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EVENTS AND SCIENTIFIC CONFERENCES

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THE SCIENTIFIC CONFERENCE'S RESULTS: LOGISTIC VIEW "Mathematical modeling, optimization and information technology"

The economic consequences of the global COVID-19 pandemic have come as a shock to global and national economies, and its effects will be felt for a long time for different spheres. Quarantine restrictions have been added to traditional uncertainties such as changes in consumer demand and market conditions, reciprocal trade restrictions and climate change, which together increase logistics risks and complicate the management of the global supply chain, reduce it resilience and change its configuration.

Instability, complexity and uncertainty in the management of logistics systems and global supply chains raise the issue of finding new approaches to optimizing both individual logistics business processes and complex transport and logistics systems and networks of trade. One of the effective optimization tools is to use big data on the current state of objects and mathematical modeling, because they can be used to describe and optimize any business processes that depend on many variables. This is especially true in the field of logistics, as any logistics company currently operates a variety of information and communication technologies, including TMS (transport management systems), WMS (warehouse management systems), YMS (territorial management systems), CRM (customer relationship management system), ERP (enterprise resource management systems), etc. Thus, the combination of existing information infrastructure, databases and mathematical models can be a new source of improving the efficiency of supply chain management and logistics systems in general.

In this regard, we would like to draw the attention of the logistics business community to the results of the 7th International Scientific Conference "**Mathematical Modeling, Optimization and Information Technology**", which took place from 15th to 19th of November, 2021 in online format. The event was part of the project CPEA-LT-2016/10003, funded by the Norwegian Agency for International Cooperation and Quality Improvement in Higher Education (DIKU). The conference was organized by the participants of the project: Transports, Informatics and Communications Academy of the Republic of Moldova, V.M. Glushkov Institute of Cybernetics of National Academy of Sciences of Ukraine, Moldova State University, Taras Shevchenko National University of Kyiv (Ukraine), Norwegian University of Science and Technology (Trondheim, Norway), Batumi Shota Rustaveli State University (Georgia), Ivan Javashi Tbilisi State University (Georgia), International Institute for Applied Systems Analysis (IIASA, Austria), Applied Systems Analysis National Academy of Sciences of Ukraine.

The conference was attended by researchers and scholars from academic institutes and universities of Ukraine (52), Moldova (13), Georgia (8), Austria (2), Norway (1), Azerbaijan (2) and other countries.

The purpose of this scientific event is connected to the project CPEA-LT-2016/10003 objectives and was to create a discussion around the theoretical and empirical problems of modeling complex systems, solving various optimization issues and active development of modern information technology; establishing scientific communications between young researchers specializing in systems analysis, risk management and modeling. The leitmotif of the conference was the use of innovative technologies in science, education and industry.

During the five busy days, were held 5 plenary sessions and 12 sectional meetings in the following areas:

– Modeling of transport systems and logistics,

– Optimization methods, stochastic processes and optimal management,

– Economic and mathematical models and methods

– Information technologies and software systems

– Innovative technologies and risk management in the industry, transport and services in the face of modern challenges

80 reports were heard, representing scientific schools of Moldova (13), Ukraine (52), Russia (2), Georgia (8), Azerbaijan (2), Austria (2), Norway (1).

Based on the results of the meetings and discussions, we would like to draw special attention to the possibilities of using the work of leading scientists to solve practical logistics problems.

1. 1. In the Stetsyuk P.I., Nurieva U.G., Nurieva F.U. report was presented a new model of integer linear programming for the travelling salesman problem, which combines the constraints of two classical problems in order to avoid breaks in the Hamiltonian cycle. The presented model can have wide practical application for the decision of extremely actual logistical problem of "last mile". It is well known that optimizing the final link of goods delivery directly to the consumer is quite difficult, because you need to take into account many factors: the exact place and time of delivery, traffic, special conditions of a particular order and others. The proposed mathematical model and the method of its solution allow to take into account many delivery conditions and choose the best route.

2. Interesting approaches to solving complex transport problems were presented in the report of Kozin I.V., Zemlyansky A.A. on the topic "Hybrid metaheuristics in the search for optimal routes". The authors proved that almost all problems related to the building of optimal routes on the graph can be formulated as optimization problems on a fragmentary structure. Such tasks include options for travelling salesman, road inspection, village postman and more. To find suboptimal solutions on a fragmentary structure (set of subsets of a finite set), scientists used hybrid algorithms representing combinations of known metaheuristics (in particular, the simulated annealing method, the evolutionary algorithm, the mixed jump frogs' algorithm) and a fragmentary algorithm.

3. Two- and multi-stage transport problems attract the attention of scientists. In particular, the report of P.I. Stetsyuk and V. Stovba proposed two modifications of the classic two-stage transport problem, provided that the number of intermediate points is given and their capacity is limited at the bottom and top. The first modification can be used in the distribution and delivery of grown products for sale or processing at the own facilities of agricultural enterprises. The second modification is relevant for finding a rational location of a given number of warehouses, taking into account the specific location of suppliers and recipients of technical resources. It can be used to determine the appropriate locations in the unified energy system of Ukraine of electricity

storage and their energy consumption. D.I. Solomon presented various modifications of multi-stage transport tasks that are widely used in various areas of the agro-industrial sector.

4. Another urgent problem in logistics is the packaging processes' optimization. In this context, the report of T. Romanova from the Institute for Mechanical Engineering Problems of the National Academy of Sciences of Ukraine on the topic "The sparse packing and its application" is of interest. This problem is motivated by the thermal energy method applied for cleaning complex shaped parts (objects) obtained by additive technologies (3D printing) from particles of non-sintered powder. The sparse packing is aimed at place the objects as distant as possible, freely sliding and rotating on the horizontal shelves of the cylindrical container subject to balancing conditions. A corresponding nonlinear programming model is derived, using the phi-function technique.

5. Inventory management is a traditional problem in logistics. Despite the large number of existing formulations of these problems and methods of solving them, the Institute of Cybernetics has developed a new method, which was presented in the report of M.S. Dunaevsky "Optimal inventory management in the condition of uncertainty". The author proposed to compare two inventory management strategies - maximization of demand fulfillment and maximization of profitability. The optimal level of inventory, determined on the basis of deficit and excess costs, is a great profitable alternative for a small company that does not require a high speed of demand or simply conducts its trading business over the Internet and does not need to be widespread.

More detailed information about the work of the conference MMOIT-2021 is presented on V.M. Glushkov Institute of Cybernetics of National Academy of Sciences of Ukraine website in "Events" section, which contains the program and materials of the conference http://new.incyb.kiev.ua/podrzdeleniya/viddilennya-matematichnoi-kibernetiki-ta-sistemnogo-analizu/viddil-metodiv-negladkoyi-optimizaciyi/konferenciya-mmoti-2021?show=1

During the numerous discussions, the conference participants paid considerable attention to the possibilities of using the presented scientific developments in real sectors of the economy, in particular, transport, logistics and energy. That is why it was decided to hold a separate scientific-practical conference "Modeling of transport systems and logistics", which will be held in March, 2022. We invite everyone to join this event and present the results of their research to a wide range of scientists and practitioners.

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Doctor of Technical Sciences, **D.I. Solomon**,
Co-Chairman of the conference organizing committee,
Doctor of Physical and Mathematical Sciences, **P.I. Stetsiuk**,
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