ISSN 1997-9347

Components of Scientific and Technological Progress

SCIENTIFIC AND PRACTICAL JOURNAL

№ 3(69) 2022

Paphos, Cyprus, 2022

Journal "Components of Scientific and Technological Progress" is published 12 times a year

Founder
Development Fund for Science and Culture
Scientific news of Cyprus LTD

The journal "Components of Scientific and Technological Progress" is included in the list of HAC leading peer-reviewed scientific journals and publications in which the main scientific results of the dissertation for the degree of doctor and candidate of sciences should be published

Chief editor
Vyacheslav Tyutyunnik

Page planner:
Marina Karina

Copy editor:
Natalia Gunina

Director of public relations:
Ellada Karakasidou

Postal address:
1. In Cyprus:
8046 Atalanta court, 302
Papthos, Cyprus
2. In Russia:
13 Shpalernaya St,
St. Petersburg, Russia

Contact phone:
(+357)99-740-463
8(915)678-88-44

E-mail:
tmbprint@mail.ru

Subscription index of Agency **"Rospechat"** No 70728 for periodicals.

Information about published articles is regularly provided to **Russian Science Citation Index** (Contract No 124-04/2011R).

Website:
http://moofrnk.com/

ADVISORY COUNCIL

and Psychology of the Moscow Social and Pedagogical Institute; tel.: 8(495)6074186, 8(495)6074513; E-mail: dekanmospi@mail.ru, Moscow (Russia)

Petrenko Sergey Vladimirovich – Doctor of Technical Sciences, Professor, Head of Department of Mathematical Methods in Economics, Lipetsk State Pedagogical University, tel.: 8(4742)328436, 8(4742)221983, E-mail: viola@lipetsk.ru, viola349650@yandex.ru, Lipetsk (Russia)

Tarando Elena Evgenievna – Doctor of Economics, Professor of the Department of Economic Sociology, St. Petersburg State University, tel.: 8(812)2749706, E-mail: elena.tarando@mail.ru, St. Petersburg (Russia)

Veress József – PhD, Researcher in Information Systems Department, Business School of Corvinus University, tel.: 36 303206350, 36 1 482 742; E-mail: jozsef.veress@uni-corvinus.hu, Budapest (Hungary)

Kochetkova Alexandra Igorevna – Doctor of Philosophy and Cultural Studies (degree in organizational development and organizational behavior), PhD, Professor, Department of General and Strategic Management Institute of Business Administration of the Russian Academy of National Economy and Public Administration under the President of the Russian Federation, E-mail: dak6966@gmail.com, Moscow (Russia)

Bolshakov Sergey Nikolaevich – Doctor of Political Sciences, Doctor of Economics, Vice-Rector for Academic Affairs, Professor, Syktyvkar State University named after Pitirim Sorokin, tel.: 8(921)6334832, E-mail: snbolshakov@mail.ru, Syktyvkar (Russia)

Gocłowska-Bolek Joanna – Center for Political Analysis, University of Warsaw, tel. 48691445777, E-mail: j.goclowska-bolek@uw.edu.pl, Warsaw (Poland)

Karakasidou Ellada – A&G, Kotanides LTD, Logistic, tel.: +99346270, E-mail: espavoellada9@gmail.com, Paphos (Cyprus)

Artyukh Angelika Alexandrovna – Doctor of Art History, Professor of the Department of Dramatic and Cinema Studies, St. Petersburg State University of Cinema and Television; tel.: +7(911)9250031; E-mail: s-melnikova@list.ru, St. Petersburg (Russia)

Melnikova Svetlana Ivanovna – Doctor of Art History, Professor, Head of the Department of Dramatic Art and Cinema Studies at the Screen Arts Institute of St. Petersburg State University of Cinema and Television; tel.: +7(911)9250031; E-mail: s-melnikova@list.ru, St. Petersburg (Russia)

Marijan Cingula – Tenured Professor, University of Zagreb, Faculty of Economics and Business, tel.: +385(95)1998925, E-mail: mcingula@efzg.hr, Zagreb (Croatia)

Pukharenko Yury Vladimirovich – Doctor of Technical Sciences, Professor, Head of the Department of Building Materials Technology and Metrology at St. Petersburg State University of Architecture and Civil Engineering, Corresponding Member of the Russian Academy of Architecture and Construction Sciences; tel.: +7(921)3245908; E-mail: tsik@spbgasu.ru, St. Petersburg (Russia)

Przygoda Miroslaw – Dr. hab., Head of Institute of Economic Analysis and Planning, Department of Management, University of Warsaw, tel.: 225534167, E-mail: miroslawprzygoda@wp.pl, Warsaw (Poland)

Recker Nicholas – PhD, Associate Professor, Metropolitan State University of Denver, tel.: 3035563167, E-mail: nrecker@msudenver.edu, Denver (USA)

Contents

Содержание

UDK 621.311

Application of Fuzzy Logic in Hydrogen-Containing Gas Purification Plant for Reactive Power Compensation

E.M. Bashirova, D.E. Matveev, A.S. Khismatullin, I.V. Prakhov

Branch of Ufa State Petroleum Technological University, Salavat (Russia)

Key words and phrases: compensation; fuzzy logic; fuzzy sets; hydrogen-containing gas; load; power.

Abstract. Maintaining the voltage quality in a hydrogen-containing gas purification plant, as well as reactive power compensation, are key tasks to ensure the efficiency of electrical complexes that include load nodes with a non-linear current-voltage characteristic. Devices using fuzzy control are in some cases preferable to devices controlled by traditional algorithms. The article develops an algorithm and a control circuit for capacitor installations in networks with a non-linear load, which are built on the mathematical tools of fuzzy logic. The obtained results prove that with a harmonic composition exceeding the established norms, the developed algorithm allows eliminating the excess load of capacitors from higher harmonic currents.

One of the urgent problems in the field of purification and adsorption separation of gas mixtures is the production of hydrogen from hydrogen-containing gas streams. Hydrogen is widely used in various industries due to its high reactivity, exceptional lightness and large amount of heat released during combustion. The main consumer of gas is oil refining and petrochemical enterprises, in other industries hydrogen is used both as the main raw material, and as an auxiliary material, and as fuel. From the analysis of measures to reduce electricity losses and improve its quality in distribution networks, it is known that one of the most effective ways is to install additional sources of reactive power and control them [1–5]. The latter, by reducing the current loads of power lines and power transformers, reduce power losses and improve voltage quality. The modern development of information technologies and computing tools creates the prerequisites for applying other approaches to solving the problem of optimizing reactive energy flows. At the moment, fuzzy logic methods are widely introduced into industrial production and allow improving the quality of regulation in conditions of incomplete information about the control object [6–9]. That is why, in contrast to the reactive power compensation approach described above, a fuzzy algorithm is proposed. The method of fuzzy logic theory uses expert assessments instead of Boolean logic and uses a set of fuzzy membership functions and rules with several conclusions to form a solution, allowing to form a knowledge base of the system [7; 8]. At the same time, term-sets of parameters of fuzzy regulation are determined on the basis of expert

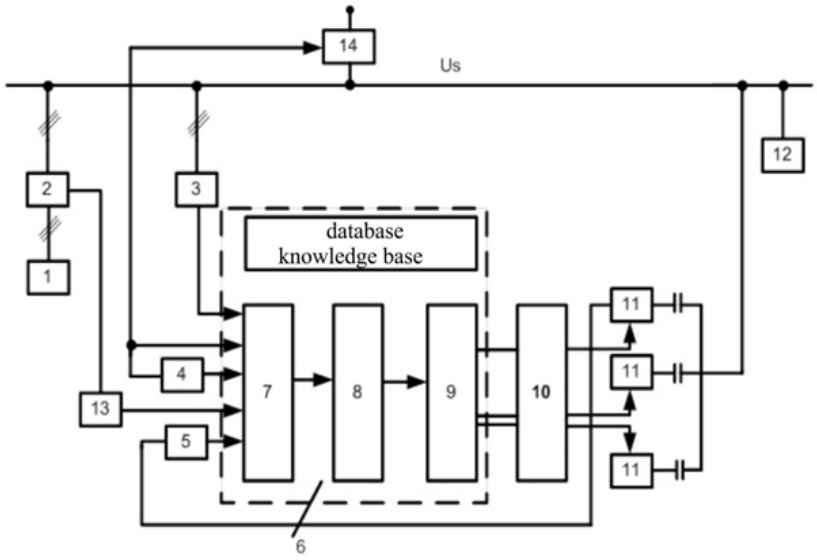


Fig. 1. Block-diagram of a fuzzy reactive power controller

knowledge [10–11].

The purpose of the study is the development of a scheme and a fuzzy algorithm for reactive power compensation in an electrical network with devices of a non-linear nature of electricity consumption.

The developed fuzzy reactive power controller is shown in Fig. 1 and described in the form of structural blocks: 1 – active load; 2 – reactive power sensor; 3 – voltage value sensor on the supply line; 4 – rate of change of reactive power; 5 – counter of the number of switchings made per day; 6 – fuzzy controller; 7 – fuzzification block; 8 – fuzzy inference block; 9 – defuzzification block; 10; 11 – base of membership functions of fuzzy sets, these input signals and a set of fuzzy production rules; 12 – switching unit; 13 – non-linear load; 14 – indicators of non-sinusoidal voltage (sensor).

The fuzzy reactive power controller operates according to the following principle. The process parameters, as well as the value of switching sections of static capacitor banks N in the form of clear signals, are sent to the fuzzy controller. The generated fuzzy sets interpreted in the fuzzifier enter the fuzzy inference mechanism [10]. Fuzzy Sets Are Found As Follows:

$$F = fuzzifier(Q, Q', U, K_U, N),$$

where Q, Q', U, K_U, N is a set of clear signals described above; F is the result of fuzzification; *fuzzifier* is an operator that allows you to perform the fuzzification operation.

The regulation of reactive power flows in an electrical network with a non-linear load is implemented in software. The parameters from the sensors, the value of the reactive power derivative (Q'), as well as the number of switching sections of static capacitor banks per day with an increase in the coefficient K_U above the norm, are sent to the block of the fuzzy decision-making mechanism. The switching decision is formed taking into account the current values of the output state vector of sections with a time delay, depending on the number of switching operations and the dynamics of reactive power change. If the condition is not met $K_U > K_U^{norm}$ there is a disconnection of sections of batteries of static capacitors. When the condition is met,

the sections of the static capacitor banks are switched off. When the condition $tg\phi \leq tg\phi_{ust}$. The operation of the fuzzy controller ends, where $tg\phi$ and $tg\phi_{ust}$ – current and set values of the reactive power factor, respectively. The proposed algorithm was tested in the MATLAB program, in the Simulink complex based on the 14-node IEEE scheme. The test circuit includes 14 buses, 5 generators and 11 loads.

The application of this approach can qualitatively affect the service life of the capacitor bank, as well as reduce the number of measures for the implementation of current and major repairs in relation to it. The probability of failure of the capacitor bank is reduced and the reliability of operation is increased.

Thus, on the basis of the mathematical apparatus of fuzzy logic, an algorithm for fuzzy regulation of reactive power in an electrical network with non-linear consumers of electrical energy is proposed. This solution makes it possible to maintain the reactive power factor $tg\phi$ within the limits regulated in the technical conditions for consumers, and can also be used to ensure the normal operational state of static capacitor banks.

References

1. Bashirov, M.G. Electromagnetic-acoustic method for assessing the technical condition of power equipment / M.G. Bashirov, I.G. Khusnutdinova, L.G. Khusnutdinova, D.R. Usmanov // Industrial Energy. – 2016. – No. 12. – P. 8–13.

2. Ermolaev, M.S. Fuzzy controller for temperature control in the ammonia synthesis column / M.S. Ermolaev, A.M. Khafizov // South Siberian Scientific Bulletin. – 2021. – No. 2(36). – P. 104–108.

3. Bashirova, E.M. Engagement of oil and gas equipment during the transition to a maintenance and repair system according to technical condition / E.M. Bashirova, U.F. Yumaguzin, R.T. Yulberdin // Transport and storage of oil products and hydrocarbon raw materials. – 2014. – No. 1. – P. 18–22.

4. Bashirov, M.G. The technical condition assessment and the resource of safe operation of technological pipelines using electromagnetic-acoustic effect / M.G. Bashirov, E.M. Bashirova, I.G. Khusnutdinova, N.N. Luneva // IOP Conference Series : Materials Science and Engineering; Krasnoyarsk Science and Technology City Hall of the Russian Union of Scientific and Engineering Associations, 2020. – P. 12191.

5. Vasilev, I. The theory of fuzzy sets as a means of assessing the periods of service of asynchronous electric motors / I. Vasilev, A. Hismatullin // Proceedings-2020 International Conference on Industrial Engineering, Applications and Manufacturing, ICIEAM, 2020. – P. 9111887.

6. Khismatullin, A.S. Synthesis of a fuzzy reactive power compensation algorithm in an electrical network with a non-linear load / A.S. Khismatullin, E.S. Grigoriev // Sovremennye naukoemkie tekhnologii. – 2018. – No. 9. – P. 131–135.

7. Khismatullin, A.S. Automated software to determine thermal diffusivity of oilgas mixture / A.S. Khismatullin // Journal of Physics: Conference Series, 2018. – P. 052013.

8. Khismatullin, A.S. Method for increasing oil resources transformers with long term operation / A.S. Khismatullin // IOP Conference Series: Materials Science and Engineering, 2018. – P. 022058.

9. Khismatullin, A.S. The use of fuzzy logic for reactive power compensation in an electrical network / A.S. Khismatullin, I.V. Prakhov, E.S. Grigoriev, R.R. Shafeev // International technical and economic journal. – 2018. – No. 4. – P. 13–19.

10. Khismatullin, A.S. Study of the effect of transformers on the quality of electrical energy in the power supply system / A.S. Khismatullin, M.R. Surakov, E.M. Bashirova // International technical and economic journal. – 2020. – No. 2. – P. 24–30.

11. Kolesnichenko, D.B. Investigation of defects in a frequency-controlled electric drive and the study of their influence on the spectra of currents / D.B. Kolesnichenko, A.S. Khismatullin, E.M. Bashirova // International technical and economic journal. – 2021. – No. 5. – P. 26–31.

Применение нечеткой логики в установке очистки водородсодержащего газа для компенсации реактивной мощности

Э.М. Баширова, Д.Е. Матвеев, А.С. Хисматуллин, И.В. Прахов

Филиал ФГБОУ ВО «Уфимский государственный нефтяной технический университет», г. Салават (Россия)

Ключевые слова и фразы: водородсодержащий газ; компенсация; мощность; нагрузка; нечеткая логика; нечеткие множества.

Аннотация. Поддержание качества напряжения в установке для очистки водородсодержащего газа, а также компенсация реактивной мощности являются ключевыми задачами обеспечения эффективности работы электрических комплексов, включающих в себя узлы нагрузок с нелинейной вольтамперной характеристикой. Устройства, использующие нечеткое управление, в ряде случаев оказываются предпочтительнее устройств, управляемых традиционными алгоритмами. В статье разработаны алгоритм и схема регулирования конденсаторными установками в сетях с нелинейной нагрузкой, которые построены на математическом инструментарии нечеткой логики. Полученные результаты доказывают, что при гармоническом составе, превышающем установленные нормы, разработанный алгоритм позволяет устранить сверхнормативную нагрузку конденсаторов от токов высших гармоник.

UDK 62-523.2

Improvement of the Power Supply System of the Catalytic Reforming Shop

G.S. Prokop, A.S. Khismatullin, A.I. Ismoilov, I.I. Tochka

Branch of Ufa State Petroleum Technological University, Salavat (Russia)

Key words and phrases: LED lighting; microprocessor protection; power supply; power transformer; switchgear.

Abstract. The object of the study is the power supply system of the complete transformer substation of the prehydrotreatment unit of the catalytic reformer. The material of modern technical documentation, methods of calculation and analysis of the existing system are used. As a result of the study, obsolete and physically worn-out electrical equipment was replaced with a new, more reliable and energy-efficient one. Research and development and technical and economic indicators have been improved through the introduction of more reliable and energy efficient means of modernization.

The trend in the development of modern production is increasingly pushing engineers to improve technological processes and apparatus. The proposed measures for their modernization need to be carefully considered from the point of view of many other areas in order to avoid unforeseen shortcomings.

Introduction

The shop's catalytic reforming unit uses pump, compressor and ventilation equipment. As electric drives for technological equipment, asynchronous electric motors with a squirrel-cage rotor with a voltage of 380 V, asynchronous and synchronous electric motors with a voltage of 6 kV with a power of up to 1250 kW are used. The power supply of consumers with a voltage of 0.4 kV is carried out from a complete transformer substation (**CTS**). All KTPs consist of 2 transformers and a two-section switchgear 0.4 kV with introductory circuit breakers and a sectional switch.

The disadvantage of the existing power supply system is its insufficient reliability, due to the non-compliance with the current standards of technical and economic indicators of the elements of the shop power supply system.

The main condition that determines the choice of an electric drive system is the requirement for speed control indicators, control range, smoothness, and dynamic control indicators. These requirements directly determine the possible classes of used electric drives and control systems. For machines and installations that do not require speed control, AC drives with asynchronous or synchronous motors are used. For mechanisms with low-power drives (up to 50 kW), which

allow step-by-step control in 2–4 steps, asynchronous multi-speed motors with switching the number of pole pairs can be used. AC and DC continuous control systems are used when smooth speed control is required.

Depending on the range and required control accuracy, these systems can be open or closed, and discrete control systems are used with very high accuracy requirements [2]. Requirements for speed control depend on the characteristics of the processes and the design of the working machines. There is no need to require performance changes, product quality improvements, etc. to ensure the use of managed disks [3].

Design and calculation

A frequency converter from ABB brand ACS880-01-145A-3 is suitable for controlling the selected motor. The electrical loads of industrial enterprises according to the maximum coefficient method are calculated in tabular form according to RTM 36.18.32.4-92 [4]. The rated payload power for the pump will be 233 kW. To drive the pump, an engine of the VAO2 brand – 450 M4 U2 was selected. The calculated maximum current for AC power consumers will be 1394.13 A. The minimum number of transformers equal to 2 is determined, which is optimal. Based on the obtained power values, transformers from the standard series Snt = 1000 kVA were selected [5].

As an input, select the Evolis switch. Having performed a thermal stability test based on the thermal impulse of the short-circuit current, it was found out that the circuit breaker meets all requirements. So, we finally accept it as an introductory and sectional one. Similarly, we choose switches for high-voltage electric motors and complete transformer substations [6].

The actual highest reactive load power of the enterprise for a complete substation is 182.5 kvar. To compensate for reactive power at KTP-3, it is necessary to install a 100 x 2 kvar capacitor bank on each section. According to the value obtained, UKRM-0.4-100 was selected from the standard range Qku = 100 kvar. This reactive power compensation device is installed on KTP-4 [7].

Experimental design and technical and economic indicators have been improved through the introduction of more reliable and energy efficient electrical appliances:

– new electric motors of the VAO2 brand – 450 M4 U2 were installed;
– replaced cables;
– installed more reliable switching devices;
– appropriate KRM are selected.

Conclusions

In this work, the development and modernization of the power supply system of the complete transformer substation of the prehydrotreatment unit of the catalytic reforming unit was carried out.

For this, the necessary calculations were made and an analysis of the existing system was made, shortcomings were identified and measures were proposed to eliminate them. The calculation of electrical loads was made, on the basis of which newer cables, switching devices, transformer, lighting were selected.

References

1. KHusnutdinova, I.G. Analiz avarijnykh situatsij v neftegazovoj otrasli pri vozniknovenii defektov v metallicheskikh elementakh obolochkovykh konstruktsij / I.G. KHusnutdinova,

M.N. Bashirov, I.K. Bakirov // Problemy sbora, podgotovki i transporta nefti i nefteproduktov. – 2017. – № 2(108). – S. 155–164.

2. Mullakaev, M.S. Tekhniko-ekonomicheskoe obosnovanie proekta “Sonokhimicheskaya tekhnologiya i kompleks ochistki neftezagryaznennykh stokov” / M.S. Mullakaev, R.M. Mullakaev, A.S. KHismatullin // Sovremennaya nauchnaya mysl. – 2020. – № 5. – S. 136–141.

3. Kolesnichenko, D.B. Issledovanie defektov v chastotno-reguliruemom elektroprivode i izuchenie ikh vliyaniya na spektry tokov / D.B. Kolesnichenko, A.S. KHismatullin, E.M. Bashirova // Mezhdunarodnyj tekhniko-ekonomicheskij zhurnal. – 2021. – № 5. – S. 26–31.

4. Vildanov, R.G. Economic aspects of reactive power compensation at gas-chemical plant / R.G. Vildanov, A.S. Khismatullin, N.N. Luneva // IOP conference series: materials science and engineering. – Novosibirsk, 2019. – P. 012108.

5. KHismatullin, A.S. Primenenie nechetkoj logiki dlya kompensatsii reaktivnoj moshchnosti v elektricheskoj seti / A.S. KHismatullin, I.V. Prakhov, E.S. Grigorev, R.R. SHafeev // Mezhdunarodnyj tekhniko-ekonomicheskij zhurnal. – 2018. – № 4. – S. 13–19.

6. Prokop, G.S. Problema elektromagnitnoj sovmestimosti v sovremennykh schetchikakh elektricheskoj energii / G.S. Prokop, KH.I. Ismoilov, A.S. KHismatullin // Nauka i biznes: puti razvitiya. – M. : TMBprint. – 2021. – № 11(125). – S. 61–63.

7. Ismoilov, A.I. Modelirovanie raboty sistemy elektrosnabzheniya nasosov vodozabornoj stantsii / A.I. Ismoilov, A.S. KHismatullin // Problemy sbora, podgotovki i transporta nefti i nefteproduktov. – 2021. – № 2(130). – S. 84–92.

Улучшение системы электроснабжения цеха каталитического реформинга

Г.С. Прокоп, А.С. Хисматуллин, А.И. Исмоилов, И.И. Точка

Филиал ФГБОУ ВО «Уфимский государственный нефтяной технический университет», г. Салават (Россия)

Ключевые слова и фразы: микропроцессорная защита; распределительное устройство; светодиодное освещение; силовой трансформатор; электроснабжение.

Аннотация. Целью статьи является повышение надежности, безотказности и энергоэффективности системы электроснабжения комплектной трансформаторной подстанции блока предгидроочистки установки каталитического риформинга. Используется материал современной технической документации, методы расчета и анализа существующей системы. В результате исследования произведена замена морально устаревшего и физически изношенного электрооборудования на новое, более надежное и энергоэффективное. Опытно-конструкторские и технико-экономические показатели были улучшены за счет внедрения более надежных и энергоэффективных средств модернизации.

Тенденция развития современного производства все чаще подталкивает инженеров к совершенствованию технологических процессов и аппаратов. Предложенные мероприятия по их модернизации нуждаются в тщательном рассмотрении с точки зрения многих других сфер, во избежание непредусмотренных недостатков.

UDK 711.4:504.06

The Analysis Situation of Urban Green Space Framework in Saint Petersburg

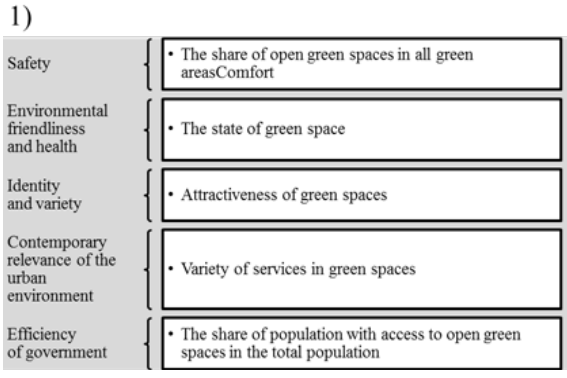
O.N. Dyachkova

St. Petersburg State University of Architecture and Civil Engineering, St. Petersburg (Russia)

Key words and phrases: green fund; green spaces; indicator; norms of urban landscaping; urban environment.

Abstract. The development of an urbanized territory significantly affects the ecological balance of the urban environment. Problem: to study the state of the green frame of St. Petersburg, analyzing the indicators of the provision of population with green spaces. Working hypothesis: green spaces are distributed unevenly across the districts of the city. The textological method of extracting information from the regulatory framework is used in the work. Results: for each district, a visualization of the provision of the city's population with green spaces was performed, including the minimum and strategic norms, the actual value of the indicator; points of growth and the need to preserve the existing volumes of green spaces have been identified; working hypothesis was confirmed.

The urban ecological system is formed under the influence of natural, technogenic and anthropogenic disturbances constantly or from time to time arising on the territory [1; 2]. For the sustainable development of a populated area, a retrospective and predictive analysis of the loads



Metropolis	The value of the indicator for the year, points					
	Urban Environment Quality Index			Green spaces		
	2018	2019	2020	2018	2019	2020
Moscow	276	283	288	32	40	42
Voronezh	154	164	176	18	26	26
Saint Petersburg	238	243	249	44	45	41
Volgograd	116	159	159	9	21	22
Rostov-on-Don	178	193	200	17	16	24
Ufa	179	182	189	40	43	43
Nizhny Novgorod	190	193	201	33	31	32
Perm	153	168	179	29	37	36
Samara	163	159	168	27	29	27
Kazan	190	201	204	30	32	32
Yekaterinburg	191	188	194	17	21	22
Chelyabinsk	160	161	170	25	23	28
Krasnoyarsk	189	181	181	26	26	28
Novosibirsk	161	158	166	27	26	24
Omsk	104	106	113	16	15	18

Fig. 1. Assessment of green spaces in the Metropolis: 1 – groups of indicators; 2 – temperature map of the indicator

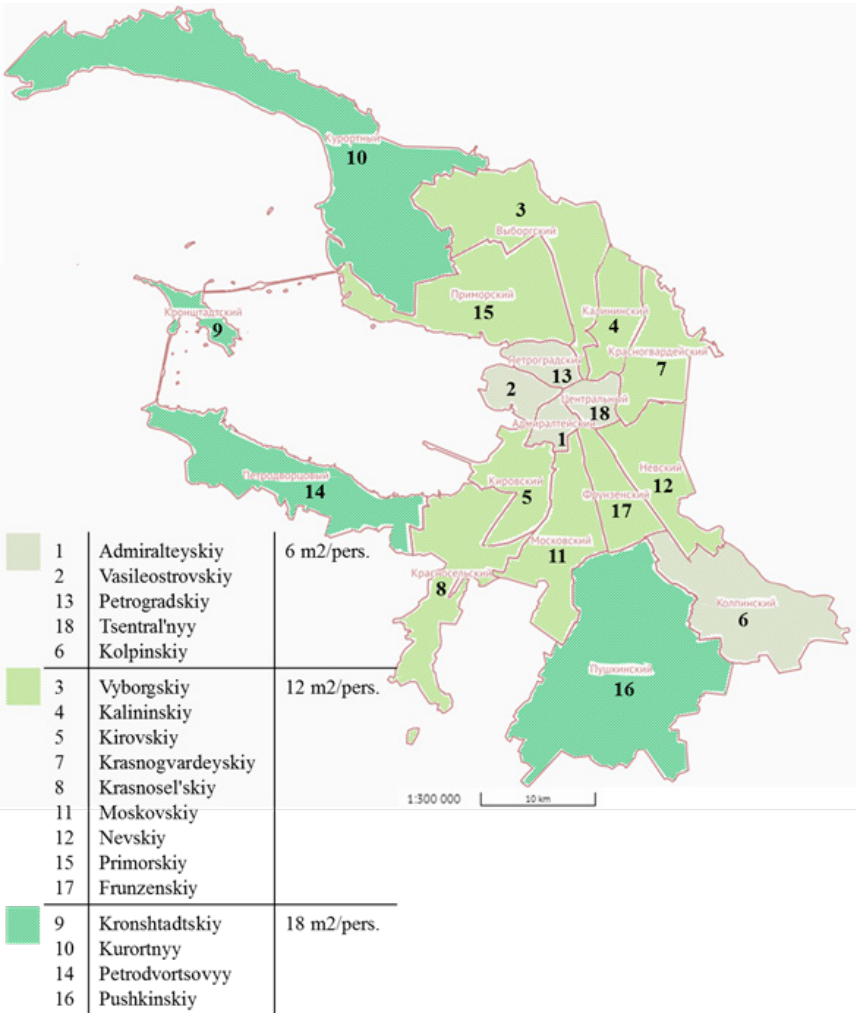


Fig. 2. The existing minimum norms for the provision of the population of St. Petersburg with green spaces

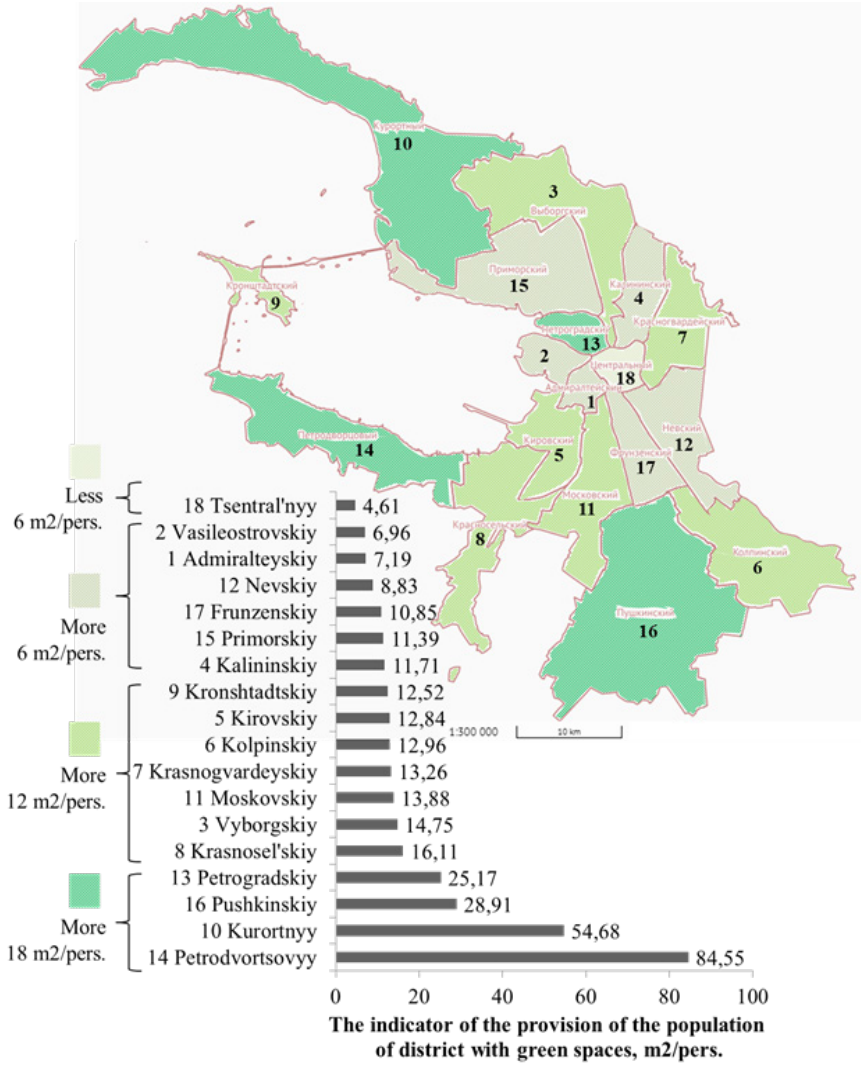


Fig. 3. The indicator of the provision of the population of St. Petersburg with green spaces as of 01/01/2021

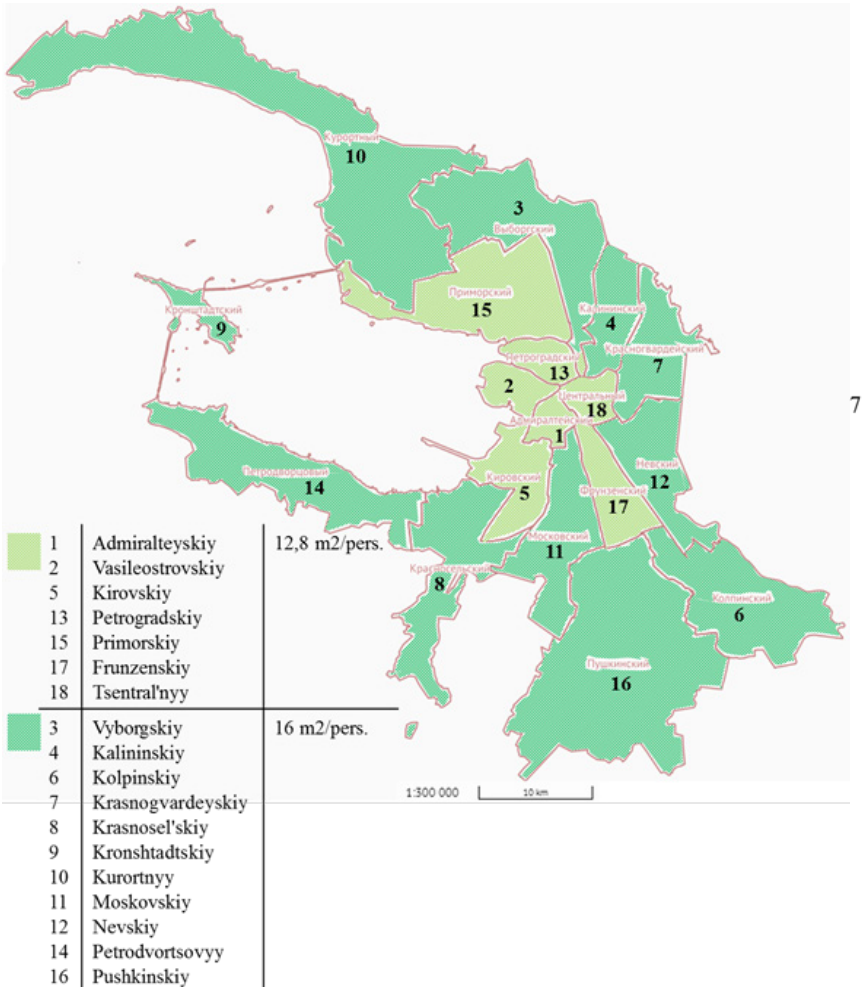


Fig. 4. Planned minimum standards for the provision of the population of St. Petersburg with green spaces

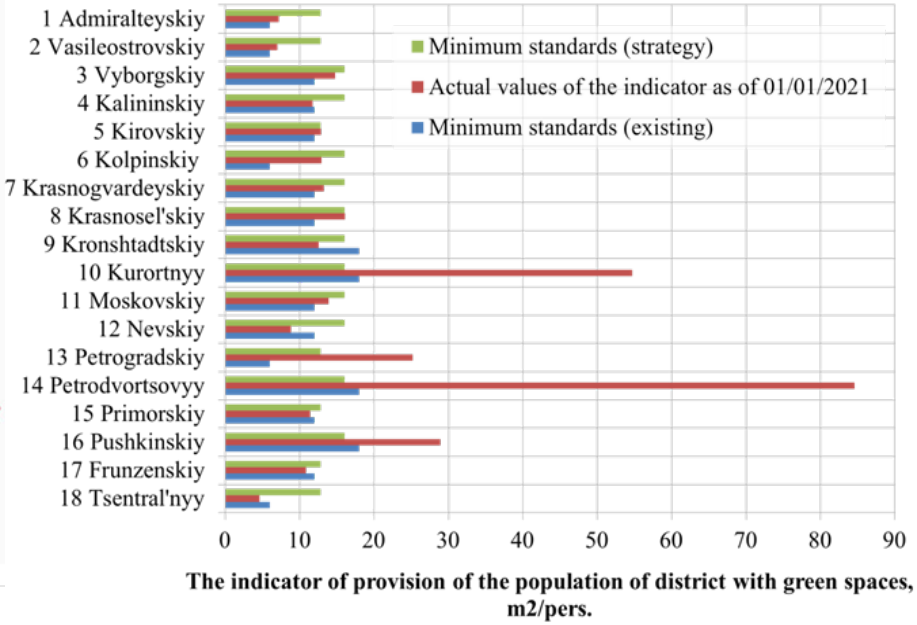


Fig. 5. Comparative analysis of indicators of provision of the population of St. Petersburg with green spaces

from these impacts and ways to minimize them is relevant [3; 4]. Given the high concentration of industry, the increasing population density in residential areas, as well as the difficult natural conditions of St. Petersburg, an important indicator of the quality of life of its residents and guests is the level of environmental sustainability of the urban environment [5]. A favorable environment on the territory of St. Petersburg is largely provided by the green fund [6].

Numerous studies have been devoted to solving the problems of creating a green frame of cities in Russia and the world [7; 8]. In [9] norms of landscaping residential territories were proposed for discussion.

Assessment of the quality level of the urban environment of Russian cities is carried out on a permanent and systematic basis. Based on the results, the Urban Environment Quality Index is formed and published annually, one of the types of evaluated spaces being Green spaces (Fig. 1).

The law of St. Petersburg dated June 28, 2010 No. 396-88 “On green spaces in St. Petersburg” regulates the minimum provision of city residents with green spaces (Fig. 2).

The indicator of the provision of residents of St. Petersburg with green spaces is calculated in the prescribed manner for each district of the city as the ratio of the sum of the areas of all areas of green spaces to the number of resident population of the corresponding district (Fig. 3).

Measures for the development of green spaces in accordance with the law of St. Petersburg dated December 22, 2005 No. 728-99 “On the General Plan of St. Petersburg” include an increase in the area of green spaces:

1) in historical areas by 20 % and the provision of the population with public green spaces not less than 12.8 m2/person,

2) in non-central areas – by 70 % and, accordingly, provision – not less than 16 m^2/person (Fig. 4).

Thus, it has been established that in order to maintain the environmental sustainability of the urban environment, the development of the green fund in St. Petersburg has (Fig. 5):

- growth zones that require managerial decisions to achieve minimum levels of provision of residents with green spaces (for example, Admiralteyskiy, Vasileostrovskiy, Vyborgskiy, Kalininskiy, Kolpinskiy, Krasnogvardeyskiy, Kronshtadtskiy, Moskovskiy, Nevskiy, Primorskiy, Frunzenskiy and Tsentral’nyy districts of the city);
- the need to preserve the existing volumes of green spaces (for example, Kirovskiy, Krasnosel’skiy, Kurortnyy, Petrogradskiy, Petrodvortsovyy and Pushkinskiy districts of the city).

References

1. Lorsanov, Ya.E. Green areas in conditions of residential landscapes in Grozny / Ya.E. Lorsanov, M.U. Rashidov, Z.G. Tatasheva // Science Prospects. – 2015. – Vol. 3. – P. 96–98.

2. Gribanovskaia, S.V. Possibilities of applying an adaptation strategy to natural risks / S.V. Gribanovskaia, A.Yu. Panova, O.V. Voronkova // Components of Scientific and Technological Progress. – 2021. – Vol. 5. – P. 8–11.

3. Dyachkova, O.N. The ecological resource of an urbanized territory / O.N. Dyachkova [Electronic resource]. – Access mode : https://www.elibrary.ru/download/elibrary_47121027_47696511.pdf.

4. Dyachkova, O.N. The ecosystem of a residential district: problems, development prospects / O.N. Dyachkova // Stroitel’stvo: nauka i obrazovanie [Construction: Science and Education]. – 2021. – Vol. 11(3). – P. 1 [Electronic resource]. – Access mode : http://nso-journal.

ru. – DOI: 10.22227/2305- 5502.2021.3.1.

5. Dyachkova O.N. Separate collection of solid household waste by residents of multi-family homes / O.N. Dyachkova // Vestnik MGSU [Monthly Journal on Construction and Architecture]. – 2021. – Vol. 16(7). – P. 838–858. – DOI: 10.22227/1997-0935.2021.7.838-858.

6. Dyachkova, O.N. Principles of strategic planning for the development of “green” infrastructure of the urban environment / O.N. Dyachkova // Vestnik MGSU [Monthly Journal on Construction and Architecture]. – 2021. – Vol. 16(8). – P. 1045–1064. – DOI: 10.22227/1997-0935.2021.8.1045–1064.

7. Merkulova, S.V. Gardening as a factor of improving of ecological situation in the urban areas (for example, the city of Saransk) / S.V. Merkulova, B.I. Kochurov, P.I. Merkulov, I.V. Ivashkina // Ecology Of Urban Areas. – 2018. – Vol. 3. – P. 13–18. – DOI: 10.24411/1816-1863-2018-13013.

8. Danilina, N.V. Analysis situation of urban green space framework in Tehran / N.V. Danilina, A. Majorzadehzahiri // Vestnik MGSU [Monthly Journal on Construction and Architecture]. – 2021. – Vol. 16(8). – P. 975–985. – DOI: 10.22227/1997-0935.2021.8. 975-985.

9. Dyachkova, O.N. Green space in the improvement system of adjacent territory (private) areas of apartment buildings / O.N. Dyachkova // Geoekologiya. Inzhenernaya geologiya, gidrogeologiya, geokriologiya [Geoecology. Engineering geology, hydrogeology, geocryology]. – 2022. – Vol. 1. – P. 85–95. – DOI: 10.31857/S0869780922010039.

Анализ состояния городского зеленого фонда в г. Санкт-Петербурге

О.Н. Дьячкова

ФГБОУ ВО «Санкт-Петербургский государственный архитектурно-строительный университет», г. Санкт-Петербург (Россия)

Ключевые слова и фразы: городская среда; зеленый фонд; индикатор; нормы городского озеленения; озелененные пространства.

Аннотация. Развитие урбанизированной территории существенно влияет на экологическое равновесие городской среды. Задача исследования: изучить состояние зеленого каркаса Санкт-Петербурга, анализируя показатели обеспеченности жителей территориями зеленых насаждений. Рабочая гипотеза: озелененные пространства распределены неравномерно по районам города. В работе использован текстологический метод извлечения информации из нормативной базы. В результате для каждого района выполнена визуализация обеспеченности населения города озелененными пространствами, включая минимальные существующий и стратегический нормативы, фактическое значение параметра; определены точки роста и потребность в сохранении объемов зеленых насаждений. В процессе исследования рабочая гипотеза подтвердилась.

UDK 33

Economical Mechanism to Attain 2050 Forecasts with Focus on Africa

Adio Durotola Michael

Novosibirsk State Pedagogical University, Novosibirsk (Russia, Nigeria)

Key words and phrases: 2050 year; Africa; economy; forecast; Nigeria.

Abstract. The goal of this research is to focus on the forecasts that have been made about the future of African economics in 2050. Its methods include both methodological and theoretical approaches to dig-out facts and figures generated from scholars worldwide about the theme. Consideration should be noted that Africa with the influence of China and exposure to Internet in recent years seems poised for 2050 forecasts. Nigeria being one of the biggest players economically in the continent is at the centre of examination in this research. The results of this research reveal African's awareness and preparedness for this big future. The hypothesis used is the regression analysis; Nigerian institution's data were used for forecasting purposes.

Introduction

Being one of the most disadvantaged economic wise continents, Africa has received a boost with future forecast of its economy, population and social welfare. While one may argue about the rise of population as a disadvantage for Africa, a close look at the emergence of China as one of the biggest economies in the world at the moment spells it is positive for the growth of African population in 2050.

According to the Division of the Department of Economic and Social Affairs of the United Nations Secretariat in 2011, most African countries will double or even triple their working population by 2050. The sole reason to these developments is due to the fact that African countries have achieved quite low levels of child birth mortality. Also HIV/AIDS as a major threat is a thing of the past; the fertility rate in these regions is high in comparison to other part of the world. Also, 25th August 2020, Africa made history with the African Region Certification Commission for Polio Eradication independently certifying that the Region was free of wild polio-virus. That is after 4 years without a single case of wild polio.

With the current crises in Ukraine which has led to the surge of gas prices, African countries Nigeria particularly is at a big gain. Although, 2050 is still far away, according to K.F. Nwanze (2019), "While our governments struggle to balance between saving lives and keeping their economies alive", if African countries combine resources effectively, work harder on preparation,

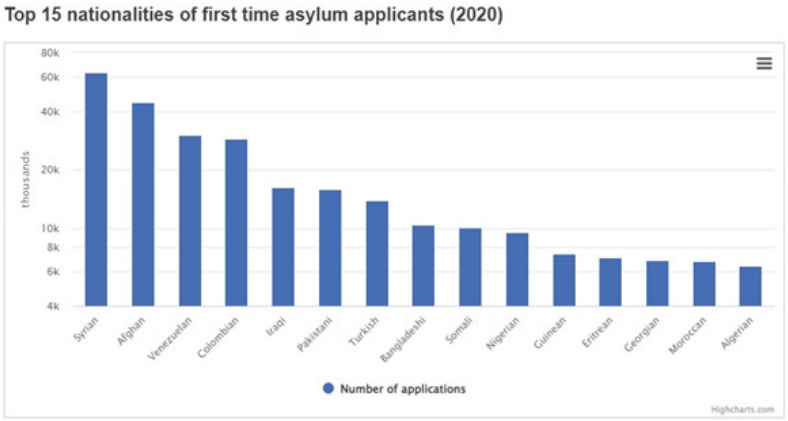
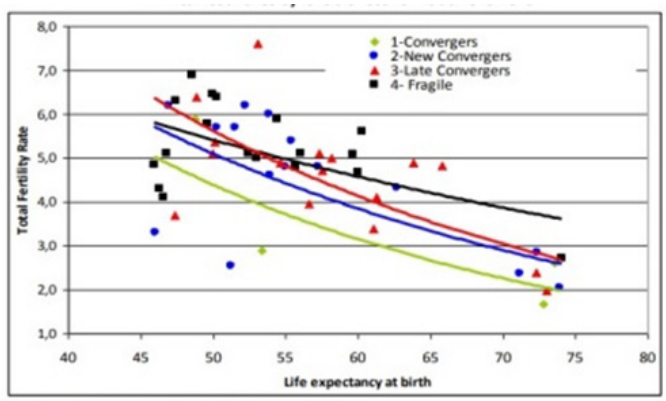


Fig. 1. Asylum seeks in 2020 in EU countries



Source: United Nations 2011 and calculations of the authors.
Note: R^2 values range from 0.316 for "Fragile", to 0.500 for "Late Convergers", to 0.446 for "New Convergers", and to 0.671 for "Convergers".

Fig. 2. Total fertility rates and life expectancy at birth rates from 2005–2010 of African countries by levels of economic achievement

don't neglect any sphere of their economics, focus on human resources, form committees to work towards these goals and adopt a Chinese approach. It will surely attain those economic prospects predicted by the United Nations in 2011 and be also able to manage its high population adequately.

Demographic Discourse

Nigeria is predicted to be the fourth population wise by 2050 with the population of 397 million, which means it'll be larger than Central African's in it's entirely. Only China, India and the United States of America will be higher.

The United Nations used couple of instruments to forecast the population of the world by 2050. This is very important because there is need to plan and be prepared for stability and growth. It will be interesting to see how the global pandemic will affect these predictions since it was made in 2011 and the pandemic in 2020. Migration is also another factor which might play a big role in the alteration of the 2050 population growth.

With notably 5 African countries on this list, predictions of 2050 might be affected if

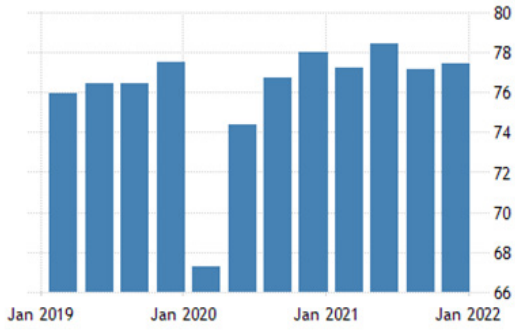


Fig. 3. China's industrial capacity utilization – 2021 Data – 2022 Forecast

eventually numbers increase in the nearest future before 2050. Anyway, the numbers could reduce if people begin to see prospects back home.

The need to accelerate simultaneously mortality and fertility decline is justified by the relationship between these two variables. This relationship is illustrated to some extent by the simple correlation between the total fertility rates (**TFR**), i.e., the average number of births per woman, and the life expectancies at birth, i.e., the average number of years lived by every person, for the four groups of countries according to the "Convergence Model" classification.

As it can be observed, these two key demographic indicators gradually improve as countries go through the four stages of this convergence process, i.e., from "Fragile" to "Late-convergers" to 6 "New Convergers" and finally to "Convergers" status. It should be noted that only four countries belong to the "Convergers" group (Fig. 2).

From what we see above, a significant improvement has been achieved by African countries. In Nigeria, in 2015, the fertility rate was 5.5 births per woman, but this increased in 2016 to 5.8 births per woman. This means that women in Nigeria will have, on the average, 5.8 children each during their entire childbearing years. Strong sense of culture and religion will be what will spike Nigeria to meet up with the future predictions.

China Trend

China ended 1970 with a population of 829,920,000 people, which represents an increase of 23,208,000 people compared to 1969. This was the beginning of China's population boom. What China did was to amass a great population before making reforms to contain it, control and transform it into a prosperous society which it is today.

While African countries might not be a socialist country, there is every chance for them to strive if they adopt policies that could integrate African great cultural heritage to economic goals and development. African culture upholds child-bearing as a priority so population boom in comparison of that of China could be achieved.

China is a diligent and wise nation with a long history. It has created a brilliant political civilization. All of five thousand years ago, ancient Chinese began to explore the concept that people are the foundation of a state. After revolution in China, on the 1st October 1949, the People's Republic OF China was established. Their main focuses were:

1) building and consolidating state power;
2) completing the socialist transformation of the means of production;
3) promulgating the first Constitution of the PRC;

4) establishing the system of people's congresses, the system of CPC-led multiparty cooperation and political consultation, and the system of regional ethnic autonomy.

What is to take here for African countries' 'Production'? There is a need for focus on production, industrialization and resource management. The effective combination of these policies is what has made China an economical giant today. Another issue which was crucial was corruption. Corruption in China could lead to death penalty. The result of such a strict system has produced state loyalists and dedicated servicemen.

China applies a system of community-level self-governance represented by villagers' autonomy, urban residents' autonomy, and employees' congresses. It should be noted that China has eliminated poverty in 2020. This simply means Africa following suit even though it might take time.

Huddles for Africa and Nigeria

To claim what 2050 has in sight, Africa must overcome its current challenges which ranges from the seat of the government to every household on the continent. Such issues include.

Political Instability. last year in September 2021 military leaders in Guinea led by Colonel Mamady Doumbouya oust the democractic government. In May, 2021 Colonel Assimi Golta led his men to plot a second coup in nine months in Mali. The coup leaders deposed the transitioning President, Bah Ndaw and Prime Minister Mostar Quane. These are few examples to show that without a long-term visionary government, no country to attain remarkable success.

Corruption. Is another issue that needs proper attention. If it continues, it means resources meant for development of both urban and rural areas will be looted and people left deprived of basic amenities which should trigger prosperity of the big future of 2050. In Nigeria for example, the EFCC are working hard to mop out corruption but it hasn't been easy even with President Mohammed Buhari who is serving his second tenure and won on the basis of anti-corruption campaign.

Energy. Africa is tagged "the black continent" not only because of the people but because of power outage. For industries to spring up and strive there is a need for a stable and sustainable power supply just like in developed countries. Nigeria is contracted to Russia's Rosatom for the second and third nuclear plant in Africa, so it seems the issue will be tackled.

Water. Without clean water to drink, the risk of different diseases threatens any society. And only a healthy society can go ahead to achieve greatness. Nigeria resort it's water consumption mainly from 'pure water' enterprises. There is need for the government to provide portable water to drink both for local and big cities.

Transportation. A typical example can be seen in Nigeria. Although the railway was opened in 1898, it didn't operate for decades and was only operational again under the government of President Goodluck Jonathan. It might interests you to know that the Corporation recorded 2.2 billion Naira (about €4.66.4 million) revenue in the first quarter of 2021. While there are other huddles like health care, crime, redundancy, education, etc. Africa must jump over, the above are really crucial in attaining 2050.

Conclusion

According to Fayode (2019), "One of the greatest global challenges today – feeding the World-is also our greatest opportunity". Nigeria is a tropical country which has the capability of

feeding a large part of the world if its agriculture could meet advanced technology and good management. I believe agricultural exports can make the country great just like Russia as one the largest wheat producing nation in the world.

Yes we can see traits, in Nigeria, there are already smart houses in Abuja, companies like Facebook, Google, MEST are opening hubs in Lagos. The rise in this sphere will definitely will be beneficial for Nigeria, Africa and could pave way for the realization of 2050 targets.

References

1. SHevchuk, YU. Rossiya v 2050 godu. Izbezhat neizbezhnosti / YU. SHevchuk. – 2021.
2. Fayode 2018–2019 Report // Little Grains of Hope.
3. Huaxia – China: Democracy That Works. – 2021.
4. Laurence C. Smith. The New North: Our World in 2050 / Laurence C. Smith. – Profile Publishing, 2011.
5. Nwanze, K.F. Nigeria – 400 Million People by 2050: Risks and Opportunities / K.F. Nwanze. – 2019.
6. Ahlers, T. Africa 2050: Realizing the Continent's Full Potential : 1st Edition / T. Ahlers, H. Kato, H.S. Kohli, C. Madavo, A. Sood. – 2014.
7. World Economic Situation and Prospects 2011 (United Nations publication, Sales No. E.11.II.C.2), released in January 2011.
8. World Urbanization Prospects; The 2011 Revision. United Nations (New York), 2011.
9. World Economic Situation and Prospects (WESP) report [Electronic resource]. – Access mode : http://www.un.org/en/development/desa/policy/wesp/index.shtml.
10. Agenda 2050: Buhari inaugurates committee to lead Nigeria's new development plan // Premium Times. – September 9, 2020 [Electronic resource]. – Access mode : https://www.premiumtimesng.com/news/headlines/413477-agenda-2050-buhari-inaugurates-committee-to-lead-nigerias-new-development-plan.html.
11. Rail transport in Nigeria // Wikipedia [Electronic resource]. – Access mode : https://en.wikipedia.org/wiki/Rail_transport_in_Nigeria.

Перспективы развития африканской экономики с учетом прогноза до 2050 г.

Адио Дуротола Майкл

ФГБОУ ВО «Новосибирский государственный педагогический университет», г. Новосибирск (Россия, Нигерия)

Ключевые слова и фразы: 2050 г.; Африка; Нигерия; прогноз; экономика.

Аннотация. Цель исследования – проанализировать экономические прогнозы, сделанные в отношении будущего африканской экономики в 2050 г. Исследование проведено с использованием как методологических, так и теоретических подходов к выявлению фактов и цифр, полученных от ученых со всего мира по данной тематике. Следует отметить, что Африка с учетом влияния Китая и доступа к Интернету в последние годы обладает потенциалом для реализации прогнозов экономического развития до 2050 г. В фокусе внимания данного исследования находится Нигерия, являющаяся одним из крупнейших эко-

номических игроков на континенте. Результаты исследования подтверждают готовность африканцев к большому качественному скачку. Гипотеза исследования сформулирована с опорой на регрессионный анализ, для проведения которого использовались статистические данные по Нигерии.

UDK 332.12

On the Development of Agricultural Production in Buryatia and Mongolia in the Aspect of Green Economy

A.O. Ayusheeva, B.N. Zhigzhitova, M.V. Mironova, E.V. Vashchenko

East Siberian State University of Technology and Management, Ulan-Ude (Russia)

Key words and phrases: agriculture; green economy; natural resources.

Abstract. The purpose of the study is to consider the development of agricultural production in Russia and Mongolia in the aspect of green economy. The objectives of the study are to identify the priority areas of the green economy in modern conditions, based on traditional crops of agricultural production. The research hypothesis is as follows: agriculture in Russia and Mongolia has common features in terms of green economy. The research methods are analysis, synthesis and generalization. The results are as follows: an analysis of the development of agricultural production was carried out; prospects for the development of agriculture in the context of green economy were determined.

The green economy is a direction in economic science that has emerged over the past two decades, within which it is believed that the economy is a dependent component of the natural environment within which it exists and is an integral part of it [1].

The priority areas of the “green” economy are:

– efficient use of natural resources;
– increasing natural capital and reducing pollution;
– prevention of biodiversity loss;
– income and employment growth [2].

Economists say that “sustainable development” is the balanced development of three components: economic, environmental and social. We can also quote the statement of the leader of the Indians of one of the American tribes: “We did not inherit our land from our fathers and grandfathers. We borrowed it from our children and grandchildren”. This is the essence of sustainable development.

The development of agricultural production should place emphasis on traditional (ethnic) ways of doing business. The concept of agrarian development, as a mechanism for the sustainable development of the regional agricultural economy, determines the priority areas for the development of the industry, primarily in the context of environmental restrictions. In the Republic of Buryatia, the mechanisms for providing the population with food should be based on the use of low-cost and environmentally friendly technologies.

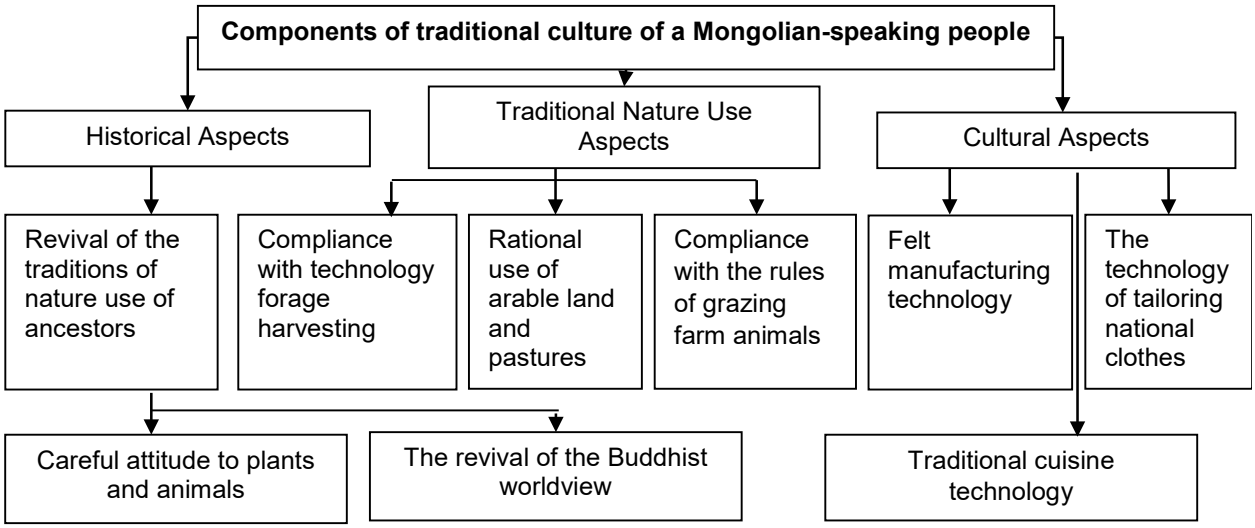


Fig. 1. Scheme of the traditional economic culture of the Mongolian-speaking peoples

The UNESCO inclusion of Lake Baikal in the list of World Natural Heritage Sites imposes an obligation to preserve the unique natural site, and the adoption of the Law "On the Protection of Lake Baikal" introduces increased environmental requirements for agricultural activities.

The most effective direction for the development of the food market is the formation of specialized areas of agricultural production based on traditional areas of agricultural production activity. In the pasture-nomadic animal husbandry of modern Mongolia and Buryatia, the prospects for the development of traditional animal husbandry based on the common ethnic roots of the Mongolian-speaking peoples have great prospects. From time immemorial, the indigenous population on the territory of Baikal Siberia led nomadic and semi-nomadic cattle breeding, which was maximally adapted to local natural conditions.

Traditional grazing is the main economic activity in Mongolia. Mongolia occupies a leading position on a global scale in terms of livestock per capita (16 heads per person). At the same time, the border areas account for 41.9 % of the livestock of Mongolia. The main directions are sheep breeding, goat breeding, cattle breeding [3].

In the process of conducting traditional animal husbandry in Mongolia and Buryatia, a unique nomadic culture was formed. Its most important component was the perfected relationship with the natural environment, i.e. was the harmony of relations between man and society with nature. The traditional economy, in essence, was environmentally friendly, waste-free, nature-saving, nature-restoring, i.e. from a modern point of view is the most reasonable. Careful attitude to any natural resources and self-restraint were characteristic of the population of Baikal Siberia (Fig. 1) [4].

In modern conditions, it is necessary to consider the development of nomadic animal husbandry along the path of intensifying the management of agricultural production systems, since extensive development technologies have exhausted themselves, due to population growth and the reduction of pasture lands (plowing, industrial development of territories, mining, etc.).

Nomadic (pasture) animal husbandry as an agroecosystem must be considered as a complex social system that carries the originality of production methods, including social aspects of the organization of society. The functional model of the development of traditional animal husbandry as a social system is shown in Fig. 2 [5].

In the Republic of Buryatia, the traditional branches of animal husbandry were beef cattle

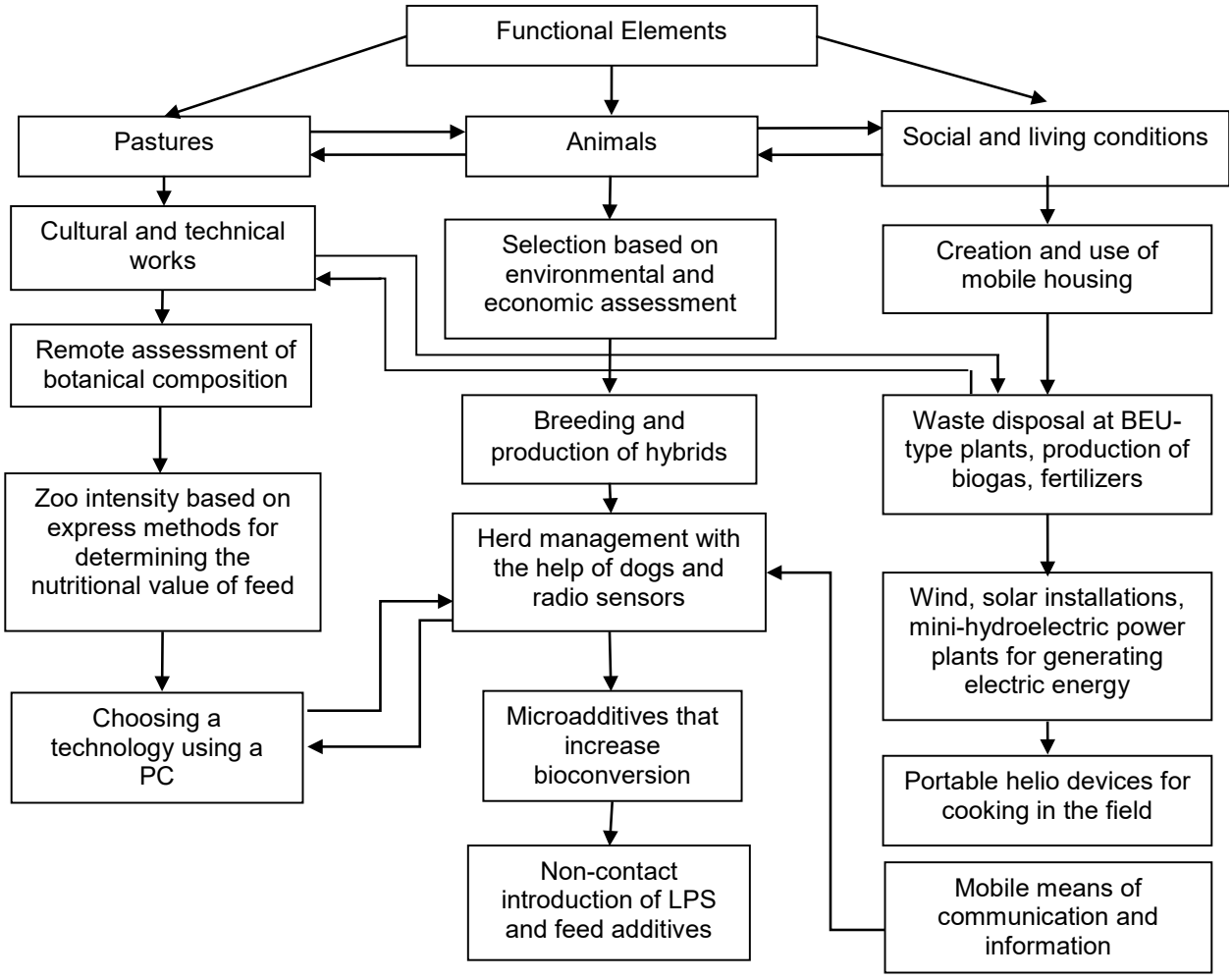


Fig. 2. Functional model of livestock development

breeding, coarse wool sheep breeding and goat breeding, herd horse breeding and yak breeding. It is likely that these industries will have limited development in the future, which, however, does not mean they are "useless" – in certain local conditions, many of them can be highly profitable, and their products will have a steady demand. At the level of municipalities located near state border too the most favored nation regime should be created, and it should be ensured that the economy of such regions should have at least two equivalent sources of financing through both regional supplies and foreign trade and cultural ties [6].

According to the analysis conducted by the Ministry of Agriculture of the Republic of Buryatia, in pasture animal husbandry, the cultivation of one head of beef cattle for meat is able to provide a profit of about 1,000 rubles, yaks 1,800 rubles, horses – 1,500 rubles and coarse wool sheep – 600 rubles. The level of profitability in the production of meat in pasture animal husbandry is 25, 300, 250, and 400 %, respectively. High economic efficiency is ensured by low costs for feeding, keeping and caring for animals due to year-round grazing.

From the above, it can be indicated that the fundamental goal of agriculture in the agro-industrial complex of the Republic of Buryatia is to provide the population with high-quality agricultural products. And in terms of the development of the region as a world-class tourism cluster, such development would be conducive the formation of the image of the Republic of

Buryatia as a supplier of marble, organic meat and meat products.

Thus, this direction harmoniously fits into the development of the tourism industry of the Republic of Buryatia in the trends of the modern development of the region's economy.

References

1. Wikipedia. Free encyclopedia [Electronic resource]. – Access mode : https://ru.wikipedia.org/wiki.

2. Yamasova, N.N. "Green" economy: questions of theory and directions of development / N.N. Yamasova // National interests: priorities and security. – 2013. – No. 11. – P. 33–38.

3. Ayusheeva, A.O. Formation of integrated structures of the agro-industrial complex of the region: Problems and prospects : monograph / A.O. Ayusheeva, 2013. – 153 p.

4. Batueva, D.Zh. Transformation of the traditional culture of managing the population in the transboundary territories of the Republic of Buryatia / D.Zh. Batueva // Successes of modern natural science. – 2007. – No. 10 – S. 24–27.

5. Taishin, V.A. Traditional animal husbandry and its development / V.A. Taishin, N. Erdenetsogt // Comparative analysis of the development of agriculture in Buryatia and Mongolia : materials of the international scientific and practical seminar. – 191 p.

6. Ayusheeva, A.O. Development of the border territories of the Republic of Buryatia at the present stage / A.O. Ayusheeva, B.N. Zhigzhitova, M.V. Mironova // Global scientific potential. – 2020. – No. 5. – P. 136–140.

О развитии сельскохозяйственного производства Бурятии и Монголии в аспекте зеленой экономики

А.О. Аюшеева, В.Н. Жигжитова, М.В. Миронова, Е.В. Ващенко

ФГБОУ ВО «Восточно-Сибирский государственный университет технологий и управления», г. Улан-Удэ (Россия)

Ключевые слова и фразы: зеленая экономика; природные ресурсы; сельское хозяйство.

Аннотация. Цель исследования – рассмотреть развитие сельскохозяйственного производства России и Монголии в аспекте зеленой экономики. Задачей исследования является выявление приоритетных направлений зеленой экономики в современных условиях, основанных на традиционных культурах сельскохозяйственного производства. Гипотеза исследования: сельскохозяйственное производство России и Монголии имеют общие черты в аспекте зеленой экономики. Методами исследования являются анализ, синтез и обобщение. Достигнутые результаты: проведен анализ развития сельскохозяйственного производства, определены перспективы развития сельского хозяйства в аспекте зеленой экономки.

UDC 338.054.23; 338.49; 338.12.015

Problems of Procurement Organization under Sanctions

O.V. Voronkova, Yu.E. Semenova, E.E. Petrova

Russian State Hydrometeorological University, St. Petersburg (Russia)

Key words and phrases: procurement organization; economic sanctions; economic security of enterprises; procurement planning; import substitution.

Abstract. The article deals with the problems of procurement organization in the conditions of sanctions. The economic turbulence caused by the closure of borders, the disruption of logistics chains, and the fall in the ruble exchange rate poses an extremely acute problem of organizing procurement and import substitution in almost all industries. The purpose of the article is to consider this problem, analyze the main difficulties in overcoming it and develop recommendations for successful business development. The hypothesis of the study is the assumption that there is a set of measures to help overcome existing difficulties. The main research methods in the article are the analysis of scientific literature and statistical data. Based on the results of the study, the authors developed recommendations for overcoming existing negative trends.

How should procurement specialists act in conditions of economic and political turbulence? In 2020–2021, we experienced a perfect storm that hit the supply chain: a pandemic, remote work, border closures, staff cuts, a shortage of labor, a shortage of masks for employees, a tense situation in commodity markets, rising prices and logistical delays. All this combined exerted enormous pressure on businesses and consumers. What other “black swans” should purchases expect? Now we are faced with unprecedented conditions of a complete trade blockade by a huge number of developed economies and other economic sanctions. In addition, in the near future we may meet with many more difficult issues, since the situation is changing not even daily, but hourly [2, p. 34]. And each time these changes lead to the most serious consequences for the supply chain and procurement. What are the right tools and approaches that can be applied in these conditions?

The first thing that had to be done to ensure timely provision of imported materials that fell under the trade blockade was to “vacuum the market”. Switch from the procurement mode “for the needs of the enterprise – Just in Time” to purchases for “Just in Case” and buy up everything that is left from suppliers “on hand”. The bad news is, if the company hasn’t done it yet, it’s probably already too late. Another good solution is to start the process of illiquid exchange with other producers. In the future, many companies are considering re-exporting through countries that have not joined the anti-Russian alliance.

Buyers are also urgently starting to consider switching to Chinese suppliers, suppliers from Southeast Asia and other parts of the world. There may be problems with finding reliable partners with the production potential of the required quality, checking these suppliers and their products. Problems are solved by purchasing the services of companies with experience in the field of inspection services, expertise, testing and certification in this geography. If the company is serious, for a long time and in large volumes will carry out deliveries from a new location, it makes sense to hire a buyer directly in this country.

In any of the above cases, you need to be prepared for a significant increase in prices for purchased goods and their delivery. The current situation will have consequences not only in terms of transportation costs, but will also lead to widespread delays in the supply of even non-sanctioned goods and an extension of the logistics leverage [4, p. 21]. What is more, import suppliers are massively starting to switch to selling only on prepayment terms, understanding our difficult economic situation, the volatility of the ruble and the problems of the banking system.

Undoubtedly, in the short term, we should expect a shortage and a decrease in the quality of production when switching to analogues. You cannot relax even with Russian suppliers. The material, component, or equipment of your suppliers' suppliers or suppliers may be of European, American, or other origin, and the supply restriction may hit your business later. Now buyers urgently need to collect and have transparent information not only about the problems of the first level, but also what is happening in the supply chain as a whole, manage risks and create end-to-end anti-crisis plans with all participants in the chain. It is obvious that all these problems with the stability of complex supply chains will not be solved quickly, and the most urgent is the reduction of import supplies.

The events of 2014 and the pandemic have already forced many organizations to think about reducing dependence on international suppliers, and instead consider the possibility of producing themselves or buying from local producers, limiting imports from other countries [3, p. 219]. Taking into account what is happening now, the pace of the import substitution process should only increase, which means an increase in the volume of work and the importance of procurement departments.

To date, in a number of industries, Russia has already reduced imports to a minimum and provided the market with its own goods. However, a large share of imports is still observed in the industrial machine tool industry, electronic, light, medical industry, heavy machinery, machinery for the food industry and pharmaceutical industry. Realizing this, the government has determined its strategy to establish its own production facilities in these industries, which will undoubtedly support buyers in the development of new suppliers.

If the company does not buy from local suppliers yet, it means that either they do not exist, or they produce products of worse quality than is necessary for the buyer's standards. And this means that firms should engage in the process of developing suppliers, together with them creating new production capabilities or competencies for them. The search and development of domestic suppliers for joint long-term projects on the development and implementation of production of analogues of imported products is a complex and painstaking work that requires certain skills and knowledge [5, p. 29]. This work should be carried out on an ongoing basis. Special resources should be allocated for this work in the procurement department. These are employees who have deep technical knowledge in a specific procurement category, who are able to find, organize and lead teams of specialists from several companies and negotiate with them.

The search for potential suppliers takes place through specialized exhibitions, work with relevant industry unions and ministries. Suppliers who already have similar production, but of lower quality, and who are able and motivated to expand their production line, improving their

products and making them more marginally, are best suited. Specialists in the development of new suppliers together with the quality service, suppliers and other attracted specialized specialists make up the project team. This is not an office job. They take part in audits of suppliers' production and discussions of projects for the production of analogues. Together, they identify the necessary equipment improvements and improvements to the production process at the supplier. They share knowledge, well-known production documentation, specifications, samples of current purchased products, take part in the implementation of modern standards and techniques, training of supplier personnel, invite various specialists for consultation.

The project team jointly participates in test productions at the supplier, finalizes experimental production batches to the technical parameters of the required quality. It is very important that at the slightest deviations in the quality of the supplied resources, contractual and partnership relations do not stop, but on the contrary, measures to eliminate deficiencies according to the 8D methodology are jointly developed (materials on this methodology are widely available on the Internet). In this process, control maps, deviation maps, agreements on various joint corrective measures will be very useful.

Sometimes, in order to achieve a result, it may be necessary to change the technological process and update quality standards not only at the supplier, but also at the purchasing company. There are also examples when the purchasing company and the supplier agree on joint investments in fixed assets and equipment of the supplier. By developing suppliers, organizations can not only refuse to import, but also create competitive advantages in the form of a new product for sale, a new optimized process or the introduction of a new standard.

In any case, we must be prepared that the development of suppliers is not a quick process. Depending on the complexity of the project, it may take years. Therefore, when choosing a supplier for joint development, it should be borne in mind that we are choosing a business partner with whom we will work for many years and whom we trust [1, p. 169]. In reality, not all suppliers want to allocate resources for such complex long-term projects for an individual client. They already have an established business and a sales market. Working on new products will require a large amount of resources, and they do not trust the company to the buyer. This lack of trust can undermine the success of supplier development programs. To overcome this problem, it is necessary to use such levers for building trust and developing suppliers as open communication at all levels, joint long-term planning, long-term contracts and the allocation of own resources to participate in the activities of suppliers for the release of new products.

Suppliers should feel part of the buyer's business. It is necessary to tell them about the processes in the buyer's company, listen to their problems. It is necessary to involve in the process and attract specialized unions and associations, specialized ministries to the buyer's side. They can help convince the supplier. If the buyer's company does not have enough influence, it makes sense to unite with other manufacturers who also need to produce these products locally.

However, despite all the difficulties described, the development of suppliers must be engaged. This is worth our efforts, because right now, more than ever, suppliers can have a huge impact on the company's processes. It is they who now play a central role in maintaining business and increasing revenue, because now the most important thing is the uninterrupted provision of high-quality and competitive resources from reliable and approved suppliers.

References

1. Desfontejnes, L.G. Formirovanie neformalnykh otnoshenij s klientami v malom biznese / L.G. Desfontejnes, YU.E. Semenova // Nauka na rubezhe tysyacheletij. – 2019. – № 12. –

S. 168–173.

2. Desfontejnes, L.G. TSifrovaya transformatsiya biznesa v period ekonomicheskoj turbulentnosti / L.G. Desfontejnes, YU.E. Semenova // Integratsiya nauki i proizvodstva. – 2019. – № 6. – S. 33–37.

3. Semenova, YU.E. Ekonomicheskaya bezopasnost predpriyatiya v usloviyakh perekhoda na distantsionnuyu formu raboty / YU.E. Semenova, E.N. Ostrovskaya // Globalnyj nauchnyj potentsial. – SPb. : TMBprint. – 2021. – № 5(122). – S. 219–221.

4. Voronkova, O.V. Economic Security in the Context of Import Substitution and the Presence of Foreign Companies in the Russian Market / O.V. Voronkova, Yu.E. Semenova // Components of Scientific and Technological Progress. – 2021. – № 8(62). – P. 20–24.

5. Semenova, Yu.E. Main Consumer Trends in Retail in the Context of Coronavirus / Yu.E. Semenova, A.A. Kurochkina, O.V. Voronkova // Components of Scientific and Technological Progress. – 2020. – № 11(53). – P. 29–32.

Проблемы организации закупок в условиях санкций

О.В. Воронкова, Ю.Е. Семенова, Е.Е. Петрова

ФГБОУ ВО «Российский государственный гидрометеорологический университет», г. Санкт-Петербург (Россия)

Ключевые слова и фразы: импортозамещение; организация закупок; планирование закупок; экономическая безопасность предприятий; экономические санкции.

Аннотация. В статье рассмотрены проблемы организации закупок в условиях санкций. Экономическая турбулентность, вызванная закрытием границ, разрывом логистических цепочек, падением курса рубля, крайне остро ставит проблему организации закупок и импортозамещения практически во всех отраслях. Целями статьи являются рассмотрение данной проблемы, анализ основных сложностей при ее преодолении и разработка рекомендаций для успешного развития бизнеса. Гипотеза исследования заключается в предположении о том, что существует комплекс мер, способствующий преодолению существующих трудностей. Основные методы исследования в статье – анализ научной литературы и статистических данных. По итогам исследования авторами разработаны рекомендации по преодолению существующих негативных тенденций.

List of Authors

Bashirova E.M. – Candidate of Science (Engineering), Associate Professor, Department of Electrical Equipment and Automation of Industrial Enterprises, Institute of Oil Refining and Petrochemistry, Branch of the Ufa State Petroleum Technological University, Salavat (Russia), E-mail: bashirova-elmira@yandex.ru

Баширова Э.М. – кандидат технических наук, доцент кафедры электрооборудования и автоматики промышленных предприятий Института нефтепереработки и нефтехимии филиала Уфимского государственного нефтяного технического университета, г. Салават (Россия), E-mail: bashirova-elmira@yandex.ru

Matveev D.E. – M.S., Branch of the Ufa State Petroleum Technological University, Salavat (Russia), E-mail: dimatvei@yandex.ru

Матвеев Д.Е. – магистр филиала Уфимского государственного нефтяного технического университета, г. Салават (Россия), E-mail: dimatvei@yandex.ru

Khismatullin A.S. – Candidate of Science (Physics and Mathematics), Associate Professor, Department of Electrical Equipment and Automation of Industrial Enterprises, Institute of Oil Refining and Petrochemistry, Branch of the Ufa State Petroleum Technological University, Salavat (Russia), E-mail: hism5az@mail.ru

Хисматуллин А.С. – кандидат физико-математических наук, доцент кафедры электрооборудования и автоматики промышленных предприятий Института нефтепереработки и нефтехимии филиала Уфимского государственного нефтяного технического университета, г. Салават (Россия), E-mail: hism5az@mail.ru

Prakhov I.V. – Candidate of Science (Engineering), Associate Professor, Department of Electrical Equipment and Automation of Industrial Enterprises, Institute of Oil Refining and Petrochemistry, Branch of the Ufa State Petroleum Technological University, Salavat (Russia), E-mail: priwan@yandex.ru

Прахов И.В. – кандидат технических наук, доцент кафедры электрооборудования и автоматики промышленных предприятий Института нефтепереработки и нефтехимии филиала Уфимского государственного нефтяного технического университета, г. Салават (Россия), E-mail: priwan@yandex.ru

Prokop G.S. – Student, Branch of Ufa State Petroleum Technological University, Salavat (Russia), E-mail: pgs2001@mail.ru

Прокоп Г.С. – студент филиала Уфимского государственного нефтяного технического университета, г. Салават (Россия), E-mail: pgs2001@mail.ru

Tochka I. I. – Student, Branch of Ufa State Petroleum Technological University, Salavat (Russia), E-mail: yupicoz@gmail.com

Точка И.И. – студент филиала Уфимского государственного нефтяного технического университета, г. Салават (Россия), E-mail: yupicoz@gmail.com

Ismoilov A.I. – Student, Branch of Ufa State Petroleum Technological University, Salavat (Russia), E-mail: abdusami.ismoilov@gmail.com

Исмоилов А.И. – студент филиала Уфимского государственного нефтяного технического университета, г. Салават (Россия), E-mail: abdusami.ismoilov@gmail.com

Dyachkova O.N. – Candidate of Science (Engineering), Associate Professor, Department of Construction Technology, St. Petersburg State University of Architecture and Civil Engineering, St. Petersburg (Russia), E-mail: dyachkova_on@mail.ru

Дьячкова О.Н. – кандидат технических наук, доцент кафедры технологии строительного производства Санкт-Петербургского государственного архитектурно-строительного университета, г. Санкт-Петербург (Россия), E-mail: dyachkova_on@mail.ru

Adio Durotola Michael – Senior Lecturer, Department of Foreign Languages, Novosibirsk State University of Economics and Management, Novosibirsk (Russia, Nigeria), E-mail: micability2012@yandex.ru

Адио Дуротола Майкл – старший преподаватель кафедры иностранных языков Новосибирского государственного педагогического университета, г. Новосибирск (Россия, Нигерия), E-mail: micability2012@yandex.ru

Ayusheeva A.O. – Candidate of Sciences (Engineering), Associate Professor, Department of Customs, East Siberian State University of Technology and Management, Ulan-Ude (Russia), E-mail: sharlu59@bk.ru

Аюшеева А.О. – кандидат технических наук, доцент кафедры таможенного дела Восточно-Сибирского государственного университета технологий и управления, г. Улан-Удэ (Россия), E-mail: sharlu59@bk.ru

Zhigzhitova B.N. – Candidate of Sciences (Economics), Associate Professor, Department of Customs, East Siberian State University of Technology and Management, Ulan-Ude (Russia), E-mail: bayarma_zhigzhitova@mail.ru

Жигжитова Б.Н. – кандидат экономических наук, доцент кафедры таможенного дела Восточно-Сибирского государственного университета технологий и управления, г. Улан-Удэ (Россия), E-mail: bayarma_zhigzhitova@mail.ru

Mironova M.V. – Candidate of Sciences (Economics), Associate Professor, Department of Customs, East Siberian State University of Technology and Management, Ulan-Ude (Russia), E-mail: mmironova@mail.ru

Миронова М.В. – кандидат экономических наук, доцент кафедры таможенного дела Восточно-Сибирского государственного университета технологий и управления, г. Улан-Удэ (Россия), E-mail: mmironova@mail.ru

Vashchenko E.V. – Senior Lecturer, Department of Customs, East Siberian State University of Technology and Management, Ulan-Ude (Russia), E-mail: vashenko_evgenia@mail.ru

Ващенко Е.В. – старший преподаватель кафедры таможенного дела Восточно-Сибирского государственного университета технологий и управления, г. Улан-Удэ (Россия), E-mail: vashenko_evgenia@mail.ru

Voronkova O.V. – Doctor of Economics, Professor, Department of Environmental Management Economy and Accounting Systems, Russian State Hydrometeorological University; Professor, Institute of Industrial Management, Economics and Trade, Peter the Great Saint Petersburg Polytechnic University, St. Petersburg (Russia), E-mail: journal@moofrnk.com

Воронкова О.В. – доктор экономических наук, профессор кафедры экономики предприятия природопользования и учетных систем Российского государственного гидрометеорологического университета; профессор Института промышленного менеджмента, экономики и торговли Санкт-Петербургского политехнического университета Петра Великого, г. Санкт-Петербург (Россия), E-mail: journal@moofrnk.com

Semenova Yu.E. – Candidate of Sciences (Economic), Associate Professor, Department of Environmental Management Economy and Accounting Systems, Russian State Hydrometeorological University, St. Petersburg (Russia), E-mail: semenjulia69@mail.ru

Семенова Ю.Е. – кандидат экономических наук, доцент кафедры экономики предприятия природопользования и учетных систем Российского государственного гидрометеорологического университета, г. Санкт-Петербург (Россия), E-mail: semenjulia69@mail.ru

Petrova E.E. – Candidate of Sciences (Economic), Associate Professor, Department of Environmental Management Economy and Accounting Systems, Russian State Hydrometeorological University, St. Petersburg (Russia), E-mail: semenjulia69@mail.ru

Петрова Е.Е. – кандидат экономических наук, доцент кафедры экономики предприятия природопользования и учетных систем Российского государственного гидрометеорологического университета, г. Санкт-Петербург (Россия), E-mail: semenjulia69@mail.ru

COMPONENTS OF SCIENTIFIC AND TECHNOLOGICAL PROGRESS
№ 3(69) 2022
SCIENTIFIC AND PRACTICAL JOURNAL

Manuscript approved for print 21.03.22
Format 60.84/8
Conventional printed sheets 3.95
Published pages 2.24
200 printed copies

16+

Printed by Zonari Leisure LTD. Paphos