Abstracts and Keywords

I.A. Alekseev, Yu.S. Pyashkur, A.A. Weber, A.A. Koporulin

The Results of the Implementing the Project of a Software and Hardware Complex for an Alternative Method of Speech Perception by People with Hearing Impairments

Keywords: reduction of auditory function; auditory perception; hardware and software complex; compensation.

Abstract. The article presents the result of the work of a team of multidisciplinary specialists from Shadrinsk State Pedagogical University, who developed a software and hardware complex for the perception of g speech by people with severe hearing impairments. The project was implemented within the framework of the grant "Organization of project activities of students in a team of multidisciplinary specialists developing a software and hardware complex for the perception of spoken speech by persons with severe speech impairments". The goal of the project was to develop a software and hardware complex to ensure speech perception by persons with severe hearing impairments through vibration signals of Morse code. The project objectives included the development of a software and hardware complex that provides an alternative way of perceiving sounding speech by persons with severe hearing impairments: development of methodological recommendations for users on the use of the developed complex. The project hypothesis is based on the assumption that the use of Morse code in the form of vibration signals transmitted to a person with impaired hearing will improve the quality of perception of spoken speech. The research methods are analysis of existing technical means of speech transmission to people with hearing impairments; modeling of the software and hardware complex for the perception of sounding speech. The results are as follows: a specialized program "Vibrohearing" was developed and, on its basis, a specialized software and hardware complex was developed for people with impaired hearing. The complex was introduced into the work of the scientific laboratory "Technologies for diagnostics and correction of psycho-speech development of children" of the Federal State Budgetary Educational Institution of Higher Education "Shadrinsk State Pedagogical University".

M.G. Bashirov, A.R. Galikeeva, I.I. Tochka, D.A. Zabolotniy

The Development of Frequency Models for a Centrifugal Pump with an Electric Drive in Comsol Multiphysics

Keywords: modeling; centrifugal pump; malfunction; frequency characteristics; electric motor; technical condition; spectrum.

Abstract. The study deals with centrifugal pumps; these are devices designed to move various liquids. In oil refineries, they play a key role in pumping oil, petroleum products, liquefied gases, water, alkalis and acids. They operate in a wide range of performance, pressure and temperature. These pumps are one of the most complex types of equipment in the oil and gas industry in terms of repair and operation. The research tasks are to improve the usual requirements for pumps, such as reliability, durability, tightness of connections and faultless operation of seals become critical in such enterprises. Malfunctions in pumps and their components can cause disruptions in the operation of technological processes and, in some cases, accidents. This article describes the modeling of frequency models by means of a fast Fourier transform of the consumed currents and voltages by an electric drive of centrifugal pumps in the Comsol Multiphysics software package for further use in simulating defects in equipment and determining their diagnostic signs in frequency characteristics. As a result of the conducted research, the application of this simulation shows the results with high accuracy and expands the capabilities of the spectral diagnostic method for assessing the condition of centrifugal pumps with electric drive in its various operating modes.

M.S. Denisenko, V.Yu. Belash

The Development of the Structure of the Information System for Admission and Registration of Members of a Public Organization

Keywords: database; information system; public organization; application; program.

Abstract. Public organizations are an integral part of the life of modern society. According to the register of registered non-profit associations on the website of the Ministry of Justice of the Russian Federation, at the moment there are more than 59 thousand such associations in Russia. The purpose of the study is to create a software product to ensure the control of accounting of members of a public organization. The hypothesis of the study is the need to use such software tools in public organizations. The research methods include the analysis of the literature on application development, idealization and formalization of ideas about the implementation of software products, testing. The results are as follows: the created application is prepared for the implementation stage.

E.S. Ermolaev, A.M. Hafizov

A Fuzzy Controller for Controlling the Temperature Regime in the Azeotropic Drying Column and Separating the Pre-Benzene Fraction

Keywords: fuzzy controller; PID controller; control system; MATLAB- Simulink; CoDeSysV2.3.

Abstract. The purpose of this article is to increase the efficiency of control of the azeotropic drying process by developing an intelligent control system for this process. The object of the study is a model of a column designed for azeotropic drying. The task is to control the azeotropic drying process, which is one of the most important tasks for the production of ethylbenzene rectified. The research hypothesis is as follows: for the design of control systems for complex objects, an important role is played by solving problems of constructing adequate mathematical or simulation models and synthesizing control algorithms that provide solutions to problems in conditions of uncertainty. As a result of the study, a fuzzy logic controller is used to get a better response.

E.M. Kochkina, E.V. Radkovskaya, K.V. Chernyshev

Comparative Assessment of the Quality of Life in the Russian Republics Based on Multidimensional Statistical Methods

Keywords: dendrogram; hierarchical agglomerative methods; integral indicator; quality of life; cluster analysis; standardization; region.

Abstract. The purpose of the study was to analyze the quality of life of the population in the republics of Russia, with an emphasis on the Republic of Crimea, as a new subject of the Russian Federation. Considering the multidimensionality of the phenomenon being studied, the authors set the task of performing a comparative analysis based on special mathematical methods and showing the presence of both positive and negative shifts. The results obtained make it possible to identify both strengths and bottlenecks in the development of the republics and take into account the results obtained when forming priorities in the regional development strategy.

K.A. Kryshko, D.A. Zabolotny, E.S. Torgashov, Sh.D. Baimov

The Development of the Interface of the Digital Twin of the Hydrogenation Reactor Based on Yokogawa Centum VP

Keywords: digital twin; Yokogawa; process improvement; ethylene production; hydrogenation reactor.

Abstract. The development of digital twins is a rather complex process that requires taking into

account a large number of diverse factors affecting the future operation of the simulated object. The implementation of the digital twin is proposed to be carried out in one widespread functional programming environment of Yokogawa, which includes the entire range of functions performed for the implementation of both complex and simple technical objects. Along with the performed mathematical modeling, an equally important factor is the development of the interface of the technological object in question. It is required to develop a twin, the interface of which will be identical to the interface of the mnemonic circuit of a real object.

D.O. Lavrentiev, V.Yu. Belash

On Creating a Mobile Application for Accounting Students' Academic Performance: The Choice of Services and Development Technologies

Keywords: development; cross-platform application; Dart; Flutter; IntelliJ IDEA; PostgreSQL; SQL; RESTful API; HTTP request; client-server; network architecture; DB; DBMS.

Abstract. This article will address the issue of software tools and technologies for creating cross-platform mobile applications. The purpose of the study is to create a cross–platform software product to provide information support for the work of a teacher in an educational institution (monitoring progress, attendance and completion of work by students). The hypothesis of the study is the convenience of using such software in educational institutions. The research methods are analysis of the literature on application development, idealization and formalization of ideas about the implementation of software products, testing. The results are as follows: the created cross-platform application is prepared for implementation in the educational process.

A.A. Liuze

Approaches to Using a Risk Management System through the Prism of the Risk Management Compendium of the World Customs Organization

Keywords: risk management system; customs authorities; WCO Compendium; changing approaches to customs control at the stages of the supply chain.

Abstract. Today, customs administrations strive for a reasonable and fair balance between ensuring compliance and minimizing disruptions and costs to legitimate trade and the public. Thanks to the introduction of a holistic approach to compliance management based on risk assessment, optimal conditions for both simplification and border control can be achieved today. A reliable organizational risk management system is one of the prerequisites for a risk-based approach to compliance management. The system provides a framework and organizational mechanisms for risk management, enabling the identification, assessment and management of risks throughout the customs service, providing employees at all levels with the opportunity to make risk-based decisions in a structured and systematic manner.

O.V. Pashkovskaya, V.A. Suchkov

Information System for Assessing the Influence of Factors on Water Quality

Keywords: geographic information technologies; QGIS; data processing; environmental factors; water quality modeling.

Abstract. In the modern world, geographic information technologies are used to solve problems related to the conservation and restoration of natural resources. With their help, it is possible to monitor, process and analyze a large amount of data. At the present time, there are no systems that specialize in determining the quality of water in watercourses. The developed system is described, the functionality

of which includes obtaining a large amount of information from different sources, processing the data, storing it in a certain standard and publishing the results to further improve the system. A geographic information system and built-in modules for data analysis were created on the QGIS platform.

N.Yu. Yuferova, E.V. Bekusheva

Application of the Zarembka Floor Test for Selecting a Real Estate Valuation Model

Keywords: real estate; valuation model; quality of evaluation; Paul Zarembka test.

Abstract. The object of this research is residential objects of the secondary real estate market in Krasnoyarsk. The purpose of the study is to identify the best econometric model describing the dependence of the price of a residential object on the location of the object. In accordance with the purpose of the work, the following tasks were set: to build models for the evaluation of real estate using the database of real estate offered for sale in the first half of 2023; to perform calculations based on the Paul Zarembka test; to identify the model that provides the best match to the experimental data using the test results. The hypothesis of the study is that the cost of residential objects of real estate depends on the location of the object. The least squares method and the Paul Zarembka test were used in the research. The results are as follows: the best model for describing the dependence of the price of a residential object and the "prestige coefficient" of the area (the location of the object) has been identified.

S.M. Maltseva, T.A. Cherkesov, M.A. Zosimova, S.A. Shigaeva

Computer Crime: Types, Vulnerable Groups

Keywords: computer technology; youth; older generation.

Abstract. The purpose of this paper is to identify the degree of familiarity with the problem of computer crime of people of different age groups in the Nizhny Novgorod region. The hypothesis is as follows: the older a person is, the less he knows about the types of Internet crimes, risking becoming a victim of them. The research methods include the analysis of scientific literature on computer crime, questionnaires, a comparative analysis of data by age groups and types of computer crimes. The results are as follows: as a percentage, the most familiar category is young people under 20 years of age.

D.A. Skvortsova, K.D. Rudenko

Modern Management Methods in Transport Logistics

Keywords: Industry 4.0; logistics systems; Big Data; logistics analytics; supply chain; forecasting methods in logistics; RFID; IoE.

Abstract. The analysis of modern technologies used in transport logistics is carried out. As a result of the analysis, the main types of systems that are used for automation and optimization of the supply chain are identified. Technologies have been identified that increase the efficiency of logistics activities, as well as reduce costs. For example, RFID tags reduce labor costs by 30 %. Various methods of big data processing are considered, which allow optimizing the work of the logistics structure, as well as building forecasts and business prospects.

The purpose of research is to study modern technologies used in transport logistics. The research objectives are identification of the main types of modern technologies used for automation and optimization of the supply chain; identification of technologies that contribute to improving the efficiency of logistics activities and reducing costs; consideration of various methods of processing big data in order to optimize the work of transport logistics. The research hypothesis is as follows: the use of modern technologies makes it possible to significantly optimize the work of transport logistics, increase its efficiency and reduce costs. The research methods include the analysis of scientific and practical publications related to the topic of transport logistics and the use of modern technologies in it; the study

and analysis of data on the application of Industry 4.0 technologies, Big Data, forecasting methods and automation in transport logistics; the analysis and interpretation of data on the impact of modern technologies on transport logistics.

Ya.V. Fomichev, O.N. Galaktionov, Yu.V. Sukhanov, A.S. Vasilev

Wheeled Cross-Country Transport Platform for Forestry

Keywords: forestry; robot; robotic platform.

Abstract. The study aims to develop the chassis system and suspension of a robotic transport platform for work in the field of forestry. The objectives are to study the conditions of movement of the platform and the requirements for its running system; develop a suspension system that provides high cross-country ability and a horizontal working platform when traveling over rough terrain. To achieve the set goal and solve these problems, methods of brainstorming, analysis and synthesis were used. As a result of the work done, a suspension design was developed based on the use of triangular arms controlled by pneumatic cylinders.

D.Sh. Akchurin, D.A. Zabolotniy, R.S. Lyusov, Sh.D. Baimov

Introduction of Artificial Intelligence Technologies in the Petrochemical Industry of Russia

Keywords: artificial neural networks; artificial intelligence; non-destructive testing methods; electromagnetic-acoustic converter; ecology; technical condition.

Abstract. The study aims to analyze and develop proposals for the integration of artificial intelligence into the petrochemical industry.

The research tasks are to analyze the existing systems of using artificial intelligence in industry and to develop proposals for the introduction of artificial intelligence in the petrochemical complex of Russia.

The article provides an overview of existing machine learning methods that are used in artificial intelligence systems, assesses the prospects for their application in various fields and provides an example of the application of machine learning to assess the technical condition and forecast the resource of oil and gas equipment.

As a result of the conducted research on the example of the use of artificial intelligence technologies in the field of non-destructive testing methods, the importance of enhanced study of methods of using artificial intelligence technologies for the development of scientific and economic potential of Russia was identified and confirmed.

A.L. Blinova, P.V. Afanasieva

Risk Analysis in the Implementation of Metrological Control in the Form of SI Verification

Keywords: risk analysis; risk identification; metrological control; measuring instruments; verification of measuring instruments.

Abstract. The article presents the results of the analysis of potentially possible risks during the verification activity, taking into account the risk-oriented approach. This approach is established by the criteria of accreditation, as well as the requirements for the quality management system, the functioning of which is mandatory for accredited metrological services. Possible risks occurring during SI verification have been identified and their impact on the accuracy and reliability of measuring instruments has been determined. Risk analysis includes an assessment of various factors leading to possible sources of measurement errors. The risk analysis process is aimed at eliminating potential risks or reducing them to an acceptable level with the help of control measures, which should

ultimately contribute to the accuracy of measurements and reliable operation of customers' measuring devices.

A.A. Dmitriev, G.V. Shubin, S.P. Antoeva

Classification and Analysis of Various Damages and Failures According to the Main Elements of the Mechanisms of BelAZ-7555v Mining Dump Trucks

Keywords: expertise; industrial safety; damages; failures; quarry dump truck.

Abstract. 25 BelAZ-7555 dump trucks, which were operated at the Taborny quarry, passed the industrial safety examination at the Taborny Mine LLC. The most repeated damages and failures for dump trucks were identified on the following main elements; on the running mechanism, on the body, electrical equipment, on the hydraulic system. From the above graphs, the main total share of detected violations for the entire fleet of dump trucks refers to the block of the running mechanism, which is quite understandable, given the operating conditions of the specified equipment. The systematization and analysis of the various damages and failures obtained from the survey results, combined into the main elements and nodes, made it possible to identify and further predict the most common violations for individual main elements and nodes of dump trucks. Taking into account the complexity of the operation of mining equipment in harsh climatic, mining and geological conditions, as the analysis showed, both the quality of quarry roads and the equipment of the repair base of the enterprise with the appropriate qualifications of repairmen and drivers of dump trucks must meet certain requirements.

A.V. Kondrashova, R.I. Kuzmina

Study of Adsorption Properties of Flask in Wastewater Treatment Processes

Keywords: purification; waste water; natural silica; flask; dynamic mode; adsorption properties; sorption capacity; modification; diffusion kinetics.

Abstract. This article is devoted to wastewater treatment using natural silica – flask of the Saratov deposit. In the material, the authors consider one of the most effective methods of studying adsorption – dynamic mode. The article also pays great attention to one of the ways to improve the adsorption properties and sorption capacity – modifying the surface of this natural sorbent. To determine the flow and action of the sorption process, an attempt was made to study the kinetics of the sorption of ammonium ions. The authors suggested an intradiffusion mechanism of the process and calculated the diffusion coefficient.

M.M. Mursikaev

Organization of (Technological) Production in the Design of a Logistics Enterprise

Keywords: stochastic model; nonlinear model; project; technological structure; production; optimization.

Abstract. The relevance of this study is that the task of designing logistics management, organizational and technical systems usually belongs to the class of weakly predictable solutions with a high degree of uncertainty. The solution of such a problem depends on its specificity, structuring of the technological system so the choice of formalized, heuristic or intellectual procedures plays a key role. The object of the study is the production system, and the subject is the logistics enterprise, considered as part of the production system. The purpose of the research is to study the organization of technological production in the creation of a logistics enterprise. The methodology of the study consists in the selection and analysis of algorithms for the synthesis of the structure of the logistics and organizational-

technological system based on the principles of decomposition, identification, optimization and coordination of decisions to achieve the overall effect of the system that exceeds the sum of the effects due to each component of the logistics system separately. Within the framework of this article it was shown that structuring of logistic management of organizational-technological system in the process of designing and building an integrated structure of organizational-functional technological management system can be attributed to the class of stochastic models and can be formalized in the form of a nonlinear stochastic model.

A.A. Tatarkanov

Development of an Algorithm for Assessing the Quality of Deposition of Functional Coatings

Keywords: arc discharge; vacuum; deposition; mathematical model.

Abstract. The article presents the results of studies aimed at theoretical communication of methods for assessing the quality of deposition of functional coatings. In a practical sense, the work is aimed at ensuring the quality of coatings based on titanium nitride applied from a vacuum arc discharge. These coatings are designed to increase the durability of loaded surfaces of various products. To ensure the formation of coatings of optimal quality, it is advisable to use not only expensive empirical approaches, but also mathematical modeling. The paper provides an overview of the main features of the process of plasma deposition from a vacuum arc discharge and checking the quality of the resulting coating. The disadvantages of existing approaches are listed. The importance of developing specialized mathematical models for predicting the quality of coatings is demonstrated. A mathematical model of the vacuum arc coating process has been developed to assess its expected thickness and uniformity in a vacuum arc discharge. The developed model makes it possible to estimate the error in coating thickness with an accuracy of 0.05 to 1 micron.

E.G. Timchuk

Occupational Safety Control System of Food Industry Enterprises Based on Technology Computer Vision

Keywords: occupational safety control system; food industry enterprise-news; computer vision.

Abstract. Industrial safety, including occupational safety of production facilities, such as food processing enterprises, is increasingly being paid attention by government agencies. At the same time, legislative acts require the use of modern monitoring tools. Therefore, this article is devoted to the development of a model of the occupational safety control system of a food industry enterprise based on the use of computer vision technology.

M.V. Batyukov, V.A. Grechushkin, V.M. Kravchenko, M.V. Buneev

NLMK Group's Corporate Employee Motivation System

Keywords: corporate motivation system; material motivation of personnel; non-material motivation of personnel; social guarantees; goal-based management system.

Abstract. The purpose of the study is to review and analyze the elements of a motivational and systemic corporate incentive mechanism for NLMK Group employees. To achieve the purpose of the study, the tasks were set: to show the main corporate mechanisms and create favorable conditions for motivating staff to work effectively. The methods of comparative, logical, economic and statistical analysis were used in the study. The hypothesis of the study establishes a competitive remuneration system operating at the Group's enterprises and other ways of material and non-material motivation of employees, including: bonuses based on work results, expanded social guarantees and opportunities for professional development, which ultimately lead to more efficient functioning of the company. And a

high level of employee motivation makes it possible to simplify the management process and achieve organizational goals faster through job optimization. NLMK Group's corporate employee motivation system is a set of interrelated motivation elements that function in accordance with the conditions of the internal and external environment, while having the main goal of achieving the company's strategic goals. The achieved results show systemic corporate elements that encourage employees to work actively in the company – its mission, values, safety of production and labor, cohesion, the possibility of career growth.

O.V. Voronkova, Yu.E. Semenova, S.F. Sharafutina, V.N. Kuznetsova

The Impact of Irrational Investors on the Russian Stock Market

Keywords: qualified and unskilled investors; stock market pricing; investment market; "noise trading".

Abstract. In the conditions of the modern, constantly changing economic situation, interest in the stock market is increasing not only among professional investors, but also among unskilled investors. The purpose of the article is to consider the influence of unqualified investors on the pricing processes on the Russian stock market. The hypothesis of the study is the assumption that in the context of the changing dynamics of the financial market there will be an increase in the number of irrational (unqualified) investors. The main research methods in the article are the analysis of scientific and business literature, statistical data. According to the results of the study, the authors identified factors affecting pricing on the Russian stock market in the conditions of a massive influx of unqualified investors, as well as the fact that the use of the hypothesis of market efficiency in practice in Russia will not be able to demonstrate its effectiveness even in a weak form. Therefore, in the current conditions of the domestic market, the theory of "noise trading" will be more appropriate in the future.

A.A. Gradinarova

Stabilization Function of Public Finances

Keywords: public finance; stabilization function; stabilization; sustainability; budget.

Abstract. The purpose of this article is to study the stabilization function of public finance and its impact on ensuring macroeconomic stability in modern conditions. The main aspects of the stabilization function of public finance; measures and instruments used by the state to implement the stabilization function were analyzed. The hypothesis of the study suggests that the correct use of stabilization measures and instruments of public finance contributes to ensuring macroeconomic stability and reducing possible economic fluctuations. In the process of preparing the article, modern methods of scientific research were used: analysis, systematization, comparative study and other general logical methods. The study revealed that the stabilization function of public finance plays an important role in mitigating economic fluctuations and ensuring macroeconomic stability.

Li Xin, Jiang Ying, Zhang Rui

Research on the Economic Development Status of Islamic Mosques in China

Keywords: China; Islam; economy.

Abstract. The financial situation of Chinese Islamic mosques is an important part of the Islamic economy. This article uses a literary method to study the unique financial condition of Chinese Islamic mosques. The aim is to show the important role and economic status of Islamic mosques in the development of Islam in China, a manifestation of the close relationship between the financial situation of Chinese Islamic mosques and the development of Chinese society.

Yu.Ya. Rakhmatullin, E.V. Pushnyak, A.N. Kuzyashev

Regulation of Agricultural Markets

Keywords: food security; crop production; animal husbandry agriculture; product markets; Republic of Bashkortostan.

Abstract. The following main goals and objectives of the study, as well as the state program of the republic in the context of agricultural products, have been determined: to ensure compliance with the Doctrine of Food Security of the Russian Federation for production; create favorable conditions for the development of exports of agricultural products in the republic; ensure sustainable development of cattle breeding; increase the efficiency of the agro-industrial complex through the introduction of innovative and high-tech technologies, etc. The resulting gross harvest made it possible to meet a significant share of the Russian Federation's internal food needs, increase export potential, and also make a major contribution to ensuring the country's food independence. In the livestock industry, solving the problem of promptly increasing the production of meat and milk will make it possible to increase the level of population consumption of these products. More optimistic forecasts are associated with the development of pig and poultry farming. The results of the article were obtained using calculation-constructive, abstract-logical, monographic and other methods.

A.V. Semashko

A Study of Practical Approaches to Assessing Financial Literacy of the Population

Keywords: financial literacy; financial literacy index; financial behavior; financial knowledge; financial attitudes.

Abstract. The purpose of the article is to investigate practical approaches to measuring financial literacy of the population. The objectives of the research are reduced to the analysis of the methodology used to measure the level of financial literacy of the population, developed by the Organization for Economic Co-operation and Development. The methods of comparative analysis, systematic approach and other general logical methods of analysis were used in the process of preparing the article. The conducted research allowed us to study the dynamics of private and general indices of financial literacy in 2018–2022 based on the results of the All-Russian survey of the population of the Russian Federation.

Ya.A. Sokolov

Positioning a Region through Assessment of its Marketing Attractiveness

Keywords: attractiveness; region; marketing; evaluation; success.

Abstract. The purpose of the article is to analyze the positioning of the region based on an assessment of its marketing attractiveness. It is noted that the process of globalization has increased competition between regions for investments, innovations, new technologies, human, natural, material, and energy resources. A conceptualization of the concept of "marketing attractiveness of a territory" is formulated and the author's approach to its assessment is described. It has been determined that the effectiveness of positioning in the system of economic relations is determined by marketing attractiveness and a well-thought-out strategy for its development and management. The stages of region positioning are presented. It is concluded that thanks to the positioning of municipalities based on an assessment of their marketing attractiveness, they have turned from not very interesting cities, villages and territories into thriving centers full of new investments and satisfied tourists (and therefore residents).

E.V. Sukhanov, Yu.A. Yakushov

Economic Consequences of the 1998 Default for the Russian Federation

Keywords: default; government short-term bonds (**GKO**); federal loan bonds (**OFZ**); economy; crisis; barrel; dollar; ruble; government spending; budget deficit; borrowing; securities; government debt; devaluation; currency auction; denomination; inflation.

Abstract. Over the past 25 years (since August 17, 1998), the economic situation in Russia has not been optimistic. It remains as such at the present time. The study is devoted to the analysis of the declared technical default of the Russian Federation on the main types of government debt obligations of GKO (government short-term bonds) and OFZ (federal loan bonds). Default is the result of the country's ongoing economic downturn of the 1990s. The research method (the main method of writing the article) is the analysis of the consequences of the socio–economic state of the national economy of Russia and its impact on the financial situation of the country's residents. The idea is substantiated that the economic course of the state requires reform in both budgetary and banking systems.

E.V. Glebova, E.P. Lapteva

The Development of a System Management Structure for Public Catering Enterprises

Keywords: public catering enterprise; management; processes; process structure; process goals.

Abstract. The formation of a culture of food safety in public catering enterprises begins with the fulfillment of the requirements of the multi-stage structure of the legislation of the Russian Federation in this area, characterized by the presence of a large number of documents at certain levels. As a working hypothesis, it has been suggested that it is necessary to use system management at public catering enterprises in order to ensure compliance with the requirements of Russian legislation for this type of activity classified as high risk. As part of the study, an analysis of the provisions of GOST R ISO 22000-2019 (ISO 22000:2018) “Food safety management systems. Requirements for organizations participating in the food product creation chain” has been made; on its basis the possibility of its use for public catering enterprises was identified as the basis for the formation of a management system.

M.B. Ianenko, M.E. Ianenko

Directions and Problems of Development of Distribution Channels as an Element of the Marketing Mix in the Metaverse Concept

Keywords: marketing mix; distribution channel; digital transformation; metaverse concepts.

Abstract. The development of technologies of the metaverse concept has not only significantly changed the interaction with the consumer in the process of purchasing goods, but has also led to the rapid growth of markets for digital goods and services. The purpose of the article is to show the features of the marketing mix of real, digital, virtual goods, using analysis of the transformation of marketing, its development and application in the digital environment, as well as to formulate recommendations for the use of marketing tools in distribution channels. To achieve this goal, , the need to transform distribution

channels is shown through the systematization of the experience of using digital technologies, creating metaverses, describing their influence on the elements of the marketing mix; recommendations for improving digital marketing strategies in distribution channels are provided.

The study used general scientific theoretical and empirical research methods. The main results of the study are to identify patterns of development in distribution channels that make it possible to formulate strategies for innovative development of companies based on a set of activities in the real world and virtual environment.