

Lecture Notes in Networks and Systems 575

Alexey Beskopylny
Mark Shamtsyan
Viktor Artiukh *Editors*

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Editors


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Contents

Formation of Depressive Areas in the Area of Quarries and Mines on the Example of the City of Bakal	1
Valentina Kurochkina	
Ecological Aspects of Reverse Osmosis Application for Drinking Water Supply	13
Dmitry Spitsov and Alexey Saimullov	
Impact of MSW Landfills on Humans and the Environment	27
Valentina Kurochkina	
Effectiveness of Regulatory Mechanisms of the Oil and Gas Industry in the Context of Environmental Problems	38
Tatyana Butova, Vasiliy Varzin, Shakizada Niyazbekova, Zeinegul Yessymkhanova, and Svetlana Anzorova	
Environmental Aspects of Innovative Development of Industrial Sectors	50
Shakizada Niyazbekova, Svetlana Anzorova, Lida Tochieva, Makka Goigova, Tamara Dzhholdosheva, and Gulnaz Supaeva	
Characteristic Properties of the Vegetation Cover of the Irtysh River Floodplain in the Vicinity of Tobolsk	59
Boris Kharitontcev, Elena Popova, and Venera Allayarova	
Schematization of the Landslide Area “Vorobyovy Gory” in Moscow, Taking into Account the Position of the Top of Callovian and Carboniferous Deposits	72
Mikhail Kropotkin	
Environmental Aspect in the System of Forming Adaptive Strategies for Regional Development	80
Tatyana Burtseva, Nataliya Mironova, Elena Volk, and Yuriy Bakrunov	

Impact of Outdoor Advertising on the Urban Ecology Taking into Account Regional Characteristics	87
Anna Fedyaeva, Angela Mottaeva, and Tatyana Larinina	
Features of Monitoring the Ecological Situation of the Urban Environment	97
Elena Ganebnykh, Ekaterina Berezina, and Elena Vasilyeva	
Channels for Perception of Ecological Situation by Youth	107
Elena Ganebnykh, Yulia Igoshina, and Igor Pryadko	
«Green Economy» as the Innovative Factor of Sustainable Regional Development	116
Natalia Kataeva, Alexey Sysolyatin, Yuriy Bakrunov, and Darya Starkova	
Ecological Monitoring of Caesium-137 Activity by Phenotypic Plasticity of Hymenophore <i>Leccinum holopus</i>	130
Dmitriy Ivanov and Evgeniy Ivanov	
Influence of Anthropogenic Load in Plant Communities with <i>Pinus sylvestris</i> L. In the West Siberian Subarctic Region	142
Elena Popova	
Evaluation of Biotic Damage to Structures as a Risk Factor for Environmental Pollution During a Comprehensive Survey of the Cultural Heritage Site of Regional Significance “The Building of the Izvestia Newspaper”	150
Rustam Fatullaev and Tembot Bidov	
Formation of Environmental Culture Among School-Age Students with Intellectual Disabilities	161
Vera Galkina, Irina Katkova, and Olga Shokhova	
Prosecutor’s Supervision of Performance of the Legislation in the Ecological Sphere	170
Elvira Nadyseva, Anatoly Kustov, and Vyacheslav Isaenko	
The Role of Transport Infrastructure in Environmental Development of PDAs	181
Angela Mottaeva, Olga Fokina, and Saparova Botagoz	
Seasonal and Interannual Dynamics of Zooplankton from Lake Kulundinskoye in 2017–2020	189
Lyubov Vesnina, Dmitry Bezmaternykh, Irina Moruzi, and Elena Pishenko	

Measures to Preserve the Environmental Sustainability of Biocenoses of Small Rivers During the Construction of Reclamation Water Intakes	199
Natalya Sasikova, Anna Khadzhide, Evgeny Kuznetsov, Larisa Motornaya, and Lyudmila Kravchenko	
Features of Skin Wound Repair Under Conditions of Stem Cell Secretome (Cytokines) Application	209
Elena Borkhunova, Sergey Pozyabin, Andrew Dovgii, and Mikhail Kachalin	
Strategy and Tactics of Artificial Reproduction of Valuable Fish Species in the Basin of the Curonian Lagoon	218
Evgenij Khrustalev, Kseniia Cheban, Tatyana Kurapova, and Liana Savina	
Fish Breeding Biological Justification Rationale of Implantation Introduction of Silver Carp (<i>Hypophthalmichthys molitrix</i>) and Grass Carp (<i>Ctenopharyngodon idella</i>) in the Basin of the Curonian Lagoon	227
Kseniia Cheban and Evgenij Khrustalev	
Predictive Assessment of the Threat to Public Health by Alluvial Gold Mining	236
Svetlana Timofeeva and Irina Drozdova	
Mapping Motion Paths from Non-zero Curvature Surfaces	245
Andrey Gushin, Natalya Chertykovtseva, Svetlana Palevskaya, Olga Pavlova, and Olga Gulenko	
The Effectiveness of the Use of the Organomineral Fertilizer Humate C1 “Healthy Harvest” and the Integrated Plant Protection System in the Cultivation of Winter Wheat in the Rostov Region	254
Sergey Chelbin, Olga Krotova, Alexander Chernyshkov, Alexandra Mandzhieva, and Ludmila Persikova	
Study of the Hydrological Characteristics of the Anapka River for the Prevention of Emergency Situations	263
Elena Gerasimenko, Evgeny Kuznetsov, Anna Khadzhide, Nadezhda Malysheva, and Lyudmila Kravchenko	
The Comparative Assessment Results of Winter Soft Wheat Grain Damage During Combine Harvesting	272
Victor Pakhomov, Ivan Chervaykov, Aleksej Kolin’ko, Sergej Kambulov, and Viktor Hlystunov	

Development of the Water Management Complex by Increasing Water Availability of Small Watercourses of the Krasnodar Territory	282
Anna Khadzhide, Issam Boukhanef, Larisa Motornaya, Arsen Kurtnezirov, Anastasia Tratnikova, and Lyudmila Kravchenko	
Meat Productivity of Black-and-White Gobies Raised Using Kaniga During the Dairy Period	290
Vasily Prystupa, Olga Krotova, Svetlana Yandyuk, Altana Ubushieva, and Arslang Khakhlinov	
Periodic Systems of Coatings on an Elastic Half-Space	300
Dmitry Pozharskii and Nikita Zolotov	
Studies of the State of Bottom Soils During Dredging to Clear the Fish-Breeding Canal Kazachiy Erik for Further Use	308
Evgeny Mikhaylov, Elena Staseva, and Dmitry Larin	
To the Question of the Epizootic Situation in the Azov Sea Basin	315
Anna Kazarnikova, Tatiana Strizhakova, Yulia Stepanova, Georgiy Mosesyan, and Daniil Bukhmin	
Digitalization as an Innovative Component of the National and Regional Tourist Product	322
Lyubov Cherkasova	
Possibilities of Bioindication of River Ecosystem Water Quality by Plankton Communities	331
Natalia Bolotova, Ivan Mukhin, and Olga Lopicheva	
The Main Factors Affecting the Use of Land Resources as Part of Agricultural Enterprises' Natural Capital	340
Oksana Butkova, Janna Matveikina, Natalya Ponomarenko, Natalya Guzhvina, and Natalya Chumakova	
Analyzing the Interaction of Fixed and Working Capital in the Production of Crop Products: Main Problems	349
Oksana Butkova	
Trends in Development of Water Tourism of the Rostov Region Rural Territories	358
Elena Shevchenko and Lyudmila Kazmina	
Morphological and Electrocardiographic Aspects of Rat Adaptation to Right Atrial Cryoablation	367
Olga Pavlova, Olga Gulenko, Pavel Boriskin, Leonid Voishev, and Elena Efremova	

Assessment of the Efficiency of Using the Resource Potential of Agricultural Production in the Region	378
Marina Kholodova, Olga Zubareva, Mikhail Kabanenko, Zhanna Kolycheva, and Oksana Timchenko	
Opportunistic Microbiota and Its Cultural Properties of Sick and Died Cats with Panleukopenia	387
Pavel Rudenko, Inna Berdyukova, Andrei Rudenko, Sergey Tresnitskiy, Sergey Pozyabin, and Mikhail Kachalin	
Evaluation of Seed Resistance of Winter Durum Wheat Varieties to Lack of Moisture and Overheating	395
Valentina Golubova and Valentina Gaze	
The Problem of Child Labor in Agriculture	404
Anna Kulikova	
Evaluation of the Possibility of Harvesting Soybeans with the Grain Reaper	412
Alexey Sibirev, Sergey Shchigolev, Maksim Mosyakov, Lyudmila Kravchenko, and Alexander Koltsov	
A Low-Growing Perspective Line of Spherical Wheat	421
Boris Romanov, Alexander Kozlov, and Alexander Paramonov	
The Effect of Gamma Irradiation on Insect Pests of Grain Stocks	429
Yulia Dorn, Nadezhda Loy, Alexander Pavlov, Natalya Sanzharova, and Taras Chizh	
The Current State and Prospects for the Development of the Dairy Farming Industry in the Region	437
Marina Kholodova and Tamara Sharovatova	
The Experience of Faith as a Worldview Universal	445
Evgeny Nesmeyanov and Galina Kharlamova	
The Effect of Pathogenic Microflora on the Spectra of Winter Wheat Seeds Moskovskaya 56, Irishka No. 172 Obtained by Luminescence	455
Dmitriy Podlesniy, Maksim Litvinov, and Tamara Vladimirova	
High Frequency Transformer for Wireless Transmission of Energy to the Consumer in Agriculture	461
Yuriy Kokhanov, Dmitriy Zhirovov, Nikolay Tsygulev, Ekaterina Tutenkova, and Oleg Kaun	
Size-Geometric Regularities of Landscaped Monument Ales Stenar	469
Alexander Shatalov	

Study of the Operating Element for Minimum Tillage	477
Galina Parkhomenko, Sergei Kambulov, Igor Bozhko, Elena Zubrilina, Olga Babenko, and Yulia Daus	
The Research Results on the Dynamic Performance of the Operating Element for Surface Tillage	485
Sergey Kambulov, Igor Bozhko, Galina Parkhomenko, Olga Babenko, Elena Zubrilina, and Svetlana Khuaz	
Influence of Plant Protection Products on the Enzymatic Activity of Calcic Chernozem	491
Olga Naimi, Vladimir Lykhman, Marina Dubinina, Elena Polienko, and Olga Bezuglova	
The Effect of Weather Conditions in the Spring-Summer Vegetation Period on Grain Quality of Winter Bread Wheat	501
Sergey Podgorny, Olga Skripka, Aleksandr Samofalov, Svetlana Gromova, and Valentina Chernova	
Social Interaction Training as a Form of Active Training for Agricultural Specialists	508
Elena Chubova and Svetlana Bylkova	
Problems and Prospects of Aquaculture Development in the Russian Federation	518
Anna Astashova and Ekaterina Khomutova	
Communication Skills of Future Farmers as a Factor of Successful Socialization in the Professional Sphere	526
Svetlana Bylkova, Elena Chubova, and Evgenia Krasnova	
Characteristic of Taxonomically Significant Morphological Indicators of <i>Gobio gobio</i> (Linnaeus, 1758) from the Ob' River (Western Siberia); Comparison with Populations from Eastern Siberia and Far East Regions	536
Elena Yadrenkina, Irina Moruzy, and Elizaveta Yeliseeva	
Development of Semantic Self-regulation in College Students with Special Healthcare Needs as a Course of Action of Secondary Vocational Education Resource Educational Center	545
Natalia Leonenko, Dmitry Totkiy, Kristina Pultsina, Valeria Amelina, Natalia Kamenkova, and Svetlana Ilyin	
On Preserving the Health of the Burzyan Bee Population in the Shulgan-Tash Nature Reserve	555
Anatoliy Sotnikov, Mikhail Gulyukin, Yuri Isaev, and Tatyana Stepanova	
Improved Potato Tubers from Botanical Seeds	562
Yury Loginov, Andrei Gaizatulin, and Anastasia Kazak	

Fattening Bull Calves for Baby Beef for Baby Food	568
Elena Golovko, Irina Sinelshchikova, and Nikolay Zabashta	
Single Organization-Wide Hazard Register Compiling Method Based on the Competency-Based Approach	578
Marina Kvitkina, Sergey Pushenko, and Elena Staseva	
Efficiency of Complex Therapy in Cats with Acute Bacterial Cholangiohepatitis	585
Andrei Rudenko, Denis Usenko, Pavel Rudenko, Lev Ananev, Sergey Tresnitskiy, and Igor Glamazdin	
Influence of Multicomponent Premix on Productive Qualities and Metabolic Processes of Pigs	594
Olga Krotova, Andrey Alekseev, Gennady Urban, Nikita Vasilev, and Maria Alekseeva	
New Technologies for the First and Second Stage of Plant Breeding	603
Alexey Podzorov, Mikhail Chaplygin, Maria Podzorova, and Ivetta Varyan	
Evaluation of the Efficacy of Pharmacotherapy for Decompensated Intestinal Dysbacteriosis in Cats	611
Pavel Rudenko, Nikolay Bugrov, Sergey Tresnitskiy, Ekaterina Lenchenko, Yulia Subbotina, and Dmitry Blumenkrants	
The Effect of Low-Cost Compound Feeds on the Productive Qualities of Broiler Chickens	620
Sergey Nikolaev, Olga Krotova, Olga Polozyuk, Maria Krotova, and Maria Savenkova	
The Use of Non-traditional Feed Products in the Feeding of Broiler Chickens	628
Olga Krotova, Elena Morozova, Alexander Chernyshkov, Maria Krotova, and Nadezhda Chimidova	
Assessment of the Vegetative Index NDVI as an Indicator of Crop Yield	637
Sergey Rodimtsev, Ninel Pavlovskaya, Stepan Vershinin, Irina Gorkova, and Irina Gagarina	
Digitalization of the Selection Process at Improvement of Kalmyk Cattle	646
Vasily Prystupa, Olga Krotova, Diana Torosyan, Olga Sangadzhieva, and Kermen Khalgaeva	

The Effectiveness of the Use of Vegetable-Protein Additives in the Production of Combined Meat Products	655
Olga Krotova, Andrey Alekseev, Elena Ochirova, Elena Avetisyan, and Maria Alekseeva	
Improving the Operating Conditions of Rice Irrigation Systems as Part of the Water Management Complex of the Lower Kuban	665
Igor Prikhodko and Mikhail Bandurin	
Fuzzy Model of the Macroregion's Production Clusters Location	674
Andrey Chistyakov, Nikolay Eletsy, Igor Khozyaev, and Gennadiy Kuzin	
Estimation of the Economic Efficiency if Technical Solutions for Combine Harvester Improvement	682
Karine Barmuta, Elena Radchenko, and Elena Artemova	
New Generation Auxin Plant Growth Regulators	691
Andi Magomadov and Kristina Malieva	
Economic Efficiency of a Mobile Formula-Feed Unit	700
Viktor Pakhomov, Sergey Braginet, and Oleg Bakhchevnikov	
The Use of Landscape Architecture for Improvement and Renovation of Industrial Facilities in Rostov-on-Don	708
Valeriia Chegge, Saveliy Marandin, Eva Belozerova, and Maria Zharkova	
Solving Issues of Land and Resource Potential of Agricultural Industry	716
Natalia Ovchinnikova, Natalia Aliyeva, and Irina Petrova	
Method of Comprehensive Assessment of Pig Productivity	723
Olga Tretyakova, Olga Krotova, Gennady Urban, Sergey Sklyarov, and Konstantin Savenkov	
Improvement of Ecological Culture and Systemic Transformation of Industrial Terminology	732
Natalya Serbinovskaya	
Model of Risk Management of Enterprises' Profit Generation in the Agro-Industrial Complex	741
Aleksei Tabakov and Irina Fomina	
Current Biological Data on the Ship Sturgeon Acipenser Nudiventris Lovetsky, 1828 (Review)	750
Victoria Bekbergenova	

Immunological-Suppressor Load of Embryonic Antigens Assessment in Sows During Pregnancy	759
Alexander Agarkov, Angelina Shulunova, Nikolay Agarkov, Alexander Sidelnikov, and Roman Tsygansky	
Serum Enzymes Activity Evaluation, Indicators of Protein and Nitrogen Metabolism in Pigs in Postnatal Ontogenesis with Allogeneic Stimulation	768
Alexander Agarkov, Natalia Pisarenko, Nikolay Agarkov, Nikolay Belugin, and Irina Nekrasova	
Modern Development Trends Hospitality Industry of the South of Russia	776
Galina Ekinil, Antonina Petrenko, and Valeria Provotorina	
Mathematical Modelling of Steady Oscillations of the Truncated Wedge-Shaped Elastic Medium	786
Vyacheslav Berkovich and Victor Poltinnikov	
Marketing Communications Sector of the Russian Federation During the COVID-19 Pandemic: Problems and Prospects in the Development of Digital Technologies	792
Lidia Shcherba and Yulia Oleynikova	
Accounting and Management of the Company's Transaction Costs in Agribusiness	801
Oksana Yuryeva, Tatiana Medvedskaya, Petr Shumilin, and Olga Shukhova	
Ecodesign and Videoecology in the Landscape and Architectural Environment of the City: Current Trends	810
Elena Goryacheva and Irina Vlasova	
State Support for the Technical Modernization of Multi-layered Agriculture in Russia: Current Status and Directions of Improvement	819
Olga Isaeva and Evgeniya Krinichnaya	
Priority Areas of Development of the Agribusiness of the Russian Federation	828
Mikhail Kabanenko, Lyudmila Dubrova, Sergey Shaginyan, Anjelika Musaelyan, and Olga Bruzhukova	
Marketing Channels in Sales Policy of Wineries on the Example of the Rostov Region Winemakers	836
Roksana Khan and Valerii Surkov	
Acceleration of the Transition to a New Technological Structure Based on the Technical Re-equipment of Agricultural Production	845
Ludmila Larina, Dmitriy Ruslyakov, and Olga Tikhonova	

Prospects for the Development of the Agrarian Complex by Updating the Technological Basis of Production	854
Ludmila Larina, Dmitriy Ruslyakov, and Olga Tikhonova	
Coal-Mining Regions Technogenic Disturbed Lands: Environmental, Social and Economic Problems (By the Example of the Rostov Region)	862
Olga Soboleva, Darya Vasilieva, and Galina Koloshina	
Efficiency of Combined Tillage in Winter Wheat Cultivation	871
Yulia Semenikhina, Sergey Kambulov, Olga Babenko, Anastasia Kislyakova, and Artyom Doroshenko	
A Model of an Elementary Technological Operation in Alternative Threshing	879
Elena Fisunova and Tatyana Lavrenova	
Analysis of Objects and Conditions of Threshing in the Threshing Space of a Combine Harvester	888
Elena Fisunova and Tatyana Lavrenova	
Comparative Effectiveness of Antiviral Agents in the Treatment of Calicivirus Infection in Cats	897
Olga Krotova, Tatyana Alekseeva, Konstantin Savenkov, Sergey Sklyarov, and Maria Savenkova	
Legal Aspects of Greening Commercial Aquaculture (Fish Farming)	906
Anna Kudaeva, Svetlana Zyablitseva, Nataliya Antonova, and Elena Lunyova	
Yield and Quality of Grain Crops Due Foliar Fertilization with Nitrogen and Microfertilizers	915
Igor Bobrenko, Natalia Goman, Viktor Kormin, Valentina Popova, and Elena Boldysheva	
Mass and Yield of Liver, Heart and Muscular Stomach of Broiler Chickens When Frozen Sapropel is Introduced into the Diet	924
Julia Arzhankova, Sofia Nikolaeva, Oksana Dmitrieva, Nadezhda Shcherbakova, and Stanislav Dikarev	
Modular System for Agricultural Machines Aggregation	931
Boris Kalmykov	
The Main Directions of Ensuring Food Security in Russia	939
Anastasiya Chertova	
Improving Reliability and Efficiency of Cultivators with S-Shape Racks	951
Sergey Radin, Sergey Shubkin, Sergey Buneev, and Sergey Yeletskikh	

Features of the Morphological Development of Grape Plants at the Stage of Shoot Rooting, Depending on the Concentration and Ratio of Macrosalts in the Nutrient Medium	959
Anton Rebrov	
Pre-sowing Treatment of Seeds and Productivity of Oil Flax Varieties in the Conditions of the Northern Trans-Urals	965
Anatoly Pershakov, Raisa Belkina, and Aigera Suleimenova	
Influence of Biological Fertilizers and Growth Stimulants on Yield and Quality of Spring Wheat Grain	973
Igor Bobrenko, Viktor Kormin, Natalia Goman, Elena Boldysheva, and Valentina Popova	
The Principles of Shortened Language Means Usage in the English and German Digital Education Environment	980
Ludmila Kosonozhkina, Alexandra Agapitova, Irina Kashurina, and Natalia Bazhutkina	
The Generalized Model of Mechanized Harvesting of Grain Crops	992
Victor Kataev, Iliia Markvo, Kaprel Khubiian, and Valery Dimitrov	
Media Technologies in Modern Communicative Space: From Communicative Self-representation to Suggestion	999
Olga Zharina, Anna Dzyubenko, Natalia Khristianova, Inna Katsitadze, and Tamara Babiyan	
Situation with Dirofilariasis in Hunting Dogs in the Ararat Region of Armenia	1008
Svetlana Zykova, Roman Slobodyanik, Andrei Kryazhev, Larisa Belova, and Velisla Masaitis	
Productivity of Kartalinsk Wheat Varieties Under Conditions of the Northern Forest-Steppe of the Tyumen Region	1015
Galina Tobolova	
Problems of Legal Regulation of Legal Relations in the Field of Agro-Industrial Complex and Their Impact on Ensuring Food Security in Russia	1021
Nikolay Saraev and Julia Isakova	
Assessment of the Regulatory Impact of Regulatory Legal Acts Regulating Agricultural Legal Relations as the Main Indicator of the Development of the Agro-Industrial Complex	1029
Nikolay Saraev, Julia Isakova, Vasily Vlasov, Galina Vlasova, and Svetlana Denisenko	

Trends in the Development of Beauty Services in the Infrastructure of Tourist and Hotel Complexes in the Rostov Region	1036
Galina Ekinil, Antonina Petrenko, and Valeria Provotorina	
Individual Entrepreneurial Activity in the Agricultural Sector of the Russian Economy: Legal Regime of Taxation, Development Trends	1047
Svetlana Miroshnik, Viktor Linkin, Tatyana Vlasova, Olesya Nemykina, and Kira Bantseкова	
Psychological and Pedagogical Training of Personnel for the Agro-Industrial Complex	1059
Elena Bolotova	
Agro-Industrial Complex of Russia: Problems and Prospects	1071
Victoria Kirilenko and Ksenia Dobrokvashina	
Conceptual Foundation of the Nature-Like Technical Systems Creation in the Meliorative Industry	1079
Jelguja Khetsuriani, Sergey Filonov, Irina Tkacheva, Timur Khetsuriani, Ruslan Kastsiukevich, and Sergey Zolotov	
Influence of Protozoosis of Small Intestine Cystoisospora Sp. And Giardia Sp. On Hematological Indicators in Dogs	1087
Veronika Lykhina, Vladimir Kuznetsov, Alena Telezhenkova, Sergey Tresnitskiy, and Nikolay Sakhno	
Determining the Parameters of the Variable-Pitch Air-Screw Separator	1096
Sergey Shepelev, Maksim Cheskidov, Vladimir Chumakov, and Yuriy Cherkasov	
Using Distance Learning Courses as a Way to Increase Motivation of Students of the Agro-Industrial Faculty When Teaching German	1104
Irina Shcherbakova and Nadezhda Kovalchuk	
The Role of the Russian Social Network Vkontakte During the Covid-19 Pandemic in Teaching Students of Agro-Industrial Faculties the First Foreign Language	1111
Nadezhda Kovalchuk and Irina Shcherbakova	
Quizlet Time: Interactive Didactic Platforms as a Part of Digital Educational Space	1118
Anna Reznikova, Elena Kosareva, Tatyana Ulyanova, Oksana Dyshekova, and Elena Gaylomazova	

To the Problem of Forming Communicative Strategies for Successful Adaptation of Foreign Students Learning Russian Within a Distance Educational Paradigm	1129
Anna Reznikova, Victoria Posidelova, Elena Khoroshko, and Evgeniya Kazanskaya	
Responsibility as a Professionally Important Transferrable Skill of Specialists in Agriculture-based Economies: Pedagogical Principles, Conditions and Methods of Development	1137
Elena Bogatskaya, Svetlana Savela, Larisa Yarovaya, and Olga Yarovaya	
Theoretical Substantiation and Development of Ecologically Safe Water Intake Devices Designs Made of Biopositive Materials in Land Reclamation Systems	1148
Jelguja Khetsuriani, Irina Tkacheva, Dmitry Podoyniczyn, Dmitry Yakovlev, Marina Egyan, and Sirun Saakyan	
Teaching Foreign Language Speech Etiquette to Students of Technical Specialties for Agro-Industry	1159
Marina Mezentseva, Natalia Fedorova, Vera Zimina, Nina Kapitonova, and Karina Shvedova	
On the Issue of the Taxation System of the Agro-Industrial Complex of Russia	1171
Ludmila Spektor and Ksenia Dobrokvashina	
Improving the Personnel Management System of the Agricultural Enterprise	1181
Maria Glyzina	
Health-Creating Higher Education Environment in Preparing Qualified Personnel	1189
Anatoly Alekhin, Svetlana Belyaeva, Ksenia Maksimenko, Irina Velyugo, Natalia Leonenko, and Dmitry Totskiy	
State Support for the Agrarian Sector in Russia: Problems and Solutions	1200
Olga Kichalyuk and Oksana Morozova	
Contribution of the Russian School of Mathematical Thought to the Fundamentals of Modern Shipbuilding	1207
Svetlana Volkova, Elena Sivak, and Alexey Shleenko	
Identification of Technological and Economic Performance Indicators of a Combine Harvester for Assessing Its Competitiveness	1214
Evgenia Muratova and Elena Ivanova	

Limitations of the Methodology for the Transition of the Territory to Sustainable Development	1221
Vladimir Kurdyukov, Sergey Kanurny, and Valeriya Klepacheva	
Method for Checking the Operability of Valve Blocks of Automotive Equipment	1232
Vladimir Vorzhev and Nikolay Rudenko	
Features of Project-Modular Education for Agro-Industrial Complex	1243
Nadezhda Efremova, Margarita Finko, Pavel Gerasin, and Yuliya Knyazeva	
Comparative Characteristics of Quality Indicators of Food and Feed Protein Concentrates from Leguminous Crops	1255
Valentina Kolpakova, Ruzaliya Ulanova, Denis Kulikov, and Vladimir Bessonov	
Analysis of the Effectiveness of the Application of the Combined-Maximum Principle in the Problems of Information Processing and Transport Control	1267
Andrey Kostoglotov, Sergey Lazarenko, Sergey Popov, Nikolay Dontsov, and Julianna Marchenko	
Estimation of the Residual Life of Cars	1276
Sergey Popov, Julianna Marchenko, Evgeny Kosenko, Nikolay Dontsov, Roman Khvan, and Denis Demchenko	
Fire Electrical Safety of Buildings and Structures of the Agro-Industrial Complex	1284
Alexander Prygunov, Sergey Popov, Nikolay Dontsov, Julianna Marchenko, and Sergey Kuren	
Features of the Use of Volumetric Fourier Holograms in Radio Communication Equipment Placed on Vehicles	1295
Alexander Prygunov, Sergey Popov, Nikolay Dontsov, Julianna Marchenko, and Edward Marchenko	
The Use of a Unified Container in an Ecological Automated System for the Removal of Solid Household Waste in an Urbanized Environment Based on Rope Transport Technologies	1304
Julianna Marchenko and Sergey Popov	
Results of Research on the Development of Structural and Technological Schemes for the Protection of Water Intake Technological Complexes from Blue-Green Algae	1312
Jelguja Khetsuriani, Irina Tkacheva, Anna Neidorf, Yuriy Kokhanov, Natia Ugrehelidze, and Dzhuleta Sarkisyan	

The Method of Identifying a Person in Formation of an Educational Trajectory	1323
Tatyana Lindenbaum, Alexander Belyaev, Elena Grebenyuk, Sergey Kramarov, and Vladimir Khramov	
Organizational and Economic Justification for Super-Early and Early Harvesting of Grain Crops with Stripping Without Threshing for Highly Nutrient Feed Preparation	1333
Viktor Pakhomov, Dmitry Rudoy, Oleg Bakhechevnikov, Nikolay Shevchenko, Anastasiya Olshevskaya, and Tatyana Maltseva	
Electromechanical Model of Variable-Length Link for Exoskeleton or Prosthesis	1344
Alexander Blinov, Andrey Borisov, Ivan Kaspirovich, Robert Mukharlyamov, and Konstantin Filippenkov	
Impedance Signal Simulation	1354
Alexey Doletskii, Sergey Klauchek, Vladimir Neumoin, Grigory Klitochenko, and Igor Solopov	
Digitalization as a Tool for Sustainable Development of Russian Agro-Industrial Complex: Regional Aspect	1363
Pavel Krasnokutskiy, Viktor Reutov, Nataliia Velgosh, Maksim Kozin, and Sergey Zmiyak	
Content Analysis of Qualitative and Quantitative Study of the Content of Documents on the Concept of Team Building at the Department of Physical Culture of Agricultural Universities for the Training of Agricultural Specialists	1370
Alexander Melentyev, Evgeny Isakov, Elena Pozdeyeva, Vasily Akhaphkin, and Dmitry Tokarev	
Forecasting the Technical and Economic Parameters of the Combine Harvester Operation Using Pneumatic and Inertia Separator	1378
Evgenia Muratova, Denis Muratov, Elena Kravchenko, Anna Sukhoveeva, and Olga Andreeva	
An Innovative Approach to the Formation of Landscape Architecture of Hotels in the Rostov Region	1389
Galina Ekinil and Antonina Petrenko	
Increasing the Efficiency of Diesel Engines by Improving the Starting System	1400
Igor Ivanov	
Mathematical Modeling of the Functional Form of an Athlete	1406
Anna Ivanova, Nikolay Ryzhkin, and Yulia Savchenko	

Small Business of Beauty Industry as a Factor in Sustainable Development of Rural Areas in Russian Regions	1413
Yulia Osipova and Lyudmila Kazmina	
Peculiarities of Product Cost Calculation and Cost Management at Russian Bakery Enterprises	1424
Valery Gusev, Taisiya Ryabova, Nikolay Chernegov, and Radion Pavlov	
Justification of the Current Directions of Economic Developments for the Permanent Development of AIC of Russia	1439
Valery Gusev, Nikolay Chernegov, and Radion Pavlov	
The Effect of Abiotic and Biotic Factors on the Reproductive Qualities of Shemaya Alburnus Leobergi Females During Spawning	1450
Galina Golovko	
Elements Spontaneity of “Sustainable Development” Model	1462
Tatyana Eroshenko and Anastasia Melnik	
Social Capital and NBIC Convergence: Application of the System Paradigm	1472
Antonina Pahomova, Sandor Halasz, Anastasiya Nardina, Galina Zelenkova, and Alexander Pakhomov	
Elitological Factors of Innovative Development of Modern Russia	1480
Oleg Artyukhin, Victor Tereshchenko, Alexander Ponedelkov, Irina Abramova, and Victor Chigvintsev	
Volumetric Model of Anisotropic Thermal Process in the PTC MathCAD Engineering Environment	1487
Alexandr Yashonkov and Vyacheslav Kosachev	
Some Features of the Investigation of Crimes in the Sphere of Agro-Industrial Complex	1499
Anastasiya Kovaleva and Olga Volkonskaya	
Social Inquiry for Higher Education in Russia: Sociological Context	1507
Yulia Isakova	
Correlation Between Socio-psychological Adaptation and Ambiguity Tolerance Among Students	1516
Anna Kryuchkova and Nikolai Timokhin	

Introduction of Innovative Technologies into the Educational and Training Process of Students of the Agro-Industrial Faculty Through Special Athletics Exercises	1526
Nikolay Ryzhkin, Tatiana Tumasyan, Olga Brovashova, and Elena Nemtseva	
Professional and Applied Significance of the Standards of the VFSK TRP for Students of the Agro-industrial Faculty	1534
Tatiana Tumasyan, Olga Brovashova, Ivan Korobov, and Nikolai Soprunov	
Testing in the Russian Language as Knowledge Monitoring Foreign Engineering Students	1542
Irina Kondratieva, Nadezhda Malina, and Tatiana Rogacheva	
Actual Problems of Taxation of Agricultural Producers and Their Impact on the Development of the Agro-Industrial Complex of the Russian Federation	1552
Elena Sivolapenko, Olga Tyutyunik, and Albert Abalov	
Economic Profitability of Using Delivery Drones at the Current Level of Battery Technology	1559
Igor Eremenko, Ekaterina Sopelnik, Oleg Ostapovich, and Andrey Atrohov	
Countering Corruption-Related Crimes in the Agro-industrial Complex	1565
Julia Isakova and Georgiy Dyatlov	
Innovative Business Models of Agro-Industrial Enterprises as a Factor in Ensuring Sustainable Development of the Region	1572
Tatyana Simonyan, Natalia Shvydenko, and Andrey Guskov	
The Concept, Essence and Peculiarities of the Process of Implementation of Control and Supervisory Activities in the Context of the Transformation of Public Administration	1581
Marina Alekseeva, Svetlana Rybak, and Anastasia Velichko	
Growth Dynamics and Digestibility Coefficient of Nutrients of Ayrshire Dairy Heifers Fed Various Levels of Protein Concentrate Mixture	1590
Nikolai Buryakov, Mariya Buryakova, Darya Zemyachkovskaya, Anastasiya Zaikina, Andreii Stavtsev, and Dmitrii Aleshin	
Results of the Study of the Effectiveness of Humic Fertilizers Activated by Hydrodynamic and Acoustic Effects	1601
Yuri Shirokov, Valeri Tikhnenko, Ekaterina Ivakina, and Ayaz Imamzade	

State Support of the Agro-Industrial Complex: Analysis of the General State and Prospects of Development	1609
Ludmila Spektor and Alexander Malyutin	
Research of Legal Protection of the Aquatic Environment in the Territory of the Russian Federation	1617
Lyudmila Spektor and Alexander Malyutin	
Unified Agricultural Tax as an Indicator of the Development and Potential of Agriculture in the Constituent Entity of the Russian Federation	1626
Viktor Linkin	
Legal Basis for State Support of Agriculture in Foreign Countries	1638
Ekaterina Sapozhnikova and Victoria Chistova	
Legislative Stimulation of Investment Activity of the Agro-Industrial Complex in the Rostov Region	1649
Elena Sivolapenko and Gennady Pratsko	
Tutor’s Tolerance in Working with Students of the Agro-Industrial Complex: Effective Development of Pedagogical Communications	1658
Marina Babenko, Svetlana Bylkova, and Nelli Khachatryan	
“Platform Law” or the Legal Aspect of the Development of the Digital Agro-Industrial Complex in the Russian Federation	1668
Ekaterina Tinititskaya and Ludmila Spektor	
Modern Marketing Technologies in Agricultural Product Sales Management	1675
Tatiana Gaponenko, Sofia Gavrilenko, and Natalia Osadchaya	
Critical Thinking in the Core of Individual Learning Paradigm	1687
Margarita Ereshchenko	
Spectrum Reconstruction Operator	1694
Andrey Gushin, Natalya Chertykovtseva, Alexander Avsievich, Svetlana Palevskaya, and Olga Pavlova	
Efficient Technology of Potato Cultivation with Top Dressing with Liquid Fertilizers During Fertigation	1705
Vladimir Milyutkin, Sergey Mashkov, Dmitry Rudoy, Viktor Pakhomov, Marina Egyan, Natia Ugrekheldidze, and Natalya Kulikova	
Essential Oil Crops and Their Properties	1716
Dmitry Rudoy, Anastasiya Olshevskaya, Mary Odabashyan, Petr Pavlov, Oxana Ananova, and Tatyana Onoiko	

Agrobiotechnology of Essential Oil Crops on the Example of Peppermint (<i>Mentha Piperita</i>)	1725
Dmitry Rudoy, Anastasiya Olshevskaya, Magomed Magomedov, Petr Pavlov, Mary Odabashyan, and Evgeniy Krasavin	
Using Ultrasound as the Main Direction of Intensifying the Grape Squeeze Extraction Process of the Autochthonous Varieties of Grapes of the Rostov Region	1734
Dmitry Rudoy, Anastasiya Olshevskaya, Andrey Mozgovoy, Marina Egyan, Anna Vershinina, Nadezhda Gordeeva, and Anastasia Skidan	
Environmental Problems of Waste Management: Transition to a Closed-Loop Economy	1744
Mikhail Ponomarev, Sergey Matulis, Ekaterina Cherepanova, and Anna Kopytova	
Primary Development Results in Forest Legislation of the Russian Federation in the 21st Century	1754
Elena Minina, Julia Shupletsova, Yuri Trunzevskiy, and Oleg Karpovich	
Environmental Protection in the Implementation of Genetic Engineering Activities	1762
Natalia Putilo, Julia Shupletsova, Viacheslav Sevalnev, and Oleg Karpovich	
Ensuring Environmental Protection in International Investment Legal Relations	1770
Vladimir Matveev, Alia Nugmanova, and Viacheslav Sevalnev	
Environmental Planning and Management as Anti-corruption Tools	1779
Valery Anisimov, Valery Lapshin, and Lyudmila Blashkova	
Ensuring Environmental Safety in an Emergency: Issues of Legal Regulation	1788
Andrey Menshikov, Leyla Mutalieva, Mikhail Moiseenko, and Denis Illo	
Morphometric and Biochemical Evaluation of Samples of the Nigella Genotype of European-Asian Origin	1797
Victor Neminov, Yulia Kostanchuk, Svetlana Motyleva, Olga Pekhova, Lidiya Timasheva, Alena Katskaya, and Vladimir Pashtetskiy	
Resistance of Variety Samples from Menthol Mint (<i>Mentha L.</i>) Collection to Rust	1806
Galina Saenko, Tatiana Shuvaeva, and Irina Gaytotina	

Using the QuEChERS Method to Determine Pesticide Residues	1814
Elisey Alekseev and Viktor Dolzenko	
The Relationship Between the Live Weight of First Calving and Indicators of Reproduction Ability of Cows with a Milk Yield of at Least 9000 kg Per Lactation	1821
Lyudmila Kuzyakina, Elena Usmanova, and Pavel Ostapchuk	
Essential Oils of the Different Species of the Lamiaceae Family as a Means of Combating Phytophagous and Plant Diseases	1831
Kirill Tkachenko and Elizaveta Varfolomeeva	
Histological Structure of the Broiler Liver Upon the Backdrop of <i>Satureja Montana</i> L. Essential Oil	1839
Tatyana Kuevda, Eugenia Zyablitskaya, Tatyana Makalish, Pavel Ostapchuk, Elena Usmanova, Denis Zubochenko, Polina Maximova, and Veronika Uppe	
Additional Properties of Potential Mycopesticides	1846
Natalia Pavlova, Daniil Malygin, Dmitry Emelyanov, Evgeniy Gusenkov, and Sonie Sokornova	
Results of the Studying <i>Melilotus Officinalis</i> Lam. Cultivation Technology Elements in the South of Russia	1853
Roman Kulinich, Evgenij Turin, Aleksandr Radchenko, Tat'yana Ganockaya, Elena Turina, Elizaveta Rostova, Anatolij Izotov, and Aleksandr Sussky	
Laboratory Testing and Calibration of Soil Moisture Sensors on Southern Chernozems	1861
Vladimir Kremenskoy, Ielizaveta Dunaeva, Aishe Dzhaparova, and Valentina Popovich	
Assessment of Pollution of Water Sources Bordering Highways	1871
Ekaterina Antonenko, Aleksandr Melnichuk, and Valentina Popovich	
The Taxonomic Structure of the Prokaryotic Biome of the Rhizosphere <i>Triticum Aestivum</i> L. Depending on the Variety and Application of Associative Bacteria	1878
Anna Egovtseva, Tatyana Melnichuk, Suleiman Abdurashytov, Elvina Abdurashytova, and Ludmila Radchenko	
Study of the Quality of Seed Processing Products of Two Species of <i>Nigella</i> (<i>Nigella Sativa</i> L. And <i>Nigella Damascena</i> L.) Grown in the Crimea	1888
Olga Pekhova, Lidiya Timasheva, Irene Danilova, and Helene Grunina	

Remote Sensing for Land Use Monitoring in the Suburban Areas of Tashkent, Uzbekistan	1899
Ilhomjon Aslanov, Ilyaskhoja Jumaniyazov, Naurizbay Embergenov, Keunimjay Allanazarov, Gulya Khodjaeva, Akmet Joldasov, and Saida Alimova	
Monitoring of Land and Forest Cover Change Dynamics Using Remote Sensing and GIS in Mountains and Foothill of Zaamin, Uzbekistan	1908
Sokhib Islomov, Ilhomjon Aslanov, Gulnaz Shamuratova, Azamat Jumanov, Keunimjay Allanazarov, Qazaqbay Daljanov, Marat Tursinov, and Qoylibay Karimbaev	
Creating Fertilizer Application Map via Precision Agriculture Using Sentinel-2 Data in Uzbekistan	1915
Uzbekkhon Mukhtorov, Ilhomjon Aslanov, Jasur Lapasov, Doniyor Eshnazarov, and Mukhammad Bakhriev	
Study of the Chitozan Effect and Its Products Based on Viral and Bacterial Diseases in Agricultural Practice	1922
Nurillo Nematov, Faziljon Abdullaev, Lola Jamolova, and Turakul Eshboboev	
Effect of Mineral Fertilizers on Increasing Productivity and Quality of Seedless Varieties of Grapes	1930
Komolitdin Sultonov, Jamoliddin Fayziev, Shamshoda Eralieva, Sitara Vakilova, and Temur Temurov	
Chemical Properties of Barberry and Sea-Buckthorn Plantation Land Soils in Uzbekistan	1941
Farkhod Chorshanbiev, Malohat Hakimova, and Saydali Turdiev	
Accumulation of Heavy Metals in Different Bodies of Dandelion (<i>Taraxacum Officinale</i> Wigg)	1949
Sokhiba Yuldasheva, Sanjar Sherimbetov, and Zafar Norboev	
Topiary Art: Basic Principles Forming Decorative Plants for Creation of Topiar Figures	1959
Feruza Rashidova, Regina Lapteva, and Abdikhalil Kayimov	
Study and Reproduction of the Representatives of the <i>Cupressaceae</i> Family Attitude to Bioecological Factors Used in Landscaping	1968
Lobar Jakhbarova, Eldor Temirov, Saydali Turdiev, and Farkhod Chorshanbiev	
Spread and Severity of Fungal Diseases of Currant Plant in the Conditions of Tashkent Province, Uzbekistan	1978
Gayrat Jumanazarov, Abdurahmon Allayarov, and Sobitjon Nosirov	

Morphology and Composition of Lipids of Barberry Seeds (<i>Berberis Oblonga</i> Rgl.)	1987
Farkhod Chorshanbiev and Erkin Berdiev	
Preparation of Aloe (<i>Aloe Arborensis</i> Mill) Medicinal Plants in Greenhouse Conditions	1995
Makhsuda Nizomova and Nodira Irismetova	
Preparation of Seedlings from Root Breeds of Medicinal Common Hop (<i>Humulus Lupulus</i> L.)	2005
Makhsuda Nizomova and Munira Yuldasheva	
Features of Growth and Development of Peppermint (<i>Mentha Piperita</i> L.) in the Row Spacing of Rosehip (<i>Rosa Canina</i> L.)	2012
Egamyor Akhmedov, Saydali Turdiev, Mehroj Dustiyorov, and Gulom Jumaboev	
Mycoflora of Vegetable Seeds	2018
Dilobar Zuparova and Mirakbar Ablazova	
Productivity Indicators and Chemical Composition of Raw Materials of Saffron (<i>Crocus Sativus</i> L.) Plant Ecoforms	2028
Bobokul Tukhtaev and Vakhob Kaysarov	
Determination of Bioecological Properties and Seed Germination of Rhubarb (<i>Tartarian Rhubarb</i>) Growing in Karakalpakstan	2036
Zamira Pazyzbekova, Berdiyaz Zhollibekov, Zhanbolat Akseitov, Gulnaz Saparova, and Indira Abdimukhamedalieva	
Designing Suit Fabric on the Shortening of the Threads	2044
Nodira Yusupova, Sanovar Khamrayeva, Dilrabo Nazarova, Nigora Jabbarova, and Saida Djabbarova	
Form-Stable Fleecy—Inlay Knitwear	2050
Mukhayyo Musayeva, Gulfiya Gulyayeva, Nuriddin Musayev, and Mirabzal Mukimov	
Analysis of the Problem of Digital Designing Modern Special Clothes for Extreme Climatic Conditions and Environmental Risks	2057
Sabokhat Pulatova, Nargiza Bebutova, Sevara Kodirova, Salikh Tashpulatov, and Irina Cherunova	
New Eco-friendly Paper Assortments for Coloring with Natural Dyes	2067
Nodira Amirova	

Research of Changes in Process Parameters of Raw Cotton During Storage	2075
Mansurbek Ruzmetov, Rakhmatjon Ruzmetov, Makhfuza Gapparova, and Timur Tychiev	
Influence of the Direction of Movement of Cotton to Pile Drums on the Cleaning Efficiency	2084
Timur Tychiev, Ilkhomjon Madumarov, Makhfuza Gapparova, and Abduvohid Ismoilov	
Effective Ways to Use Silk Waste	2092
Gulnoz Yusupkhodjaeva and A'lokhon Yusupkhodjaev	
Effects of Fiber Parts of Mixture on the Quality of Yarn	2098
Shavkat Fayzullaev and Abdumalik Pirmatov	
Studying the State of Raw Cotton During Its Compression and Unloading	2108
Khayrulla Usmanov, Botir Mardonov, Fazliddin Sirojiddinov, and Makhsudjon Ochilov	
Experimental Determination of Cotton Raw Materials Separation in Improved Delivery Structure	2119
Makhsudjon Ochilov and Oybek Kholmuratov	
Method for Producing Yarn from Mixed Fibers with Improved Characteristics	2126
Nuriddin Ruziboev, Vohid Isakulov, Anvar Juraev, and Mokhinur Tulaganova	
Theoretical Calculation of Thread Tensions in the Automatic Silk Spinning Zones	2133
Azamat Gulamov, Botir Mardonov, and Alisher Eshmirzaev	
Spring Characteristics of Dried Latex (<i>Ferula Assa Foetida</i> L.) and Flinders Rose (<i>Capparis Spinosa</i> L.) Plant Seeds	2141
Abdullo Rabbimov, Gulchekhra Vafokulova, Olim Razzokov, Elbek Rabbimov, Shirin Achilova, and Kudrat Sattarov	
Increasing the Productivity and Energy Efficiency of the Drum Grain Dryer	2151
Jalolitdin Mukhitdinov and Elyor Safarov	
Selection of New High-Yielding Rice Varieties Suitable for the Territory of Karakalpakstan	2159
Duysenbay Utambetov, Urazbay Abyllaev, Bahodir Abdullaev, Mardan Aberkulov, Kuanyshbay Aytbaev, and Mirbek Kamalov	

Phytophthora Potato Disease and Measures to Combat with It in Uzbekistan	2168
Urol Khamiraev, Uchkun Rakhimov, Bakhrom Sodikov, and Ubaydullo Rakhmonov	
Use of Retardants Against Lodging of Medium-Sized Soft Wheat Varieties	2179
Mukhtabar Tashmatova, Bakhrom Azizov, Mardan Aberkulov, Saidmurat Baboev, and Olimjan Ikromov	
Fiber Consumption and Quality Indicators of Varieties of <i>G. Hirsutum</i> L. Type and Interspecific Hybrid Combinations	2187
Jakhongir Ergashev, Guzal Kholmurodova, Ramish Egamberdiev, and Anisa Barotova	
Improvement of the Technology of Copper Production by Involving in the Processing of Industrial Waste JSC “Almalyk MMC” in Uzbekistan	2193
Shoira Mukhamedzhanova, Oybek Nuraliyev, Zhonibek Ismailov, Bekzod Karimzhonov, and Qakhramon Ochildiev	
Electronic Financial Services for Environmental Management Entrepreneur in Thailand	2200
Pisit Potjanajaruwit	
Effects of Accounting Information Systems on the Performance of Environmental Management Entrepreneur in Thailand	2206
Pisit Potjanajaruwit	
Natural Externalities of Economic Growth Stabilization	2213
Denis Ushakov, Natalia Malishevskaya, Natalia Mazikova, and Eteri Rubinskaya	
Vital Factor for Homestay Operation of Tourism Natural Environment in COVID-19 Period	2223
Rumpapak Luekveerawattana	
Influence of Organization and Self-efficacy on Accountants’ Ecological Competencies Development (The Case of Juristic Businesses in Bangkok)	2234
Anocha Rojanapanich	
Exploring Potentials for Gastronomy Tourism Through Organic Farming: A Fringe Area of Nakhon Pathom, Thailand	2242
Siripen Yiamjanya	
Rural Development as a Factor of Sustainable Development	2253
Sofia I. Sypok and Tatiana E. Marinchenko	

Evaluation of Efficiency of Small Agricultural Enterprises Economic Activity Under Sustainable Development Conditions	2262
Andrii Sakhno, Irina Salkova, George Abuselidze, Tanya Yanchuk, and Nataliia Buha	
Analysis of the Impact of the Automobile Service Center on the Environment	2272
Radik Ildarkhanov	
Accounting Potential as a Key to Prediction of Regional Fungal Biodiversity	2282
Maxim Safonov, Asya Filippova, Tatyana Safonova, and Marina Bulgakova	
Technical and Economical Model of Wastewater Evaporation in Superpro Designer	2289
Yuri Tsarev, Sophia Tsareva, Maxim Markin, and Marina Ugryumova	
Morphological and Anatomical Study of Medicinal Plant Material <i>Myrtus communis</i> L	2302
Yuliya Cheryatova	
Seasonal and Climatic Conditions and Urboecological Factors of the Middle Volga Region	2309
Yana Davydova, Viktor Gorelik, Svetlana Filippova, Valeriy Vlasov, and Alena Podlubnaya	
Dynamics of Electricity Consumption in the Context of the COVID-19 Pandemic	2318
Oksana Pirogova, Alisa Mustafina, and Vilena Zasenکو	
Environmental Consequences of Virgin and Fallow Lands Development in Kazakhstan	2327
Zhanna Mazhitova, Fakiya Shamshidenova, Gaziza Isakhan, Gulnara Kurmangali, Aiman Azmukhanova, Aigul Zhalmurzina, and Omarova Bibizhamal	
Comparative Assessment of the Ecological State of Lake Donuzlav in a Long-Term Aspect	2338
Natalia Sytnik	
Principles of Sustainable Development in Municipal Management: The Case of Northern Districts of the Irkutsk Region	2349
Natalia Krasnoshtanova	
Agriculture and ESG Transformation: Domestic and Foreign Experience of Green Agribusiness Finance	2357
Vitali Daroshka, Igor Aleksandrov, Marina Fedorova, Irina Chekhovskikh, Ekaterina Ol, and Vyacheslav Trushkin	

The Role of Education in the Development of the Economy Based on Green Technologies	2369
Natalia Przhedetskaya, Elena Kulkova, Svetlana Reznichenko, and Veronika Sheveleva	
The Role of Organic Fertilizers and Zeolite in Growing Organic Produce	2378
Alevtina Kulikova, Vitaly Isaichev, Evgeny Yashin, Elena Volkova, and Mikhail Cherkasov	
Rational Use of Hydrocarbon Resources in the Context of Environmental Sustainability of the Country	2385
Oleg Andreev	
A Case of Dominant Black Coat Color in Russian Populations of German Shepherd Dogs	2394
Marianna Yu Gladkikh, Olga V. Kuznetsova, Anton V. Markov, and Maria A. Maximenko	
Basic Principles of Organizing Information Support for the US Agricultural Sector	2401
Stanislav Ermakov and Sergei Ilkevich	
Succession of the Microbial Communities in the Surface Soil Layer Under the Manure Cake of Large Phytophages	2409
Oleg Zhurlov	
Russia's Green Transition: Opportunities and Challenges	2416
Daria Iakimova and Yulia Dzis	
Standardization of Engineering and Geological Surveys in the Development of Urban Underground Space in the Russian Federation	2426
Valery Belyaev	
New Organizational and Economic Mechanisms for the Development of the Russian Fishery Sector	2440
Margarita Voytyuk, Vyacheslav Voytyuk, and Tatiana Marinchenko	
Principles of Formation of Field Crop Rotations in the Conditions of the Forest-Steppe of Western Siberia	2448
Valery Chibis	
Characteristics of the Allele Pool of Simmental and Crossbred Cattle Population in Volga Region Using Microsatellites	2455
Kenan Hamdan, Marianna Gladkikh, Olga Kuznetsova, Marina Selionova, and Marina Glushenko	

Directions of Innovation and Investment Policy in Ensuring the Ecological and Economic Balance of Sustainable Development	2463
Anna Shokhnekh, Tatiana Kosulnikova, Lidiya Sizeneva, and Dmitriy Sharapov	
Analysis of Morphometric Parameters of Watercourses and Their Catchments in the Vorona River Basin of the Forest-Steppe Zone of the Russian Plain	2471
Kirill Kuzmin and Mikhail Bukovskiy	
Technological Transformation Barriers of Environmental Innovations Determinants in the Context of Caring and Responsible Consumption	2480
Anna Shokhnekh, Yury Zhadaev, Tamara Yovanovich, Arina Baskakova, and Olga Glinskaya	
Urban Construction Waste Dumps	2491
Yulia Galitskova	
The Need to Improve the Method for Assessing the Competitiveness of Enterprises of the Oil Refining Complex	2499
Gulsina Gabdullina, Aisylu Akhmetgareeva, Irina Vyachina, Julia Repina, Svetlana Khusainova, and Jano Jomaa	
The Content of Heavy Metals in the Muscle Tissue and Liver of Some Species of Fish from the Lakes of the “Smolensk Lakeland” National Park	2508
Tatiana Evenkova, Pavel Zelenkovskiy, Stanislav Dubrova, Ivan Podlipskiy, and Vladimir Hohryakov	
Problems of Implementation of Modernization Processes in the Petrochemical Industry at the Present Stage	2516
Gulsina Gabdullina, Irina Vyachina, Aisylu Akhmetgareeva, Julia Repina, Rimma Garaeva, and Regina Yunusova	
New Approaches to the Formation of Digital Competencies of Specialists in the Machinery and Transport Industries	2523
Dmitry Sitkin, Natalia Solodilova, Dmitry Shabalin, and Ivan Kozar	
Aviation Method of Extinguishing Landscape Fires - Experimental Substantiation of Parameters	2533
Alexey Denisov, Stanislav Gundar, Mikhail Danilov, and Sergey Podkosov	
Structure and Sedimentary Basin Evaluation Along «Tatseis» Profile on Territory of Republic of Tatarstan	2540
Rail Kadyrov and Raheem Ullah	

The Results of Laboratory Studies of the Automatic Sowing Depth Control System	2547
Sergey Kokoshin and Anatoly Kizurov	
Intensification of Self-overgrowth of Berms of Non-working Sides of Quarries	2556
Konstantin Galaida, Boris Talgamer, and Aleksandr Zagibalov	
Control System and Algorithm for Construction of Optimal Technological Routes for Machining Parts in the Machining Shop	2566
Anvar Kabulov, Ilyos Kalandarov, Doston Raxmatov, and Nodirbek Namozov	
Priming of Crop Seeds as a Reserve for Increasing the Efficiency of Forage Supply	2575
Fedor Kipriyanov, Petr Savinykh, Vasilij Sysuev, and Igor Ustyuzhanin	
Organizational and Technological Approaches to the Formation of a Comfortable Environment and Development of the Ecological Structure of a City	2583
Konstantin Petrov, Inna Zilberova, Irina Novoselova, and Tareq Al-Fatla	
The EU “Green Deal” in Russia: Perception of Socioeconomic Values of Eco-Transformation	2592
Dmitri Levi and Natalia Zaslavskaya	
The Effectiveness Assessment of the Use of Environmental Measures in the Volga Federal District	2600
Vasily Karaulov, Elena Karanina, and Ksenia Kartavyh	
The Main Directions of Increasing Exports of Agri-food Products in the Context of Integration into the World Market	2607
Guzaliya Klychova, Akmaral Bukharbayeva, Alsou Zakirova, Elena Shlyapnikova, Vyacheslav Sokolov, and Zhainagan Jalbirova	
Structural and Technological Prerequisites for Reducing the Energy Intensity of Grain Processing in Hammer Crushers	2622
Vladimir Sukhlyaev, Fedor Kipriyanov, Andrey Palitsyn, and Petr Savinykh	
Analysis and Evaluation of the Quality of Life of the Labor Force of the Regions of Russia	2632
Alsou Zakirova, Guzaliya Klychova, Zhanna Zhaxylykova, Gulnar Talapbayeva, Ayaz Zakirov, and Raua Aitmanbetova	
Difference Schemes for Numerical Simulation of Surface Acoustic Waves	2642
Dauletbay Utebaev and Khakimbay Atadjanov	

Microbiological Malodorous Deodorization of Aeration Stations for Wastewater Treatment	2649
Anna Malysheva	
Staffing the Sustainable Development of the Russian Arctic: A Professional Profile	2655
Irina Stepus, Anna Simakova, Evgeniy Pitukhin, and Petr Pitukhin	
Modeling of Structural and Technological Parameters of Sprinkler Nozzles	2669
Larisa Zhuravleva	
The Influence of Gender Identity on Speech Including Internet Communications and Automatic Translation	2678
Elena Madinyan and Victoriya Sibul	
Geophysical Research in the Preparation of Ski Slopes for Competitions: Case Study of the Garabashi Glacier (Elbrus, Caucasus)	2686
Sergey Sokratov and Denis Frolov	
The Role and Place of Irrigated Agriculture in Agricultural Production and Its Economic Efficiency	2694
Guzaliya Klychova, Alsou Zakirova, Raheem Ullah, Marsel Khismatullin, Mars Khismatullin, and Elena Nekrasova	
Rational Use of Russia's Own Workforce from the Perspective of Environmental Economics	2707
Evgeniy Pitukhin, Petr Pitukhin, and Maxim Kukolev	
Assessment of the Cable-Stayed and Cable Damping System Used in the Russky Bridge and Determination of the Force Acting on the Bridge's Cables	2719
Ahmed Ramadan Ahmed and Nikolay Ermoshin	
Determination of the Delivery Time of Goods Fully Completed in the Manufacturing Chain	2731
Vladimir Poluektov	
Correction of Neural Network Solutions by Logical Analysis Methods	2739
Larisa Lyutikova	
Peculiarities of Metrological Support Organization During Measurements, Tests and Control	2749
Alexey Borisov	
Application of Hub Location Problem in Construction Industry Supply Chain	2755
Farid Asayesh and Andrey Borisovich Semenov	

Cements Based on Secondary Resources of the Metallurgical Industry as a Driver of Green Logistics in Supply of Building Materials	2765
Liliya F. Kazanskaya and Natali M. Al-Atasi	
Solutions for Crucial Problems in Reconstruction of BAM Vostochny Polygon	2774
Svetlana Zhdanova, Oksana Neratova, Arkadii Edigarian, and Nikolay Gorshkov	
Growth Rate of Quail When Applying Succinic Acid	2782
Sergey Yu. Smolentsev, Nadezhda A. Kislitsyna, Marina S. Gugkaeva, Zarema R. Tsugkueva, Nadezhda S. Persaeva, Irina V. Puhava, and Lyudmila A. Mullakaeva	
Pathomorphological Picture of Lungs of White Rats with Preclinical Study of UVMC «Lizunets»	2788
Damir D. Hairullin, Elena G. Gubeeva, Farit F. Zinnatov, Aliya R. Kashaeva, Alexander P. Ovsyannikov, Azamat H. Shantyz, Andrey V. Malanev, Damir V. Aleev, Lyudmila A. Mullakaeva, Anatoly I. Trubkin, Guzalia R. Yamalova, Sergey Yu. Smolentsev, Kadriya F. Khalikova, Gulnara G. Galyautdinova, and Gennady S. Frolov	
Immunological Aspects of Bovine Leukemia and Tuberculosis	2797
Talgat R. Yakupov, Farit F. Zinnatov, Azat M. Alimov, Sergey Yu. Smolentsev, Saviya G. Mingazova, Chulpan A. Kharisova, Damir D. Hairullin, Radii M. Papaev, Guzel G. Shalamova, and Guzel N. Zainasheva	
Molecular Dynamics Study of the Influence of Hydrogen Impurity on the Migration Velocity of [001] and [111] Tilt Boundaries in Palladium	2803
Gennady Poletaev, Yuriy Bebikhov, Alexander Semenov, and Roman Rakitin	
The Influence of Socio-psychological Conditions in the Treatment of Infectious Diseases as a Condition for Overcoming the Stigmatization of This Condition	2810
Elena Shilova and Marina Grigoreva	
Climate Change in the Arctic: Wind as an Impact Factor on the Coastal Phytocenoses in the Barents Sea	2819
Mikhail Makarov and Svetlana Malavenda	

Influence of the Landform and Atmospheric Circulation on the Ecology of an Industrial City	2828
Azat Gaifutdinov, Tatiana Gaifutdinova, Regina Medvedeva, Rezida Khusnutdinova, Raya Zaripova, Rustem Galiev, Sergey Dyrin, and Azat Rafikov	
Prospects of Using of Information and Communication Technologies in Russian Agriculture	2837
Oleg Repinskiy, Maria Gubanischeva, Dmitriy Mokshin, and Irina Maratkanova	
Comparative Analysis of Accounting for Derivatives in International Financial Reporting Standards and Russian Accounting Standards	2846
Elena Karanina, Nina Ilysheva, and Georgii Georgiev	
Micro-cements for Soil Strengthening	2855
Liliya Kazanskaya	
Environmental Management of Cultural Strata at the Present Stage	2864
Oleg Semukhin and Elena Semukhina	
Distance Learning at University: Trends, Problems and Prospects	2873
Olga Aleksyutina, Evgeny Aleshin, and Elena Yakubenko	
Ways to Form the Economic Nature Management in Modern Economic and Environmental Conditions	2882
Natalia Ivanova	
The Application of Wireless Network Technology in Spoken English Teaching in the Era of Mobile Internet	2892
Yabin Huang	
Development of Guidance on the Preparation of the Environmental Impact Assessment Report for the Center for Nuclear Science and Technology of Vietnam	2900
Ta Van Thuong, Oleg Tashlykov, Pham Khac Tuyen, and Vu Hoang Hai	
The Environmentally-Efficient Canal District Design Respecting Urban Context	2908
Luka Akimov, Vladimir Badenko, Elena Gaganova, and Valentina Kashintseva	
Methodological Bases for Supporting the Program “Integrated Development of Rural Areas”	2917
Svetlana Sheina, Albina Fedorovskaya, and Karina Chubarova	

Vibration-Free Decorative Concrete Technology is the Key to Sustainable Development of Landscape Architecture	2926
Lyubov Kastornykh, Vera Kosenko, Alexander Kaklyugin, Mikhail Kholodnyak, and Angelina Fedorchenko	
Reconstruction of Urban Development with the Use of Modern Building Materials	2936
Svetlana Sheina, Elena Vinogradova, and Ilya Chernyavsky	
Sustainable Development of the Construction of Buildings for Educational Institutions	2945
Svetlana Sheina, Lidiya Girya, and Yana Aleksandrova	
Modern Approaches to the Preservation of Monuments of Cultural Heritage in the Structure of Rural Settlements	2954
Alexandra Vorobieva	
Experience in the Construction and Design of Housing in Rural Settlements in the South of Russia (on the Example of the Rostov Region)	2961
Inga Okuneva and Aleksandra Vorobieva	
Methodological Foundations for Pre-investment Assessment of an Integrated Sustainable Development Area for the Construction of Social Institution	2970
Svetlana Sheina and Artem Shvets	
International Experience in Implementing Information and Digital Technologies in the Educational Process of Higher Educational Institutions: The Possibility Borrowing and Adaptation	2980
Galina Pulenko, Yelena Zhukova, Juliya Karagodskaya, and Nataliya Bazhutkina	
Digitalization of Education and Distance Learning Technologies: Development Trends	2991
Elzara Tsybenko, Elena Panferova, Marina Volodina, and Natalia Vartanova	
Possibilities to Use Information and Communication Technologies in Teaching Disciplines of the Natural Sciences Unit	3000
Tatyana Shkil and Tatyana Belikova	
Sustainable Development of Project Activity of Students of the Technical University	3009
Raisa Bazaliy	

Small Architectural Forms Made of Decorative Concrete for Landscape Design of Rural Settlements	3016
Lyubov Kastornykh, Vera Kosenko, Alexander Kaklyugin, Mikhail Kholodnyak, and Angelina Fedorchenko	
Trends in the Optimization of Agriculture in Russia Through City-Farming	3027
Daria Protopopova, Irina Podosinina, and Ekaterina Kojevnikova	
Motivational Model of Student Performance for Educational Training Programs for Specialists with Higher Engineering Education for Transport	3036
Igor Timoshek and Pavel Timoshek	
Improving a Company's Reputation When Working with Different Types of Requests Based on Managed Queuing Models	3046
Elizaveta Kondsrashova	
Interrelation of the Main Factors Influencing the Effectiveness of BIM Implementation	3055
Konstantin Kryukov and Ahmed Ghazal	
Introduction of Innovative Adaptive Building Envelopes to Improve Energy Efficiency of Apartment Buildings	3064
Elena Gorbaneva, Svetlana Sheina, Valery Mischenko, Elena Ovchinnikova, and Kristina Sevryukova	
Evaluation of the Aesthetic and Decorative Properties of Ceramic Bricks	3074
Yuliia Bozhko, Kira Lapunova, and Dmitriy Ovdun	
Study of Dissipative Properties of Conventional and Fiber-Reinforced Concrete	3084
Boris Pinus and Inna Korneeva	
Justification of the Method for Determining the Final Settlement of Ring Pile Foundations Tanks in Clay Soils	3091
Anatoliy Polishchuk and Oleg Shmidt	
Author Index	3101

EVALUATION OF EFFICIENCY OF SMALL AGRICULTURAL ENTERPRISES ECONOMIC ACTIVITY UNDER SUSTAINABLE DEVELOPMENT CONDITIONS

Abstract

It has been proposed to use the method analysis of the operating environment to assess the effectiveness of small agricultural enterprises based on the characteristics of two input factors (resources) - labor costs of enterprises, the cost of equity and the resultant factor - the volume of sales. Coverage coefficients by volume of sold products (goods, works, services) of cost of own capital and labor costs for small agricultural enterprises by types of economic activity have been calculated, which allowed rating of types of economic activity by small enterprises by coverage coefficients of sold products (goods, works, services) cost of capital, labor costs and financial results. It has been proved that the activity of small agricultural enterprises among all other types of economic activity has the highest rating on the coverage coefficients of sold products (goods, works, services) of labor costs, but the lowest on the coverage coefficients of sold products (goods, works, services) capital, despite the fact that the amount of profit is inferior only to economic entities engaged in wholesale and retail trade; repair of motor vehicles and motorcycles. Using the coefficients values of sold products coverage volume (goods, works, services), the cost of equity and labor costs, has been built an environment for small agricultural enterprises, which allowed to form a line of technical efficiency (agriculture, forestry and fisheries-wholesale and retail trade; repair motor vehicles and motorcycles-Information and telecommunications-education) and on the basis of the position of agriculture, forestry and fisheries to find a new position by designing a line with the position of inefficient economic activity (activities in the field of administrative and support services). The possibility of optimizing the activities of small agricultural enterprises by increasing the volume of sold products (goods, works, services) and reducing costs, which will improve the financial result (increase profits).

Keywords

Small agricultural enterprises, type of economic activity, labor costs of enterprises, cost of equity, volume of sold products (goods, works, services), financial result, method analysis of the operating environment, technical efficiency (inefficiency) of economic activity.

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Introguction

Modern economy development requires the application of qualitatively new approaches to the study of economic entities. At present, the usual analysis tools are not enough, which would allow to draw conclusions about economic activity of enterprises efficiency on the basis of changes in the dynamics of performance indicators. Besides, there are not enough parametric methods analysis, in particular correlation-regression models that provided the influence of one or more parameters on the performance indicator, which proves the study relevance.

Taking into consideration the globalization effects on the activities of national economies and enterprises, the instability and cyclical nature of economic processes, a significant amount of economists' works are devoted to the effectiveness of enterprises in terms of sustainable development. The influence of innovations on the enterprises efficiency under the conditions of sustainable development was studied by Halme, M., & Korpela, M. [10] and Malysheva, T.V, Shinkevich A.I., Kharisova G.M., Nuretdinova Y.V., Khasyanov O.R., Nuretdinov I.G. and Kudryavtseva S.S. [14]. Studies of Kozlova E.P., Potashnik Y.S., Artemyeva M.V., Romanovskaya E.V., Andryashina N.S. [12] and Hryvkivska, O., Kotvytska, N., Ivanova, N., Pryimak, N., & Salkova, I. [11].

Scientists Fenyves V., Tarnóczy T., & Zsidó K. [5] in their research emphasize that in the context of sustainable economic development is particular importance the assessment of business performance. They propose to make this assessment using the method analysis of DEA data processing. It is necessary to constantly monitor the efficiency and cost-effectiveness of the company and provide information for corporate

decision-making. The authors Smerichevskiy S. F., Kryvovyazyuk I. V., Prokhorova V. V., Usarek W., & Ivashchenko A. I. [13] propose the use of symptomatic diagnostics of enterprises under conditions of sustainable development violations of the world economy.

Also, in today's difficult conditions of the economy, the topic small business supporting and increasing its efficiency acquires a special role. Sycheva I. N., Ovchinnicov Y. L., Voronkova O. Yu., Akhmetshin E. M., Kolmakov V. V., & Vasilieva A. G. [2] studied the efficiency of small business in rural areas and indicate that government support and cooperation with large enterprises are needed to increase its efficiency. Galluzzo N. [4] during the study of small Italian farms efficiency also emphasizes the need for financial support, subsidies and special agricultural policies.

The method analysis of the operating environment is actively used to assess the effectiveness of economic activity in the agricultural sector, in particular, both individual entities and the industry as a whole. Special attention was paid to this aspect by scientists who studied economic efficiency, innovation and investment in agriculture: Kaletnik G., Honcharuk I., Okhota Y. [3], Pronko, L., Furman, I., Gontaruk, Y. [8], Kucher A. [6].

Taking into consideration all mentioned above, it is necessary to improve methods for assessing economic activity efficiency of small agricultural enterprises in terms of sustainable development. The basis of the method analysis of the operating environment is M. Farrell's study [1], who first proposed its use in the study of the efficiency of natural monopolies. Later, this method proved to be so universal and easy to use that it began to be used by researchers in many countries to assess the effectiveness not only of enterprises but also of banks, educational institutions, hospitals and many others.

It is profitable to determine the efficiency of business entities using non-parametric methods, in particular the method analysis of the operating environment. Its essence is to study the efficiency not between specific small agricultural enterprises operating in agriculture, forestry and fisheries by determining the maximum values of profit or revenue from products sales (goods, works, services), but in comparison with similar entities in other industries and areas of activity. An important feature of this method is the absence of financial result factor as the main indicator of efficiency, but the decisive factor has been accepted technical efficiency, which allows positioning by distances in the operating environment and identify projections of optimal costs and sales.

The purpose of the research

The purpose of the article is to apply the method analysis of the operating environment to assess economic activity of small agricultural enterprises effectiveness in terms of sustainable development.

Materials and Methods

The study has been done on the basis of small businesses activities - small businesses operating in agriculture, forestry and fisheries. The main indicators for assessing the economic efficiency of this type of activity in the aggregate of all enterprises in the operating environment for 2019 were selected the following indicators: labor costs of enterprises, the cost of equity, sales, financial result.

The method analysis of the operating environment allows to determine and assess technical inefficiency level of the studied subjects based on the distance to the boundary line, which is a variation of ideal, i.e. effective subjects. Thus, ideal (technically efficient) objects had an efficiency coefficient of 1, and technically inefficient - from 0 to 1.

This method was developed to manage natural monopolies, as it was possible not to take into account their profits, but to optimize two input indicators - costs (e.g. cost of capital and labor costs) and one effective - income from sales of products (goods, works, services) [1]. Later, the method analysis of the operating environment was used for various entities - from enterprises and institutions, to regions of states, activities, sectors of the national economy and more. Moreover, the ability to optimize the activities of the subject by finding their projections on the line of technical efficiency allows you to find options to reduce costs and increase sales regardless of resource characteristics and performance, as proved in previous studies [7,9].

We propose to use the method analysis of the operating environment to determine the efficiency of economic activity of small agricultural enterprises in several stages, using the statistical collection "Activities of large, medium, small and micro enterprises" [15]. We use M. Farrell's example, which will allow in the form of factor (resource) indicators to attract labor costs of enterprises (L), the cost of equity (K), effective - products sold volume (goods, works, services) (Y) (Table 1).

Table 1

Performance indicators of small enterprises for 2019 (cost of equity, labor costs of enterprises, sales), mln.UAH

№	Type of economic activity	Labor costs of enterprises, L	Cost of equity, K	The volume of sold products, Y
1	Agriculture, forestry and fisheries	1318,1	186086,6	206240,1
2	Industry	19686,0	46332,7	223972,3
3	Construction	11266,7	-3031,7	178547,9
4	Wholesale and retail trade; repair of motor vehicles and motorcycles	28283,5	76622,5	841961,4

5	Transport, warehousing, postal and courier activities	7685,0	16005,7	92609,1
6	Temporary accommodation and catering	2545,8	4023,1	14051,8
7	Information and telecommunications	7246,2	5724,5	61543,3
8	Financial and insurance activities	1822,8	91548,2	20039,6
9	Real estate transactions	8787,7	117458,8	80665,8
10	Professional, scientific and technical activities	10448,5	46041,0	60324,9
11	Activities in the field of administrative and support services	6105,7	33685,9	42954,1
12	Education	896,2	177,4	3204,5
13	Health and social care	2000,2	3307,1	6152,2
14	Arts, sports, entertainment and recreation	698,7	2126,3	3811,5
15	Provision of other types of services	786,7	977,4	3797,4

Small enterprises engaged in agriculture, forestry and fisheries together have one of the lowest labor costs - UAH 1,318.1 million. Smaller values of expenses only in the sphere of administrative and support services (UAH 6,105.7 million), education (UAH 896.2 million), arts, sports, entertainment and recreation (UAH 698.7 million), provision of other types of services (UAH 786.7 million). At the same time, the total cost of equity of small agricultural enterprises is the highest compared to the value of economic entities of other types of economic activity (UAH 186,086.6 million). In terms of the sold products volume (goods, works, services), in their totality, small agricultural enterprises (UAH 206,240.1 million) are inferior to economic entities engaged in economic activity in industry (UAH 223,972.3 million), wholesale and retail trade; repair of motor vehicles and motorcycles (UAH 841961.4 million).

Using the data in table 1, calculate the coefficients of coverage by the volume of sold products (goods, works, services) of the cost of equity (K / Y) and labor costs (L / Y) in terms of financial results for small enterprises by type of economic activity in 2019 (Table 2).

Table 2

Coefficients of coverage by the sold products volume (goods, works, services) of the cost of equity and labor costs for small enterprises by type of economic activity in 2019

№	Type of economic activity	L / Y	K / Y	Фінансовий результат, млн. грн.
1	Agriculture, forestry and fisheries	0,006	0,90	19968,5
2	Industry	0,09	0,21	10749,5
3	Construction	0,06	-0,02	7046,3
4	Wholesale and retail trade; repair of motor vehicles and motorcycles	0,03	0,09	24504,1
5	Transport, warehousing, postal and courier activities	0,08	0,17	3523,6
6	Temporary accommodation and catering	0,18	0,29	239,2
7	Information and telecommunications	0,12	0,09	4087,6
8	Financial and insurance activities	0,09	4,57	4817,9
9	Real estate transactions	0,11	1,46	18015,4
10	Professional, scientific and technical activities	0,17	0,76	5727,5
11	Activities in the field of administrative and support services	0,14	0,78	4462,2
12	Education	0,28	0,05	298,0
13	Health and social care	0,32	0,54	420,6
14	Arts, sports, entertainment and recreation	0,18	0,56	-328,7
15	Provision of other types of services	0,21	0,26	296,8

The closer to zero the calculated coefficient, the more likely to optimize the results of enterprises - to reduce costs and / or increase sales.

Based on the calculated coefficients of coverage by the volume of sold products (goods, works, services) of the cost of equity and labor costs by types of economic activity and financial results for small enterprises (Table 2), the rating of economic activities (Table 3) for the following criteria:

- the highest rating was received by types of economic activity in which the coverage ratios were as close as possible to zero ($L / Y = 0.006$ for small agricultural enterprises, which is the lowest indicator - rating 1);

- the lowest rating was received by types of economic activity in which the coverage ratios were as close as possible to unity ($K / Y = 0.90$ for small agricultural enterprises, which is the highest indicator - rating 11);

- further analysis does not take into account ratings by types of economic activity, coverage ratios of which are greater than one (financial and insurance activities, real estate transactions), as well as activities with negative equity (construction) and negative financial results (art, sports, entertainment and recreation).

Table 3

Types of economic activity ranking by small enterprises according to the coefficients of coverage by the sold products volume (goods, works, services) of the cost of equity, labor costs and financial results in 2019

№	Type of economic activity	Place in the ranking		
		L / Y	K / Y	Financial result, UAH million.
1	Agriculture, forestry and fisheries	1	11	2
2	Industry	5	4	4
3	Construction	3	-0,02	5
4	Wholesale and retail trade; repair of motor vehicles and motorcycles	2	2	1
5	Transport, warehousing, postal and courier activities	4	3	10
6	Temporary accommodation and catering	10	6	14
7	Information and telecommunications	7	2	9
8	Financial and insurance activities	5	4,57	7
9	Real estate transactions	6	1,46	3
10	Professional, scientific and technical activities	9	9	6
11	Activities in the field of administrative and support services	8	10	8
12	Education	12	1	12
13	Health and social care	13	7	11
14	Arts, sports, entertainment and recreation	10	8	-328,7
15	Provision of other types of services	11	5	13

Thus, in Fig. 1 one can see the positions of 11 types of economic activity in 2019. The abscissa axis - the coefficients of coverage by the sold products volume (goods,

works, services) of the cost of equity; ordinate - coefficients of coverage of sold products volume (goods, works, services) of labor costs of enterprises.

Positions 1, 2, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15 - positions of economic activities for small enterprises (Chart 1 - Chart 3).

Line 1-4-7 - line of technical efficiency, where technically efficient types of economic activity are agriculture, forestry and fisheries (1), wholesale and retail trade; repair of motor vehicles and motorcycles (4), information and telecommunications (7).

Technically inefficient types of economic activity are activities of positions 2, 5, 6, 10, 11, 12, 13, 14, 15.

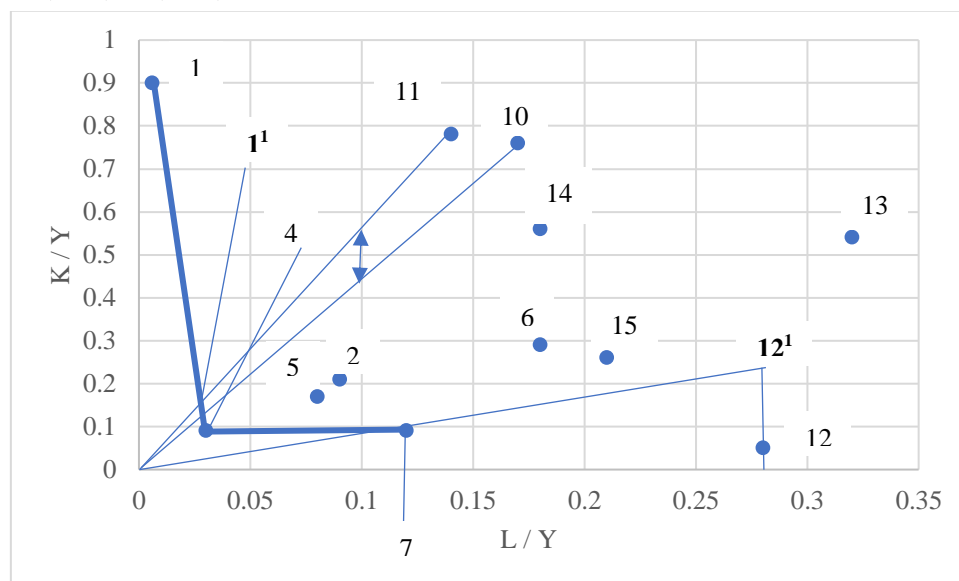


Figure 1. Optimization of the position of small agricultural enterprises in the economic entities environment by type of economic activity

The new position of the type of activity in agriculture, forestry and fisheries 1^1 was obtained due to the intersection of the technical efficiency segment line 1-4 with the segment 0-11. Position 11 (activities in the field of administrative and support services) has the maximum approximation to position 1 compared to the positions of other technically inefficient economic activities (in Fig. 1 the advantage of position 11 is demonstrated by the example of the nearest position 10 (professional, scientific and technical activities)).

Thus, for the optimized position of economic activity in agriculture, forestry and fisheries (1^1), the new coverage ratios will be: $L / Y = 0.03$, $K / Y = 0.16$. Taking into consideration, that in small agricultural enterprises labor costs are among the lowest compared to enterprises engaged in other economic activities, further optimization will be based on the coverage ratio of sold products (goods, works, services) of the equity cost. Y).

The calculation of the possibility of increasing the volume of sold products (goods, works, services) is carried out through the cost of equity ratio to the new value of the coverage ratio:

$$0.16 = 186086.6 / Y; Y = 186086.6 / 0.16 = 1163041.25 \text{ million UAH.}$$

Based on the latter value, we can conclude about the significant potential of small agricultural enterprises, which allows next year to increase sales by 956801.15 million UAH. (1163041.25 - 206240.1).

The calculation of the possibility of optimizing equity is carried out by multiplying the volume of sold products (goods, works, services) by a new value of the coverage ratio:

$$0.16 = K / 206240.1; K = 206240.1 * 0.16 = \text{UAH } 32998.42 \text{ million.}$$

Based on the latter value, we can conclude that there is the possibility of reducing next year's investment in equity of small agricultural enterprises in the amount of 153088.18 million UAH. (186086.60 - 32998.42).

CONCLUSION

Based on the study of the efficiency of economic activity of small agricultural enterprises in terms of sustainable development, it can be stated that the technical efficiency of economic activity of small agricultural enterprises is achieved due to low labor costs of enterprises. Using the possibilities of the method analysis of the operating environment, the presence of significant potential in the activities of small enterprises of agriculture, forestry and fisheries due to an increase in sales by 5.6 times, as well as reducing the use of equity by 17.7%. Taking into consideration, that for small enterprises of this type of economic activity, the coverage ratio of sold products (goods, works, services) of the cost of equity decreased due to the proposed optimization from 0.9 to 0.16, it is possible to determine proportionally the increase in profit to 111823.6 UAH million

Another important factor in using the method analysis of the operating environment is the optimization of another type of economic activity - the educational services provision (position 12). In contrast to activities in agriculture, forestry and fisheries, with a constant coverage ratio of sold products (goods, works, services) the cost of labor costs, the coverage ratio of sold products (goods, works, services) the cost of equity should increase to 0.24.

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