# MATHEMATICAL MODELING METHODS APPLICATION IN SOLVING PRODUCTION OPTIMIZATION PROBLEMS

**Koroleva Maria**

Student of Samara State University of Economics

Samara, Russia


**Kuderova Anna**

Student of Samara State University of Economics

Samara, Russia

**Abstract.** This scientific article deals with modeling and analysis of the game schema in game theory which is used for optimization sale of products in a retail enterprise. The authors have studied the available scientific publications in Russia and abroad about the mathematical modeling application and, in particular, game theory for solving various business problems. It is revealed that the analyzed scheme allows to simulate a realistic market situation. This is achieved, firstly, due to the fact that such a scheme is developed taking into account the organization's desire to maximize profits, and the consumer, in turn, to minimize its costs. Secondly, due to the fact that the studied scheme takes into account the change in seasonal demand for products. The research was carried out in several stages: the necessary data of the trading enterprise are presented; the problem formulation is performed and its mathematical model is developed; possible strategies for players are considered; the optimal products sales volume by type is determined. Practical application of the chosen method has shown that the theory of games is capable to give the most accurate and justified explanation of the players' behavior with opposite economic interests.

**Keywords:** game theories; strategies; saddle point; optimization; payment matrix.

**JEL codes:** C 02; C 61.

## References

1. Buntova, E.V. Mathematical models in economics. / Science of the XXI century: current trends of development Materials of the International Correspondence Scientific and Practical Conference. 2015. pp. 989-992.

2. Boonman, H.J.; Siddiqui, A.S.Capacity optimization under uncertainty: The impact of operational time lags. // European Journal of Operational Research. 2017, Volume: 262, Issue: 2. P.: 660-672.

3. Fuegenschuh, M.; Fuegenschuh, A.; Ludszuweit, M.; and others. Mathematical Optimization of a Magnetic Ruler Layout with Rotated Pole Boundaries / Conference: Operations Research Conference. Univ Vienna, Vienna, Austria, 2015. Book series: Operations Research Proceedings. 2017. P.: 117-123.

4. Boning, M.; Breier, H.; Berbig, D. Optimization Model for the Design of Levelling Patterns with Setup and Lot-Sizing Considerations / Conference: Operations Research Conference. Univ Vienna, Vienna, Austria, 2015. Book series: Operations Research Proceedings. 2017. P.: 401-407

5. Epifantseva, A.A. Application of the methods of the theory of cooperative games in the study of the relationship of economic entities in the sphere of leasing. Abstract of the dis. ... candidate of economic sciences / S.-Petersburg. state. un-t. St. Petersburg, 2015.

6. Stepanov, P.P. Solution of actual problems of oil and gas industry enterprises using the methods of game theory // Cybernetics and programming. - 2016. - No. 4. - P.11-17. DOI: 10.7256 / 2306-4196.2016.4.20162. URL: http://e-notabene.ru/kp/article_20162.html

7. Karpova, E.G. Managing innovation with the use of game theory // Regionology. 2011. № 3 (76). Pp. 64-70.

8. Korshunova, G.V.; Romanova, L.E. The use of game theory in the analysis of interactions of market entities // Economic analysis: theory and practice. 2006. № 9. P. 48-52.

9. Demyanova, O.V.; Rashitova, A.R. The application of the theory of games for making strategic decisions on the example of a Russian company // Financial analytics: problems and solutions. 2016. No. 33 (315). Pp. 52-60.

10. Zhao, Q.Z.; Wang, C.Y.; Zhang, Z.M.; and others. The Application of Operatons-Research in the Optimalization of Agricultural Production, Operatons Research, 1991. Volume: 39, Issue: 2. P.: 194-205.

11. Ma, Shuang; Du, Gang; Jiao, Jianxin (Roger); etc. Hierarchical game joint optimization for product family-driven modular design // Journal of the Operational Research Society. 2016. Volume: 67, No.: 12. P.: 1496-1509.

**Contact**

Maria Koroleva

Samara State University of Economics

141, Sovetskaya Armiya str., Samara, Russia, 443063

mariaafony@gmail.com


Anna Kuderova

Samara State University of Economics

141, Sovetskaya Armiya str., Samara, Russia, 443063

annkuderova@yandex.ru