ABSTRACTS

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The generalized model of an enterprise strategic management based on system optimization / M. D. Godlevskiy, N. U. Romanovich // Bulletin of NTU "KhPI". Series: System analysis, management and information technology. – Kharkiv : NTU "KhPI", 2014. – № 61 (1103). – P. 3–7. – Bibliogr.: 5. – ISSN 2079-0023.

The concept "strategic management" was first used at the junction of 60-70-es of the 20th century to indicate the difference between the current management at the level of production and management, which is carried out at the highest level of an enterprise. In this case, the focus is transferred to the external environment to respond adequately and timely to the changes taking place in it.

As a tool, which generates the process of strategic management of enterprise development, the key performance indicators are used. On the basis of system optimization ideology the method for the development of effective solutions, which, depending on the class of system optimization problem can be "discovered" as a set of various models, algorithms, techniques is proposed. The method is based on solving the problem of multi-criteria optimization providing that the original purpose and capabilities of the company are incompatible. Multi-criteria optimization is carried out using the concession and limitation method.

Keywords: strategic management, key performance indicators, optimization system, concessions method, limitation method.

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Models of transportation problems and structural-topological synthesis in the strategic management of logistics distribution / I. M. Godlevskiy, A. A. Pinaeva // Bulletin of NTU "KhPI". Series: System analysis, management and information technology. – Kharkiv : NTU "KhPI", 2014. – № 61 (1103). – P. 8–13. – Bibliogr.: 5. – ISSN 2079-0023.

A corporate strategy of the company is shaped from marketing, logistics and production strategies. A strategic goal in the logistics domain consists of several sub-goals, one of which is to configure the logistics network. Models and algorithms for solving transport problems and selecting placement of manufactures and warehouses are used in order to solve the configuration problem. This paper considers the layered structure of the logistics distribution network of two intermediate levels for mass consumer goods, which are presented by disaggregating and consolidating warehouses.

The purpose of the work is the development of transport problems models and selection of the intermediate warehouses location due to a given location of a manufacture.

To achieve this goal the decomposition of the whole problem is carried out and separated into two sub-tasks: the task of dispersion; the task of consolidation and the task of products disaggregation. The first model degenerates into a problem of structural-topological synthesis with Boolean variables, as a result of its solving the consumption warehouses are attached to certain disaggregated warehouses.

The second model is a transportation problem with intermediate nodes which is converted into an ordinary transportation problem of linear programming with continuous, integer and Boolean variables. As a result the location of consolidating warehouses and product flows from manufactures to disaggregated warehouses are defined. The branch and bound method is used to solve these two sub-problems.

Keywords: logistic network, distribution, decomposition, transport task, linear programming, method of branches and borders.

The use of discrete analogue of the state vector derivative in the control law at the synthesis of a stabilizing inventory control / Yu. I. Dorofieiev // Bulletin of NTU "KhPI". Series: System analysis, control and information technology. –Kharkiv : NTU "KhPI", 2014. – № 61 (1103). – P. 14–23. – Bibliogr.: 12. – ISSN 2079-0023.

The problem of stabilizing inventory control synthesis under the action of an unknown but bounded external demand and structural constraints on the values of states and control actions is

consider. Control law is designed as a linear time-dependent feedback using the discrete analogue of the state vector derivative. This control method allows to form the desired dynamic properties of a closed system with incomplete information about the external disturbances. The concept of invariant ellipsoid is used for the evaluation of the closed system reachability set. The control synthesis problem is reduced to a set of semidefinite programming using the technique of linear matrix inequalities. The numerical example is consider. Numerical solution of the problem is obtained by using freely distributed software implementation of methods for solving convex optimization.

Keywords: inventory control, reachability set, invariant ellipsoid, linear matrix inequality, semidefinite programming.

The problem of maneuverability for units of nuclear power plants in Ukraine was analyzed and to solve this problem need to modernize the systems of automatic control units was justified. The linear model for unit of nuclear power plants with reactor WWER-1000 to analyze transients after changing load of the electrical generator were shown. On base of this model the synthesis of optimal automatic control systems in normal operation modes with various regulators was made. Transients of changing state of power unit were shown. According to its temporal characteristics of these processes do not contradict the possibility of work power unit maneuvering modes. For research of the compromise combined method of control that provided stability of the reactor, the multizone model of nuclear reactor with calculation of axial offset in the model of power unit was used. Disadvantages of different models and methods of control by power unit of nuclear power plant in order to improve its control system were analyzed.

Keywords: unit of nuclear power plants, automatic control system, analyses and synthesis methods, mathematical models, transients.

The question of difficult and nonstationary dynamical processes that take place in sugar production have been examined in this work. There have been determined basic, commonly used, effective methods and schemes of neurocontrol of technological processes: direct and indirect methods, consecutive scheme of neurocontrol, scheme of inverse spread in time, parallel neurocontrol and direct accommodative control. For each of examined methods there have been handpicked neural network models. There have been made the analysis of these models, also the analysis of controlling of process in sugar production based on applied neural networks. There have been particularly analyzed different approaches in neurocontrol of technological processes. There have been received algorithms of settings of neuroregulators according to appropriate quality criteria of controlling, also allows to take into consideration changes of incoming and outgoing signals in automatic system of controlling of processes. Improvement of properties of obtained algorithms reaches by using methods of controlling theory, by means of taking into consideration not only the incoming and outgoing values, but also their foretold values.

Keywords: sugar production, technological process, neural network, controlling, algorithm, quality criteria, object, signal, identification.

The constructions method of the information technology by decision support system for multilevel enterprise with seasonal activities / P. O. Chikunov, O. O. Krivodubskiy // Bulletin of NTU "KhPI". Series: System analysis, control and information technology. – Kharkiv : NTU "KhPI", 2014. – № 61 (1103). – P. 40–524. – Bibliogr.: 6. – ISSN 2079-0023.

The work is devoted to solving scientific problems of formation a constructions method of the information technology by decision support system based on systematic analysis of the characteristics of the technical and economic activities in processing enterprise with multi-level management structure and the seasonal nature of the formation and execution of the order book and with multilevel forecasting seasonal and monthly indicators, with polyvariance determination of optimal values loading of capacities and operational management of processing complex. In method are includes: the system analysis of the characteristics of the enterprise, the development of logical-formal models of relationship performance, static mathematical models of seasonal planning, dynamic models of operational management, functional goals of optimal control, numerical procedures for solving equations and finding optimal solutions and an algorithm of information technology. Static statistical models of strategic and tactical planning differs from the existing by subject areas and recurrent adaptation process. Dynamic deterministic real-time model differ from existing by adaptive parameters estimation procedures. An improved method for coordinated interaction of decision-makers in determining the performance of the production program, which consists of a hierarchy of subordination making solutions for different criteria.

Keywords: decision support system, information technology, systems analysis, management criteria, multi-level system management, process modeling, planning and management, control algorithms.

Development of functional schemes and algorithms for decision-making system in the planning of orders sheet rolling production / S. O. Kosylov // Bulletin of NTU "KhPI". Series: System analysis, control and information technology. – Kharkiv : NTU "KhPI", 2014. – № 61 (1103). – P. 53–60. – Bibliogr.: 10. – ISSN 2079-0023.

There have been developed decision support system in solving the problem of optimal scheduling for class technological objects conveyer type with technological pause before processing on units and limited by order turnaround time. The result of this development has been presented as a structure and algorithm of the system optimal planning of orders for sheet rolling production. In addition, the method of accounting for time constraints in solving the problem of optimal planning has been proposed. The system is implemented in the form of automatic workplace for a person who makes decisions and allows multivariate estimates of the production program. There have been made conclusions of the advantages of the developed approach to planning and increase production efficiency in its use.**Keywords:** optimal planning, mathematical models, decision support system, optimization criteria, objective function, duration of the delay, the algorithm.

The optimization algorithm of uniform flow in the weighted graph with constraints on bandwidth of vertices / S. A. Tsybulnyk // Bulletin of NTU "KhPI". Series: System analysis, management and information technology. – Kharkiv : NTU "KhPI", 2014. – № 61 (1103). – P. 61–65. – Bibliogr.: 2. – ISSN 2079-0023.

We propose an iterative algorithm for selecting optimal source intensities of the uniform flow in the weakly connected weighted graph, while every pair of its vertices is connected by no more than one path, with constraints on the bandwidth of vertices and fixed transmission (transformation) ratio of flow along the arcs. The computational scheme is an iterative procedure that uses a piecewise linear approximation of the function of the flow sources intensity at the vertices of the graph. The algorithm can be used to select the optimal water conservation measures providing normative quality of surface water in the basin according to the dominant or integral indicator of return water composition.

Keywords: body of water, water conservation measures, mathematical model, weighted graph, uniform flow, optimization.

Method of multiple-formal representation audit domain / T. B. Neskorodeva // Bulletin of NTU "KhPI". Series: System analysis, management and information technology. – Kharkiv : NTU "KhPI", 2014. – № 61 (1103). – P. 66–74. – Bibliogr.: 3. – ISSN 2079-0023.

The method of multiple-formal representation of the audit domain for a comprehensive analysis of the following areas: types of work (supply, production, sales, financial and economic activities); The structure of the analysis domain is presented as a union of sets of data on the direction considered and determined the relationship between the data sets. The method is illustrated by the account of direct material costs in the calculation of the production cost. Converting data analytical account of direct material costs in the calculation of cost of production is formalized as a multilayer directed graph whose vertices – analytical account of the account of current assets, ribs – accounting transactions of material costs. Transmission, storage, data conversion is performed according to the structure of the graph and at all stages shown in the domain analysis of the relevant departments and activities.

Keywords: multiple-formal representation, the subject area of audit, a comprehensive analysis, account of the direct material costs, method.

Development of mathematical and algorithmic support of information technology analysis of the financial condition of the issuer / A. V. Shmatko, L. S. Ovechkina // Bulletin of NTU "KhPI". Series: System analysis, management and information technology. – Kharkiv : NTU "KhPI", 2014. – № 61 (1103). – P. 75–80.– Bibliogr.: 5. – ISSN 2079-0023.

Method of complex financial analysis of the issuer's securities using fuzzy concepts proposed. Overview of the most common methods of analysis of the financial condition of the company is made. Analysis of existing methods and models for assessing the financial condition of the company held. The main drawbacks of existing methods and models for assessing the financial condition of the company are shown. The main stages of risk assessment described in bankruptcy. The main parameters used in the analysis of complex financial condition of the company are defined. The classification of the risk of bankruptcy of the company performed. Description software that implements the proposed method performed. Developed software that implements the method of complex financial analysis risk of bankruptcy will improve the quality of managerial decisions when choosing investment options.

Keywords: stock market, issuers, bankruptcy, financial condition assessment, fuzzy representation

Computational method for the surface atoms identification in the molecular dynamics data / I. I. Marchenko // Bulletin of NTU "KhPI". Series: System analysis, control and information technology. – Kharkiv : NTU "KhPI", 2014. – № 61 (1103). – P. 81–86. – Bibliogr.: 5. – ISSN 2079-0023.

We propose a method of processing data obtained from the by molecular dynamics simulation of the formation of thin films for identification of the surface particles of material. The value of the electron density around each atom can be used as a criterion of atom affiliation to the surface of the material. As a result, the problem of finding the surface atoms is reduced to the processing of three-dimensional array. Value of each element is the electron density in the geometric point corresponding to the geometric center of the array element. This method has been tested for several typical examples and showed the correct results. The results of the proposed method can be used to find the density, roughness, microstrain, etc.

Keywords: mathematical modeling, molecular dynamics, calculation algorithm.

The procedure for solving the control problem of the investment portfolio structure for an individual person / A. E. Goloskokov, I. D. Kriukov // Bulletin of NTU "KhPI". Series: System analysis, control and information technology. – Kharkiv : NTU "KhPI", 2014. – № 61 (1103). – P. 87–96. – Bibliogr.: 9. – ISSN 2079-0023.

An approach to the management structure of the investment portfolio of an individual, in which you need to determine the optimal strategy for managing the investment portfolio by finding the risk structure of the portfolio and capital allocation between different types of assets. Considered one of the main portfolio theory - Markowitz model, which is fundamental in the theory of portfolio investments

and is used when the structure of the risk portfolio. In the allocation of capital between risk and risk-free part of the portfolio management is used in the form of feedback based on the Pontryagin maximum principle. The allocation of capital between the different types of investments carried out in such a way that the real capital of the portfolio should be a capital investor specified benchmark portfolio with a given yield to them.

Keywords: investment portfolio management, assets, risks, stocks, bank deposits, individual, formation of an investment portfolio.

Here proposed to diagnose the state of the enterprise, as an approach to the determination of it's financial condition, to respend information avaible in a visual form, based on analysis of planned and actual values of paramentrs and further define the operation of the business plan. To determine the condition of the company are encouraged to use technology to work with imprecise information using neural networks.

The choice of artificial neural network topology as the process of setting it's structure was carried out on the basis of information obtained from commercial organizations, which are currently actively use this type of technology. The developed software based on modern programming concepts using basic design patterns. Moreover, this software can be used on any device that supports platform .Net 4.

Keywords: diagnosis, financial condition, enterprise, pattern recognition, naural network.

The actual problem of increasing the efficiency and maintain comfortable conditions in residential and industrial areas in conditions of significant fluctuation of temperature of environment is considered in the article.

One effective way for solution of this problem is the automation of process control in relation to individual heat points of multi-storey buildings.

The article gives a brief overview and critical analysis of the main stages and directions of development of approaches to the problem of automation of individual heating units. It is noted that the majority of control algorithms heating process based on the use of regulators of direct action, compensating the basic perturbation - a change of temperature of environment. Also, in a number of scientific researches, as an alternative, is suggested to build a system of automatic control of heating supply based on the combined principle of management.

The purpose of this article is a comparative analysis of different structures of automatic control systems (ACS) of heat supply.

The article offers simple thermal, electric and mathematical models of heating supply, as well as structural diagram of the combined ACS, allowing by a corresponding change some parameters of the model to analyze wide scale regulators and to compare them with each other.

Comparative analysis of different variants of the structure of regulators confirmed a significant decrease the time of transient process by using the combined principle of management of heating supply.

Keywords: heating supply, automatic control, individual heat points, electric and mathematical models, transient processes.

The paper presents the analysis of the problem of synthesis of ontological component in the intelligent core of decision-making system related to woods fire fighting. The paper suggests an approach of ontological knowledge system development concerning the strategy and tactics of woods fire fighting, woods pyrology and necessary resources as a totality of three domain ontologies. The mechanism of knowledge-based inference in the ontological system is described. The basis of the approach is made by METHONTOLOGY approach. The process of ontology construction within this approach breaks down into a series of sub-processes to create an intermediate representation. In accordance with the proposed methodology, we first construct a glossary of terms, then concept classification trees and binary relations diagrams. The use of ontological approach to the creation of systems with artificial intelligence is promising in terms of improving the efficiency of decision-making in emergency situations, as well as conservation of intellectual capital of experts.

Keywords: woods fire, tactics and strategy of fire fighting, decision support system, intelligent core, knowledge-based inference, ontology, ontological system.