ABSTRACT AND REFERENCES
CONTROL PROCESSES

A STUDY OF UNCERTAINTY OF EXPERT MEASUREMENT RESULTS IN THE QUALITY MANAGEMENT SYSTEM (p. 4-11)

Tetiana Bubela, Mykola Mykyychuk, Alla Hunkalo, Oksana Boyko, Olena Basalkevych

Since the quality of measuring in international practice is assessed by uncertainty of the results, and an apparatus for its calculation in the area of expert measurement has not been developed yet, the study focuses on the methods of estimating uncertainty of expert measurement results.

The authors have conducted analytical research on the sources of expert measurement results' uncertainty, among which the main ones herewith singled out are: imperfection of experts, wrong choice of their number, and assessment conditions. The system of expert quality indices and the methods of their identification are suggested in the article. It enables making the right choice of the optimum methods of estimating the expert quality indices in any concrete case. The expert assessment of the significance of student activity components with regard to their uncertainty calculation has proved that the most important component is a "study activity", and the least important one is a "social activity".

The suggested recommendations for standardizing the specialist experts' quality indices suggest setting the lower limits of the admissible values. It allows normalizing their characteristics and optimizing the process of their attestation and hereby ensures coherence in expert measurements.

Keywords: uncertainty estimation, expert measurement results, expert quality, standardization recommendations.

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DEVELOPMENT PROCESS MODELS FOR EVALUATION OF PERFORMANCE OF THE EDUCATIONAL ESTABLISHMENTS (p. 12-22)

Tatyana Otradskaya, Viktor Gogunskii

Known methods of forming the generalized quality indicators of educational institutions, as a rule, provide for the averaging of many parameters. These technologies do not take into account the heterogeneity of indicators that cannot be represented by a single indicator. Parametric formalization of the educational system on the basis of modeling allows the switch to multifactorial quality assessment, which creates conditions for the proactive improvement and enhancement of performance of educational institutions.

In this paper, a generalization of the management structure on the basis of the process approach and the factors of influence on the results of the processes to predict the quality of separate processes and organizations in general is made.

The general concept for developing the forecasting models using the process structure of the organization and the vector of parameters of influence on these processes is proposed. Its essence is to create a multi-level structure of processes and calculate the quality of each process in steps, which correspond to the levels of processes. To calculate the quality of each process, the types of parameters that influence them, the methods for their normalization and determination of values are identified. Initial direct and reverse parameters are conditionally singled out. The function of the quality evaluation of processes, which is a dependence of the estimated quality on the actual values of parameters and their weights of influence on the process is proposed.

The generalized concept can be applied to the development of the quality forecasting model of educational institutions.

Keywords: educational institutions; quality evaluation; proactive management, decomposition; modeling; generalized indicators.

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DEVELOPMENT OF ALGORITHMS FOR EFFICIENT MANAGEMENT OF FIRE RESCUE UNITS (p. 22-28)

Ivan Pasnak, Oleksandr Prydatko, Andriy Gavrilyk

The need of development of efficient algorithms for the integrated management of the fire rescue units' activities from the moment of recieving the notice of the fire until return to the depot was substantiated. The need to assess the travel time of a fire extinguishing vehicle to the place of the call and fire area as key drivers of successful fire elimination was substantiated. We received a dependency that allows setting the value for the area of the fire depending on the duration of its free development and linear velocity of expansion. The analysis of this dependency shows that even a slight reduction in the duration of the free development of fire will significantly reduce the fire area and, accordingly, the amount of due losses. To design the algorithm of efficient management of the fire rescue units' activities using the software package STATISTICA, dependencies were received allowing setting the values of travel time of a fire extinguishing vehicle to the place of the call and, as a consequence, the area of the fire, depending on the distance to the destination of the call and the time of day. On the basis of the received dependencies a block diagram was created of algorithm-simulation model of efficient management of the fire rescue units' activities. The algorithm makes it possible to determine the optimal routes of fire rescue vehicles and calculate the area of a fire by proposed dependencies, as well as to choose the optimal technology for fire extinguishing. A computer software program, developed on the basis of this algorithm, will allow the head of fire extinguishing to facilitate the calculation of the parameters of development and elimination of fire, as well as the optimal quantity of capabilities for its elimination. A program to select the optimal technology of firefighting was also considered. The program for PC was written in the programming language C# for the Windows XP and Windows 7 operating systems. As a result of the program's work for grade A and B fires, we receive the estimated quantity of forces and facilities for elimination of fire.

Keywords: fire rescue unit, special purpose vehicles routing, assessment of the travel time, parameters of a fire, fire extunguishing technology, fire-fighting machines.

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E-READINESS EVALUATION MODELLING FOR MONITORING THE NATIONAL E-GOVERNMENT PROGRAMME (BY THE EXAMPLE OF UKRAINE) (p. 28-35)

Tetiana Fesenko, Galyna Fesenko

The study has produced a critical review of the current approaches to developing international indices on the e-maturity of a country and analysed their criteria system. The authors have identified the specific dynamics of the programme "Electronic Ukraine" on the basis

of sub-indexes of international systems of e-governance assessment. Ukraine, with its consistently high rates of human capital and progress in the development of the telecommunications infrastructure index, has been found prone to regression in terms of its online services index (OSI). Therefore, it has been suggested to use a system of weighting coefficients instead of the average weight measurement system of e-development (the United Nations E-Government Development Index). The authors have revealed that online services in Ukraine are mostly narrow-focused on providing information, whereas the transaction and participatory forms remain underdeveloped. To achieve progress at all OSI stages, the study suggests extending the system of sub-indexes in terms of assessing the e-readiness management level (both the political and legal environment for implementing e-projects and the main stakeholders). The four stages of OSI development have been extrapolated onto the Project Management Maturity Model (PMMM), and dependence has been revealed between the development of transactional services and the achievement of the third level in the management system ("a singular methodology"). The study offers recommendations for effective management of e-government programmes as to the choice of criteria for monitoring e-projects. The authors suggest evaluating the implementation of the "Electronic Ukraine" programme by the following parameters: "conformity to the strategy", "realistic programme feasibility achieved by the project team", "stakeholders' influence", and "compliance with the beneficiaries' needs". Eventually, the study has developed a model of evaluating the Electronic Ukraine programme with regard to the problem of multi-criteria mathematical programming. The suggested system of evaluating progress in the implementation of e-programmes contains sub-indexes that attract the stakeholders' attention not only to the individual values obtainable by achieving the objectives of a programme but also, in the case of Ukraine, to the possible progress of the country in improving its position according to global indexes.

Keywords: e-government, e-readiness, online service, stakeholders, programme management, management maturity.

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INFORMATION SUPPORT MODEL OF PRODUCTION TRUNSFUSION PROCESSES (p. 36-43)

Alina Mikhnova, Dmitro Mikhnov, Kateryna Chyrkova

A model of information support of production transfusion processes is offered. Formalization of content of information support of processes is performed for the model with the requirements of the regulatory framework, with the decomposition of production transfusion processes, with the quantitative and qualitative data estimates for the information support of processes. Analysis of global trends of automation of production transfusion processes, properties and functional characteristics of specialized medical information systems for blood services allows formally provide a functional structure of the system which provides information support. A feature of the model is the possibility with different levels of detail to formalize the information support highlighting the data collection control point, and thus, in general (roughly) or deployed (in detail) review evaluated system to meet the requirements. In addition, the model takes into account the varying degrees of importance of the data received for information support, and varying degrees of automation of functional modules of the system.

The resulting model allows for the generalized indicator to access the compliance of information support to the requirements of normative standards of quality blood products, which can be used to determine the value of the reference indicator of the generalized information support and the level of compliance with the information support of the test system to a reference system.

Keywords: production transfusion processes, specialized medical information system, information support model.

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FORMATION OF METHODOLOGICAL LEVELS OF ASSESSING CITY PUBLIC PASSENGER TRANSPORT EFFICIENCY (p. 44-51)

Volodymyr Vdovychenko, Yevgen Nagornyy

The need of the investigation of the efficiency of the city public passenger transport was substantiated from the positions of a system approach. The principles of the system approach are implemented by representing the city public passenger transport as a constituent element of the city environment at the metasystem level. On the basis of the defined stages, the methodological levels of the city public passenger transport assessment were defined, the analysis of the inter-level connections was carried out and the principles of its systematic assessment of its functioning efficiency were formulated. On the basis of the synthesis of the inter-level parameters of the efficiency assessment and the quantification of the advantages of the elements states, taking into consideration the conditions of accounting the function of the increment in the metasystem effectiveness, the formalization of the constituent elements of the assessment of the city public passenger transport system efficiency was presented.

The presented approach to the assessment of the city public passenger transport efficiency opens up the new opportunities in terms of understanding the problems of functioning efficiency increase and is based on the accounting conditions of forming the effective state of the whole metasystem.

By the investigation results, the expediency of determining the hierarchical forms – composition, structure, organization and metasystem – as the methodological levels of investigating the city public passenger transport was established.

The proposed levels and the formalization of the conditions of the inter-level influence reflect the terms of the formation of the purpose hierarchy of the city public passenger transport functioning in the city environment; they form the basis for designing the functional strategies of the transport system development and creating the analytical models of the formation of the organizational and managerial aspects of its functioning.

Keywords: city public passenger transport, metasystem, system efficiency, methodological level of investigation.

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DEVELOPMENT OF THE METHOD OF EFFICIENT MONITORING OF THE MAIN ACTIVITY OF A TRAIN DRIVER (p. 52-58)

Valerii Samsonkin, Yaroslav Petinov

A method of monitoring the state of a train driver with the use of his/her individual standard and the rules of the justified differential interference in the operating activity was developed. This gives an opportunity to increase the train motion safety up to qualitatively new level. Furthermore, the method makes it possible to effectively control the reliability of the "human factor", a train driver, under real conditions. As a result of the studies, the algorithm of specifying the degree of a train driver's behavior deviation from his/her normal state during the process of controlling the train was suggested.

Its essence lies in specifying the "not a standard"state by defining four levels: critical, warning, preventive and informational. Each level requires different actions regarding the interference in the control process of a train. The directions of the justified corrective actions concerning the control of the locomotive were determined. The criteria of their estimation were obtained due to practical application of the system approach, the characteristic feature of which is the use of dependence of the dispersion on the functional state of the system, and Shewhart's Control Charts.

The suggested method uses contemporary transport technologies, digital onboard instruments and microprocessor devices; it does not require additional equipment in the cabin (bracelets, buttons, handles, etc.). Technical application of the method can be integrated practically into any form of the traction rolling stock. In this case, a new form of vigilance control does not distract a train driver from the main activity and does not require any significant capital investments.

Keywords: train driver, individual standard, human factor, motion safety; monitoring of the state; vigilance control.

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