Reviewer's Report on Thesis Entitled "Mathematical Modeling of the Competitive Environment" (Gorynia Ekaterina Valerievna for a degree candidate of physical and mathematical sciences)

The thesis entitled "Mathematical Modeling of the Competitive Environment" investigates competitive relationships which occur in different environments. The main ones are biological and economic. The research of the thesis is worthy in both theoretical and applied fields. The main results of the thesis are as follows.

1. The statistical analysis of the world market of food export using classical approaches and criteria was carried out. Part of the statistical analysis of the world market is the assessment of the level of competition. The paper analyzes the world market of various product categories over the last 60 years. The theoretical analysis of the market showed that the existing criteria are not sufficient to draw an unambiguous conclusion about the market situation. The developed criteria for statistical analysis allow to give an accurate assessment of the market state, to establish threshold values of market concentration and to give a forecast of its development.

2. Most existing models do not consider the presence of niches, trophic resource, time factor, habitat change, etc. Mathematical models for n populations are not found either. In the thesis, the developed models take these factors into account. Simulations are also carried out for the case of n populations for different types of relationships – interference , exploitation, hierarchy . The results of the modeling allow to identify factors that influence population death, to assess the dynamics of population survival, to establish the influence of environment on competitive relationships.

3. The results can be used by biological authorities for rational use of protected areas or to control of populations. Also developed criteria and metrics can be used by antimonopoly authorities or other organizations regulating competitive relations in the market to expand, refine or redefine existing methods of assessing competition and identifying monopoly or oligopoly in the market.

The thesis shows that the author, Gorynia Ekaterina Valerievna grasps a lot of knowledge of advanced mathematics and has a strong ability to go in for scientific research.

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Sep. 10, 2024.

33-06-771 от 17.09.2024