CHARACTERISTICS OF SOME APPORTIONMENT METHODS BY COMPUTER SIMULATION

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In examined homogeneous multi-optional systems, the decision is made on two or more final options, consisting of parts of a homogeneous resource measured in integers; the resource in question is apportioned to beneficiaries-options (states, parties, etc.), aiming at ensuring the extreme value of a given criterion. It is considered that decisions are based on solving a deterministic optimization problem. To solve the optimization problem is used an apportionment method (algorithm). There is not yet a universally accepted apportionment (APP) method to be used in similar situations. Thereby are used several apportionment methods.

Studies [1, 2] show that APP methods, which in some situations allow for better solutions, in other ones yield to other methods. This can lead to unexpected effects. Known theoretical results sometimes do not give an unambiguous answer to what APP method is preferable to use in a concrete situation. In such cases, it is appropriate the comparative analysis of APP methods by computer simulation.

In this aim was elaborated the computer application SIMAP and were done respective calculations for eleven APP methods [1-3]: Hamilton (H), Sainte-Laguë (SL), d'Hondt (d'H), Huntington-Hill (HH), Adapted Sainte-Laguë (ASL), Quota linear divisor (QLD), Lower quota linear divisor (LQLD), Quota dependent linear divisor (QDLD), Variable linear divisor (VLD), Quota variable linear divisor (QVLD) and Lower quota variable linear divisor (LQVLD).

Done comparative analyses show the following preferences of investigated APP methods:
- by the disproportionality of solutions,

H ≻ QVLD ≻ LQVLD ≻ QLD ≻ LQLD ≻ {SL, VLD} ≻ ASL ≻ HH ≻ d'H ≻ QDLD;
- by the percentage of compliance with the Quota rule,

{H, QVLD, QLD, QDLD} ≻ LQLD ≻ SL ≻ LQVLD ≻ VLD ≻ ASL ≻ HH ≻ d'H;
- by not favoring options, H ≻ SL ≻ ASL ≻ HH ≻ d'H;
- by the percentage of Alabama paradox,

{SL, ASL, HH, d'H} ≻ QLD ≻ LQLD ≻ H ≻ QVLD ≻ LQVLD ≻ VLD ≻ QDLD;
- by the percentage of New state paradox,

{SL, ASL, HH, d'H} ≻ QLD ≻ LQLD ≻ H ≻ QVLD ≻ VLD ≻ LQVLD ≻ QDLD;
- by the percentage of Population paradox,

{SL, ASL, HH, d'H} ≻ QLD ≻ LQLD ≻ H ≻ QVLD ≻ LQVLD ≻ VLD ≻ QDLD.

Comparative multi-aspectual analyses show that from eleven investigated methods there is reasonable to use, in specific areas, only three or four: the Hamilton, Sainte-Laguë and Adapted Sainte-Laguë methods and may be the Quota linear divisor method.

Keywords: *apportionment methods, computer simulation, comparative analyses.*

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