo Pontecorvo 3, 56127, Pisa, Italy
lcioni@di.unipi.it, gallo@di.unipi.it
tel.: (+39) 050 2212741 (+39) 050 2212714
fax: (+39) 050 2212726
(1) corresponding author

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One of the hardest problems to solve in distributive contexts is to decide how to allocate to one agents from a set of selected agents a bad or a disagreeable chore.
This is the type of problem which is encountered when one has to decide the localization of controversial or dangerous plants (such as incinerators, waste dumps, chemical plants, oil refineries and the like) whose realization affects a well defined area, but whose effects may cover much wider areas. More generally it is the problem of territorial planning, that is how to allocate activities and to decide about the possible uses of the soils.
In the present paper we present a solution based on the use of the auction mechanism. For this purpose we propose three mechanisms that extend the auction mechanism, so to have an auctioneer (the decision maker that carry out the allocation) that proposes a chore to a set bidders (the decision makers that must compete among themselves for its implementation) through one of the following three mechanisms, the first two of multi shots type and the latter of one shot type.

1. The auctioneer offers the chore and a sum of money **m**. He/she raises the offer from an initial starting value up to an upper bound **M** (the maximum he/she is willing to pay) until one of the bidders accepts it getting both the chore and the money. The auction ends when either one of the bidders calls “stop” or the auctioneer reaches M, none of the bidders calling “stop”. We may have a void auction sale if no bidders accepts the final value M. The auctioneer can avoid this by fixing a high enough value M.
2. The auctioneer offers the chore and fixes a starting sum of money **L** (the maximum he/she is willing to pay). The bidders start making lower and lower bids. The bidder who bid less (or makes the last bid) gets the chore and the money. Of course the auctioneer has no lower bound. Under the hypothesis that the bidders are not willing to pay for getting the chore we can suppose a lower bound l=0. If this hypothesis is removed we can, at least in principle, have negative bids. We may have a void auction sale if no bidders accepts the initial value L. The auctioneer can avoid this by fixing a high enough value L.
3. The auctioneer offers the chore and the bidders bid money for not getting it under the proviso that the one who bids less will get the chore whereas the bids of the others will be used to form a monetary compensation for the loser. Also in this case

it is possible to have a void auction sale. The mechanism allows the selected bidders to pay an exclusion fee so to avoid attending the auction. These fees (a private information of the auctioneer) are used as a further compensation for the losing bidder.

The paper frames these three mechanisms within the general context of Auction Theory. It also presents the existing relations among the proposed mechanisms, describes their properties and proposes some descriptive algorithms or recipes.
The paper closes with a section devoted to the applications of the proposed auction mechanisms to real world allocation problems as well as a section devoted to possible extensions and refinements.