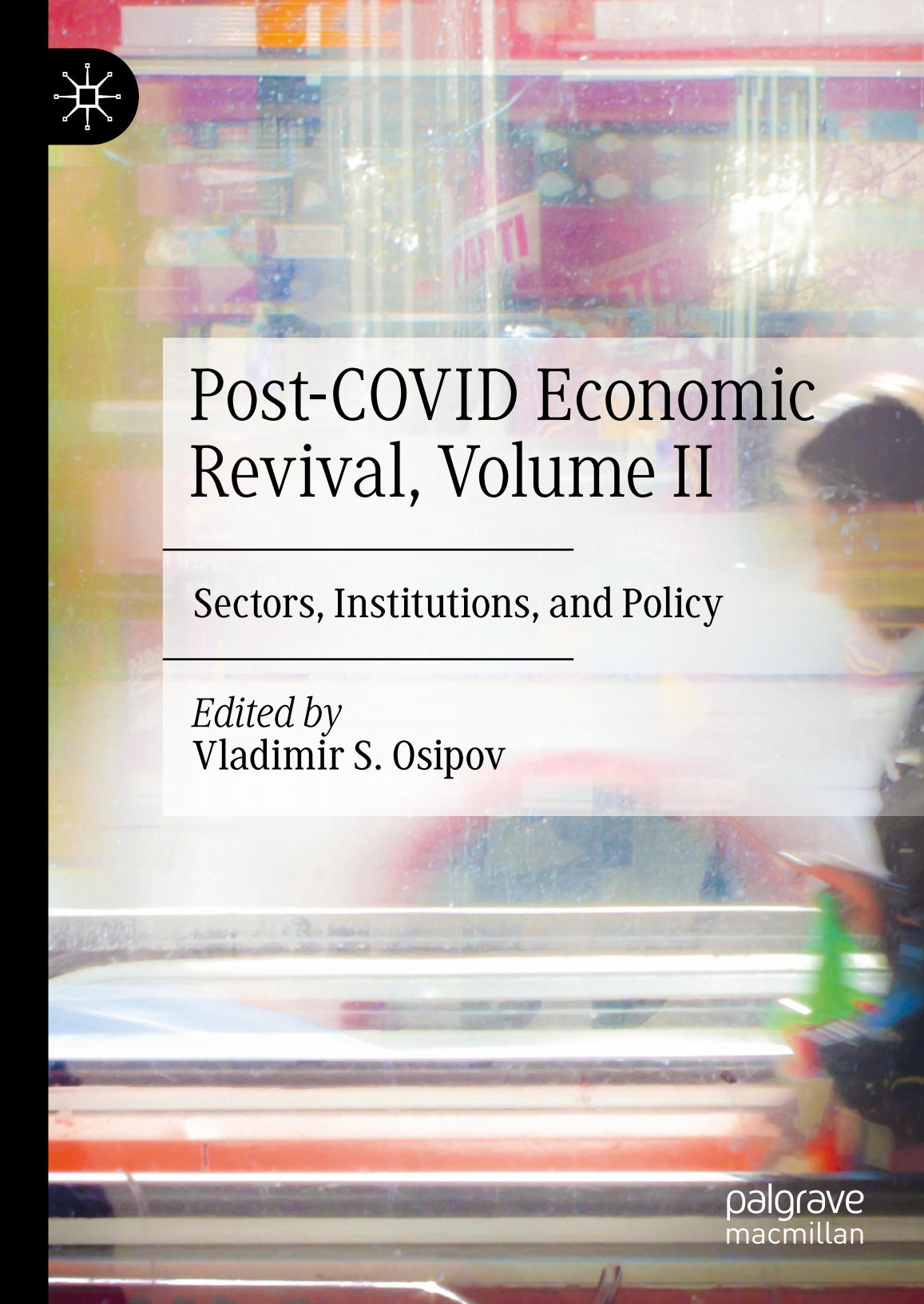

Post-COVID Economic Revival, Volume II

Sectors, Institutions, and Policy

Edited by
Vladimir S. Osipov

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ISBN 978-3-030-83565-1 ISBN 978-3-030-83566-8 (eBook)
https://doi.org/10.1007/978-3-030-83566-8

This Palgrave Macmillan imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

This two-volume project is the result of research carried out by scientists from many countries of the world: Austria, China, Croatia, Hungary, Kazakhstan, Poland, Russia, Slovakia, Spain, Turkey, and UK. We pursued the goal not only to analyze the economic consequences of the coronavirus crisis, but also to highlight the trends and prospects of Post-COVID development in different countries and sectors of the economy. It was important for us to assess the prospects for overcoming the coronavirus crisis in several dimensions: the behavior of the state, the situation in the financial sector, sectors of the economy, and the social dimension (labor market, health care, life insurance, culture). The project consists of two volumes, and each consists of two parts. First part of the first volume is devoted to the problems of state behavior during the coronavirus crisis and the post-mortem period. Here we examined several aspects, the digitalization of the economy, the development of public administration, institutional changes at the level of some countries, regions, and the structure of the economy. Special attention is paid to risk management both in public administration and in the corporate sector. Second part consists of number of chapters in which considered the prospects for the development of the financial sector, including investments, insurance, FinTech and digitalization, and crypto-assets. The last chapter of the volume has its own conclusion in which prospects of Post-COVID Statehood are described.

The second volume of our project consists of chapters about revival in such sectors of economy as structural changes, technologies, circularity and waste management, aircraft manufacture, electricity, urban mobility and house construction, real estate, transport, automobile industry, and tourism. So the last part of the second volume is devoted to development in social sector. There are perspectives of labor market, life insurance, healthcare and medical services, and culture in Post-COVID age in this part. The last chapter has a role of conclusion and is devoted to the problem of judgment and human rights protection at the COVID and Post-COVID periods.

We asset this project as a part of great discussion about paths, opportunities, risks, and possible scenarios of Post-COVID economic revival, which is the most important problem of nowadays World.

Moscow, Russia Vladimir S. Osipov

Acknowledgments

The authors are grateful to the REGION Group (Moscow, Russia) for financial support in the implementation of research projects.

Prof. Dr. Vladimir S. Osipov as Editor would like to thank Moscow State Institute of International Relations (MGIMO University), Moscow Russia, Rector of MGIMO University academician Anatoly V. Torkunov, Vice-Rector of MGIMO University Dr. Andrey A. Baykov, Prof. Dr. Petr I. Kasatkin, Prof. Dr. Lilia K. Raitskaya, Prof. Dr. Rustem T. Yuldashev, Prof. Dr. Artem I. Krivtsov, Ass. Prof. Dr. Maxim I. Inozemtsev.

The final book is the result of the very fruitful cooperation with editorial team, and in particular with Project Coordinators from Springer Nature Ms. Hemapriya Eswanth, Mrs. Karthika Purushothaman and Mr. Sham Anand Lourthu swamy, and also Commissioning Editor from Palgrave Macmillan Ms. Ruth Jenner: Without their impeccable managerial skills, support and advices the book couldn't have been completed.

Editor would like to say his special thanks to Mr. Nikolas Hyder and Mr. Michail Matveev for translating and proofreading the manuscript.

Finally, Editor would like to thank Prof. Dr. Alexey G. Zeldner as teacher, tutor, supporter, most intelligent adviser, and best friend. This book couldn't be prepared without his support.

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CHAPTER 1

Post-COVID Revival: Economy and Society

Vladimir S. Osipov

Since the beginning of the pandemic, 3,000,225 people have died from the coronavirus in all countries of the world, according to data from Johns Hopkins University. 139 million people were infected with COVID-19, 79.7 million were cured.

Countries with the highest number of coronavirus victims:

- USA—566 thousand;
- Brazil—368 thousand;
- Mexico—211 thousand;
- India—175 thousand;
- Great Britain—127 thousand.

Russia ranks fifth in terms of the number of people infected with coronavirus (4.6 million) and seventh in terms of the number of deaths (103 thousand). 4.2 million people have recovered from COVID-19 in Russia.

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_1

If we will compare these data with population of these countries, our conclusions can be sadder than just data of deaths. All these countries have strong Big Government and financial possibilities to protect people and make healthcare system most effective in the world. USA, Great Britain, India, and Russia are competitors on world pharmaceutical market, but results are so deplorable for people.

Former World Bank Executive Director Naim Moises wrote the book "The End of Power" in which he argued that the state is losing power, that non-state organizations are more influential than state bodies (Moises, 2013). However, the post-COVID economic revival requires precisely state participation in economic processes, since without the state it is simply impossible to overcome the current economic crisis. Thus, what we are seeing now is not the "end of official power," but its renaissance, the spread along with the coronavirus. The state penetrates into those spheres of the economy where previously only private business operated.

Three scenarios, that we described in the first volume of the book, should be concretized in sectorial receipts of post-COVID economic revival. The third part of the second volume of our book is dedicated to problems of restructuring the economics and revival in different sectors of economy, such as innovations and technologies, circular, medical waste and green economics, electricity, aircraft and airlines, urban economics, housing construction and real estate, transport, automotive industry, and tourism. Different influence of COVID pandemic on these sectors of economy dictates different approaches to mechanisms of economic revival there. The fourth part of the book is dedicated to may be most important for society social sector. There are problems and decisions in healthcare systems, labor market, culture, and life insurance considered in the last part of the book.

Our authors tried to introduce their own opinion on these receipts for economic revival at post-COVID age. We focus on problems of post-COVID economic revival in different industries and social sector.

Non-working days at the period of pandemic were announced in majority of the countries. It was one of the most effective steps in anti-pandemic policy. Decree of the President of the Russian Federation of March 25, 2020, No. 206 "On the announcement of non-working days in the Russian Federation" was such step to reduce the incidence. Non-working days included the period of from March 30 to April 3, 2020, and were prolonged many times.

Non-working days for industrial business were very painful. It means that after first quarter of anxious expectations and second quarter of lockdown, only third quarter was a period of slow revival. Service sector began its slow revival only in first quarter of 2021.

As it is noted in the UN research "World Economic Situation and Prospects 2021"[1] world economy decreased on 4.3%. Russian GDP decreased on 3.1%, and it is less than world indicator.

The most important export goods of Russia—oil and gas were influenced by slowdown in world production of goods. This cause stays the main against the backdrop of the economic crisis caused by the pandemic. Once again, it became clear that the raw material dependence of the state budget is unacceptable in the twenty-first century, but, as usual, these lessons remained unlearned. Another one side of economic crisis consists in reducing the purchasing power of the population due to a decrease in income at the lockdown and non-working period. Investment activity decreased too, and one of the reasons was global value chains disruption.

Economic crisis of 2020 had three characteristics, which can be described as follows:

- decline in global mining;
- protectionist economic policy of majority of states;
- lockdown for most businesses.

As the trade was one of the sectors which had not undergone closure, the decrease in this economic activity was over 4% and less than in other service sectors. Since this economic crisis was based on a non-economic basis, but pandemic, there was non-economic sequence of stages of development of a crisis. Firstly, the businesses were closed not as a result of bankruptcy, but because of decisions on forced closure (lockdown). Economic actors dealing with the means of production are the first to experience difficulties in an economic crisis, but the second—economic actors involved in the production of consumer goods. After lockdown and decreased purchasing power of consumers, including due to social distance, fear of contracting coronavirus infection or bans on leaving home without a reason (many countries have introduced measures to

[1] https://www.un.org/development/desa/dpad/publication/world-economic-situation-and-prospects-2021/.

track the movement of citizens using mobile applications and QR codes). Thus, the drop in the rate of economic development in different sectors of the economy turned out to be dependent on how severe was the measures of government regulation in relation to such sectors. Other side consists of governmental support of the business. Some kind of business got financial support and tax vacations, others got preferential loan at a reduced rate with government guarantees of coverage.

Real disposable income of the population decreased in 2020 due to lockdown.

In many countries, it was forbidden to lay off workers in enterprises closed for lockdown; however, the business could not bear these unproductive costs and indirectly sought to force their employees to go on vacation without pay. The business should be understood, because it has nowhere to get money to cover wages in the absence of economic activity, but the staff found themselves in an almost pre-bankruptcy situation. The pandemic and lockdown resulted in a suspension of business activity and a decrease of global economic growth. Emergency measures were required to support employment and incomes of the population. The pandemic has generated the need for and increased the role of emergency aid in social policy as a factor in macroeconomic stabilization.

Experts of the World Bank analyzed social programs in 215 countries and found that by December 11, 2020, there were 1,414 social support economic programs for the population. Compared to March 20, 2020, only 103 social anti-crisis programs were adopted in only 45 countries (Gentilini et al., 2020). The International Labor Organization noted that by January 15, 2021, 1,622 anti-crisis measures in social policy had been taken in 209 countries.[2]

Anti-crisis packages of economic social support were adopted in order to prevent the growth of poverty due to the forced cessation of economic activity of business. Quarantine measures were called in order to prevent the spread of COVID-19 infection, but, at the same time, they caused the decrease of economic activity. The state was obliged to support the income of the population, since social upheavals could lead to the collapse of the state itself. This is the reason that by the end of 2020, almost all countries of the world have taken one or another measure of social economic support to the population.

[2] http://www.social-protection.org/gimi/ShowWiki.action?id=3417&lang=EN.

A special category of social support programs should include assistance to families with children. The modern world economic system is built in such a way that families with children find themselves in worse economic conditions compared to families without children or single people (Alesina & Glaeser, 2004; Dorling, 2013; Le Grand, 2008; Seabrook, 2014). Family income is divided among all family members, and since children are not an economically active population, the specific income is lower in families with children. During the period of the pandemic and falling incomes of the population, families with children experienced a greater decrease in specific income. The International Labor Organization notes that 73 countries have adopted special economic assistance programs for families with children.[3]

Analysis of social support programs leads to two important conclusions:

1. Those countries that before the pandemic had deep-embedded and rather large-scale social insurance programs, had only to expand the amount of aid (to reduce taxes from business to social funds and increase the amount of benefits).
2. Countries with a weak social protection system, with high unemployment and poverty, were forced to accept new assistance programs with larger budgetary injections to support almost all segments of the population (direct one-time unconditional cash payments, food aid, deferred payment of utility bills, tax payments, mortgage payments, etc.).

The reduction in the tax burden within the framework of employers' contributions from the wage fund to social and pension funds affected only funds paid over the minimum threshold of 12,130 rubles. The deferred payment of other tax liabilities did not have the expected effect. Moratoriums and restrictions could not significantly limit the company's losses related to full downtime and the need to pay constant costs expressed in rent payments, employee salaries, ongoing equipment repairs, etc.

One should not forget the fact that digitalization of business before the pandemic has already threatened a number of professions. There are a

[3] Ibid.

number of predictions that robotization and digitalization will lead to an increase in unemployment and poverty. An unconditional basic income, a reduction in the working week, and other measures were proposed as measures to support the unemployed (Banerjee & Duflo, 2019; Dun et al., 2020; Osipov, 2019; Osipov et al., 2021; Stepnoff & Kovalchuk, 2020; Van Parijs & Vanderborght, 2017; Yankovskaya et al., 2020).

"We are facing the worst health and economic crisis in 90 years. As we mourn the growing death toll, we must remember that the choices we make now will determine our collective future"—said UN Secretary General Antonio Manuel de Oliveira Guterres. Earlier, he compared the situation with the pandemic to the consequence of World War II.[4]

This emergency calls for the inclusion of all institutions in tackling the post-pandemic economic revival.

Development institutions, which are created upon to coordinate investment policy and accelerate the exchange of experience, will undoubtedly become the basic instruments for overcoming the post-COVID recession. Health care, the development of smart cities and new urban technologies, and the introduction of the principles of a circular and green economy will most likely become the key areas of work of development institutions at the stage of post-COVID economic revival.

The second volume is devoted to the problems of different sectors of the economy, because each has its own way emerged from the pandemic crisis. The fourth part of the second volume examines perhaps the most important aspect of the post-COVID economic revival—the state and prospects of the social sector of the economy. It focuses on the labor market, health care, and life insurance. In more detail, the two volumes are disclosed as a collection of the following chapters.

Chapter 2, "The National Technological Initiative of Russia Project Implementation as a Basis for the Development of Perspective Technological Markets and Industries in Russia." This chapter reveals the aspects of implementation of the National Technological Initiative of Russia (NTI) Project, which serves as the foundation for the development of perspective technological markets and industries in Russia. It will also remain relevant in the post-COVID era. Within the frames of analyzing this project, the authors present the project's structure, the criteria, which perspective

[4] https://gadebate.un.org/generaldebate75/ru/.

technological markets should meet, and the specifics of shaping and development of the Russian "champion" companies. Moreover, the authors outline the peculiarities of the high-priority cross-cutting technologies, which are used in NTI projects to create globally competitive high-tech products and services. Since it is a long-term program, NTI requires certain modernizations to be able to face these challenges, which revealed themselves in the pandemic period; this is also addressed by the authors.

Lockdown limitations on businesses and economics, though temporary, have undoubtedly caused a global decline of activity of entrepreneurs, investors, and consumers. Therefore, amid the pandemic, the prospective NTI markets are even in higher demand than before. This is especially true for such areas as genetics, biotechnology, neurotechnology, and quantum technology, as well as digital security.

Chapter 3, "Opportunities and Prospects for Transition to Post-COVID Circular Economy," describes disadvantages of the resource-dependent linear economy model and competitive position of circular economy. Sustainable recovery requires the implementation of the principles of a circular economy and the adoption not only of economic, but also socio-environmental decisions. The positive dynamics of the volumes of waste utilization in Russia, the reduction of hazardous waste, and the volume of its burial in open landfills have been revealed. Cases of opportunities for the development of enterprises based on the principles of circular economy and the prospects for creating integration alliances for waste recycling are provided.

Chapter 4, "Disposal of Medical Waste in the COVID-19 and the Post-COVID Period," considers the situation of medical waste management in the world and in Russia in COVID-19 and post-COVID period. During the period of the pandemic, each country has been faced with the insufficiency of the established system of sorting and recycling of waste. The need to modernize the created separation and disposal measures system has become critical. Getting a large number of medical wastes, including masks, gloves, napkins, and plastic bottles from under antibacterial agents to landfills along with food waste is fraught with unforeseen biological consequences, or rather complete intoxication and the inability to use these resources in the future. This paper considers the proposal for a possible solution, its economic and risk grounding and proves, that can be the implementation of project "Ecotechpark"—closed-loop complex of sorting, recycling, and producing facilities.

Chapter 5, "Pricing in the Context of Structural Modernization in Post-COVID Economy," analyzes the gradual restructuring of the economy from a raw material orientation to modern high-tech development on an innovative basis. The shock transition to market relations, combined with price liberalization in an unprepared economy and population, led to a sharp drop in production, living standards, and inflation. A raw material monopoly and an oligopoly arose in the country—as a result, an annual increase in prices and tariffs. The corona crisis, combined with the aggravation of environmental problems in the world, sharply raises the question of changing the development model, a gradual transition to alternative energy sources, and the modernization of production on an innovative basis. In accelerating this process, a significant role belongs to the improvement of the pricing methodology, which facilitates the flow of capital into industries that ensure technological progress. The study substantiates the need to change the methodology for the formation of internal prices for the products of the fuel and energy complex in order to create conditions for the restructuring of the economy for innovative energy-saving technologies. Based on the analysis of the sources of cost growth in the backbone sectors of the economy, recommendations have been developed for improving domestic prices for fuel and energy complex products, providing an increase in efficiency in related sectors of the economy in the post-COVID period of its revival.

Chapter 6, "The Impact of COVID-19 on Agriculture," describes the situation, that agriculture plays a vital role in food supply and its sustainability for all countries, irrespective of their development level. The agricultural sector consists of the entire food chain, from farm to fork. As COVID-19 has had enormous effects on the entire sector, all these steps should be considered to evaluate the impact of COVID-19 on agriculture. After the pandemic, governments have taken precautions to different extents, such as the lockdown of public places, putting some regions in quarantine, or imposing restrictions on domestic and/or international travel, which changes the food demand in the population. The stocks were run out for a while in many countries, and the food industry has to face this crisis. Also, agriculture uses manpower for many production steps depending on countries. However, after the pandemic, firms have slogged to find labor, and also they needed to take precautions to spread coronavirus in managements. This also affected cost and processing procedures. This situation led countries to one of two scenarios; the first one is increasing the international relationships and make easy to overcome

this kind of crisis, and the second one is to obtain their food supply chain. In this chapter, the effects of COVID-19 on the entire agricultural production and supply chain will be discussed.

Chapter 7, "Economic Mechanisms of Regulation of Innovative Industrial Technologies in the Post-COVID Age," is devoted to new technological reality, where the main competitive advantages are based on advanced technologies, human and artificial intelligence, data management, and effective management. But reality has made its own adjustments and the crisis associated with the spread of coronavirus infection has slowed down many mechanisms for the introduction of innovative industrial technologies. The authors consider the uneven process of technology implementation in the post-COVID age. In particular, the associated different approaches to decision-making at the level of existing economic actors. The authors reveal the principles of economic evaluation of measures to support industrial production during the spread of coronavirus infection. It is concluded that the current reality has not only worsened the economic situation of many technological industries, but also, due to the emergence of threats to the life of the population, has called into question their further activities. After analyzing the main macro-indicators, the authors came to the conclusion that the economic recovery is based on the stable operation of the industrial sector and it is necessary to restructure the economic system in order to find new sources of economic growth.

Chapter 8, "Post-lockdown Flights: New Strategies for Civil Aircraft Manufacturers and Airlines," presents an original approach to the study of the impact that the suspension of passenger aircraft flights during the pandemic has had on the formation of trajectories for maintaining stability, as well as on strategies for diversifying the activities of aviation industry companies. Aviation is seen as a driver of a countries' development and a point of pride. It is clear that, therefore, the pandemic has come as a shock to the airline industry, with a large decline in passenger traffic and a delay in the delivery of new aircraft. This study used aviation statistics to confirm the conclusions of the crisis situation, as well as strategic and scenario analysis and modeling, taking into account the variability of the expected actions on the part of representatives of the aviation industry and objective competition among airlines for the most popular air routes and business jet flights. This chapter presents an assessment of the development strategy of Russian airlines, including modeling possible trajectories of a gradual increase in the number of flights as the

borders open, domestic tourism develops, and vaccination is carried out in the world. The prospects of new aircraft produced by the Russian aircraft corporation and their niche orientation are determined, taking into account the restoration of medium-capacity flights and flight range. The conclusion is reached about the important role of the governments in supporting the aviation industry in the pandemic period and the need for joint efforts to ensure flight safety for passengers.

Chapter 8, "China's Electricity Market Reform in the Post-COVID Era," is devoted to China's most recent power system reform started in 2015. It has been running for five years until the COVID-19 spread in the beginning of 2020, pushing the pause button of global economy. The epidemic brought tremendous negative effects on social and economic development of China, and people's normal lives suffered a traumatic shock, especially during the first half of year in 2020. Those impacts were continuously passed to electricity market. Demands of electricity experienced a big drop and hold back the electricity marketization reform. As a response to those difficulties occurred during the epidemic crisis, China's electricity industry implemented multiple new policies and actively worked on supply maintenance and price reduction, which ensured the normal operation of social life and production and provided strong support for safe resumption of work and production. At the same time, in 2020, as the last year of China's 13th Five-Year Plan, Chinese governments also announced a series of policies to guide China's power market reform and continuously support further development during the 14th five-year plan.

Chapter 10, "Creative Industries: a Review of the Effects of the COVID-19 Pandemic," is devoted to the problems of the functioning of creative industries (theaters, museums, entertainment events, etc.) during the pandemic and post-COVID period. It is important to note that since the creative industries are primarily cultural goods and services in their economic essence, it should be noted that they have suffered more from lockdown and quarantine measures than material production. The study shows the current state of the creative industry and also suggests possible ways out of the crisis for producers of cultural goods.

Chapter 11, "Impact of the COVID-19 Pandemic on the Housing and Construction Markets," shows the unpreparedness of certain market segments to the adaption needed to weather the current situation. Digital transformation was supposed to be the main trend in the housing market.

A significant problem was the multidirectional information and the aggregate of data that was provided to the subjects of the housing market. This predetermined the need to improve the information infrastructure of the Russian housing market, considering international experience. Foreign experience shows both the active digitalization of data and the availability of sufficiently effective tools that allow market participants to make informed and adequate decisions regarding the construction or purchase of housing. Within the framework of this study, the information infrastructure of the Russian housing market was presented. This considered how both modern digital technologies and the consequences of the crisis (which itself does not have an economic essence) have impacted on the housing sector. Since the role of the state in the country is quite significant, this aspect was also considered in the formation of this infrastructure. The author proposes to create a single information center that will accumulate, process, and issue the required information to market entities. The author showed that at the initial stages, financing the formation of the information infrastructure of the housing market can be carried out from state funds, which will make it possible to free up funds for the development of not only the market, but also related industries. The author showed the influence that the information infrastructure of the housing market has on decisions to build or purchase housing, as well as on the process of financing market entities.

Chapter 12, "The Use of Artificial Intelligence in Automation of Planning and Operational Management of Organizational and Technical Systems in the COVID-19 Pandemic," investigates an approach to the creation of intelligent information systems for the automation of planning processes and operational management of objects of organizational and technical systems. This line of research is highly demanded in the context of increasing risks and non-statistical uncertainty in the COVID-19 Pandemic.

Chapter 13, "The Changing Role of the Transport Facility Internal Audit in the Post-COVID Period," is devoted to the difficulties of economic actors and institutional conditions of developing new electronic applications and systems, and strengthening their internal control and information security systems. Today, no organization can do without a well-functioning IT system: Most of the operations are performed via the Internet, electronic document management, electronic signatures, and enterprises are striving to replace paper media with electronic ones. The article is aimed at developing additions to the existing tools for assessing

the effectiveness of the internal control system at the Russian Railways' structural enterprises, as well as at developing recommendations aimed at improving its efficiency at the post-COVID period.

Chapter 14, "The Economic Impact of the COVID-19 Pandemic on the Russian Automotive Industry," describes the situation in which the COVID-19 pandemic has had a severe negative impact on manufacturing industries, including the automotive industry. The aim of the work is to analyze the impact of the COVID-19 pandemic on the performance of the Russian automotive industry, to assess the development trends of this sector of the Russian economy. The paper investigates the dynamics and structure of production and sales of automotive products in the Russian Federation in the context of the impact of the COVID-19 pandemic, provides a comparative assessment of the impact of the pandemic on the global and Russian automotive industries, identifies the key problems and risks of the development of the automotive industry in Russia, and concludes that it is necessary improving the mechanisms of state regulation of the development of the Russian automotive industry.

Chapter 15, "Tourism at the Post-COVID Era," is devoted to COVID-19 pandemic influence on tourism as economic sector and the crisis that affected economies worldwide had an enormous impact on tourism. According to UNWTO data, in 2020 the tourism declined by 60–80% on the global scale during the COVID pandemic in comparison to 2019. The impact of the COVID pandemic on the global tourism situation it is obvious, and the recovery of tourism will need a different development approach and the new era of tourism will begin. In this chapter, the new tourism is defined with trends at the Post-COVID Era emphasizing the slow recovery with adopted tourism products and strategies. Post-COVID tourism must focus on the development of new tourist products in the area of selective forms of tourism, emphasizing the well-being of tourists, health, safety, and security issues, and sustainability.

Chapter 16, "Influence of COVID-19 on Healthcare System," contributes an evaluative analysis of the behavior of world healthcare system. The pandemic tested the strength of the world's healthcare system. The fight against COVID-19 took place at the limit of its capabilities and the further viability of some systems was threatened. The impact also was visible by the additional costs to prevent the spread of coronavirus and to eliminate its consequences. The chapter analyzes the gaps

and challenges identified during the COVID-19 pandemic in the healthcare sector, both in Russia and in the world. The chapter also accumulates expert recommendations to address existing problems.

Chapter 17, "Government Protection of Both Parties in the Operation of the Post-Epidemic Labor Market in China," considers the situation with regulation of the labor market in China at the COVID and post-COVID period. In the post-epidemic period, when the epidemic prevention and control initially achieved results, China, as the first country to discover and report COVID-19 and the most successful country in epidemic prevention and control, implemented government protection policies for both sides in the labor market in terms of stabilizing employment, which achieved remarkable results and served as a model for other countries. Generally, the government protection policies of the Chinese government for both enterprises and labors include the following aspects. First, monetary, fiscal, and employment policies work together to stabilize employment, strengthen protection for both sides, and ensure the sound operation of the labor market. Second, the forms of employment are standardized and diversified in accordance with the law to effectively protect the legitimate rights and interests of labors and give enterprises greater flexibility and convenience in employment. Third, special assistance is offered to enterprises in difficulty, key employment groups, and the unemployed.

Chapter 18, "Flexible Employment Development in Post-COVID Economic Revival," as it flows from the title is devoted to flexible employment in post-pandemic period. The economic shock caused by the COVID-19 pandemic has had profound impacts on the labor market. Compared with regular employment, flexible employment represented by non-standard employment, part-time job, self-employment, and other forms that rely on the Internet platform have played an increasingly more important role in China's economic revival. This chapter focuses on flexible employment development during the post-COVID economic recovery in China. Specifically, it summarizes the current situation of flexible employment in China in the post-COVID era first and then further discusses the factors that may affect flexible employment as well as potential barriers under the global spread of COVID-19. On this basis, some possible suggestions are put forward. With a more flexible labor market in the future, greater attention should be paid to stabilizing employment; in addition, policies should be strengthened to support workers

and enterprises, along with appropriate standards of flexible employment and comprehensive social protection systems.

Chapter 19, "The Impact and Response of Artificial Intelligence on Labor Market in Post-Epidemic Era," is devoted to the role of AI for labor market of China. After the outbreak of new crown pneumonia, it not only has a great impact on the social economy of China, but also on the labor market, and artificial intelligence has shown its unique competitiveness in this epidemic. The theoretical circle holds that the great development of information technology, Internet, artificial intelligence, and other technologies not only leads to the productivity revolution marked by the change of labor data, but also brings about the major changes in social relations of production, exchange relations, consumption, and even distribution. Artificial intelligence brings new challenges to effective labor market governance, promotes the direction of wealth accumulation from capital to knowledge, speeds up the trend of labor force externalization, and changes the demand of workers' work skills.

Chapter 20, "The Impact of the Coronavirus Pandemic on the Healthcare System in Poland," exposes the imperfections of the healthcare system inherent in Poland before the pandemic. The aim of the study is to identify key changes in the healthcare system in Poland caused by the pandemic and to determine the prospective implications of the pandemic on the healthcare system in Poland. The basic research question is: To what extent may the COVID-19 pandemic change the healthcare system in Poland in the future? The result of the study is the identification of the impact of the pandemic on the healthcare system in Poland, considered in terms of the financing and implementation of health services in Poland, taking into account Polish conditions. The work fills the research gap related to the fact that, based on the crisis present, future healthcare system standards are needed, and this presents a proposal thereof.

Chapter 21, "Back to the (Ab)normality: Eastern-European Labor Markets After Pandemic," describes the situation of labor markets which are at most risk: Middle class loses part of its income while working class is losing jobs or facing demand to work under dangerous conditions. In many countries the diminished by neoliberalization market regulation put many workers at danger. In this paper, we will examine labor market policies during pandemic and its effects on labor markets of Eastern European countries.

Chapter 22, "Health Insurance Problems of Unknown Infections," is devoted to justification of possible effective organizational forms of

ensuring insurance protection of the population against epidemics of unknown infections analogies of risks of epidemic and risks of natural disasters, their dependence on climatic changes are analyzed; similarity of emergence and damages of two of these groups of risks from the point of view of a possibility of their insurance. There are also offers on insurance of risks of epidemics by the principle 2P2 with use of platforms blockchain formulated.

Chapter 23, "The Impact of the COVID-19 Pandemic on the Labor Market in Poland," is studying the condition of the labor market in Poland and to present the directions of changes taking place in the future at the time of post-COVID. Based on the analysis of existing sources, the identification of research gaps in the necessary areas of research on the ongoing changes in the labor market caused by the COVID-19 pandemic was identified. This stage of research was based on publications in the field of social and health sciences, for which inductive reasoning was performed. The results of the study allow the conclusion that the COVID-19 pandemic has negatively affected and continues to affect the labor market in Poland, affecting the employment level, economic activity rate, unemployment rate, and economic inactivity. At the same time, the pandemic has changed values and opened up opportunities for the labor market in the future in the form of new jobs and new skills. The presented results fill the knowledge in this area and enrich international literature on the problem of economic and social consequences of the pandemic and its impact on the evolution and development of the labor market. They can contribute to further in-depth labor market research in the time of the COVID-19 pandemic.

Chapter 24, "Analytical Review of the Market for COVID-19 Vaccines: Production, Cost, and Distribution," considers all the main vaccines against coronavirus, production and pricing peculiarities, and also analyzes the formation of the vaccine market in the world. The study is aimed at finding organizational and economic opportunities to defeat COVID-19. The author notes that her research does not promote or deny the need for vaccination, does not advertise any vaccine, but only examines the mechanisms of the formation of the global vaccine market. The article provides predictive data on the development of the pandemic, as well as the victory over it.

Chapter 25, "Judicial Institutions and Legal Services in the Post-COVID Period," proclaims opinion of the authors, that human and civil rights are not subject to revision under any circumstances, even a

pandemic, and can't be the basis for violation of human and civil rights. As well known, the judiciary is one of the branches of government in any democratic state. The independence and efficiency of the judicial system is a guarantee of the possibility of protecting one's rights and suppressing violations of rights through the use of legal violence against the offender. No grounds can be offered to belittle the judiciary and its role in law enforcement. The provision of legal services contributes to the development of justice and high-quality law enforcement, therefore legal services—notarial, lawyer's consulting, advocacy—are accompanying the processes of law enforcement and the establishment, change, and termination of legal relations. With this chapter, we conclude our large two-volume project looking at the prospects for post-COVID economic revival, and with the theme of this chapter emphasize the role of the court and legal services in the new environment of post-COVID development.

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PART I

Markets at Post-COVID Age

CHAPTER 2

The National Technological Initiative of Russia Project Implementation as a Basis for the Development of Perspective Technological Markets and Industries in Russia

Irina B. Repina and Valeriya V. Nemtsova

Introduction

The vector of development of contemporary Russia, especially amid the post-COVID situation, is mainly directed toward the extension of the domestic production of innovative products and services. This is demonstrated by forming strategies of international development (Belozorova & Sultanova, 2019), which are targeted at the creation of high-quality

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_2

projects in the high-tech and research sectors (Schislyaeva & Shamrai, 2018), the use of domestic standards and recommendations together with the international experience of designing innovative infrastructures, and, certainly, approaching foreign markets and reaching economic leadership on the global arena (Nevskaya, 2020).

The major challenge was to create a platform capable of making the right use of available tools and building up a new innovative structure headed by the innovation-supplying companies (Grigoryan et al., 2020; Palkina, 2020; Semin et al., 2020). Overcoming technological barriers to creating new products is a principal challenge both for Russian and foreign high-tech companies, which is a key to competitiveness at the perspective markets, especially in the post-COVID situation (Maksimova & Morozov, 2020).

The National Technological Initiative (NTI) is an association of representatives of businesses and expert communities aimed at the development of prospective technological markets and industries in Russia, which may eventually become the backbone of the global economy (National Technological Initiative, 2021). NTI is viewed as a long-term interagency program of public–private partnership to promote the development of new prospective markets on the basis of high-tech solutions and the establishment of the conditions for global technological leadership, which will be shaping the development of the global and Russian economy by 2035 (Government of Russia, 2021).

The activity to develop the markets is arranged as roadmaps or strategic planning documents, which contain a set of actions interrelated and interconnected as regards the tasks, due dates, performers, and resources. The roadmaps are implemented by way of launching specific NTI projects.

NTI unites technological entrepreneurs, representatives of universities and research centers, large business associations of Russia, development institutions, expert and professional communities, and executive power agencies (Lyapina & Stroeva, 2017).

To address the issues of financial and non-financial support, creating the tools to increase the number of participants, technological teams, and start-up companies involved, and identifying the prospective growth areas, the ANCO (Autonomous Non-Commercial Organization) Platforma NTI was established by the decision of the Government of the Russian Federation (Makarov et al, 2020; Official Website of RVC).

NTI focuses on new global markets, which shall come into shape in 15–20 years. Most of the markets will have a network nature (they will

inherit the currently existing Internet approaches or will make use of the Net infrastructure) (Lobatyuk et al., 2017). The new markets will be oriented at customer; the distance between the producer and the consumer shall become minimal.

Results

NTI development takes several stages. At the initial stage—which was already completed—the following actions were performed: primary, the selection of Nets, their institutionalization, establishing the principal organization structures for planning and implementation, preparing roadmaps, planning the further government financing for the projects implementation, and creating the legal and regulatory framework to regulate the emerging markets, products, and services related to the NTI markets (Shinkevich & Barsegyan, 2018; Sibirskaya & Oveshnikova, 2018).

In 2020, due to the current economic situation (Spitsyn et al., 2020; Vetrov, 2020) it was decided to modernize the existing program and transfer to NTI 2.0, which would include the larger quantity of markets and tasks that emerged during the COVID-19 pandemic. In May 2020, Foresight NTI 2.0 took place, which was dedicated to analysis and forecasting of the markets of newly emerging and already existing NTIs, as well as planning further actions and measures.

The review of prospective markets of NTI 2.0, revealing its key segments and hypotheses, is provided in Table 2.1.

During the post-COVID situation, Foresight NTI 2.0 gained successful development; within the frames of Foresight NTI 2.0, it is possible to connect to the prospective markets of a digital community NTI 20.35 online. Foresight NTI 2.0 is a new vision of ideas of the National Technological Initiative and participants of NTI ecosystem. It is a unique project for creating an image of the future: For the first time, a large-scale NTI ecosystem event shall take place online according to the Rapid Foresight methodology. Foresight NTI 2.0 will make it possible to analyze the trends, forecast the demand, deal with threats and barriers, understand what changes should be made in the laws alongside what kinds of specialists should be trained by the higher educational institutions, and finally identify how to create and develop companies earning money at the new markets.

According to NTI strategy, by 2035 the share of private investments in the long-term research programs will be no less than 50%. Foreign

Table 2.1 Analysis of perspective NTI markets

Seq. No.	*Market name*	*Market hypothesis*	*Market key segments*
1	AeroNet	Aerial logistics and surveillance, which are implemented by a new generation of unmanned aerospace systems united into a single relevant information field	Unmanned aircraft systems; aerospace systems; small spacecraft; remote systems for sensing, monitoring, and 3D-modeling of territories and objects, as well as the required infrastructure
2	TechNet	Open ecosystem of advanced production technologies, materials, equipment, and services (factories of the future) facilitating the NTI markets development	Digital alter egos, cyber-physical systems. Product data management. Digital manufacturing and operations
3	NeuroNet	The market of human-machine communication means based on advanced neurotechnology solutions adding to the productivity of human–machine systems and the efficiency of psychical and mental processes	Neuroassistants, neuroeducation, and neuropharmacology. ExoRehabilitation. Artificial intelligence for telecommunication companies. Neuronal replacement. Neurotechnology in economics
4	HealthNet	Personalized medical services and drugs increasing lifespans, as well as new efficient means of prevention and treatment of different diseases	Preventive medicine; sports and health; medical genetics; information technology in medicine; healthy longevity; and biomedicine
5	FoodNet	The market of disruptive technology and services from microbe to the plate	Smart agriculture. Accelerated selection; new cultivated crops and sources of raw materials; accessible and affordable organics; super-local farms; personalized nutrition. Changing a logistic chain from the manufacturer to the consumer

(continued)

Table 2.1 (continued)

Seq. No.	*Market name*	*Market hypothesis*	*Market key segments*
6	WearNet	Ecosystem of businesses, including the creative industry (fashion), light industry, retail and technology, manufacturing and distributing a fashion product of the future, which is a hybrid product. New technologies and digitalization act as a way to overcome disconnection and as a driver of "hybrid revolution"	Distributed computer-aided manufacturing systems with a unified system of ordering and logistics. Robot-assisted factories targeted at small-scale production and single piece production. Services and tools for supporting individual clothes design
7	EduNet	Network-centric educational ecosystem ensuring the country's competitiveness at the global market	Creation, personalization, packaging, and technological delivery of the educational content and training programs for all ages, including shifting the focus to development of personal competencies
8	GameNet	Development and application of gaming methods and practices in business, culture, education, science, health care, public management (Osipov, 2021), and communities to improve the overall quality of human life	Cross-media gaming universes with new types of network monetization. Cyber-physical games with a new level of immersiveness. Gamification and digitalization of sport games
9	EcoNet	Projects aimed at environmental preservation and the creation of infrastructure reducing the negative impact of climate change	Deep analysis and climate control technology, creation of experimental and super-local climatic zones restoring biodiversity waste as a resource

(continued)

investments to the Russian technological solutions shall account for no less than 10% of the total country budget on research and development (Dol, 2021; Skuratova, 2019).

Also, by 2035 the total expenses on science and technology shall reach 4% of GDP (Prudiy & Kulikov, 2020; Samoilenko, 2020). Incomes of

Table 2.1 (continued)

Seq. No.	*Market name*	*Market hypothesis*	*Market key segments*
10	HomeNet	Network associations of tenants, houses, and condominiums. Digital bus for a home, house, and condominium. Digital platforms for management, design, construction, and operation of residential premises and communal facilities. Dwellings outside the comfortable climatic zones (space, Arctic, water, mountains, etc.)	The market shall develop the projects aimed at creating a comfortable environment for people to live and work, which also includes severe and unexplored natural and climatic zones
11	SportNet	The market of cross-sports technologies and cyber-physical systems for homeostasis of humans and society	eSports are electronic devices for professional and amateur sportsmen; sponsorship of sporting events; media channels broadcasting sporting events and sports matches; sports betting
12	AutoNet	The market of new robotic aviation creating new technologies, values, quality of life, and work for the people and the enterprises	Transport and information telematic systems, smart city mobility, transportation, and logistics services
13	MariNet	Smart sea traffic management system and world ocean exploration technologies	Digital navigation and communications, innovative shipbuilding, ocean resources, development technologies
14	EnergyNet	Distributed power generation, from personal power to smart grid, smart city. Internet of Energy, an ecosystem of power energy producers and consumers, which seamlessly integrate into the general infrastructure and exchange power energy	Reliable and flexible distributed networks Smart distributed power generation Personal power plants and consumer services

(continued)

Table 2.1 (continued)

Seq. No.	*Market name*	*Market hypothesis*	*Market key segments*
15	SafeNet	Safe and protected computer technologies, data transfer solutions, safety of information, and cyber-physical systems	Devices used to ensure safety; applied systems for addressing the safety issues; safety of networks and safety of management platforms and applications

Source Created by authors

the Russian companies and universities from intellectual property management will make up 1% of the global market turnover, while Russia shall enter the top-5 countries in the rating according to the number of professionals in R&D (Yakovets, 2019).

To ensure the sustainable growth of newly established NTI markets, the top-priority cross-cutting technologies have been outlined, which should be used in NTI projects to conquer a certain share of the global market in any specific industry. Among them are big data, AI, blockchain systems, quantum technology, new and portable energy sources, new manufacturing technology, sensorics and robotic components, wireless communication technology, management technology for biological object properties, neurotechnology, virtual reality, and augmented reality.

The establishment of scientific and research background in Russia for such groups of technology will make it possible to create globally competitive high-tech products and services (Mil'kina & Lits, 2020; Novak, 2020; Popova, 2020; Schislyaeva & Shamrai, 2018). At the same time, the focus of research activity of the Russian universities and research institutions on the NTI technological areas will make it possible for them to gain high demand from the high-tech industries of the national economy within the next 20 years (Aimukhammedova, 2020; Andreeva & Dmitrieva, 2020; Fedotova et al., 2020; Ivaschenko et al., 2017; Spitsyn, 2019).

One of the tools for developing cross-cutting technologies is the network of NTI Competency Centers, which is a network of engineering education consortia on the basis of the Russian universities and scientific organizations. The centers carry out research and educational activities in partnership with the largest technology companies for the purpose of training the leaders in development of new technologies and performing

technology transfer (Kononkova, 2020; Kulikov, 2020; Povalko, 2019; Shinkevich & Shinkevich, 2018; Sibirskaya, 2017; Tsogoeva & Galaova, 2020).

Discussions

Therefore, within the frames of NTI as an umbrella program for developing the potential of technological entrepreneurship: (1) priority disruptive technologies were selected, which have the highest influence on development of the NTI markets, and (2) the institutions of financial support for the projects from the state budget funds in the form of grants and subsidies were created, which should facilitate for the initial search of investments for entrepreneurs to bring their ideas to life (Osipov, 2016).

One should also note the interim results of implementing the national goals 2020 as the basis for the development of prospective technological markets and industries of Russia. The crisis caused by a new coronavirus infection so far did not affect the demographic processes. However, new economic problems (risks of unemployment, declining income) may aggravate the current birth rate situation.

Taking into account the positive dynamics of the previous years, the life expectancy in 2020 should have reached 73.9 years. However, the declining socioeconomic situation caused by the spread of COVID-19 had a negative effect on the life span of the Russian population in 2020 (Erokhin, 2020; Ryazanov, 2020).

In Q1 2020, the real disposable household incomes showed a decline, but this was not yet caused by introduction of lockdown measures. A serious decline of incomes was observed in Q2 2020.

The restrictive measures adopted by the Government of the Russian Federation to fight the new coronavirus infection resulted in the sharp decline of economic activity, which, in its turn, had a negative impact on the level of employment and salary/wages of the employees (Duma, 2020). In this situation, achieving national strategic goals for the growth of real incomes and the alleviation of poverty becomes problematic. According to the national objectives, it is planned to alleviate poverty twofold by 2024. In 2019, before the consequences of the coronavirus transmission began to reveal themselves, the planned value of poverty alleviation had not been reached. At present, the risks of failure to meet the target values become even higher.

According to the Federal State Statistic Service of the Russian Federation, in May 2020 unemployment in Russia reached the maximum level for the past eight years, which requires the revision of existing measures against poverty and an increase of funding in this area (Dun et al., 2020; Osipov, 2019; Osipov et al., 2021).

In 2019, the target value for the improvement of living conditions was reached. Along with that, due to the unfavorable epidemiological situation caused by the coronavirus infection and, as a result, a possible increase in the length of construction and a drop in the consumer purchasing power, reaching the target value in 2020 is rather difficult. Also, there is a risk observed of not meeting the target in case of failure to provide the funding as was planned for 2020.

Temporary lockdown limitations on economic operations in the current year lead to a decline in entrepreneurial, investment, and consumer activity, the volume of goods produced, and the services provided. All this leads to a risk of failing to meet the target value as regards the national objective of technological development acceleration.

At the same time, the Federal Scientific and Research Program of Genetic Technology Development was approved for 2019–2027. The program envisages the establishment and development of educational organizations, laboratories, and centers engaged in research in the area of genetic technologies, their technological support, scientific research, and developments involving genetic technologies, including the development of bio-based products, diagnostic systems, and immunobiological substances for health care, and agricultural and industrial biotechnologies (Konina, 2021a, 2021b; Konina et al., 2021). It is also planned to develop in vitro and in vivo models of human diseases with the help of genetic technologies, as well as the financing of bioresource centers.

Despite the aggravation of external and internal conditions of economic functioning, the GDP growth rate in Q1 2020 turned out to be high enough.

The inflation rate in May slowed down, mainly due to moderate demand and the dynamics of currency exchange rates. The main groups of goods and services in May made an approximately equal contribution to the monthly inflation rate value, although the highest growth of prices was observed for services.

The indicator concerning the establishment of high-performance export-oriented sectors in the principal economic areas—first and foremost, the processing industry and agro-industrial complex (Roud &

Vlasova, 2018), which are developed on the basis of advanced technologies and possess a highly-skilled staff—showed insignificant growth as compared with 2018, which is not sufficient to reach the target value by 2024.

Conclusion

The onset of the unprecedented socioeconomic crisis caused by the coronavirus pandemic posed new challenges on the way of achieving the national objectives of the national projects development and implementation. However, both in the period of pandemic and in the post-COVID period, the demand on the Nets is high like never before. For instance, one of the advantages of unmanned delivery is the absence of contact between people during cargo handling, which is one of the most important factors of fighting the infection spreading. The strongest demand will be observed in such areas as genetics, biotechnology, neurotechnology, quantum technology, and digital security.

Therefore, by creating an unprecedented platform, Russia applied a mass-scale approach to addressing the current economic issues, which is different from the experience of other countries. Within the frames of NTI, Russia focuses on those markets where it is possible to create the industries of a new technological paradigm, which are important for ensuring national security and high living standards for the population.

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CHAPTER 3

Opportunities and Prospects for the Transition to Post-COVID Circular Economy

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Introduction

The rapid spread of COVID-19, the global and extraordinary nature of the pandemic, and the need for strict measures to prevent the spread of coronavirus have led to a disruption in the trajectory toward the strategic achievement of the Sustainable Development Goals (SDGs).

The need for self-isolation has exacerbated the shortcomings of a resource-dependent linear economic model that progresses from resource extraction to waste generation (Ellen MacArthur Foundation, 2020). It is clear that the pandemic has disrupted supply chains both globally

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_3

and locally, exposing the problem of lack or excess of certain resources. Disruptions in waste collection and utilization were observed; in particular, an increase in waste from the food sector—particularly plastic containers and packaging—took place (Giudice et al., 2020).

In contrast to a linear economy, a circular economy (CE) implies a rethinking of value chains, with the development of waste-free low-carbon processes. The introduction of CE principles will provide a combination of environmental, economic, and social benefits: in particular, a reduction in resource consumption, an increase in the use of renewable resources, a decrease in resource intensity of processes, a reduction in primary raw materials in a product, a reduction in utilization costs, the creation of new jobs, and many more (Korhonen et al., 2018; Osipov et al., 2021a, 2021b, 2021c; Osipov, 2019).

It is advisable to link the economic recovery in the post-COVID period not with the model of global economic growth characteristic of a linear economy, but with a more sustainable CE model, making decisions on the development of industries taking into account the impact on the environment (Ibn-Mohammed et al., 2021). Business models based on CE principles intensify the closed consumption of local resources, reduce dependence on imports, promote diversification and sustainability of supplies, and lead to a reduction in emissions. Thus, around the world, it is predicted that up to 700 thousand new jobs will be introduced by 2030 and CO_2 emissions will be reduced by 50% by 2050 with the transition to the CE (Material Economics, 2020).

The formation of the Russian national policy in the post-COVID period aims at restoring the stability of the economy and achievement of 18 SDGs. Among them, the following SDGs are directly related to the CE: industrialization, innovation, and infrastructure; sustainable cities (Osipov et al., 2018); responsible consumption and production; partnership for sustainable development; and combating climate change, among others. At the same time, it should be considered that indicators of various SDGs have a direct or indirect impact on each other, ensuring synergy of development (Roscongress, 2020). Accordingly, the research into the possibilities and prospects for the transition to the CE in Russia is relevant, especially in the absence of systemic comprehensive programs for the implementation of the principles of CE and the lack of scientific and practical research in this area.

The "re"-principles, which underlie the transformation to the CE, rests on the three main ones: to *reduce, reuse,* and *recycle,* waste (Marques &

Fritzen Gomes, 2019). Later, the 6R and 9R models appeared, which characterize the sphere of production and consumption in a more differentiated manner (Potting et al., 2017; van Buren et al., 2016). At the same time, Russian studies deal mainly with the systematization of foreign theoretical studies, including the CE concept analysis (Gureva, 2019), prospects for the CE implementation in Russia (Valko, 2018), concepts and definitions as part of "re"-models (Valko, 2019), and barriers and prospects for the CE introduction in Russia (Ratner, 2018). As far as Russia is concerned, the generalized theoretical nature of the research and the lack of attention to the prospects for the transition to CE can be noted.

It seems necessary to clarify and supplement the "re"-models in accordance with Russian realities, so as to substantiate the existing conformity of Russia's economic activities to the "re"-principles and the possibilities of transitioning to the CE. When updating the "re"-models, it is necessary to take into account the changes in the Federal Law "On Production and Consumption Wastes" of Russia (FL No. 89, 1998; FL No. 458, 2014). This law clarifies the concepts of MSW (recycling, regeneration, recuperation); sets forth the priority for recycling, not incineration; introduces the institute of regional operators; increases the responsibility of producers for environmental damage; and continues with such principles (Volkova, 2018).

At the same time, international data indicate an increase in interest in the CE as a system, method, model, and concept that contributes to sustainable development in the post-COVID period. The idea of preferential support and the financing of CE-related projects (which bring both economic and environmental benefits through the circular alliances' creation, including the public–private partnerships formation) draws a red thread in current publications (Ellen MacArthur Foundation, 2020). The promising investment trends are identified in the following areas: construction (renovation, improvement of buildings); transportation (repair, restoration of transport); packaging; clothing; food (collection, sorting, processing); in each area, reusing materials and building new circular business models is crucial.

It should be noted that in the context of the current pandemic, there were significant changes in the handling of waste: Recycling plants that deal with separation of plexiglass, paper recovery, cement processing, and suchlike have been closed across the world due to the suspension of related industries; there were risks of moving garbage with contaminated

materials to other areas; there was an increasing demand for disposable plastic food delivery packaging and non-degradable personal protective equipment (Doussoulin, 2020). In the post-COVID period, the deceptive impression of the economic efficiency of plastic packaging production—especially for Russia, with the availability of polymer raw materials based on petroleum products—should not limit the implementation of the CE principles for plastic recycling. Also, preference should be given to short plastic recycling chains, cooperation ties in recycling, the popularization of secondary packaging in the media, fiscal and regulatory measures at the state level, and the public procurement of materials and products that are a part or a product in a closed cycle (Giudice et al., 2020).

The concepts of resource loops, with long and slow life cycles, are found in publications on the transition to CE in the post-COVID period in relation to various industries (Wuyts et al., 2020). Individual waste from farming, agricultural activities, and by-products that harm the environment are assessed; the need for R&D in the field of rational environmental management alongside the transition to bio-technologies with government support for the formation of circular business models is indicated (Donner et al., 2021).

To popularize the CE principles as an opportunity to return to sustainable development in the post-COVID period, it is common to present the advanced results of a particular country or region in the form of cases which reflect circular decisions that have a positive effect on the economy, ecology, and society.

The purpose of this study is to form a set of prospects for Russia for the transition to the CE. This should be in line with the identified relevance of the world economy's transition to the CE, as a way to restore stability in the post-COVID period. On the grounds of the literature review, this purpose is clearly of broad concern to many researchers. The aim is to be reached through the following tasks implementation:

- updating the "re"-models for Russia;
- statistical processing of data on MSW in Russia;
- drawing up cases of using the principles of the CE in Russia, also in integration with the EAEU countries.

Methodology

The research materials include scientific and practical data published in the sources of the Scopus databases and Web of Science: Mainly articles of such Open Access journals as Sustainability and Resources, Conservation & Recycling, as well as Russian publications that are present in the RSCI system. Periodic publications by the Ellen MacArthur Foundation, World Bank, Higher School of Economics, Rosstat (The Russian Federal State Statistics Service), and suchlike have been analyzed as well. The materials for the case formation are based on online data of periodicals and the official websites of enterprises.

The theoretical methods of scientific knowledge have been applied: a retrospective analysis of international scientific and practical experience in terms of the transition to the CE; the CE principles in waste management and international experience thereof; systematization and generalization of new knowledge; a synthesis and method of analogies to identify the opportunities and prospects for the transition to the CE for Russia; abstraction, formalization, and conceptual modeling to actualize the "re" model for Russia.

Results

Conceptual "Re"-Model of the CE

There are many different ways in which "re"-models and the presentation of the 9 R-principles of CE are carried out in the research. These include in the form of numbered lists: (R1) Refuse; (R2) Reduce; (R3) Reuse; (R4) Repair; (R5) Refurbish; (R6) Remanufacture; (R7) Repurpose; (R8) Recycle; and (R9) Recover energy (van Buren et al., 2016); in block-tabular form (Gureva, 2019; Valko, 2019); or as a bottom-up hierarchy (Vetrova, 2018). In other "re"-models, the concept (R1) *Rethink* is introduced—this combines measures to intensify the use of goods (conveying information about multifunctionality, exchange of goods, etc.)—and the *Refuse* principle is assigned the position R0, as the most important one. The following points are displayed: the rising value of the principles from R9 to R0 for the CE; R0 → R9 technological innovation flow; and R9 → R0 flow of innovation in development; renewal and socio-institutional change (Potting et al., 2017). The blocks of useful application (R8, R9), the extension of the life of goods or their parts (R3–R7), and smart use and production (R0–R2) (Kirchherr et al., 2017) are specified.

The most detailed study of R-principles is an analytical review of early publications on the definitions of each R-imperative, carried out by Reike et al. (2018). The study combines the principles of *Rethink* and *Repurpose* as interchangeable concepts to denote a new way of an old product use. The concept of *Re-mine* is introduced, which goes practically unmentioned in publications devoted to the CE in developed countries with a high proportion of recyclable waste. *Re-mine* involves the extraction of useful materials for further use from open dump and burial sites (García-Rodríguez et al., 2013).

Understanding the *Re-mine* principle is useful for countries with a high level of MSW burial in relation to its recycling, which is true in particular for Russia, where a significant amount of MSW is subject to disposal of in landfills. According to Rosstat (2020), in 2019, 3881.9 million tons of waste were disposed of, and 3800.8 million tons were placed in storage and burial sites. The *Re-mine* principle requires the high-tech extraction of valuable components from diverse unsorted waste with the development of new methods for its recycling; for example, there are examples of the extraction of precious metals from waste (Westerhoff et al., 2015).

It should be noted that the map of interrelationships of R-principles presented by Reike et al. (2018) is the most consistent with the notion of a conceptual model of all analyzed models, since it interconnects the various features investigated by the authors. This map, for example, shows the chains of product creation and its movement to the consumer, the movement of primary recycled waste, and individual components, in conjunction with the R-principles of circularity. This map displays the scheme of interaction between business and consumers through the basic principles of the CE, but does not demonstrate the involvement of participants in the economic process in the implementation of the CE principles.

The offered "re"-model in this chapter is updated for Russia. It includes some new imperatives necessary for the development of the CE in this country and the basic "re"-principles of the CE (Fig. 3.1).

The use of the prefix "re" in the name of the model, and not the traditional "R," was a deliberately choice, in order to emphasize the iteration and recurrence of the CE. Participants of the economic process, such as the state (government), science (educational and R&D organizations), business organizations, and citizens, are introduced into the model.

Russia's transition to the CE model is at an early stage. As such, much attention is paid to systematizing the best practices of various countries

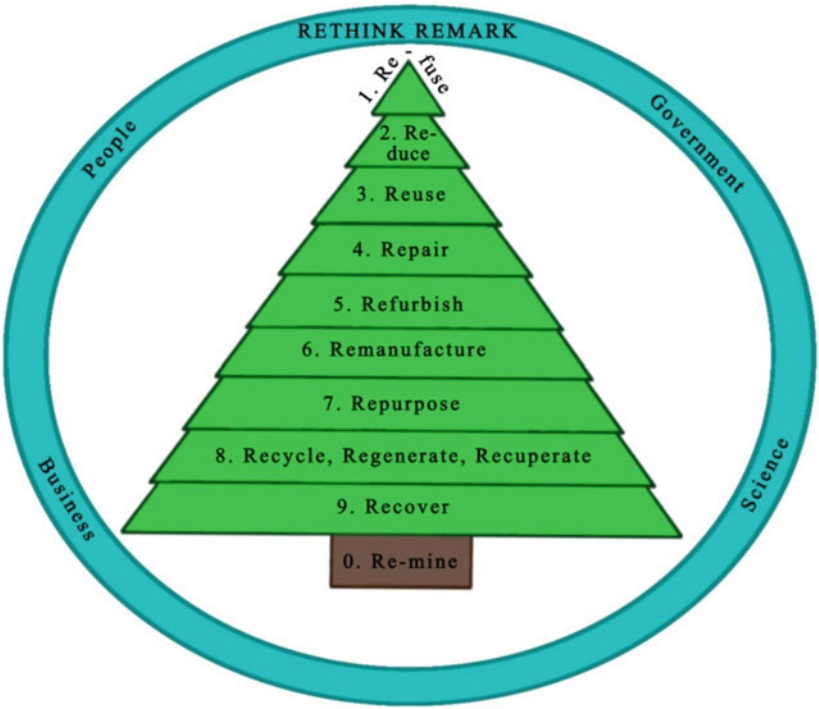

Fig. 3.1 Conceptual "re"-model of the CE, relevant for Russia (*Source* Designed and created by authors)

(China, Japan, Finland, USA, Singapore, and Germany, among others); promising areas of eco-design, recycling, sharing, and leasing of goods for various purposes are being implemented; secondary sales markets are developing (Gureva & Butko, 2019).

Unlike other models, the concept of *Rethink* is taken to a new level and is understood as "*review, reconsider, reappraise*"—this should help when rethinking the advantages and possibilities of transitioning to CE, for comprehending the previously made decisions in terms of MSW and their consequences for the environment and society, and to formulate new directions of development and new thinking on the principles of circularity. State bodies, organizations, and the public should all be able to apply this new level (Osipov, 2016).

The model reflects the mutual influence of all economic participants on the implementation of the CE principles. It is obvious that legislative initiatives will have an impact on the actions of both the population and organizations; it should lead to an increase in the public procurement of environmentally friendly goods, the creation of public–private projects of an environmental focus, more programs implemented for subsidizing projects in the field of MSW management and utilization, and hopefully more. Initiatives can also come from scientific organizations: targeted R&D, (co)funded by the state and/or business, may be carried out, aimed at solving the problems of recycling and reusing materials and products, as well as of the innovative development of biodegradable materials and environmentally friendly technologies.

The public initiative is important, not only under the "top-down" influence of state bodies and communal services (e.g., during the transition to separated waste collection), but also "bottom-up." So, the period of isolation significantly expanded the population's activity in terms of digital resources use to order, exchange, and sell goods, while a decrease in population incomes naturally led to an increase in citizens' loyalty to the purchase of used goods and products after their repair and renovation. The proposed model demonstrates the circularity—the closed nature of the interrelationship between the participants in economic activity.

The introduced concept of *Remark* should be especially noted. It incorporates the meaning of the chain *notice* → *observe* → *detect* → *register* → *speak out*. The interaction of government bodies, organizations, and the population cannot run without the availability and exchange of information aimed at popularizing the CE principles, identifying promising directions for the return to sustainability in the post-COVID period. The media's one-sidedness is insufficient with the *Remark* principle. Instead, it is necessary to develop digital technologies for collecting and processing information in comments, to expand the number and accessibility of platforms for collecting information and opinions in terms of the CE principles implementation, in particular, with regard to MSW reduction. These proposals are consistent with the general growth of digitalization as a recovery trend in the post-COVID period (Iida, 2020) and its positive impact on the economy, technology, and society (Osipov, 2021).

Principles 1–9 in their content basically correspond to those discussed in earlier publications: (1) rejection of non-environmentally friendly materials and technologies; (2) reduction in their consumption; (3) resale,

reuse, sharing; (4) repair of used goods; (5) product upgrades; (6) renewal with the introduction of recycled components; (7) a new way of using products, requiring remarketing, and rebranding activities; (8) recycling to obtain secondary raw materials; and (9) energy as a waste product. An addition is the expansion of the principle (8) with "re"-principles, in accordance with Russian regulatory requirements, where the concepts of *regeneration* and *recuperation* are introduced; regeneration is the return of pre-processed waste to the production cycle, and recuperation is the extraction of useful components for their reuse.

The division into business and science in the model of organizations is made intentionally to emphasize the weak connection between science and business. Their iterative interactions are necessary for the implementation of joint programs and projects, provided the coordination at the state level and the influence of public concerns about environmental pollution problems. Indeed, grants and subsidies under federal programs often involve the participation of both a scientific organization and an enterprise that co-finances the project. However, most promising findings remain at the R&D stage and do not reach out of the production-scale stage. Thus light industry traditionally has a negative impact on the environment due to chemical processes of dyeing, bleaching, etc.

The "re"-principles in the model are located by analogy with Maslow's pyramid, where the realization of the need to implement higher-level principles occurs while mastering lower-level technologies and activities. *Re-mine* is designated as zero in the model for Russia; in this case, the most significant factor to solve the problems of territorial pollution is regarding MSW storage and burial, as this factor requires breakthrough technologies for the separation, recycling, and reuse of existing waste, and as the factor which in no way associates with the concept of private cannibalism (Schenkel et al., 2015).

Cases of Implementing the Principles of CE in Russia

In April 2021, in the special economic zone (SEZ) "Alabuga," the Supervisory Board headed by the President of Tatarstan Rustam Minnikhanov approved five projects with a total investment of over 9.3 billion rubles. The projects involve the launch of new production facilities, two of which have an environmental focus and deal with the production of recyclable polymer packaging and biodegradable packaging made of paper fiber.

Danaflex-Alabuga envisages the creation of a plant for the production of films for fully recyclable packaging with an investment of 4.5 billion rubles. As a result, it is planned to create 230 additional job places. Danaflex already has 3 production facilities in Tatarstan and has been operating in the SEZ Alabuga for two years. A new extrusion production with a capacity of 50 thousand tons is planned to be launched by the end of 2022. Expected revenues from the existing production in the SEZ Alabuga are 7 billion rubles. (Tatar-inform, 2021).

The company was founded in 2001 with the ambitious goal of becoming a leader in the packaging market. Danaflex produces one-, two-, and three-layer barrier film packaging for various food products from polyethylene, polypropylene, polyethylene terephthalate, and copolymers. In 2007, in terms of production volumes in Russia, the company became the industry leader. In 2009, RUSNANO invested in the creation of the Danaflex-nano plant and successfully completed the deal in 2016 by selling its stake to Danaflex. Among the customers of Danaflex packaging, there are foreign food companies such as Unilever, Nestle, Fritolay, and Mondeléz, as well as large Russian companies including Maheev, Makfa, and Akkond, among others (ROSNANO, 2016).

In 2016, Danaflex began the construction of a plant in Europe, and already in 2019 successfully implemented this project by opening a plant in the Czech Republic and becoming an international company. Part of Danaflex's mission is "we produce packaging that will not leave a mark on the planet"; the corporate strategy aims at maintaining sustainability, the quality of life of society, responsible consumption, and wise resource management. The company has invested €7.5 million in a recovery station and returns 100% of volatile solvents to the technological process. By 2024, 80% of all the company's products will be 100% recyclable (Danaflex-group, 2020).

This case demonstrates that Russian companies go beyond the awareness of the importance of progressive, economically viable technologies, and even during the critical post-COVID period invest in the development of environmentally friendly production that meets the principles of the CE.

Discussions

Formation of Waste Utilization Chains Between Russia and Kazakhstan

On the territory of Kazakhstan in 2020, 125 million tons of waste was accumulated at 3.2 thousand landfills, with the formation of more than 5 million tons of MSW per year with an annual increase of 5%. Up to 83% of landfills do not meet environmental requirements. However, until 2016, the waste situation in Kazakhstan was considered more critical. As a result of the EAEU countries' commitment to a green economy, the implementation of relevant strategic programs and concepts (Selisheva, 2018), and the "extended producer responsibility" tool implemented in Kazakhstan in 2016, the share of MSW recycling increased to 15% in 2020, relative to 2.6% in 2016 (6-fold). In order to avoid unauthorized landfills, GPS sensors are installed on the garbage collecting equipment. An agreement was reached with UNIDO on the transfer to Kazakhstan of equipment for the destruction hazardous waste (KZ Prime Minister, 2020). To support the recycling and transportation of waste, almost 50 companies received state funding in the amount of 7 billion tenge (Ausharipova & Kulumbetova, 2020).

Kazakhstan exports waste for recycling to China, Uzbekistan, Russia, and Kyrgyzstan, as well as to EAEU countries. Waste from paper, oil refining, scrap metals, and plastics are the main subject to cross-border movements. In 2018, the first plant for full-cycle recycling of secondary plastics and the manufacture of metal-plastic products was opened in Kazakhstan. For the stable operation of the enterprise, the accumulation of plastic waste takes place through collection not only from the regions of Kazakhstan, but also from the nearest regions of Russia. 180 job places were created, and production volumes reach 20 thousand tons of products per year (Kazinform, 2018).

This case demonstrates the implementation of the CE principles and their maintenance through integration associations. Such developments make it possible to use waste management short chains, expedient in the post-COVID period, due to the cross-border import of waste and uninterrupted loading of a full-cycle enterprise.

Conclusion

This study has revealed that the recovery in the post-COVID period requires a shift from the model of global economic growth—from the linear economy to the CE model. The transition to the CE in Russia requires an understanding of the significance of the CE principles at all levels, with the identification of the potential for individual economic actors to influence them and undertake decisions that are not only economically advantageous but also environmentally and socially significant. The possibilities of the transition to the CE in the post-COVID period have been outlined, such as short chains of plastic recycling, cooperation in recycling, government procurement of materials and items that are a part or a product in a closed cycle, etc.

The "re"-models were refined and supplemented in line with Russian realities. Unlike other models, the "*Rethink*" concept is taken to a new level and is understood as *review*, *reconsider*, and *reappraise* so as to formulate a new way of thinking, newly comprehending previously made decisions and redefining development trends based on the principles of circularity. The "*Remark*" concept has been introduced as a chain of *notice* → *observe* → *detect* → *register* → *speak out*, to intensify information exchange through digital technologies.

A quantitative assessment of the waste management sphere in Russia has been made. The following positions have been specified: the positive trend of the increase in recycling; the reduction of hazardous waste generation; a decrease in waste placed in open landfills; the growth of burial volumes. A high positive correlation was established between the costs of MSW management and the volume of waste utilization. The findings confirm the possibilities for further movement toward the transition to the CE in the post-COVID period.

Cases have been introduced to demonstrate that Russian enterprises realize the importance of the economic impact of the technologies introduced and also understand the relevance of the development of environmentally friendly industries that meet the CE principles. The case on integration between EAEU countries (Russia and Kazakhstan) shows the opportunity for the creation of short cross-border chains for waste collection, sorting, and recycling.

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CHAPTER 4

Disposal of Medical Waste in the COVID-19 and the Post-COVID Period

Natalia G. Sidorova and Anastasiia R. Druzhinina

Introduction

As a result of the global coronavirus pandemic, factories and manufactures have been stopped, a substantial percentage of businesses have been suspended, and 3.38 billion people in 78 countries—43% of the world's population—are in self-isolation.

During the period of the pandemic, each country discovered the insufficiency of its established systems for sorting and recycling waste. The need to modernize the established measures for separation and disposal has thus become critical. A large amount of medical waste—including masks, gloves, napkins, and plastic bottles from under antibacterial agents—is going to landfills along with food waste; this is fraught with unforeseen biological consequences, or rather the complete infection of the area, and the inability to use these resources in the future.

Waste generation has significantly increased around the world in recent decades, and there are no signs of it slowing down. This is due to

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_4

a number of factors, such as population growth, urbanization, and economic growth, as well as consumer shopping habits. In 2018, the total waste generated by the EU-27 from all economic activities and households amounted to 2.317 million tones for that one year alone, and by 2050 the generation of waste is predicted to increase to 3.4 billion tons (Neubauer, 2007).

The definition of "waste" is material which has been used: paper, plastic, glass, textiles, and metal packaging; this covers chemical, medical, household (food), and industrial waste. For a long time, there were three main technologies of waste disposal: landfills, incineration, or dumping into the ocean. Only in the second half of the twentieth century did the problem of ecology attract the planet's attention.

Methodology

Being aware of the scale of damage that waste causes, all developed and developing countries aim to raise public awareness in the field of separate waste collection; most countries actively promote a "recycling" culture (Osipov et al., 2021). France has had a law banning the collection of unsorted household waste for more than 10 years, and The Netherlands has banned the disposal of organic waste. Regulations prohibiting or restricting the disposal of biodegradable organic waste in landfills have been adopted in Austria, Belgium, Denmark, France, Italy, Norway, and a number of other countries. However, the distribution of waste disposal, sorting, and recycling capacities is unequal across the union. Thus, Germany, France, The Netherlands, Sweden, Italy, and the UK have a share of about 75% of all incineration capacities in Europe (Seltenrich, 2013).

In the countries of the European Union, various measures are being taken to improve the waste situation. Germany uses a unique waste sorting system and is the European leader in waste recycling: One average German resident produces 618 kilograms of garbage per year. But 64% of all waste in this country is recycled or disposed of (Birkenstock, 2019). Sorting waste begins in citizens' homes, where at least 3 different garbage containers are installed. According to statistics, the German industry receives 14% of raw materials from waste. However, in Germany, there is another problem—the average German produces more garbage than the average European. Each resident of Germany in 2016 threw out 626 kg of garbage, while the European average is 482 kg per person (Birkenstock,

2019). The total turnover of all companies engaged in garbage collection in Germany alone is now about 50 billion euros per year. It is predicted that in ten years, the recycling market will play a more important role in the country's economy than the automotive industry today.

It is worth noting that the countries of Scandinavia are also not inferior to the EU. According to the local waste management association Avfall Sverige, 99% of household waste is disposed of in Sweden (TASS, 2017). The Swedes have learned how to effectively turn garbage into energy. More than 50% of municipal solid waste (MSW) is recycled and reused. Plastic, paper, and food waste are recycled or used for the production of biogas. Businesses are responsible for disposing of packaging and end-of-life goods, including electrical appliances, cars, and medicines. The remaining part of the waste—after careful sorting—is burned to produce energy, which plays a large role in the heating system.

At the moment, there are more than 30 incinerators in Sweden. In 2016, 2.3 million tons of garbage was burned to generate energy (TASS, 2017). The country even imports waste for incineration, including from Norway, the UK, and Ireland. The country has full control over sorting and processing. In such a society, no citizens would wish to break the sorting rules; most of the neighbors are familiar with each other, and in addition, there is a chairman of the condominium board who intervenes and puts things in order if something is wrong (e.g., if people overload containers with "other garbage" so that the garbage collectors refuse to empty them, they have to book an additional trip of the garbage truck for a fee). For convenience, there is a recycling center, where different types of garbage can be collected and organized, within walking distance of each residential building, with containers for collecting batteries as well as separate tanks for hard and soft plastic. This Scandinavian country is the leader in Europe in generating energy from waste.

As for Asia, Japan occupies a leading position in the processing of MSW (Ermolaeva, 2019). The principles of waste separation depend on the district and the requirements of the municipal authorities, and often the division occurs into 4 fractions: non-combustible, incinerated, recyclable, and large-sized. For each type of waste, special bags of a certain color and volume are designed, so that it is easier to distinguish what type of waste is in them. Special stickers are applied to large items. To ensure that everything is sorted correctly, the workers who service the garbage truck watch. The garbage collection machine arrives at certain hours. By the time of collection, the residents take out the bags, which

must be transparent so that the garbage collectors have the opportunity to check the correctness of sorting (the garbage is not accepted otherwise). Each type of waste is taken out exactly on the appointed day of the week, which is set by the municipality. For example, in the city of Kita-Kyushu, on Tuesday and Friday incinerated garbage is taken out, on Wednesday it is cans and bottles, and on Thursday packaging plastic is collected. On a day that is not intended for this type of garbage, it will not be accepted, and if the bags are left at the garbage truck they will issue a fine to the housing cooperative. To ensure that the guests of the country also observe the rules of separate collection, the Japanese have installed special urns on the streets: Holes in them are made to match the shape of what they are intended for. For a better understanding of what category of waste a particular container belongs to, all packages of goods have a label that makes it clear where to dispose of it. For example, on the packaging of yogurt, it is indicated that the lid should be thrown into plastic garbage, and the cup should be thrown into incinerated waste.

Japan recycles 90% of the waste, but is still concerned about this amount (Iida, 2020). According to statistics, the average Japanese person produces about a kilogram of garbage every day. To reduce the possible amount of waste to a minimum, the Japanese spread the idea of "mottainai": "Do not throw it away until you have used it completely." In the town of Kamikatsu, the government is introducing the idea of completely eliminating disposable goods. In 2003, the municipality began to actively implement a special structural reform aimed at reducing the number of disposable goods. Now, 60% of the population of Kamikatsu have made their choice in favor of reusable goods, which has significantly reduced the amount of waste. It is also worth noting that each merchant is required to report annually what they personally did to ensure that their customers make fewer purchase (e.g., selecting fewer plastic bags).

In Japan, the lack of widespread ecotechnoparks is compensated by garbage "clusters" and factories, and according to the law on the efficient re-use of resources, manufacturers are required to disassemble their own products and recover raw materials (return part of the materials or energy for reuse in the same technological process). Thus, 98% of the metal in Japan is obtained from recycled materials. In Tokyo, with a population of more than 13 million people (with an agglomeration of about 38 million people), 0.2% of the waste is processed into recyclable materials, and 0.8% is processed into energy.

It is worth noting that Japan is one of the first countries that began to form a zero-waste culture, linking the waste processing industry with pleasant associations. In this regard, in Osaka, the Maishima factory was designed as an entertainment complex by the artist Friedensreich Hundertwasser. The main function of the plant is the processing of waste into energy; in addition, however, the complex also included a rehabilitation center for the disabled, which gives the project social significance.

From all of the above, it is worth concluding that every modern developed country that cares about the future is trying to contribute to the preservation of the Earth and the improvement of the environmental situation in a global sense.

The situation in Russia is somewhat different. The Russian Federation is in the top 3 countries that produce household waste (the United States leads, with China second). In total, the country generates about 5.4 billion tons (the average annual value for the period 2013–2017) of household, agricultural, industrial, and other types of waste, of which 55–60 million tons are MSW; this amounts to about 400 kg of waste per person per year. The vast majority of raw materials are sent to landfills; in 2018, there were 5 million hectares of landfill, yet according to forecasts, this will increase to 8 million by 2026. Thus, the annual increase is 0.4 million hectares (the total area of Moscow and St. Petersburg).

Unfortunately, only about 7–8% of the collected MSW is involved in the economic turnover; the rest of their volume is sent for disposal. A small percentage of waste reuse is associated with insufficient infrastructure development: currently, 243 waste reuse complexes, 53 waste sorting complexes, and about 40 thermal recycling plants operate in Russia.

In accordance with the Decree of the President of the Russian Federation №204 "On National Goals and Strategic objectives for the development of the Russian Federation for the period up to 2024," the national project "Ecology" has been developed (National project "Ecology", 2019), within the framework of which federal and relevant regional projects for the period 2019–2024 are planned for implementation. Now all the work on the removal and disposal of garbage is aimed at increasing the volume of recycling and the reclamation of old landfills. The regional operator will manage the entire process.

Since January 2019, Russia has introduced a new system for handling MSW. The principles and mechanisms of garbage collection, sorting, recycling, and disposal have changed. The main goal of these innovations is to

solve the problem with landfills, increase the number of processing facilities, and reduce social tension. At the moment, the most popular method of waste disposal among the regions of Russia is landfill, which is highly toxic and ineffective and clearly does not fit the concept of the Ecology project.

Results

COVID-19 Pandemic and Its Effect

There has been much discussion around the purchase of medical masks. Their effectiveness in protecting against COVID-19, according to experts (Desai & Aronoff, 2019), has not been proven; according to most virologists, they must be changed every two hours when worn in conditions of constant communication with infected people (primarily doctors) or visiting crowded places. The situation is similar with disposable gloves, which are needed when traveling on the subway and visiting grocery stores (Greenhalgh, 2020).

The European Union has introduced special measures for the duration of the pandemic. In the UK, Italy, and France, they refused to separate the collection for the time of the coronavirus. All household waste automatically became potentially hazardous medical waste, which had to be collected in double bags to avoid contact with animals. It was also recommended to throw out the bags no earlier than 3 days, and if there are symptoms of COVID-19, leave the waste at home until the test results are received. At this time, Germany issued recommendations for separated collecting waste: all waste, except glass, should be thrown into a tank for non-recyclable raw materials.

The United States—the leader in the number of cases—also suspended the movement of RRR (reduce, recycle, reuse) in a number of states. Those who wish to collect waste separately are invited to store "clean" waste at home; the collection and transportation of such waste from homes are now suspended. Eco-friendly recycling programs have been scaled back in almost all major US cities.

In Wuhan, China, medical waste has increased sixfold. Before the epidemic, the volume of medical waste was 40 tons of medical masks, gloves, and protective suits; now it has increased sixfold and reaches at least 240 tons. Recycling technologies are not used for such waste.

A similar rapid growth of medical waste is recorded in Russia. Since the introduction of the self-isolation regime across the country, garbage collection companies and cluster workers have recorded an increase in the amount of household waste (Salikhov, 2020). In Omsk, the volume of garbage increased by 30%, in Kazan by 20%, and in Ufa by 45% on average. According to experts, the coronavirus can survive for five to seven days in waste and on surfaces that an infected person has touched. This applies to plastic bottles, aluminum containers, and medical masks. Rospotrebnadzor (Russian State Service of consumer rights protection) made recommendations regarding the suspension of the sorting centers. This is due to the fact that manual labor is mainly used on sorting lines. Accordingly, this can provoke infection.

Plastic waste has another problem, which is only indirectly related to the COVID-19 pandemic. Plastic recycling is becoming unprofitable. This is due to the fact that oil is becoming cheaper, and processing is quite a costly process. It is easier for manufacturers to make new plastic from cheap raw materials than to buy an expensive result of processing.

Thus, an analysis of existing solutions for system waste collection (Table 4.1) was carried out, with the aim of implementing them to minimize the consequences of the coronavirus pandemic in the Russian Federation.

Thus, it was chosen to consider the Ecotechnopark (ETP) option in more detail for the following reasons:

1. The solution is complex: The Ecotechpark will collect not only hazardous types of waste (masks, gloves, plastic packaging) but also normal waste (no less important for processing); multistage sorting, processing, and production from recyclable materials;
2. This approach will improve the current system—sorting centers and vending machines have already been introduced in some cities of Russia for the separate collection of aluminum and plastic containers (even if often only bottles), but a large percentage of Russian cities are not yet sufficiently equipped with these tools;
3. The issue of separate waste collection should be approached gradually. At the moment, the population is not ready to independently deal with waste sorting. Ecotechnopark will solve this problem with the help of residents, educational and entertainment events held for training based on the ETP, and cooperation with large companies.

Table 4.1 Analysis of technological solutions for waste collection applicable in Russia

Options of sorting waste	*Advantages*	*Disadvantages*
Sorting points		
Household collection points (bins for waste paper, waste for sorting: colored glass, porcelain, metal, cardboard, wrapping paper, empty bottles, batteries, colored napkins, plastic, biowaste, unsorted and non-recyclable waste)	Convenient location; a gradual introduction of the population to the problem; the average cost is 14,000 rubles (plastic waste bin with a volume of 240 liters is designed to separate various household waste into four fractions)	Cluttering often occurs because the flow and removal of garbage is irregular; due to the lack of knowledge and culture among the population, incorrect sorting is possible, which will affect the quality of recyclable materials; it is necessary to sort and process garbage in advance, otherwise this raw material will not be accepted for processing
Quarter waste bins (a chain of 10–15 containers of different colors and with different inscriptions, made of steel or plastic, sorting waste into fractions)	Convenience of quarter boxes being distantly located from crowded "points," which allows tanks to have a large volume; collections can be organized less often with the possibility of shipment of larger vehicles	A well-functioning system is needed so that people collect waste at home, accumulate it, and take it to a certain place

(continued)

The key task of the emergence of an Ecotechpark as an investment object will be the development of a system for processing and neutralizing medical waste, with the introduction of the latest technologies and attracting the potential of scientific and educational institutions, as well as the creation of an economic zone with a special tax regime.

Table 4.1 (continued)

Options of sorting waste	*Advantages*	*Disadvantages*
Bulky reception stations on the street, at churches, and near parking lots (collection of clothes, shoes, toys, bulky items/accessories, and household appliances)	Convenient location with places of permanent use and long-term stay	A well-functioning system is necessary so that people collect waste at home, accumulate it, and take it to a certain place
Tanks in stores (for glass bottles, plastic of a certain category, batteries, light bulbs) and in pharmacies (for expired medicines, etc.)	Convenient location with places of permanent use and long-term stay; it is possible to carry small portions of hazardous waste, without the need for disposal	It is necessary to regularly and fully educate the population on the collection of this type of waste, since much belongs to hazardous types (unusable batteries and accumulators; expired medicines and vaccines; paints and varnishes; car tires; polyethylene; mercury lamps; thermometers, etc.)
Fandomats in educational institutions, residential buildings, parking lots, gas stations, train stations, and metro stations	Solves the issue of convenience—can be located in any room or area equipped with a protective coating, equipped with sensors and holes designed for a certain type of waste; most offer "incentives" in the form of bonuses for certain products	The cost of the equipment is about 300,000; the issue of installing these devices has not been legally resolved; this is happening at the initiative of the manufacturer of fandomats
Seasoned and initiative collection points		

(continued)

Table 4.1 (continued)

Options of sorting waste	*Advantages*	*Disadvantages*
Waste collection points organized monthly	Collection of rare seasonal waste for recycling	This must be a place that is both convenient and functional, which is easier to do right away at the sorting base; the amount of waste may be insignificant for further processing; the collected waste will have nowhere to recycle due to the absence of this type of recycling center
Sorting centers		
Mobile centers	Convenient location with places of permanent use and long-term stay; can be located in parks, on beaches, and other places of active recreation; serviced with the same regularity as house bins, larger volume; ease of removal from the territory (park area, camp, beach, etc.)	An unpopular type of separate collection; in Russia there are no suppliers of these centers; the cost is higher than average

(continued)

The necessary finances for the implementation of the ETP project are currently estimated at 500 million rubles. This amount is necessary to launch the project; the further process will be automated within the system and additional financial resources will not be required.

Table 4.1 (continued)

Options of sorting waste	*Advantages*	*Disadvantages*
Ecoparks and Ecotechparks	Provide the ability to perform all operations from collection and sorting to overproduction and the creation of new products; requires an only initial investment, then works autonomously; ensures the collection of the maximum number of waste fractions; performs the functions of a production unit, a research center, and an educational site; provides jobs for more than 400 people	Expensive (in Russia the average cost of a project is about 18.3 billion rubles); requires a large number of resources (financial, labor, etc.); requires an area of 10 hectares and well-established logistics

Source Created by the authors

The project's production capacity of 300,000 tons—including 200,000 tons of solid waste per year—assumes the production of electricity for the ETP's own needs, which also provides the possibility of organizing a closed system.

The estimated cost of the project is 500,000 thousand rubles. The area required for an ETP with 4 greenhouses (for growing vegetables on fertilizer from recycled materials) is 10 hectares.

The advantages of the Ecotechpark include:

1. The absence of emissions from highly toxic secondary products formed during the incineration of garbage at low temperatures—dioxins, furans, Benz(a)pyrenes, etc.;

2. The dimensions of the sanitary protection zone are less than the normative ones and are within the boundaries of the allocated building area;
3. Its nature—it is a completely land-free method of the disposal of waste;
4. The modularity of the equipment and the ability to quickly increase productivity at the request of the customer by adding new modules;
5. The creation of new jobs;
6. The equipment used is of Russian production.

The project has a complex business model: manufacturer-aggregator-franchise. At the initial stage, the priority is about services for waste processing, as well as the production of organic fertilizers. In the future, the focus will be more on the service segment—amplifying the provision of residency and developments in the field of environmentally friendly production, as well as becoming an educational and event platform. The next step will be the registration and sale of licenses—the franchise business model.

Discussions

There are several solutions for disposing of medical waste in the COVID-19 and post-COVID period, such as incinerators, using old and modern technologies (Sweden, Japan, Germany), modern landfills (Denmark, Norway, Sweden), etc. However, this list does not name any of ecological element. This article sets out to present a project that can be a worthy option for currently operational systems.

For this project, several types of risks were considered: technical, economic, political, associated with ensuring safety; these were analyzed with Bow Tie, SWOT, FTA, ETA, and a review of risks with possible measures to prevent them.

1. Technical risks

   A lack of practice using large-scale equipment for high-temperature super-adiabatic combustion in Russia and around the world. To reduce the technical risks herein, the plan is to use Russian equipment.
2. Economic risks

Possible costs due to the absence or delay of payments from suppliers for waste disposal; the risk associated with the inability to implement the investment return schedule (lack of waste, unforeseen costs). Economic risks can be mitigated through the following measures:

- Ensuring a stable supply of waste through the conclusion of contracts with factories and industrial enterprises;
- The volume of daily deliveries of waste should be at least 600 tons per day and up to 300,000 tons per year;
- Development of the transport structure of the enterprise to ensure a guaranteed supply of raw materials (commercial waste) and export of finished products.

3. Political risks

   The likelihood of losses due to political decisions/changes. The successful implementation of the project is a factor in strengthening the political course aimed at developing, strengthening, and stabilizing market transformations (Osipov, 2021a, 2021b). With the most unfavorable political changes, this project is supported by the interests of solving environmental problems associated with the disposal and recycling of waste, both newly formed and existing landfills.

4. Risks associated with ensuring security at the facility

   Potential disruptions or complete shutdowns caused by sabotage, interference, and natural disasters.

These risks can be prevented by:

- providing round-the-clock security of the plant territory with a pass entry and exit system;
- establish a system for protecting commercial secrets at the enterprise;
- organizing the principle of organizing the work of emergency teams.

Analysis

The FTA of the project takes into account the quantitative characteristics of each event (risk). Fault Tree Analysis (FTA) is a technique for identifying and analyzing factors that can contribute to the occurrence

of a specific undesirable event (risk, defect). This analysis is carried out sequentially, in a hierarchical order from the "final" event to the "basic" ones, which are the primary causes of risk development. Each event has its own probability of occurrence, calculated by the project manager, risk owner, or risk manager. A fault tree is used to identify and evaluate probable events leading to a risk (defect). The analysis can be carried out at any stage of the project (initiation, selection, development, implementation). For example, at the initiation stage, an undesirable event is analyzed in detail, working through as many events as possible in order to choose the most suitable option for the development of the project. At the selection stage, the risk can be considered with an emphasis on the unwanted reactions of the interested parties (stakeholders) involved in this process. Undesirable events at the development stage mainly relate to the technical process, such as a lack of resources, the departure of key members of the organizational group, etc. Risks regarding the implementation of the finished product are considered in order to identify the reasons associated with the lack of support from users, the government, and other stakeholders.

Figure 4.1 shows an integrated tree: ETA and FTA results, sorted by project stage. Event Tree Analysis (ETA) is a graphical method that displays a sequence of mutually exclusive events with the likelihood of occurrence in order to prevent unwanted consequences. This analysis is used to model project processes to identify the most favorable scenario. The input data are the initiating event, its causes, and the probability of these events occurring. The Integrated Tree, in turn, combines Fault Tree Analysis (ETA) and Event Tree Analysis (FTA). This presentation option is necessary to simplify the perception of the overall picture of project risks.

Also, a SWOT analysis of the ETP project was carried out in order to identify risks, weaknesses, and opportunities, highlight strengths to prevent them, and reduce the impact (Popova, 2020).

- Legend: S-strength, W-weakness, O-opportunity, T-threat.
- Ratings: Z-importance, P-certainty, V-significance (calculated as Z * P).

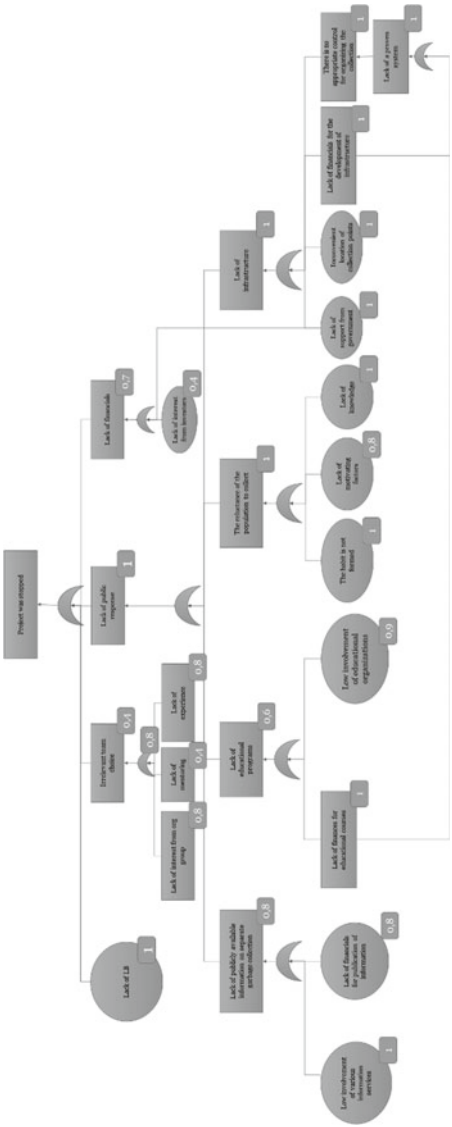

Fig. 4.1 Integrated "tree" of project events (*Source* Created by the authors)

Each factor is assessed taking into account its significance: V is an assessment of its importance for doing business, taking into account the certainty of this assessment (i.e., the probability that it is erroneous).

For each of the fields of the SWOT matrix, the arithmetic mean score U is derived. The introduction of these estimates allows, among other things, to display on the diagrams the significance of strengths, weaknesses, opportunities, and threats, to compare them with each other, and to visually assess the attractiveness of the starting position of a new business.

Strengths U = 90.7

- S1: Circular Economy: Z = 10; P = 10; V = 100
- S2: Cost is below the market average: Z = 10; P = 9; V = 90
- S3: Unique technology for biogas production: Z = 10; P = 10; V = 100
- S4: Production capacity: Z = 10; P = 9; V = 90
- S5: The project is suitable for national goals (including the National Project "Ecology"): Z = 10; P = 10; V = 100
- S6: Variability of ETP configuration for regional requests: Z = 8; P = 8; V = 64

Weaknesses U = 32

- W1: Unknown in the market: Z = 4; P = 4; V = 16
- W2: Financial resources of RUB500 million are required to start the project: Z = 7; P = 9; V = 63
- W3: Lack of project management experience: Z = 6; P = 4; V = 24
- W4: Financial Management: Z = 5; P = 5; V = 25

Opportunities U = 81.6

- O1: Entering the markets of the CIS, Asia, and around the world: Z = 10; P = 10; V = 100
- O2: Entering new markets—fronting: Z = 8; P = 9; V = 72
- O3: Implementing new technologies: Z = 8; P = 8; V = 64
- O4: Expanding the product range: Z = 9; P = 8; V = 72
- O5: Creating a high-tech cluster in the field of green technologies: Z = 10; P = 10; V = 100

Threats U = 69.8

- T1: No investor to start the project: Z = 10; P = 10; V = 100
- T2: Global Force Majeure: Z = 6; P = 4; V = 24
- T3: Deterioration of the Russian economy: Z = 7; P = 9; V = 63
- T4: Frame leak: Z = 10; P = 10; V = 100
- T5: Change of the governing body of the project: Z = 10; P = 10; V = 100
- T6: Political risks: Z = 4; P = 8; V = 32

This analysis is visually presented in the diagrams in Fig. 4.2.

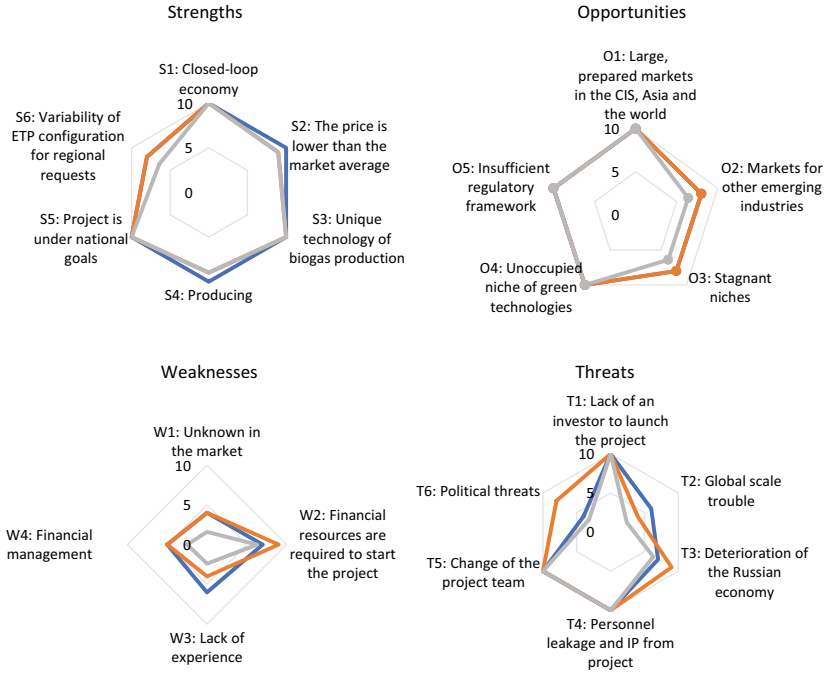

Fig. 4.2 SWOT-analysis of the ETP project (*Source* Created by the authors)

Competitor Analysis

Analysis of the competitor's environment allows the action of the organization to be planned, choosing a strategy to get the maximum effect from the activity based on the strengths and capabilities of the project, reducing the impact of risks and weaknesses. The analysis of possible competitors in the same field of the project is presented in Table 4.2.

The purpose of this analysis was to identify existing, ongoing, and planned projects, the main activity of which is the sorting and processing of waste with further production.

Economic Indicators

The total capital expenditures for construction are determined in 2019 prices in the amount of 430.5 million rubles in Table 4.3.

The calculation took into account tax and insurance contributions required to be paid by LLC in accordance with Federal Law No. 209-FZ of July 24, 2007 "On the Development of Small and Medium-Sized Businesses in the Russian Federation" (Tax Service of the Russian Federation, 2020). The data is relevant at the time of the situation with COVID-19, which does not allow for determining the exact tax rates for the project and may vary.

The key indicators of the project are:

1. Cost price—430.5 mln rub.
2. IRR—21.2%
3. Revenue—815.6 mln rub.
4. Payback period
5. Job places—400–450 people
6. Capacity—300,000 tones/year waste, including 200,000 tones/year solid waste
7. Area (with 4 greenhouses)—20 hectares
8. Products—recyclable materials, fertilizers, heat and electricity, biofuels (synthesis gas, biogas, pellets, briquettes, etc.), building materials (plastic pipes, rubber chips, polymer-sand products, crushed stone, eco-cotton, etc.), products from recycled materials (toilet paper, buckets, garden tools, children's playgrounds, etc.), and organic farming products (cucumbers, tomatoes, herbs, peppers, strawberries, radishes, etc.).

Table 4.2 Comparison table for competitors

ETP	*Location*	*Operation*	*Production*	*Price (bil. rub)*	*Product*
Ecotechpark KALUGA	Kaluga	Recycling and sorting of garbage	500 (10^3 tones/year)	25	Ferrous and non-ferrous metals, glass, paper, plastic, electronic scrap
Ecotechpark BUMATIKA	Perm	Complex for sorting, temporary storage, and disposal	300	4.9	Paving slabs, paving stones, fence caps, eco-wool, PET granulate, heating oil
Ecotechpark Ryazanskiy	Ryazan	Recycling, disposal of solid waste	245	3.4	Industrial products, compost from biological waste—food and other liquid waste, alternative energy and fuel, textile wool and threads, waterproofing material, rubber granules for children's and sports grounds, bitumen, crushed stone, cardboard, glass, metal, polyethylene raw materials, fuel briquettes
Ecotechpark (project)	Saint Petersburg, Vladivostok	Collection, sorting, processing, production, research	From 300	0.5	Cement, tools, agricultural products, fertilizers, food products, fuel, construction parts

Source Created by the authors

Table 4.3 Costs of the ETP project and taxes required to be paid by the project

Name	*Costs (rub)*
Planning	39,680,900
Civil works	66,724,100
Installation of equipment	17,884,600
Commissioning works	20,035,000
Waste processing complex equipment	286,214,500
Total	**430,539,200**
Taxes	*Rate, %*
VAT (USNO applies) USN	0.0
USN	6.0
FOMS (SME entity)	5.0
FOPS (SME entity)	10.0
FIU (as a resident of Skolkovo)	14.0
FSS in case of temporary disability and in connection with maternity	0.0

Source Created by the authors

From an analysis of these, the effectiveness of the implementation of such tools in Russia can be concluded.

Conclusions

The proposed solution of the "Ecotechnopark" project is an effective, socially necessary, multifunctional complex that will be implemented under the national goals and the Ecology project in the fight against a dangerous, deadly virus. Critical tasks for the disposal of hazardous waste can be implemented; this will protect the population throughout this difficult social situation. The project was positively evaluated by ITMO (Saint Petersburg) and FEFU (Vladivostok) universities and accepted for the implementation of processing plants in the Leningrad Region of the Russian Federation.

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CHAPTER 5

Pricing in the Context of Structural Modernization in Post-COVID Economy

Alexey G. Zeldner

Introduction

The transition from a planned economy to a free market one was rather painful in Russia. The use of a shock tactic led to a production downturn, hyperinflation, the slowdown of technological progress, and a decrease in living standards. The destruction of the pre-existing pricing system and orientation to international market prices hampered economic development and imposed a commodity-based model of development upon an industrially developing country.

The price liberalization carried out in Russia in combination with privatization brought into existence oligopoly structures in commodity sectors, and the linking of fuel and energy prices to a global level resulted in their year-by-year growth and, as a result, growing profits, thus predetermining the transfer of capital to the commodity sectors and the rise of a commodity-based model in the country. That slowed down

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_5

the growth of the non-commodity economy, reduced innovation-based development rates and labor productivity.

The COVID-19 crisis affecting all countries worldwide has demonstrated the vulnerability of the country's development based on raw materials. One should also take into account the need to embrace energy-saving technologies due to the worsening environmental situation. These circumstances increase the regulating role of the state in the more efficient use of cost-related tools, especially prices, in order to promote the transfer of capital to energy-saving technologies on an innovative basis.

Russia's existing fuel and energy pricing system linked to international market prices results in year-by-year price growth, impedes the restructuring of the economy and gradual transition from the commodity-based model of development to an industrial one on an innovative basis. The damper mechanism being used in the fuel and energy sector and linked to international market prices (netback) is not aimed at price reduction. In this regard, this article, through analyzing the pricing system in a planned economy and in developed countries, substantiates the need to adopt, for the purposes of domestic pricing during the period of economic restructuring, a pricing model taking into account actual costs, the capital intensity of products, and a profit margin in combination with other economic levers and incentives.

Methodology

In addition to statistical and analytical methods, this study uses such methods for scientific research as ascent from the abstract to the concrete. The cost-based pricing method including cost reimbursement and normal profit earning has been analyzed as part of the research. Pricing alternatives according to the "base product plus economic effect" principle, as well as market-based pricing methods, have been reviewed as well. Despite the planned nature of pricing in the USSR, such researchers as V. R. Boyev, V. Ye. Yesipov, G. R. Romanchenko, E. A. Sagaidak, etc., actively studied the problem of price substantiation based on a profit margin with respect to both products and sectors. Furthermore, the author has reviewed L. Erhard's approaches toward pricing during the recovery of the German economy, the methodological approaches of P. Heyne regarding the consideration of marginal costs, the position of D. Harper who demonstrated that "the cost plus method is a convenient and expedient pricing tool" and M. Bailey's theory that two key

forms of protection against price increase are available to any society, i.e., "competition and antitrust legislation".

Results

Stable socioeconomic development largely depends on the availability of a well-functioning model a priori intended to continuously improve the structure of the economy on the basis of up-to-date innovative technologies. In this regard, the role of prices and pricing methodology being used in the development model is high. An efficiently operating system of prices supports not only economic but also social growth, and this is a condition to social stability in any society. And it is not by accident that L. Erhard, the creator of the German economic wonder (1956), wrote, "the essential goal of a social market economy may only be deemed fully achieved when prices decrease concurrently with growing productivity, thus ensuring an effective increase in wages". An efficient pricing policy, all other factors being the same, ensures the transfer of capital in favor of those sectors, which support scientific and technological progress and the country's leading position in the global innovation hierarchy. This is the way to shape a progressive economic structure. It is commonly known that the level of international prices for fuel and energy products started to grow significantly since the beginning of the twenty-first century. Ranking second in terms of gas output and third in terms of crude oil production globally, Russian producers started to benefit from this situation in an aggressive manner. Between 2000 and 2018, crude oil production increased from 313 million tons to 523 million tons (by 1.7 times) and natural gas production rose, over the same period, from 555 billion cu. m to 726 cu. m (calculated by the author on the basis of the Russian Statistical Bulletin, 2001, 2019), or by 1.3 times, and the output of other natural resources increased as well. This trend has demanded considerable investments and adversely affected the condition of non-commodity sectors, their modernization, and their innovation status.

An analysis of fixed capital investment trends in various segments of business activities has demonstrated that investments in the extraction of mineral resources grew year by year between 2000 and 2018 and increased by 15.1 times (including by 9.5 times as concerns petroleum production). The percentage of investments in the extraction of natural resources, together with pipeline transportation costs, reached 28.2% of the total investments in fixed assets in 2018. For comparison purposes,

investments in the manufacture of machinery and equipment and in the manufacture of computers, electronic and optical devices accounted for 0.3 and 0.4%, respectively, in 2018. Furthermore, investments in the manufacture of machinery and equipment dropped from 77.2 billion rubles to 62.5 billion rubles between 2014 and 2018, and investments in the manufacture of computers and electronic devices decreased from 73.9 billion rubles (2015) to 68.3 billion rubles in 2018 (calculated by the author on the basis of the Russian Statistical Bulletin, 2019). Therefore, the favorable international prices of commodities, while supporting profit growth, have turned the investment strategy of the country toward a commodity-based model of development.

The current situation characterized by the COVID-19 crisis, sanctions and declining demand and prices for fuel and energy products very strongly requires to diversify the Russian economy, to modify its structure, to sell more deeply processed products rather than raw materials, to speed up modernization of non-commodity sectors on an innovative basis and to accelerate innovation-driven restructuring of the economy. The improvement of pricing methods combined with the use of a system of economic levers and incentives can play a significant role in accelerating the restructuring of the Russian economy on the basis of up-to-date technology and innovations. The priorities of economic development, including those applying at a regional level, were reviewed by Osipov et al. (2020) and Yankovskaya et al. (2020).

Price liberalization and its economic consequences pursuant to the RSFSR President's Decree No. 297, dated December 03, 1991, "On Measures to Liberalize Prices" began when 90% of retail prices and 80% of wholesale prices were at once exempted from state regulation. At the same time, the Decree limited maximum price growth with respect to a number of socially significant products (bread, milk, etc.). But those limitations were lifted since March 1992 as well. It should be noted that the theoretically proper decision to liberalize prices was neither well-conceived in practical terms nor well-prepared methodologically.

The liberalization was not synchronized with monetary policy or with the demand potential of legal entities or individuals. As demand dropped, companies lost their working capital. Their large-scale privatization and money emission resulted, within a short period, in inflation at a rate of thousands percent. In its turn, that led to the depreciation of individual earnings and savings. The share of poor households rose from

33.6 to 45.9% between 1992 and 1995. The results of that liberalization primarily benefited (due to the absence of any price controls) the monopolies arising from shock privatization that increased their profits owing to dramatic price growth accompanied by demand reduction. The Russian commodity monopolies, which gradually expanded their weight and connections, have so far managed to retain their influence on pricing policy, and the pricing system in the commodity sectors, as a result, is linked to international market prices. When evaluating the situation of the early 1990s from today's perspective, one understands that the price liberalization plan was synchronized with the shock privatization that allowed people close to the government and the banking sector to buy the national wealth of the country at low prices.

The liberalization process was launched in January 1992. According to official statistics, producer price indices in 1992 grew by 99.6 times for crude oil, 144.6 time for gasoline, 152.3 times for diesel fuel, 59.9 times for electricity, 56.1 times for coal, and 13.2 times for natural gas (Source: calculated by the author on the basis of the Russian Statistical Bulletin, 2001). Before 1992, the history of Russia had never seen such a drastic leap of prices for oil and products of its refining. The end of state regulation and transition to free pricing in retail and wholesale trade triggered an avalanche-like price growth not only in non-commodity sectors, but also across the whole system of utility rates. Due to the lack of effective control (the State Committee for Pricing was dissolved) natural monopolists raised their prices each year during the following 30-year period. Pricing methods were developed by the monopolies themselves, who knew well how to set "fair prices".

The chain of incessant cost augmentation in all sectors of the Russian economy is based on the growth of prices for crude oil and petroleum products, coal, metals, gas and electric power. Price growth of this kind automatically results in higher utility rates and higher expenses of households for all types of utilities (Table 5.1). In addition, as a rule, prices and rates in the country grow irrespective of international price fluctuations. Since 2000, as is commonly known, international prices for crude oil and petroleum products, as well as the profits of Russian monopolies, have significantly increased, but prices and utility rates in the country have been demonstrating a consistent upward trend.

The real incomes of the population are known to have dropped since 2014, and this process accelerates because of the pandemic. This is due not only to the growth of consumer prices, but also to the growth of

Table 5.1 The movement of utility rates for households in Russia

Type of utility	*Years*			*2010 on 2000, times*	*2018 on 2010, times*
	2000	*2010*	*2018*		
Housing charge per 1 sq. m, RUB	1.3	14.3	31.1	11.0	2.2
Electric power per 1 kWh, RUB	0.39	2.32	3.87	5.9	1.7
Pipeline gas (per 1 person monthly), RUB	5.6	43.8	75.6	7.8	1.7
Heating per 1 sq. m, RUB	1.6	2.9	13.0	1.8	4.5
Water supply, per 1 person monthly, RUB	15.8	25.9	130.0	1.6	5.0

Note Judging by the data in the table, utility charges have been steadily grown since 2000
Source Calculated by the author on the basis of Russian Statistical Bulletin, 2008, 2019

utility rates. Between 2010 and 2018, according to our estimates, nominal salaries increased by 271 times, pensions by 1.8; at the same time, as shown by the table, the housing charge per 1 sq. m increased by 2.2 times, heating charges by 4.5 times, water charges by 5 times and power and gas charges by 1.7 over the relevant period. This trend aggravates social stratification. The assets ratio describing income differentiation between the highest-income 10% of the population and the lowest-income 10% demonstrates steady growth between 2000 and 2018 (from 0.397 to 0.413) (Source: calculated by the author on the basis of the Russian Statistical Bulletin, 2007, 2019). It should be noted that the continuing growth of prices and utility rates is the result of the oligopoly that has developed in the country, both in commodity sectors and in retail chains.

Due to the high margin of fuel and energy sales, the existing commodity-based model of development promotes the attraction of investments into this sector. "Whoever holds more 'money votes' exerts stronger influence on what goods will be produced". As long as the production of fuel and energy products remains profitable due to the growth of volumes and prices, monopolies will be extracting raw materials, despite any geological difficulties or environmental consequences. It is this factor that, as Samuelson emphasizes, allows us to understand "how the need for any goods expressed through demand interacts with

the costs of such goods (products or merchandise or services) reflected in supply… this is the most important tool to understand the economic world we live in" (Samuelson & Nordhaus, 2009).

In connection with the COVID-19 crisis and environmental issues, there is the urgent need to speed up the development of alternative energy sources. For Russia, the present situation means that there is no alternative to gradual structural changes in its development model, modernization and innovative development, as well as actual formation of a social market model based on a mixed economy and a public–private partnership mechanism. And the pricing system in combination with state regulation can play a significant role in accelerating the restructuring process. It should be noted that pricing methodology is largely interrelated with the level of development of productive forces and production relations, the operating model of the society and the goals that this model is meant to achieve.

Discussions

Methodological Approaches Toward Pricing in Developed Countries

J. M. Keynes once raised a toast to economists who "make civilization possible". The factors defining the potential of civilization include, inter alia, the problem of prices, their understanding and their functions, the utilization of which shapes the pace of development and the structure of production by encouraging scientific and technological progress that continuously makes its adjustments to the economic way of thinking. And, as emphasized in a monograph under a similar title, "The Economic Way of Thinking", "such adjustments often refuted or modified the conclusions made by economists in the past. The same process will probably continue in the future as well" (Heyne, 2002).

When discussing the role of prices, Paul Heyne divides them into designated prices (i.e., the ones set by sellers) and those, which are determined by demand and supply. Supply depends on costs and they are taken into account by any price searcher who sets his own prices, whereas price takers accept what the market sets. One should "draw a distinction between price searchers and price takers. Price takers are forced to accept the price dictated by the market. The substitutes available to buyers are so good that any attempt to raise the price or to modify the terms of sale would leave a seller with no customers at all. On the other side, a price seeker can sell various quantities of his product at various prices, so he should

search for the most favorable price" (Heyne, 2002). In setting their prices, such sellers (price searchers) take into account marginal costs and marginal revenue.

Whatever the pricing model, the base price is derived from the current costs incurred in the production and sale of a product which comprise product cost. Such costs are defined as a monetary expression of the value of any economic resources being spent in performing certain acts by an economic actor. The monetary expression of the current costs incurred in the production and sale of a product represents its cost. In this regard, it is important to take into account all costs. The full costs include both transformation and transaction ones. Transformation costs influence product cost through the technology that is used, whereas any expenses related to economic exchange are characterized as transaction expenses (North, 1996).

Costs are the most important factor to be taken into account for pricing purposes. In practice, a reverse relationship is also possible. "It often occurs that, vice versa, prices determine costs … price setting based on full costs, or 'cost plus', is a convenient and expedient pricing method" (Harper, 1966). This is the case when a company first determines at what price its product would be in demand. In principle, however, the level of costs represents such a threshold that any evaluation of product below it would lead its producer to bankruptcy. From the pricing perspective, "costs should be most appropriately viewed as a limit for price setting". This is one of the most common approaches to price setting, which relies on a "product cost plus profit margin" scheme subject to differentiation across a product range. And this is a fundamentally important aspect for domestic pricing in Russia where they not only fail to take into account costs in full, but also fail to publish or control them, whereas the domestic prices of fuel and energy products are linked to the international ones.

In their policy, U.S. companies rely on the priority of their own considerations and adhere to the following basic principles. Let us identify some of them:

- "never cut prices for any product components below the total amount of their production costs;
- continuously seek to maintain prices below the competitors' level;
- set prices so that the company could receive a predetermined percentage of return on investments;

– use prices to protect your market from the entry of competitors" (Harper, 1966).

In a monopoly environment, pricing relies on a standard methodology based on the maximization of total profits and minimization of costs. In principle, price management under monopoly conditions is intended solely to increase profits. In mathematics, this technique is called the "gradient method of maximization". In this regard, if a monopolist were aware of the long-term trend of demand, he could set a higher price level from the beginning, but he seeks to do so all the time so that his wishes loosely correlate with the actual capabilities of consumers. In 1934, A. Lerner proposed an index describing the level of monopoly power that is represented by the firm's markup over its marginal cost. The relevant formula is: $L = (P - MC):P$, where P is price and MC is marginal cost.

Demand is not only a requirement but also the ability to pay for any goods to be purchased. But one should also take into account the quantity of market demand that the consumer can purchase and whose characteristics depend on various factors, including the function of demand in relation to price. The inverse relationship between demand and price is called the law of demand. The law of demand is known to be the market economy principle according to which the level of demand for a good is inversely correlated with the price of the good by increasing when the price per unit of the good decreases and decreasing when it grows. Demand will be determined by the maximum ability to pay for a given product. Supply arises when a product offered to the market can be sold. In this regard, the higher the price of the product, the more sources offer it (for any given conditions). This relationship expresses the law of demand.

Theoretically, prices begin to grow when demand exceeds supply. Following the prices, utility rates begin to repeat the price trend, but the pace of their growth is somewhat lower that price growth, since it is hampered by the low real incomes of the population. If the rates grow excessively, the population responds by payment defaults and social protests. Given the growth of prices for fuel and energy, utilities and other tangible resources, industrial enterprises are forced to raise their own prices. As a result, the demand for, and competitiveness of, their products decline.

Whereas monopoly is from time to time subject to state regulation, oligopoly looks like competition among several allegedly independent

companies, which, as a rule, enter into an agreement. In an oligopoly environment, prices will be derived from costs per product unit and appropriate markup percentages according to the cost plus scheme. But the costs per product unit largely depend on volumes and, consequently, represent a variable parameter, so it is advisable to look at average costs.

According to Schumpeter (1997) and Galbraith (1973), large oligopoly firms with market power are necessary in order to achieve fast scientific and technological progress. It is claimed that contemporary research and development activities associated with the creation of new products and production processes are incredibly expensive. Therefore, only large oligopoly firms are able to finance extensive research and development (R&D) activities.

The issue of whether oligopoly and R&D are interrelated is subject to discussion and largely depends on the specific model of development. For instance, a study of the 61 most important inventions appeared in the United States between 1880 and 1965 revealed that more than half of them were made by independent inventors in no way associated with the industrial research laboratories of joint stock companies. Such significant achievements as air conditioning, power steering, ball pen, cellophane, jet engine, insulin, xerography, helicopter and catalytic oil cracking were born in the minds of independent inventors. Other inventions of no less importance were made by small- or medium-sized companies. According to that study, about 2/3 (40 of 61) of the key inventions of the preceding century were made by independent inventors or resulted from the research activities of rather small firms (Galbraith, 1973; Schumpeter, 1997). These findings do not deny that large companies made essential discoveries as well. But it should be kept in mind that R&D activities in a number of industries related to national security are carried out at the expense of government funds. For the purpose of evaluating the actual contribution of monopolies and oligopolies to R&D, one should also take into consideration their continuous desire to raise their profits, including by means of the price factor when balancing demand and supply.

Developed countries, including the United States, were strongly affected by the adverse influence of monopoly-related price growth in the 1870s and 1880s, when their industrial basis was under formation, and eventually put together a system to contain that influence. This includes competition and antitrust legislation. One should add to this the

growth of labor productivity that ensures lower cost through scientific and technological progress.

Legal Regulation of Monopoly Pricing

As emphasized by Bailey (1958), who prepared materials for the U.S. Congress, "The society has two key forms to protect itself against long-term overpricing of products: competition, either potential or actual, on one hand, and antitrust legislation, on the other hand".

To this end, both antitrust legislation and public regulatory authorities were used to control "economic behavior". In 1890, the Sherman Antitrust Act was adopted. Its main substance was briefly described in its two key sections. In section 1: "Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared to be illegal…" In section 2: "Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony".[1]

In accordance with the Act, its violation entails criminal responsibility, company liquidation, fines or triple compensation of damages. Initial legal cases, however, demonstrated that some items in the Sherman Act had to be clarified, and the Clayton Act was promulgated in 1914 in order to enhance and elaborate the Sherman Act. For instance, it banned price discrimination of buyers, unless justified by a difference in costs. It also prohibited purchasing stock in competing corporations to the extent that it could lessen competition, and a number of other adjustments to the previously adopted Sherman Act were made. At the same time, an act establishing the Federal Trade Commission, the body in charge of enforcing the antitrust laws, investigation and prosecution of criminal cases, was approved in 1914.

The history of developing the system of antitrust measures in order to promote a competitive environment (which comprises 130 years since the Sherman Law was adopted) has seen much debate and a lot of successful and unsuccessful decisions, but, judging by the condition of the U.S. economy, the system basically works and the United States is the global

[1] Sherman Act. https://www.law.cornell.edu/uscode/text/15/1.

leader in science and technology boasting a well-developed economy and high living standards.

The more than a hundred years' struggle for the development of a competitive economy has secured a significant growth of all socioeconomic indicators and allowed the avoidance of significant losses. For example, the calculations carried out by A. Harberger (1954) with respect to the monopoly-related losses of the U.S. GNP for certain industries accounting for 45% of the total output in the U.S. processing sector "demonstrated, when extrapolated to the entire industrial sector, that annual losses between 1924 and 1928 had amounted to about 6% of the GNP. A calculation for 1988 using this methodology results in a figure of $4.8 billion, or not more than $20 per capita annually".

Antitrust legislation is intended to create a competitive environment. The competitive environment in the area of trade in, for instance, crude oil and petroleum products in the United States ensures a more flexible approach toward the relationship of international and domestic prices for fuel and energy products. As is commonly known, the development of the U.S. industry in a number of sectors, including oil, was, at its early stage, characterized by monopoly trends in terms of production, processing, pricing and profits. For example, the Standard Oil cartel controlled 80–85% of the refining capacity in the United States. After its unbundling pursuant to a court order, the cartel's successors control 25–30% of the sector's output and compete among each other on the market.

Antitrust activities in the United States contribute to a more robust approach toward the relationship of international and domestic prices. For instance, according to the statistics agency of the U.S. Department of Energy, established by the Congress in 1977 (Energy Information Administration, or "EIA"[2]), the average retail price of gasoline in the United States is rather closely interrelated with crude oil prices. It should be noted that the EIA's mission is to disseminate statistical data in a manner independent from political considerations, as well as forecasts and analyses, in order to supply information on economic policy to fast-responding markets as well as to raise public awareness regarding the energy sector and its role in the economy and the environment.

In the crisis year of 2008, for example, the gasoline price per gallon increased from $3.04 to $4.06, or by 33.5%, between January and July.

[2] https://www.eia.gov/.

Starting in August 2008, when the crisis aggravated and crude oil prices slumped, the gasoline price in the United States began to decrease: $3.77 per gallon in August, $3.7 per gallon in September, $3.05 per gallon in October, and $2.14 per gallon in November. Therefore, the gasoline price per gallon dropped from $4.06 to $2.14 over the second half of 2008, i.e., by $1.92 or 47.3% (Source: calculated by the author on the basis of World Bank and IMF data). Whereas the United States achieved an almost twofold gasoline price decrease, thus maintaining a rather high demand for gasoline and competitiveness of its products, Russia saw a seasonal winter price decrease (2008) within the range of several percent points, which just slightly influenced the fuel price that accounts for a considerable percentage in the cost structure of many goods and utility charges.

The U.S. Supreme Court has jurisdiction over any specific cases related to excessive prices and margins being charged by monopolies. The Tariff Commission takes action against companies driving up their margins and requests them to return to the area of reasonability and to respect case law, referring to a judgment of 1923, as well as a judgment of 1944 regarding margin setting with respect to natural gas. The 1923 case concerned a water company. The company complained that its profit margin was too low (6%) so that it failed to support the reproduction process. After careful consideration, the court ordered a margin of 8%. In a case against a gas company in 1944, it was adjudicated that a profit margin of 6.5%, rather than the 8% set by the company, would be just and reasonable. Furthermore, the court ruled that the profit margin should be at a level allowing capital attraction on acceptable terms and enabling the company to earn profits for self-financing within a reasonable range.[3]

Each U.S. state has its own governor-appointed tariff commission with a small staff that monitors the situation. Given that oil prices increase and decrease on a month-by-month basis, the commission allows companies to regulate gasoline and electricity prices and rates. Such prices and rates should be so that to cover the company's costs and secure a small margin for operational development. All major deviations from this pattern result in lawsuits and large penalties. In addition to the effective control of gasoline prices, water, gas and electricity rates are regulated in a similar manner.

[3] FPC v. Hope Nat. Gas Co., 320 U.S. 591 (1944). Source: https://supreme.justia.com/cases/federal/us/320/591/.

The setting of such prices and rates and, accordingly, profit margins is regulated first by the reasonability of each company's management and then by the tariff commission. All changes in such prices and rates will be made after a special hearing intended to test whether the relevant request for rate adjustment is justified. This process is subject to due regard for the interests of consumers, the company and the public and a reasonable approach toward rate setting.

Therefore, it can be noted that any decrease in gasoline prices in the United States clearly correlates with the movement of international crude oil prices. The level of prices and rates is supervised by the tariff commission in each state that severely thwart any monopoly-related growth of prices and rates by means of large penalties and license withdrawal. Any serious conflicts are to be considered by the U.S. Supreme Court, which, as a rule, protects the interests of consumers and adjusts the margin taking into account prior case law based on the principle of reasonability and morality.

The Contemporary Principles of Fuel and Energy Pricing in Russia

At the current stage of development, despite the declining prices and sales and hydrocarbon products, the fuel and energy sector (FES) in Russia remains to be a stable pillar of the Russian economy. Russia possesses the whole range of fuel and energy resources allowing it not only to meet the needs of all sectors and areas in full, but also to be a leader in the exportation of gas, crude oil, and products of their processing. The products of the FES, including the oil industry, are an element of the production process in most industries that can either contribute to their development or make them lose competitiveness due to the steady growth of energy prices and utility rates. However, the state also influences this price growth by raising excise duties and taxes with respect to petroleum products in order to replenish its budget (Osipov, 2016).

The existing pricing system in the Russian oil sector is of oligopolistic nature. It is dominated by vertically integrated oil companies (VIOCs), which include the whole chain from production to refining at their own refineries and to sales of petroleum products at their own gas stations. Such VIOCs as Rosneft, Lukoil, Gazpromneft, Surgutneftegaz, etc., produce more than 80% of crude oil and refine more than 75% of the production at their refineries. Independent companies accounting for not more than 5% of the total production are forced to "purchase petroleum

products on a wholesale market at a price that includes the margin of VIOCs or traders".[4] This determines the monopoly position of VIOCs on the petroleum product market and in wholesale and retail pricing. Given the digitalization of the economy, as Inozemtsev (2021) correctly notes, one should expect that vertically integrated oil companies will play a more active role in the making of not only economic, but also political decisions.

VIOCs clearly tend to monopolize the market through their production and refining activities and through expanding their retail operations, and this, as a result, restricts the access of independent players to retail sales and reduces their number. The monopolization of oil production and refining by major VIOCs manifests itself most conspicuously in pricing on the wholesale market. In most regions, VIOCs also dominate retail sales of fuel and energy products at gas stations. The hierarchy of VIOCs' priorities with respect to sales of products from their refineries is typically as follows: export deliveries, supplies to their group companies, and sales to independent market players.

In this regard, independent companies are mostly unable to purchase products directly from refineries, because VIOCs create intermediary vehicles that make their products more expensive; moreover, in a number of cases they impose conditions prohibiting retail fuel sales in those regions where the relevant VIOC's gas stations operate. This results in higher costs and, consequently, higher prices. In addition, in order to minimize their tax burden, major VIOCs refine the crude oil they produce at their own refineries, thus saving on taxes.

An attempt to establish understandable legal rules in fuel and energy prices was made by the Federal Antimonopoly Service (FAS) back in 2012. Then two draft laws, "On Market Pricing of Crude Oil and Petroleum Products in the RF" and "On Trade in Crude Oil and Petroleum Products in the RF", were prepared. In particular, the Russian FAS proposed to introduce into legislation the following formula of a "fair" price with respect to crude oil or petroleum products for the domestic wholesale market: net revenue from oil sales minus export duty and transportation costs. According to this scheme, the domestic price of a certain product would be linked to the price of a comparable type of fuel in Northwest Europe and Mediterranean countries. In this regard, the

[4] United States Information Agency.

"fair" domestic price would be equal to the foreign (essentially, global) price minus transportation costs and customs charges. In addition, it was proposed to set quotas for mandatory sale of petroleum products. Quotas of this kind with respect to gasoline, for instance, had been introduced at the St. Petersburg Exchange in the amount of 10% of the total domestic sales, but they were reduced to 5% in 2020 due to the pandemic.

An explanatory note to the draft Federal Law "On Market Pricing of Crude Oil and Petroleum Products in the RF" stressed that "A stable situation on the domestic market for petroleum products occurs when well-balanced relationships, in terms of prices and volumes, develop along the following chain: refinery – small-batch wholesale trade – retail trade. The prices of the wholesale segment (refineries) that are set by the refinery owners predetermine the situation on the small-batch wholesale and retail markets: the price of the "first sale" from a refinery accounts for more than 75% of the retail price of motor fuels. Due to this, an unbiased competitive consumer price could only be achieved if the terms and conditions of petroleum product supplies at the wholesale stage are non-discriminative and representative price indicators are available with respect to crude oil and petroleum products".[5] The drafts did not become law. The pressure of the commodity lobby was apparently too strong (this is my assessment).

The monopolization of the oil market by vertically integrated companies (which are predominantly private) allows them to deliver their crude oil to refineries at selling prices and then to supply their own gas stations at cost, so that they are subsequently able to influence pricing policy and to create a more preferential environment for their refineries and gas stations as compared to competitors. They sell petroleum products to independent companies at a price that includes their own costs and margin, that is why such independent companies have lower profitability.

The system within which the costs and prices of oil production and refined products are formed is made up by production, transportation, refining and sales at gas stations. Theoretically, this would involve classical accumulation of costs and prices along the chain of added value from production to sales to end users. But this approach toward final price formation is not respected in Russia. So what is the situation with FES product pricing in one of the petroleum-richest countries? Throughout

[5] http://www.consultant.ru/cons/cgi/online.cgi?req=doc&base=PRJ&n=99767#06262786582765179.

the 30-year period of the "robust" development of a market economy in the country, fuels and lubricants have been ever more expensive and utility rates for electricity, gas, heat, etc., have been rising on a year-by-year basis. Let us discuss the scheme of cost and price formation along the chain: production, transportation, processing (at a refinery) and sale (at a gas station).

In the petroleum product price formation chain, refineries hold a central place, being the only enterprises in the domestic market which purchase and process crude oil. Refineries acquire crude oil via several channels, including commodity exchanges where futures contracts (with clearly fixed prices and delivery dates) are offered; refineries also purchase crude oil by entering into long-term contracts with oil-producing companies. A further alternative for oil purchasing is offered by special trading platforms/hubs; their advantage is that delivery will be effected within two business days after a transaction is executed.

If imported crude oil arrives at a refinery, its price is formed by the cost of the imported oil, transportation costs and the enterprise's refining expenses, and the refinery will, in its turn, take into account its own costs and adds a certain profit margin, both elements being included in the refinery's selling price.

Where any domestically produced crude oil goes to a refinery, the following alternatives are possible:

1. If any crude oil produced by a VIOC is processed at its own refineries, then it will be sold to gas stations practically at cost;
2. If an independent refinery purchases crude oil in Russia, it will take into account the prevailing global price (netback) and subtract transportation costs and export duty, but there will be a significant addition in the form of excise tax.

The Russian domestic price of gasoline and diesel fuel is determined on the basis of such prices as prevail on leading exchanges. In this regard, the international price level, transportation costs, and the amount of export duty will be taken into consideration. The costs shaping the final price of gasoline and other petroleum products are influenced to a greater extent by taxes (accounting for as much as 65%), annual inflation, excise taxes, the costs of gas stations and a profit margin, and this all is to be covered by the end consumer.

The completion of the tax maneuver that is scheduled for 2024 will result in the elimination of export duties and an increase in the rate of mineral extraction tax (MET). But the elimination of export duties creates conditions promoting an increase in international prices, thus making domestic sales more preferable than exportation and, therefore, encouraging oil companies to raise final domestic prices. As the tax maneuver is completed, refineries lose their budget subsidies (calculated as the difference between the export duties on crude oil and petroleum products, respectively). Most refineries face profitability problems and see a solution in raising their selling prices that would trigger a chain reaction in retail sales. Therefore, the issue of price growth limitation becomes relevant not only during the current crisis when real incomes decline, but also for the post-crisis period.

Given that FES products are linked solely to global price trends, a growing netback would also drive up retail prices for gasoline and diesel fuel. But there is a limitation in Russia related to the fact that real incomes decline. And this factor hampers a dramatic increase in retail prices. In a "market' environment, the government introduces a reverse excise tax that impedes a price hike but do not stop price growth due to inflation, excise taxes, and other taxes.

The reverse excise tax formation scheme includes setting a target level of oil purchases by refineries on the domestic market as percentage of the total volume of oil produced; furthermore, an additional excise tax accrues to refineries that will be set off against tax payments. In order to receive such a reverse excise tax, a refinery must bring the production of Euro 5 gasoline to at least 10% of its total production or invest 60 billion rubles in modernization during a number of years.

The key component of the reverse excise tax is a damper (the difference between the ruble netback for gasoline and a notional domestic price) to be set by the government annually. If the netback exceeds the domestic price, then 68% of the difference with respect to gasoline and 65% of the difference with respect to diesel fuel will be reimbursed by the state through the damper (tax reduction). If the damper is negative, a reverse process will occur so that any incentives for maintaining a stable price level on the market will be lost. The damper regulations include a clause to the effect that no damper will accrue if current domestic prices exceed the notional price by 10% or more. This encourages players to maintain their prices at the level so designated, thus allowing the avoidance of a negative damper. In addition, as experts believe, damper additions to the reverse

excise tax with respect to the different types of fuel—ordinary gasoline and diesel fuel—are accounted for together and this often results in overstated prices even where it could be avoided. For example, a negative damper for gasoline merges a positive damper for diesel fuel, this results in additional taxes payable by the refinery, and the refinery is forced to pass such additional taxes on to consumers.

The notional price deserves particular attention. The Russian government sets the notional domestic price of gasoline and diesel fuel. In 2020, the notional price per ton of gasoline was 53,600 rubles and the netback for gasoline was 53,770 rubles. It is not completely clear what methods were used to substantiate the notional price. Given that it is valid for a year and subject to indexation by 5% in each subsequent year, it is not flexible enough to respond to current fluctuations. The crisis caused by the COVID-19 pandemic in early 2020 collapsed the price and production of oil, gas, and petroleum products. The notional price failed to respond to the dramatic market changes and prices at Russian gas stations remained at the same level, although most countries worldwide were reducing their prices at gas stations following the downward trend of international prices. The mechanism for setting such notional prices needs to be improved, primarily by introducing higher transparency and a more flexible approach toward their setting that would take into account the potential of the domestic market and global pricing conditions. This situation requires to use, at least during the period of post-pandemic economic revitalization, the practice of regulatory sandboxes (Salikhov, 2020) in order to determine a possible institutional framework for utilizing a damper mechanism in such circumstances.

Conclusions

1. The strategy of commodity-based development (failing to enhance innovation activities and ensure genuine competition) chosen by Russia has led the country to the slowdown of scientific and technological progress (except for the defense sector), its lagging behind of developed countries in terms of labor productivity growth, and the differentiation of its population in terms of living standards. At the same time, the COVID-19 crisis associated with the deterioration of all socioeconomic indicators, especially in the FES, has brought about major changes in the approaches toward further development

of the country. The Russian government has prepared its "Consolidated Strategy for the Development of the Processing Sector in the Russian Federation until 2024 and for the Period Ending in 2035" (approved by a government order dated June 6, 2020).[6] In essence, it is an attempt of policy modification aimed at structural changes in the economy to the extent that the government relies upon the processing sector for the purpose of developing the national economy. It is proposed to generate demand by implementing national projects. Quite serious problems arise with respect to innovative technologies, and the concession model used by the country during its first industrialization can be utilized to speed up innovation.

2. In order to develop a pricing methodology and a system of prices supporting structural shifts in the economy, it is required to set up an institutional center which would, in addition to the methodology and system of prices, maintain control over their change. It should be noted that attention was paid to institutional forms of pricing in Russia since the initial years of the Soviet period. For instance, the Pricing Commission was established as early as December 1917 as an instrumentality of the Presidium of the Supreme Economic Council; the Committee of Fixed Prices was formed a year later; and the Committee for Prices of the People's Commissariat of Finance was set up in 1921. Until 1969, the country maintained its pricing management system. In 1969, the State Pricing Committee of the Council of Ministers was established as part of government restructuring, which was renamed in 1979 as the USSR State Committee for Prices and dissolved in 1991 due to the economic reform, elimination of the planned economy system, and transition to market relations. A price liberalization era began and, as a result, prices started to grow in an uncontrollable manner in the absence of genuine competition and antimonopoly legislation.

Given the current COVID-19 crisis and the need to carry out economic restructuring on the basis of modernization and innovative development, Russia needs a coordinating structure capable of pursuing

[6] Government Order No. 1512, dated June 6, 2020, "Consolidated Strategy for the Development of the Processing Sector in the Russian Federation until 2024 and for the Period Ending in 2035".

a well-balanced, long-term pricing policy, including pricing methodology and effective control—a task that the Federal Antimonopoly Service is still unable to cope with. It should be kept in mind that almost all developed countries have government entities of this kind in various forms and at various levels.

3. The idea of synchronization between domestic fuel and energy prices and international ones, proposed by large companies and entrenched in Russian business practice, has resulted in continuous price growth in the leading sectors of the country and in all related industries that restricts competitiveness, slows down innovation-based modernization, and, consequently, contains the growth of labor productivity. The existing situation in the socioeconomic development of Russia requires, given the COVID-19 crisis, to strengthen the role of the state in regulating economic levers and incentives (prices, taxes, credits, etc.) in order to gradually turn the national economy to a contemporary industrial path. Let us discuss, in the same order as they were proposed, alternative approaches toward regulation of FES product pricing that favor potential price decrease and the attraction of investments for the purpose of economic restructuring.

Given that VIOCs, with their complete cycle of production and distribution, are highly profitable, enjoy a large number of tax benefits, and pay very substantial dividends, it is possible to introduce a unified balance sheet for them in order to maintain a stable level of retail prices for at least three years in coordination with a three-year budget. Such a stable price level without any inflation adjustment during three years would ensure a decrease in utility rates and transportation costs, and that would influence the consumer market as well. Gradually, an environment favoring the development of non-commodity industries would emerge and there would become possible to reduce retail prices for the most energy-intensive products in the food industry. This is one of the alternatives that could enable us to lower prices for the products of natural monopolies which make a major contribution to the steady growth of costs in any adjacent sectors. Let us discuss other alternatives as well, such as a damper mechanism for pricing.

4. An economically reasonable pricing system demonstrates the maturity of an operating economic mechanism. The system of prices for natural resources, including fuel, energy, and some other commodities, that exists in today's Russia is primarily driven by international prices whose fluctuations are difficult to predict. It should be noted that the methodology according to which international prices are calculated is inconsistent with their market understanding based on the relationship of demand and supply. OPEC, an organization including 15 countries (but not Russia, which is an invited party), plays a dominating role in establishing international oil prices. The OPEC countries account for more than 50% of the total oil output and control the prices prevailing on commodity exchanges that represent a futures variety of the financial market.

As regards the exportation of FES products, it is appropriate to take into account international prices, but orientation to their level in the domestic economy, given the economic situation of individuals and legal entities in Russia, leads to growing costs, non-competitive products, and lower living standards. Moreover, due to the fact that domestic prices are linked to international ones, prices for petroleum products during the COVID-19 crisis decrease following the downward trend of crude oil prices in many countries, but not in Russia. The fact of the matter is that Russia uses a damper mechanism that allows oil monopolies to maintain a high profit margin and the state to replenish its budget. The population and the non-commodity sector remain to be unprotected (this is my assessment). Formally, however, the damper is intended to protect the population against the growth of prices (but it does not provide for their reduction and poorly controls their growth). The damper is conceived as a compensating rather than incentivizing mechanism. It can be briefly described as follows: when international prices for FES products grow, oil companies seek to expand their exports by reducing supply on the domestic market, thus triggering price growth. In order to prevent this, the state applies compensatory payments.

In conclusion, it should be noted that prices for fuel resources in Russia are in fact regulated by the state using the damper mechanism rather than determined by the level of costs or the relationship between demand and supply as is the case with market prices. When developed countries find themselves in a similar situation, they impose protective customs duties

that regulate the interests of both the state and oil companies. The (flexible) use of the taxation system (MET, VAT, excise taxes) in combination with differentiated customs duties could significantly simplify the pricing mechanism with respect to gasoline and diesel fuel and make it more understandable for both producers and consumers. In addition, of course, there is the need for competition among gas stations belonging to various oil companies, and the state should control their location in order to rule out any monopoly.

The existing damper mechanism supports the dependence of price fluctuations at gas stations upon the export price of oil; theoretically, it inhibits both increase and, in fact, decrease of retails prices at gas stations. The latter, however, deprives our country of its competitive advantage (as a major oil producer) which could help it reduce production costs in all areas related to the FES; this fact affects the issues of economic restructuring.

Changing the approach toward pricing on the domestic market could make it possible to carry out structural modernization of the Russian economy on an innovative basis and to ensure the growth of real incomes of the population. The damper mechanism linked to international prices should be abandoned, because its use primarily leads to price growth together with all resulting socioeconomic consequences. Any approach toward domestic price setting should take into account actual costs and, with due regard for the capital intensity of products, determine a target profit margin. In this regard, the state should use a system of economic levers and incentives in order to create approximately equal conditions for production, including the establishment of reserve and annuity funds in order to mitigate any price fluctuations caused by natural environmental conditions.

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CHAPTER 6

The Impact of COVID-19 on Agriculture

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Introduction

Pandemics are not a new phenomenon (Ceylan et al., 2020), but it seems that COVID-19 is a unique one in terms of its disruptive effects on daily life and the economy of the countries across the planet. After the first report in Wuhan, China in December 2019, the virus began to spread quickly to other parts of the world, and COVID-19 outbreak was announced as pandemics on March 11, 2020, by the World Health Organization (WHO, 2021a). As of now, the WHO have reported over 144 million confirmed cases, with over 3 billion deaths due to COVID-19 globally (WHO, 2021b). Globalization and easy travel options have

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_6

resulted in the continuous spread of coronavirus, although immediate decisions were taken on both domestic and international travel restrictions by all countries. The main coping strategy with coronavirus was explained as cleaning and social isolation. After the pandemic, governments have taken precautions to different extents such as the lockdown of public places, putting some regions in quarantine, or imposing restrictions to domestic and/or international travels, which changes the food demand in the population. The subsequent social isolation, part of the struggle, affected the many areas all over the world, such as education, social life, and the economy (Nicola et al., 2020).

Every sector was affected by COVID-19, and each sector tried to manage this period through different strategies. Agriculture is not only an economic sector but the core of food security. Therefore, almost all countries have lessened the curfew and travel restrictions for people involved in agricultural production. There are different inputs of agricultural production systems, such as seed, land, labor, and fertilizer. Every need of agricultural production systems is a product of another sector, and each economic and/or social issue in these sectors directly affects agricultural sector (Nicola et al., 2020). Lioutas and Charatsari (2021) argued that the COVID-19 pandemic uncovered the interconnections and interdependencies between agriculture, society, and the economy, and revealed the vulnerability of agriculture to external disturbances compared to all previous crises or disasters.

Agricultural production systems differ considerably around the world in terms of production practices, crops produced, farm size, the availability and usage of production inputs (including labor), mechanization level, and so on (Osipov & Skryl, 2019). The effect of COVID-19 on each of the main elements in the agricultural production chain can be considered as the direct effect of the pandemic on agricultural production. On the other hand, precautions such as curfew and lockdown in public places, travel restrictions, and loss of health and wealth for people in agricultural sectors also significantly affected demand, supply, and access to food. Thus, the indirect effects of COVID-19 have been more prominent and disruptive on agricultural commodities. The list of direct and indirect effects of COVID-19 on agriculture is given in Fig. 6.1.

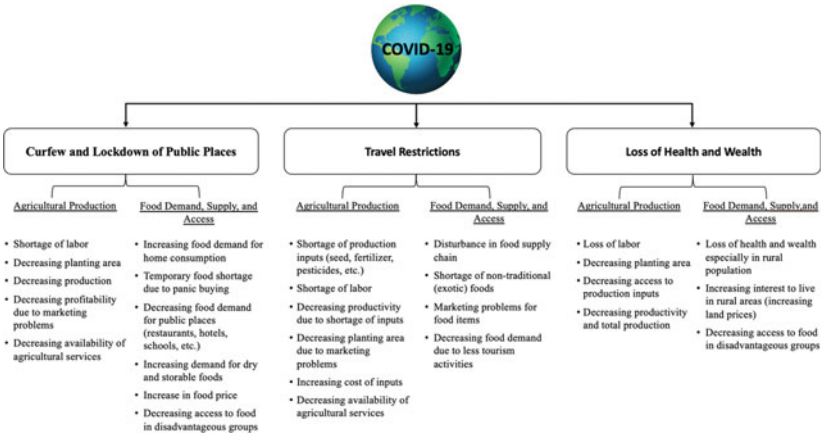

Fig. 6.1 Impact of COVID-19 pandemic on food supply chain (*Source* Created by authors)

The Impact of COVID-19 on Agricultural Production

Labor Availability

Sustainability in agriculture is big concern, especially being fragile against risks; continuous exposure to threats of natural and human-made factors complicate plans and scenarios in "preventive" agricultural management that is trusted to guarantee food security both in local and global situations. The effects of expected incidents such as climate change or floods can be minimized, but sudden changes such as COVID-19 could not be anticipated; therefore, responsive actions have to be immediately taken to compensate the extemporaneousness regarding each units of an agricultural system. Agriculture is the output of tedious collaborative work, with contributions from farmers, labors, scientists, technicians, and facilitators for marketing in supply chain. Workforce in agriculture meets significant rates of unemployment, particularly for people dealing with low-income levels in developing and developed nations. Local labor and seasonal and migrant workers make up the main workforce in agriculture. The risks that put food security in danger, therefore, also threaten the labor employment in agriculture, as the pandemic has made this concept more concrete. Millions of people lost their jobs due to the closure of factories, and the

difficult working conditions often showed their effects on transportation restrictions. This effect on agriculture was more obvious as people immediately started panic buying as soon as the WHO declared the event to be a pandemic. This panic was also observed in labor recruitment, so agricultural production become more self-sufficient for countries. The exports have declined by 20% in first quarter of 2020 (Lin & Zhang, 2020).

The International Labor Organization (ILO) announced the risk groups under threat of COVID-19, and workers in agrifood system have been considered at "greatest risk" (ILO, 2020b). Luckstead et al. (2021) claimed that COVID-19-induced stay-at-home orders for non-essential workers and illness affecting essential workers are major factors that led to disruptions in the food supply chain. Bochtis et al. (2020) reported that lockdowns and restrictions in the mobility of workers across borders contributed to labor shortages, mainly in countries that rely on seasonal workers. They estimated that 50% of the agricultural workforce and 54% of the workers' annual income are at moderate to high risk in future years should the current pandemic situation continue (Bochtis et al., 2020). In 2020, the number of unemployed people is anticipated to increase by 75 million, and of course, agriculture will be one of the most affected sectors. This delicate situation also showed its effect on labor recruitment. In China, 46 million people—representing a huge number of those employment in agriculture and the food sectors—are unemployed as of 2020 (Zhang et al., 2020). Ineffective measurements put stress on labor; in particular, migrant and seasonal workers were reluctant to work in different cities and abroad. Countries like Canada, Germany, Italy, or Portugal rely on migrant workers, but labor arrivals to these countries were restricted with a quota system and strict regulations have been implemented (Landry et al., 2021). Cortignani et al. (2020) reported that the farms that use temporary labor in fruit and vegetable crops harvesting can suffer strong and direct productive impacts due to its availability decrease; however, direct effects may also occur in farms that use this labor as unskilled support in some temporary activities of livestock breeding. Haqiqi and Horeh (2021) estimated a decline in agricultural output in all the U.S. counties, ranging from 1.18 to 7.14% of total production.

Canada allocated a budget for migrant workers to ensure that these people can also benefit from the health system, and Portugal conferred citizenship; however, the reality cannot be overshadowed as interviews and scientific papers revealed the challenges on reaching clean sanitation, proper hygiene tools, or clean accommodation opportunities. Countries

or organizations enacted new legislations to protect the rights of laborers: for example, European Union (EU) and African Development Bank (AfDB) took significant initiatives. Local people were more readily hired instead of migrants, and laborers were supposed to work extra and paid for overtime in EU member countries. The health of migrant workers was strictly controlled and tested for COVID-19 infection before entry to the EU (Bochtis et al., 2020). The AfDB established better strategies and categorized these plans according to initial and late responses of the agricultural systems in the continent. The AfDB came up with an original idea of a "green corridor" which allowed the free pass of labor, fertilizers, insecticides, and agricultural tools across borders. The AfDB also supplied and distributed equipment to protect against COVID-19 (Fernando, 2020). Strict bans in several countries—even prohibiting travel between cities—complicated planting and harvesting due to labor scarcity like in Nigeria (Obayelu et al., 2021). In China and Turkey, regulations on farmers and labors were more flexible, also including free transportation, but even so, the interruptions in logistic lead to shortage in labor availability (Benek et al., 2020; Gu & Wang, 2020). Interestingly, the unemployed people working in non-agrifood-related sectors started looking for jobs in agriculture, and the number of such laborers doubled in some cities in Turkey; however, the wage of labors was decreased as response (Benek et al., 2020). Kumar et al. (2021) reported that the effects of COVID-19 were different in different regions, and the lack of migrant labor in some regions and a surplus of workers in others greatly affected the April harvest, leading to a decline in agricultural wages in some communities and an increase in others, as well as to critical losses of produce.

Farming Culture

Machine and fully automated systems are in every part of our life and create an alternative to humans, especially when the work poses a danger to people. Automation in farming plays an important role in increasing efficiency; nevertheless, small-scale farming culture is still common, with substantial dependence on human physical ability. This culture is more common in developing countries with very limited access to new technologies. The replacement of technology with a human workforce can increase the unemployment rate, which creates a dilemma between better

agricultural practices with fully automated systems and a human workforce. Global crises such as climate change or COVID-19 increase the concerns on food security and on related issues. Food security needs continuous food production without interruptions; in this regard, labor availability alongside established farming practices guarantee the food access to people.

The pandemic has slowed down the export of fuel, fertilizers, chemicals, insecticides, and herbicides to developing countries. If such trade was possible, these countries had to buy at very expensive prices because of alternative transportation efforts. This situation badly affected the farmers and severely reduced the yield in affected countries (Workie et al., 2020). The initial shock was later compensated by gradual normalization, but it could not reach the point before the pandemic, so farmers still struggle on finding these chemicals and fertilizers. However, in the same research, it was claimed that limited access to this agricultural equipment has not changed the condition in developing countries, as they already lacked easy access to these chemicals before the pandemic. The effect of these products instead mostly felt in developed countries (Workie et al., 2020). The results of a survey study in four African countries (Ethiopia, Myanmar, Nigeria, and Uganda) demonstrated that farmers' access to high-quality seeds and services was negatively affected by COVID-19 precautions in early stage (de Boef et al., 2021).

Farmers dependent on conventional systems in agriculture were the most affected group in the agrifood system. The continuous flow in supply chain can be guaranteed with complete automation in agriculture, as few scientists propose its fast implementation in the sector during pandemics (Henry, 2020). The great dependency on a labor workforce rather than automated systems began changing farming systems' routines during the pandemic. Farmers—especially small-scale farmers—started changing their crop-planting plans, so crops which require less effort (such as maize) shifted with rice (e.g., in India). Adhikari et al. (2021) reported that traditional subsistence farming appears to be somewhat resilient, with a potential to contribute to key pillars of food security, especially access and stability; the commercial farming was more impacted due to the lack of resilient supply networks to reach even the local market.

The production of medicinal plants has increased, as, accordingly, have their export (Ben-xi & Zhang, 2020; Lin & Zhang, 2020). Governments even supported these initiatives, accepting this as one of most prominent actions in tackling the labor shortage in these regions (Sampath

et al., 2020). The pandemic affected people's daily diet program, which changed the demands on several crops. The shutdown of restaurants, factories, schools and colleges led to a reduction in vegetable consumption, and as a whole, this affected the existing agricultural programs, as farmers tried different alternative crops that gained popularity (Gu & Wang, 2020).

Agricultural Systems Connectivity

Agriculture is a holistic sector composed of different components. These systems are intra- and inter-connected. The connection between these components has great importance for a country's well-established agricultural system. This connectivity prompts the second greatest concern of the pandemic, after labor availability. From field to market, the process is always tedious; the pandemic has still made this process more difficult. Transportation restrictions and the contagious nature of COVID-19 severely restricted the system. The condition of agriculture made the marketing phase extra problematic and risky. People involved in carrying the crops from field to market had direct and more common contact with people, and these people become more vulnerable to be infected by the virus. Graders, contractors, and logistic operators are, therefore, exposed to highest risk for infection, and this caused interruptions in supply chain which reflected badly on the final market price (Bochtis et al., 2020). The reduced purchasing power and expensive food prices made the situation harder for consumers. Delays and restrictions in logistic decayed some vulnerable and perishable crops, and the cost is reflected as the price to markets and farmers had huge losses (Jámbor et al., 2020).

Transport channels were closed immediately to take action against the virus' spread; after a while, flights were kept closed, but road and marine transportation possibilities have become relatively flexible. The border closures not only affected the agricultural production but also affected trade. Social distance rules logistically lead to more fuel consumption. Countries tend to be more self-sufficient and limited the export of some key crops such as wheat and rice (Workie et al., 2020). This condition disrupted production, and supply chain connectivity took big damage. After a firm-level survey in China, Ben-xi and Zhang (2020) concluded that agricultural exports tended to decline on average, and smaller firms were affected more during the pandemic. However, they reported that exports of some agricultural products—especially grain and

oil—held strong and even increased, while the exports of goods such as livestock products, horticultural products, and mushrooms sharply decreased, implying the essential demand for staple food during the pandemic (Ben-xi & Zhang, 2020).

The Impact of COVID-19 on Food Demand and Consumption

Food and health have been the most important needs since the beginning of human history. The global population increases day by day, and feeding people is becoming more difficult. Through the COVID-19 pandemic, these needs became more important. After the spread of coronavirus all over the world, governments took precautions to prevent further infections. Firstly, people were warned about cleaning, social isolation, and wearing masks. However, warnings were not enough, and governments took more rigid precautions, such as partial lockdowns, obligatory mask-wearing, and the restriction of traveling, especially internationally. These precautions changed consumer behavior, food supply, and access.

Food Demand

The COVID-19 changed consumer behavior according to their income level, social status, and food prices (Bakalis et al., 2020; Cranfield, 2020). By the announcement of the pandemic, in Europe, the demand for fresh bread increased by 76%, and frozen vegetables by 52% (Aday & Aday, 2020). Apart from Europe, the pandemic directed people to stock stable food like pasta, rice, flour, canned foods, bottled water, etc. This panic-buying behavior caused food shortage in markets and led to a sharp adaptation in consumer habits (Loxton et al., 2020). Besides, the COVID-19 pandemic created a need for healthy food consumption: thus, there was an increase in fruit and vegetable demand compared to other food (Aday & Aday, 2020). After a spike in food demand and food storage, this demand decreased. Askew (2020) reported that the consumer behavior of French people changed after 8-weeks of quarantine, when they started to buy only necessary food.

The COVID-19 crisis also induced a simultaneous drop in demand for food products in the hospitality industry and a rise in demand in retail. This shifted demand significantly disturbed food production, processing,

and marketing processes in terms of labor organization, planning, operation, logistics, and economic returns (Coopmans et al., 2021). Weersink et al. (2021) reported a significant decrease in meat demand (cattle, pig, poultry) just after public closures in March, which led to decrease in prices, and as a consequences the production decreased too in following months.

On the other hand, the demand for food was related to income in developing countries. People with fixed income were not able to change their food demand habits. However, increases in layoffs and stagnating economic sectors during the pandemic decreased people's purchasing power. For example, incomes in India was decreased sharply (by approximately 40%) after lockdown in March, 2020 (Workie et al., 2020); similar findings were also reported in Pakistan (Ali et al., 2020), and in Myanmar (Boughton et al., 2021).

Food Access

Food security guarantees the equal access for people to access the food they need; however, people do not live in equal conditions. 135 million people face inadequate food access, and this number is expected to double during the pandemic (Henry, 2020). COVID-19 has further worsened the existing problem, with the effects not even being possible to anticipate for the future. The sudden spike in demand caused stock to run out and broke the food supply chain for short time. This unexpected situation interrupted the food distribution channels almost every country in the world. Stephens et al. (2020) listed five factors that decreased in food security during the COVID-19 pandemic:

- An increase in unemployment;
- Partial lockdowns, which limited physical access to markets;
- Restrictions of running food social safety nets;
- Insufficient restock capacity of markets after panic buying;
- The inability of transferring of fresh fruits and vegetables.

FAO indicated that the restriction of international travel negatively affected food trade. When the logistics of agricultural production became difficult, the post-harvest process of crops got longer and restocking products on market shelves resulted in delayed because of the stay-home

orders. This was also another factor that affected food access during pandemics.

The stay-home orders reduced the number of employees in agricultural production units. This interrupted meat and dairy product production, and the access of the population to these products was limited. This situation forced people with low incomes to shop from informal markets and created a questionable environment in terms of food security (FAO, 2020a).

The other limiting factor of food access was increased food prices. The obstacles in agricultural production and food trade caused increasing in food prices. The food price inflation was increased by the global spread of coronavirus (Fig. 6.2). This price inflation peaked in April 2020. Despite the reduction in food prices, the price was never as cheap as before April

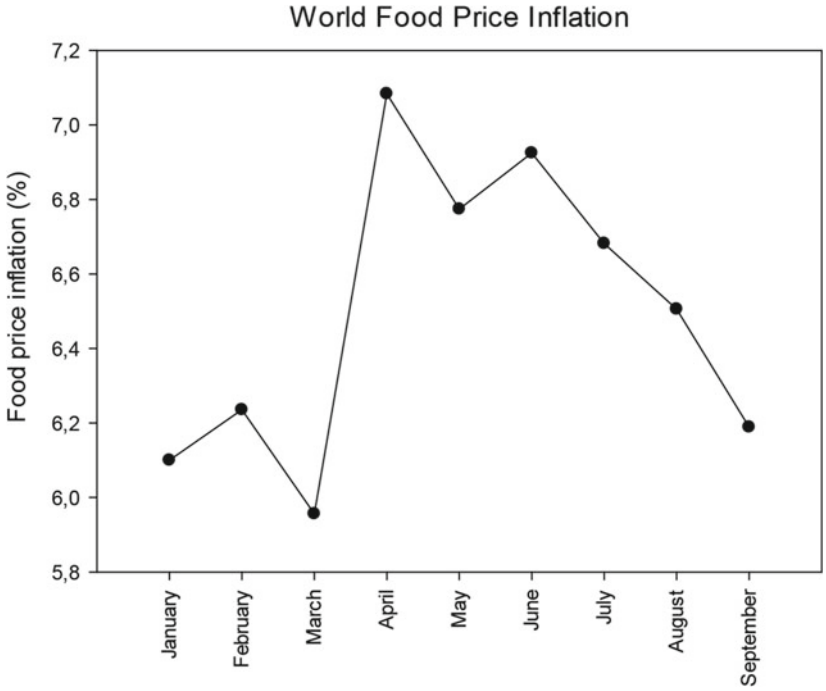

Fig. 6.2 Food price inflation all over the world after the COVID-19 pandemic (*Source* Created by authors on the basis of FAO [2021])

2020 (FAO, 2020b). Food insecurity—which raised due to COVID-19—will highly affect the poorest and the most vulnerable segments of the population. Kumar et al. (2021) reported that the partial closure of rural markets and procurement options, combined with the insufficient supply of products, led to shortages of food supplies and dramatically increased prices, which particularly affected urban dwellers and the poor in India.

The other impact of COVID-19 was increasing unemployment. Many people who need to feed their family lost their jobs. Hence, the governments in developed countries supplied food for these people. However, in developing countries, the governments did not have the economic power for food supply. Briefly, the COVID-19 has reduced people's access to food through the loss of livelihoods and income, especially in undeveloped or developing countries, such as in Myanmar (Boughton et al., 2021), in Pakistan (Ali et al., 2020), in Nepal (Adhikari et al., 2021), and in India (Kumar et al., 2021).

Food Supply

The food supply chain starts from agricultural production and ends at the consumer's tables. The chain contains food processing, packaging, and logistics (Chen et al., 2020). There are two systems employed for food supply chains: food quality and food safety. Food quality is protected by laws and obligations by individual governments; however, food safety is obtained by market laws or international associations (Bendeković et al., 2015). Manpower is very necessary for livestock and agricultural production, especially in developing and underdeveloped countries. However, access to labor became very difficult during the COVID-19 pandemic. Thus, food production was interrupted and food supply became harder (FAO, 2020b). Boughton et al. (2021) reported that a much larger share of farmers had difficulties in selling their agricultural produce in Myanmar. Ceylan and Ozkan (2020) noted that production of fresh fruits and vegetables was affected more due to shortage of labor after lockdown in Turkey, since production of these crops mostly depends on seasonal/migrant laborers in Turkey. They also pointed out that temporary lockdowns have negatively affected the incomes of small farmers who sell their products in district bazaars. Some countries found solutions for this problem. For example, in France, skilled workers could not enter the country because of closed borders, and unemployed people were called to work in the field. Another example comes from Britain, where a campaign

named as "Pick for Britain" was introduced to find 70,000 British workers during harvest season (Nature Plants, 2020). However, the limitation of finding manpower was still a problem for agricultural production, and continuous food supply could not be maintained (ILO, 2020a).

The pandemic led people to panic-buying of foods, which caused an unexpected shortage of food stocks. On the other hand, this highly contagious virus created difficulties in agricultural production, which will be discussed later. Another limiting factor in the food supply chain was closed borders. The governments prohibited international traveling systems, which interrupted international trade. Later on, regulations were made and the international trade system stabilized (Siche, 2020). Disruption in food supply chains also resulted in changes in consumer behavior, such as a reduction of food waste, return to fresh and local products, adapting diets, consuming new products, and the cultivation of food gardens as observed in Caribbean countries (Blazy et al., 2021).

Food systems based on processing industry are considered as highly vulnerable to global crises and shocks, such as COVID-19, due to their low resilience and flexibility (Rivera-Ferre et al., 2021). Prosser et al. (2021) reported that the COVID-19 pandemic has put the food and drink industry in Wales—where it is considered a priority sector, with £22.1bn in annual turnover to the national economy and over 200,000 jobs supported—at significant risk. They highlighted the vulnerability of the existing food system due to its reliance on the hospitality sector, on imported food, and on large corporations, and the need to stimulate long-term sustainable alternatives to protect producers from future shocks and to ensure the continued supply of food to feed the nation. Hence, they suggested developing new producer-led and organization-led models to overcome food supply problems during and after pandemic conditions (Prosser et al., 2021).

Conclusion

The COVID-19 pandemic significantly affected all economic sectors worldwide. Due to the vital role of agriculture on food security, it is more crucial to understand the causes and consequences of COVID-19 on the agriculture systems of each country, as well as to identify developing strategies to create resilient production and supply systems. Although it is not yet possible to fully understand the entire effects of COVID-19

on agriculture systems, it is not too soon to derive some general conclusions: it has brought unemployment, restrictions to exports and imports, a loss of income, and uncertainty in the agricultural sector. The restrictions to the domestic and international mobility of goods and people disrupted the food supply chain at regional, national, and global levels due to the high degree of interdependency and connectivity across the entire food supply system. Agriculture systems significantly differ among countries depending on the development level, constitutional structure of production systems, or marketing channels. Therefore, it is essential to consider the characteristics of the agriculture system in each country to build a tailor-made resilient agrifood system. Some projections regarding changes in agricultural systems in the post-COVID era as follows:

- Increasing domestic agricultural production and self-sufficiency in food security will be critical in all countries. The governments must develop new strategies to promote this projection.
- To reduce labor dependency, the mechanization level of big farms will be enhanced, and post-COVID agriculture will become more autonomous or even farmerless.
- The COVID-19 pandemic clearly demonstrated that small family farms are more resilient in terms of food production under crises, but they are also more vulnerable in terms of access to production inputs and marketing their products. Governments must formulate the mechanisms for their sustainability.
- Indoor agriculture production with autonomous systems can be increased to eliminate environmental dependency.
- The food processing and packaging industry must achieve advancements in developing countries for the better marketing of agricultural products.
- Digital marketing of fresh, dry, and processed foods will increase all over the world.

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CHAPTER 7

Economic Mechanisms of Regulation of Innovative Industrial Technologies in the Post-COVID Age

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Introduction

The development and modernization of the industrial sector of the economy is one of the priorities of the state policy of the Russian Federation. Currently, many industries are dependent on imported components, which refer to high-tech products developed and manufactured abroad. The criterion of successful development of the Russian economy is the

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_7

creation of a developed manufacturing and processing industry with strong export potential, consisting of innovative business units which receive the bulk of income from the sale of high-tech products (Braccini & Margherita, 2018; Rojko, 2017).

Being the embodiment of disruptive technologies and taking advantage of innovative industrial technologies, the industrial complex finds itself at the core of the industrial revolution 4.0, offering a wide range of economic opportunities and challenges. It is also a solid growth point for the global economy, especially in the post-industrial era (Konina 2021a, 2021b; Konina et al., 2021). The global economy already relies heavily on the industrial sector. Many solutions enable communication, navigation, mobility, weather forecasting, and have proven indispensable, enabling virtual productivity and understanding and monitoring the effects of disaster during a pandemic. Industrial goods and services are used by users from insurance, energy, agriculture, telecommunications, defense, and security. In addition, the industrial economy contributes to the development of new technological advances: quantum superiority (including quantum communications), autonomous vehicles.

High-tech industry is at the core of a vital part of the economy and is seen by many experts as a vehicle for the economy as a whole, the proper design of economic regulation mechanisms will have a positive effect on economic growth, including productivity growth based on the introduction of innovative industrial technology.

As the economy becomes increasingly digital, the demand for solutions from the industrial sector will steadily increase. The digital economy is estimated to be worth more than $1 trillion by 2040.

The digital economy has a synergistic effect, as investment in innovative industrial technology leads to scientific advances and more data collected, which in turn leads to further scientific advances.

The development of a digital economy based on the introduction of innovative industrial technologies is becoming extremely relevant at the present time, as it has the potential to take a leading role in the recovery of the global economy.

Methodology

The expediency of industrial policy, forms, tools and institutions of its implementation were considered in the works of economists domestic and foreign authors D. Bell, J. Galbraith, G. Murdal, D. North, L. I. Abalkin,

S. Y. Glazyev, D. S. L'vov, V. I. Maevsky, V. M. Polterovich. Modern interpretations of the new industrialization, digital economy, and mechanisms for regulating the spread of innovative industrial technologies can be found in the works of V. V. Akberdina, R. S. Grinberg, S. S. Ivanter, G. B. Kleiner, V. S. Osipov, E. M. Primakov.

The transition to a digital economy is a significant restructuring of the economic system using new digital industrial technologies (Akberdina et al., 2018, 2020). It leads to a fundamental rethinking of the existing structure and changes in all processes, allows the creation of new formats for working with economic actors, such as consortia, and adapting products and services to the needs of a particular economic agent (Maevsky et al., 2016; Polterovich, 2018). The result should be the achievement of key results of economic efficiency, optimization of costs, and improvement of the quality of the provided service or produced product (Allen, 2017; Castells & Himanen, 2002; Krugman, 2003).

But unprecedented measures to curb the spread of COVID-19 have corrected the implementation of the transition to the digital economy and had a negative impact on the Russian economy and industrial production in particular. According to the Ministry of Economic Development, Russia's GDP declined by 3.3% in the first 3 quarters of 2020. And at the end of the year, the decline in industrial production in Russia reached 2.9% (Sarkis et al., 2020).

It should be noted that the Russian economy and industrial sector had problems with growth even before the epidemic. This was due to both structural problems and the energy crisis. Today, the situation is exacerbated by a drop in demand for energy resources (which make up a significant part of the export earnings of the Russian economy) and gaps in the supply chain (Skryl & Osipov, 2021). In the first two quarters of 2020, energy prices fell by 18%. Now the situation has begun to improve, as production is gradually resuming its work, the lifting of the quarantine has dramatically increased transport activity, as air transportation accounts for about 7% of the total consumption of petroleum products (Oztemel & Gursev, 2020).

A crisis of any nature shows how important and valuable reliable and readily available data is to assess impacts, develop responses, monitor and support their implementation to mitigate negative impacts and accelerate recovery. Satellite imagery, navigation, and communications supported decision-making and increased the transparency of the impact of government responses during the pandemic (Casalino et al., 2020).

The COVID-19 crisis and the measures taken by governments to control the spread of the disease had a major impact on most sectors of the economy, including industry. The main problems for the industrial sector are the introduction of telework, shutdowns of industrial plants and start-ups, outages, loss of activity in connected sectors, supply chain disruptions, payment delays, increased costs and reduced demand, resulting in lower income and productivity levels and increased costs. Long-term threats to the sector could be low demand, changes in government policy, and reduced budgets.

According to ESPI, 40–50% of workers in the European industrial sector were working remotely in the second quarter of 2020. Some satellite operators switched almost entirely to telecommuting. Employees had to adjust to the new work environment, while employers were quick to develop IT infrastructure and other necessary facilities to enable telecommuting. Still, 44% of employees showed some degree of productivity loss (Degli Esposti et al., 2021).

The UK reports that 47% of companies have experienced a drop in international demand and 44% of companies are operating below full capacity, while 52% of companies have postponed or abandoned plans to expand internationally or to attract foreign investment (PwC, 2020).

Public-private partnerships, widely used in industrial infrastructure, have been threatened by a weak private sector. Industry did its best to mitigate the negative effects of the pandemic and ensure business and plan continuity. Government customers met payment schedules and ensured stable and predictable demand, which had a positive impact on the upstream segment, while the commercial (about 33% of EU revenues) and export segments were subject to higher levels of uncertainty (ESPI, 2020). Commercial actors expected revenue losses ranging from 15 to 30% (Ivanov et al. 2020).

The industry has been particularly vulnerable to the current crisis due to the fact that most workers in the sector are employed directly in production, and the work is often difficult or impossible to do remotely (Hess, 2013). In addition, given the specifics of the industry, it is not always possible in principle to ensure social distance at workplaces in manufacturing plants, warehouses, logistics, etc. (Guo et al., 2018). The negative consequences of the crisis were especially pronounced in the energy, automotive, and aviation industries (Galushkin et al., 2019). Due

to the spread of the COVID-19 epidemic around the world, manufacturers of cars, electronics, and aircraft are facing problems related to the availability of raw materials and components.

The OECD estimates that each month of forced prolongation of restrictive measures will result in an additional decline in industrial production equal to a 2-percentage point reduction in annual GDP growth (UNCTAD, 2020).

If at the macro-level we will see a decrease in GDP due to the prolonged introduction of restrictive measures limiting economic activity, then at the micro-level the accumulated losses of companies will only increase in the context of a slowdown in trade growth due to growing trade contradictions and border closures in the near future.

In the context of the pandemic, the Government of the Russian Federation has developed a number of economic mechanisms to support the private sector, namely the introduction of tax vacations, preferential loans for the payment of wages, etc. All these measures theoretically should lead to an increase in business activity and the growth of real incomes of the population. In fact, only those enterprises on the list of industries that are particularly affected by the introduction of quarantine measures receive these measures. These are mainly the trade and services sectors. Not a single enterprise, which is part of the real sector of the economy received these preferences (Resolution No. 434 of the Government of the Russian Federation of April 3, 2020). This half measure will not bring much efficiency, because it is the stable operation of enterprises in the real sector that ensures the course of recovery of the economy as a whole, since industry and manufacturing occupy the second place in terms of the number of people employed in the economy. The short-sightedness of the exclusion of industry from the list of affected industries is especially evident when considering the indicator of industrial production growth in the "Forecast of socio-economic development" presented for 2021 and planned for 2022, 2023. Note that in 2020 industrial growth was—2.9%, against the stated 3.3% by the end of 2021. It turns out that in a year, the real sector of the economy should not only recover its values compared to 2019 (in 2019 growth was 2.3%), but also further increase the growth rate in subsequent years (AIAA, 2020).

The crisis caused by the spread of the coronavirus infection has worsened the prospects of the Russian economy in 2020–2021 (Table 7.1). Official statements by officials and the imminent end of the epidemic (thanks to universal vaccination) make optimistic forecasts for the near

Table 7.1 Main macroeconomic indicators of the Russian economy

Index	*2020*	*2021*[a]
GDP, billion rubles	106,6	115,0
Industry Production, %	−2,9	3,3
Retail Trade, %	−4,1	3,0
Gross Investments, %	−8,4	3,8
Real Disposal Income, %	−4,5	2,6
Federal Budget Balance, % of GDP	−3,8	−1,5
Money Supply (M2), %	13,5	9,0

[a]Forecasted values
Source Authors' processing

future, but qualitative economic recovery growth will be very difficult. Every crisis leaves its mark and requires an adequate response and support from the state (Baldwin, 2016). The affected sectors of the economy will not be able to recover on their own due to the fall in wages and employment during the crisis, especially in small and medium-sized enterprises. The global economy is also in a critical condition. According to IMF experts, by the end of 2020 the world economy will have shrunk by 3%. This figure is much higher than during the global financial crisis of 2007–2008. Therefore, one should not expect a rapid recovery of the world economy and pull the Russian economy with it (Yankovskaya et al., 2020).

Results

The raw materials sector of the Russian economy is still the leader in terms of revenues. In the current crisis, these revenues are distributed throughout the economy through the budget mechanism, which serves as a kind of basis for recovery growth (Shumacher et al., 2016). In addition, it is necessary to launch new economic mechanisms in the field of regulation of innovative industrial technologies. Otherwise, we will continue to observe a fading economic dynamic. If short-term industrial policy measures are now identified, new sources of industrial production growth must be found in order to continue economic growth. Among them we can highlight the following (Elder-Vass, 2016; Osipov, 2016; Shwab, 2017).

- Automation of production. The introduction of robots, artificial intelligence, mechanisms of the Internet of Things, etc., into the production process.
- Reprofiling of production. Due to the aftermath of the COVID-19 crisis, some non-medical companies have begun to produce medical products such as masks, ventilators and their components, and disinfectants. It is worth noting, however, that this is not a long-term survival strategy.
- Creation and development of industrial centers and clusters operating on a fundamentally new technological basis and modern organizational management principles.
- Training and retraining of personnel.
- Close coordination with the public sector, which will regulate the production of critical products and ensure the interests of citizens.

On the other hand, new sources of growth can carry certain risks for the country's entire economy. In particular, I would like to analyze how the introduction of innovative industrial technologies can transform the structure of the economic system.

Undoubtedly, the application of innovative technologies has many advantages. When we talk about innovative digital technologies (Osipov & Roncevic, 2021), at the household level we mean electronic goods and services, the transition of people and businesses to online interaction and online services. The introduction of innovative industrial technologies is the future, and most importantly, digital technologies should solve the problem of overcoming the dependence of the Russian economy on raw material resources. Indeed, the digital economy can significantly reduce costs by replacing live labor with robotic labor, improve information support for decision-making, and reduce the role of office, production, and sales areas. The digital economy is characterized by the appearance on the market of fundamentally new products (unmanned cars, artificial intelligence), electronic money, renewable energy sources, the development of energy-saving technologies, etc. Digitalization is the result of the industrial revolution, and by no means can the fact of technological progress be denied, because in the end it will contribute to the victory or defeat of this or that particular game. When digital optimism begins to transform from theory to practice, then

the country, the company, and even the average consumer face challenges that many are not prepared for.

Many risks can be predicted and forecasted, and with a good combination of circumstances, they can also be insured. But in order to do so, it is important to get the regulatory mechanisms for innovative technologies right (Curran, 2018; Kagermann, 2015).

One consequence of digitalization is the risk of preserving databases and protecting personal data from abuse. The right to protect the personalized sphere from digital fraud and piracy must be understood and protected. Today, interacting in a multipolar world, many companies are faced with escalating and increasing information aggression. Therefore, it is important that the transition to a digital economy is accompanied by strict rules and regulations and supported by a stable institutional environment. Effective institutions will also help reduce the risk of monopolization of digital ownership. Today's economy shows that ownership is not always based on an ownership relationship. In most cases the owner can be separated from the digital resource, and a third party can regulate access to or even dispose of the resource. Here we are talking about various electronic services, social networks, and messengers.

Discussions

The innovative industrial technology sector is currently the fastest-growing job-creating industry. It is erroneous to assume that automation and robotics carry the risk of losing most jobs, thereby creating an additional risk of declining incomes. In reality, an innovative industrial sector will create more jobs than will be cut as a result of digitalization. This fact is confirmed by the work of many economists, including experts from the World Economic Forum. But the risk will still manifest itself in the fact that new jobs will not be distributed evenly throughout the country but will be concentrated in the so-called high-tech centers. There will be a high percentage of unemployment in areas where manufacturing and mining are located, as well as a large share of agriculture.

There is another risk of digitalization—the digital divide. As a rule, a high level of communication quality (which is a mandatory element of the transition to digital development) is observed near large cities and centers (Osipov et al., 2018). In hard-to-reach places, there is still not even access to broadband Internet. Nor can we deny the existence of

stagnant industrial centers that are not ready for the transition to new technologies.

The digital economy requires flexible, highly skilled IT personnel. Today the share of IT-cadres is negligibly small and amounts to just over 1.5% of the able-bodied population, even though IT-specialty is considered one of the most popular among job seekers. Every year about 22–24 thousand young IT specialists enter the labor market, but the market capacity does not meet the requirements of the digital economy. In fact, it turns out that the labor market is not yet restructured and cannot provide jobs for IT specialists. The pace of digitalization of the economy does not match the pace of labor market transformation. (Hendrickson et al., 2020).

Barriers to personnel training represent the most significant obstacle to the development of innovative industrial complex in Russia. This issue was especially relevant after the crisis caused by COVID-19. In the study the set of barriers can be divided into five main groups of problems.

Lack of qualified personnel is a barrier to development of innovative industrial complex in 27 out of 85 Russian regions. First, the problem arises due to the insufficient number of graduates in the field of digital economy and digital transformation. It should be noted that in this case the issue of managerial and analytical competencies is crucial.

The implementation of projects for the digitalization of industries requires a large number of industry analysts, who must form the requirements for the digital transformation of the industry through the implementation of digital technologies. Due to the fact that educational institutions are not focused on training chief digital transformation specialist and data analysts, specialists are severely lacking. In order to achieve the indicators of training specialists in the field of information security it was necessary to organize in 2015–2016 an increased enrollment of students in relevant educational programs. The recommended sets of specialties and areas of training in key competencies are limited to information technology specialties, and not all areas of training exist in the regions. Insufficient admission of applicants to universities in the field of digital economy and the lack of budgetary places in the specialties related to information technology and information security are noted in many regions.

Second, not all existing employees have sufficient skills to support the digitalization of the economy, and there is also an outflow of specialists. In the industrial sector, there is a shortage of state and municipal

employees with digital competencies at the required level. There is a shortage of highly qualified specialists in many areas of implementation of the measures of the national program "Digital Economy of the Russian Federation" in public authorities at all levels, as well as in high-tech industries.

The general low level of competence of citizens in the field of information technology makes it difficult to digitize various processes and apply innovative technologies. Many citizens, including members of the older generation, do not have computer skills, which leads to difficulties in obtaining various services electronically. Unequal access to technology among the population in the context of an acute shortage of professional development courses and training programs does not allow the necessary level of digital literacy of citizens. There is a problem of a shortage of people who want to acquire skills in the digital economy.

The lack of educational programs and professional development courses in the digital economy is a problem in 17 regions. Additional educational courses and programs in educational institutions are needed to develop digital literacy for various categories of the population. There are no programs for the mandatory specialized training of regional executives in the digital economy. The federal executive authorities are responsible for comprehensive training in the digital economy. It should be noted that there are no criteria required to assess the level of training, as well as a methodology for their application. The absence of a list of educational programs aimed at developing competencies in the digital economy does not allow for an objective assessment of the level of training for the digital economy.

Another barrier is the absence of a fixed list of competencies as part of the implementation of innovative programs. The absence of certain criteria for the concept of "digital competencies" does not allow economic agents to implement measures to achieve the indicators of the national project "Personnel for the Digital Economy". There is a difficulty in the qualitative preparation of training programs for competencies in the digital economy, in the management of recruitment plans for specialties in this area, in the preparation of professional development and retraining programs. Until tools for independent assessment of competencies in the digital economy are developed, it is currently impossible to assess the competencies of specialists.

In addition, it is necessary to outline the problem of employment in the context of the recommended number of information security specialists, as regional organizations do not need such a number of specialists. This barrier is observed in many regions of Russia, which also lack the necessary jobs for specialists in this area.

Despite all the difficulties, the industrial sector survived the COVID-19 crisis quite well. The decline in production was less than expected in spring-summer of 2020. But investments in industry have not yet reached the desired level and at the end of the year amounted to more than half of the total volume of investments in fixed assets. It is planned to further increase investment activity in the industrial sector. The market growth of innovative industrial technologies is expected to be 15% (CNES, 2020).

The impact of COVID-19 was mainly focused on manufacturing and operating activities during the period of restrictions, resulting in financial pressure on small and medium-sized businesses and program delays. With a high reliance on government spending, the future of the industrial sector will depend on changes in regulatory mechanisms for the introduction and diffusion of innovative industrial technologies. There may also be ripples from other industrial clusters.

It is worth noting that in integrating industrial technology, space exploration is the most vulnerable subsector of industry. Navigation, Earth observation, and satellite production show moderate impact on industrial development in general, while telecommunications and launch systems are highly resilient. The space sector is influenced by both macro-level trends and market forces. It has a significant dependence on the industrial sector, which is subject to macro-trends. Supply chains in the space sector are evolving as top-down factors drive the development of new systems and the creation of new innovative industrial technologies on the downstream stages. Space exploration is likely to expand through lower launch costs and technological advances. Mass production of satellites and reusable vehicles will reduce costs. Potentially the cost reduction could be from $200 million over the last decade to $5 million (currently $60 million) (ILO, 2020). Green initiatives and the SDGs will create significant demand for space products.

Conclusion

The industrial sector will continue to be a sector where positive externalities are centralized, offsetting the effects of the interaction of the world's

economies. Successful regulation of industrial technology can propel the industrial sector to the forefront, thereby returning the economy to prosperous recovery growth.

The proposed industrial technology regulation mechanisms would allow high-tech companies to dominate the industrial sector by offering more scalable and innovative solutions with a personalized approach. This will result in limited entry into the sector and oligopolistic competitive relationships may develop.

To take full advantage of the fourth industrial revolution, a sustainable industrial complex must be built in the economy. State regulation of industry must be expressed in competent industrial policy, which plays an important role in the recovery of this sector. Industrial policy is aimed at economic growth and achieving the sustainability of the digital economy, including the development of public-private partnerships. A review of government programs to develop a green economy will create additional market opportunities in the industrial sector.

Recovery from the crisis is central to regulatory policies worldwide. The symbiosis of entrepreneurship and technological progress is essential for industry. As the industrial sector begins to successfully commercialize the introduction of innovative industrial technologies, the concentration of production in special zones remains a matter of paramount importance, since the development of an innovation market must be supported not only by market forces but also by qualified human resources. The role of education is to move towards creating a favorable environment for the growth of human resources potential, building the required competencies, and orienting and adjusting the market architecture so that domestic companies are globally competitive.

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CHAPTER 8

Post-Lockdown Flights: New Strategies for Civil Aircraft Manufacturers and Airlines

Julia A. Kovalchuk

Introduction

The history of the aviation industry demonstrates an exceptional example of how progressive innovative technologies have become fundamental to the success of the ever-developing economies of many powerful countries (Dierikx, 2008). The aviators who gave their names to the designed aircraft and aviation companies not only went down in history, but also created effective brands and a worthy reputation for their achievements. Aviation provides an opportunity to develop the country's image (Kobierecki, 2020; Raghuraman, 1997) and so can act as a tool of soft power in political issues (Bilkay & Yilmaz, 2017). Now there is international cooperation in the production of new passenger narrow-body and wide-body aircraft, because, despite the competition among the world's

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_8

leading aircraft companies from the USA, the EU, Canada, Brazil, Russia, and China, any modern passenger airliner is in fact the product of interaction among engineers and suppliers from different countries who strive to make productive, high-quality, eco-friendly, and super-technological aircraft.

Aircraft are always distinguished by exceptional reliability and safety—this is not only a guarantee from the manufacturers, but a responsibility to the passengers. Thanks to the global innovative development of aviation, the production of different types of aircraft in terms of the number of passengers on board and the range of flights has evolved, so society has been able to fully feel the freedom and speed of airborne movement when making their business trips or traveling. However, in 2020, the world was faced with a cruel reality that has led to the suspension of flights around the world; of course, this has affected not only the unfulfilled plans of passengers, but also the operation of airlines and aircraft manufacturers.

The COVID-19 pandemic has been a global shock to the economy. The pandemic had a huge negative impact on the global aviation sector—various indicators of the scale of the decline in 2020 show how far the industry, which has 80 million jobs in the world, has been pushed back (Garrow & Lurkin, 2021). The number of passenger aircraft in overall fleet returned to its 2008 level at the end of 2020, and the number of passengers transported fell to the level of 2003 (CAPA Centre for Aviation, 2020). The aviation industry has also been severely affected and is in crisis: the end of 2020 has seen a 66% decline in demand compared to 2019 (de Juniac, 2020), which has led to losses of $118 billion, and airlines on average lost about 75% of their revenue from passenger transportation, although they increased revenue from cargo transportation by 36% (IATA, 2021). This development is good, because cargo transportation has become the basis for maintaining the functioning of certain supply chains in industry (Thies et al., 2021).

Global airlines experienced a shock from the suspension of flights: in 2020, traffic in Europe alone decreased by 71% (Dunn, 2021) and global passenger traffic amounted to only 1.8 billion people (ICAO, 2021a)—the last time the airlines carried so few passengers was in 2003. Revenue Passenger Kilometers (RPM) returned to the numbers of 1999, while the passenger load factor fell back to as was in 1993. Before the pandemic, tourism was the main driver of demand for passenger air travel, providing from 30 to 70% of passenger traffic depending on the season. Tourism and business travel have seriously declined due to the danger and will recover

slowly depending on the opening of borders and balancing consumer spending. Overall, airlines made 19 million flights in total—this is about the same as in 1999, and half what it was in 2019.

Such a fall was previously unthinkable. All this data tells us about the extremely difficult situation that has developed in the aviation and airline industry. During the development of aviation, despite some accidents and aircraft incidents, until 2020, global passenger traffic had fallen only three times in history: (a) with a decrease of 2.6% in 1991 due to the global recession; (b) with a decrease of 2.9% in 2001 after the September 11 attacks; (c) with a decrease of 1.0% in 2009 during the global financial crisis. Even then, passenger traffic has never fallen so rapidly as by 66%, and it is demand that determines revenue in the aviation industry (Drabas & Wu, 2020).

The only positive result of the suspension of flights in the pandemic was the reduction of CO_2 emissions into the atmosphere. This was an important task that airlines and aircraft manufacturers have been trying to solve for many years. However, no one imagined that it would happen in this way. Now, during the recovery period, it is important to understand how to maintain this course of reducing emissions while returning to the pre-crisis level of the number of flights and increasing the number of modern fuel-efficient aircraft.

Therefore, these theses indicate the critical impact of the pandemic on the aircraft industry and air transportation, and this requires the search for strategic solutions to support the activities of aircraft corporations and airlines until passenger traffic is restored to pre-pandemic values.

Methodology

The analysis of the current crisis situation in aviation was made on the basis of open aviation statistics posted on the Internet from The International Air Transport Association (IATA), International Civil Aviation Organization (ICAO), The Airline Group of the International Federation of Operations Research (AGIFORS), and the Federal Air Transport Agency at the Ministry of Transport of The Russian Federation. This allows us to significantly increase the validity and reliability of the study.

When systematizing the main strategic decisions to restore the activities of aircraft manufacturers and passenger traffic for airlines, the methods of strategic analysis were used, including an analysis of the external environment and the company's competitiveness, assessing risks and potential

threats in the spread of negative effects of a shock event (i.e., a pandemic). Taking into account the variability of the proposed actions on the part of different representatives of the aviation industry and the objective competition among airlines for the most popular air routes, a scenario analysis and modeling was conducted, considering the possible trajectories of a gradual increase in the number of flights as the borders are opened and vaccination is carried out around the world.

Results

It is difficult to predict with high accuracy what a return to the pre-crisis indicators will look like for the airline industry or to estimate the number of flights and the number of passengers—this process will take more than one year. Many countries have entered a third wave, international flights are closed again, and passenger demand has fallen. Nevertheless, even in this situation, there is a small increase in domestic flights—even though they can become a threat and further spread the disease. Airlines no longer plan their earnings and are ready for emergency refunds and ticket exchanges—this has become the "new normal" for them. The lack of confidence in the rapid recovery of demand has an impact on aircraft manufacturers, as airlines are no longer interested in updating the aircraft fleet, have losses, and may refuse to supply new aircraft. All this creates great challenges for the aviation industry and increases the need to design solutions to support airlines and aircraft manufacturers in this new environment.

The distribution of flights in 2020 shows the dilemma of the divergence between the international and domestic aviation markets of each country. Participants of the international aviation market have high hopes for the upcoming summer periods, due to the easing of certain restrictions in countries and the opening of the season in resorts, as well as vaccination. ICAO identifies two borderline recovery scenarios: (a) in the optimistic scenario, passenger numbers are expected to recover to 71% of the 2019 level by June 2021 (53% on international flights and 84% on domestic flights); (b) in the pessimistic scenario, only a 49% recovery is envisaged (26% on international flights and 66% on domestic flights) (ICAO, 2021b).

For example, the passenger traffic of Russian airlines in 2020 almost halved (to 69.2 million people), with international traffic falling dramatically by almost 75% (Federal Air Transport Agency, 2021); yet Russia was

the only domestic market that grew more in the summer of 2020 than even in the prosperous 2019 (Pearce, 2020). Now, it is possible to fly from Russia to about a couple of dozen countries (including the United Arab Emirates, the Maldives, Tanzania, and Greece). It is noteworthy that the USA, even from the very beginning of the pandemic, did not include Russia in the so-called black list (which, for example, included European countries and the United Kingdom); in the USA, Russians could—and still can—fly on tourist visas.

The Moscow air hub ranked fourth in the world in 2020 in terms of passenger traffic (Levinsky, 2021), surpassed by only three Asian "lions"—Shanghai, Bangkok, and Beijing—and overtaking the London air hub (consisting of six airports). The airports of the Moscow air hub—Sheremetyevo, Domodedovo, and Vnukovo—served a total of 48.6 million passengers. Although they lost 52% of passenger traffic (75% on international routes and 30% on domestic ones), these three airports were among the top ten busiest airports in Europe in 2020, including airports in Istanbul, Paris, London, Amsterdam, Frankfurt, Madrid, and Barcelona. Of course, Russia (as well as, for example, China) is pulling a more active recovery of flights within the country—in the absence of foreign resort programs, Russians have switched to domestic tourism.

This inflicted heavy losses on Aeroflot Group; with its main shareholder being the state, it is the largest airline in Russia. Nevertheless, as it specialized in international flights, the airline suspended 94 scheduled international flights and lost 60% of passenger traffic. The airline, which will be 100 years old in 2023, has a goal to reach 100 million passengers by its 100th anniversary and become one of the top ten airlines in the world. In the spring of 2020, however, the airline carried no more than 5 thousand passengers per day instead of 120 thousand, as was the case last year. The difficult situation, due to the pandemic, was the impetus for the development of the Strategy 30/30 (Aeroflot, 2020), which is focused on restoring flights as the borders open, increasing passenger traffic by 30% and reducing prices in economy class by 30%.

Meanwhile, domestic airlines Pobeda and Azimut completed the pandemic year 2020 with a profit. This was facilitated by a slight drop in passenger traffic—Pobeda has 12%, and Azimut has only 2%. The strategic decisions of these airlines were based on price adjustments, including the sale of tickets for domestic flights, as well as the receipt of state subsidies to support regional aviation and the operation of Russian-made aircraft. In general, the different levels of declines in the directions of flights served

to make the national carrier—Aeroflot—revise its development strategy to the Strategy 30/30. This will be facilitated by the reallocation of roles in the air transportation market and the diversification of the activities of three of the four companies of the airline group—Aeroflot, Rossiya, and Pobeda.

Aeroflot, as the parent company of the group, will continue to operate in the premium segment, but will focus on international flights, and plans to carry 35–40 million passengers a year by meeting the needs of Russians for foreign travel and transit of passengers from Southeast Asia to Europe and America through the largest international airport of the Moscow air hub, Sheremetyevo. The company's fleet will consist of long-haul and medium-haul aircraft exclusively of foreign production.

Pobeda is an airline discounter. At the beginning of the epidemic, it completely stopped flights, and in the summer of 2020, it returned to domestic flights. Therefore, it will be advisable for this airline to transfer to short- and medium-haul routes on domestic flights. To do this, Aeroflot plans to transfer all Boeing 737–800 aircraft and the rights to all its domestic flights, which will increase passenger traffic to 55–65 million passengers per year and reduce the cost of tickets in economy class by 30%.

Taking into account the territorial extent of Russia and the long distances across the country, it would be correct to form social programs on the basis of one airline. Thus, Rossiya will serve subsidized domestic flights, use only Russian planes, and carry up to 25 million passengers a year.

For other airlines, the development of niche segments—inter-regional and intra-regional transportation, transportation in hard-to-reach areas, special international flights (including tourist flights)—can be suggested as strategies for restoring activity. One of the best private Russian airlines, S7 Airlines, received a 30% reduction in traffic in 2020, but maintaining its basic strategy as a route network from the center of Siberia (the city of Novosibirsk) allowed domestic flights to ensure stability during the difficult period of lockdown.

It is difficult for airlines to keep their ticket prices due to losses and debts accumulated during the pandemic alongside the inflation of the main items of expenditure (fuel, airport maintenance, leasing payments, etc.). Therefore, an increase in ticket prices is favorable for airlines, but is not considered as a good strategic decision due to the obvious decline in

passenger traffic in the future. Therefore, the most popular flights, especially during the summer season, are expected to increase prices, which will allow airlines to gradually increase their income from the pandemic indicators.

Also, interesting options can be seen from the practice of airlines that refuse free food and drinks in economy class. This will reduce the current cost of implementing the flight.

In any case, these strategies will give new trajectories to overcome the consequences of the pandemic and the decline in passenger traffic, will enable keeping the employment of flight and engineering workers, and will still save income; after all, the crisis is not only a negative event, but is also a new opportunity. For Russians, domestic tourism as "staycation" format (stay+vacation) turned out to be very relevant.

The development of domestic tourism and the gradual reopening of international flights are being promoted by testing and vaccines—this could lead to a 50% increase in the total number of flights as early as 2021 (IATA, 2020). Future tourists are ready to be vaccinated for the sake of travel, and vaccinated citizens are vaccinated to travel without restrictions. Therefore, airlines are expected to increase the number of flights to sea resorts in the summer and to mountain resorts in the winter.

The Strategy 30/30 from Aeroflot Group is not merely ambitious, but also aims to increase the airline's capitalization. This is an important factor for obtaining private investment, in addition to significant financial assistance from the state. Already in February 2021, shares of global airlines rose by 20.9% due to optimistic data on vaccination, as well as investors' expectations of an increase in the number of flights during the summer tourist season. The largest growth is shown by the shares of American airlines (+29.1%) and European airlines (+21%) (IATA, 2021). The efforts of all representatives of the aviation market are aimed at restoring passenger traffic (including through the promotion of vaccination) and increasing their income, but the most expected result of these tasks should be considered an impulse to restore pre-crisis indicators in civil aviation for aircraft manufacturers, which also suffered from the pandemic.

Turning to the activities of the two world giants of the aircraft industry, then because of the pandemic, they also experienced negative consequences. Boeing received an absolute "anti-record" for 43 years: −60% of the figures for 2019 (Boeing, 2020). A total of 157 aircraft were delivered to customers in 2020—this is a quarter of the volume of its European

competitor, Airbus Corporation. Airbus, nevertheless, reduced deliveries in 2020 by a third, and only submitted 566 aircraft (Airbus, 2020).

It is obvious that the drop in supplies also affected other aircraft manufacturers. The history of the aviation industry in Russia is associated with the successes and innovative achievements of the Soviet Union's aviation, so the United Aircraft Corporation (UAK) was established in 2006. Despite the epidemiological situation, the UAK's enterprises did not stop their work. Modern IT solutions made it possible to quickly transfer employees of engineering and corporate centers to remote workplaces. Factories also did not stop: shift support for continuous production processes was organized, on which the implementation of aircraft production programs depends, strict control over the health of employees was introduced, and security measures were taken.

The UAK development strategy focuses on the implementation of projects for new Russian aircraft: the Sukhoi Superjet 100 short-haul airplane, the MC-21 medium-haul airplane, and the Russian-Chinese CR929 long-haul airplane (UAK, 2021).

The main project of Russian civil aviation has in recent years been the MC-21, a new generation narrow-body medium-haul airplane; now it continues the flight test program. Due to the pandemic, there was a short break, but work has already resumed. Currently, as part of the certification program for Russian and European standards, the MC-21 is undergoing a large complex of ground, flight, and bench tests. The airplane is equipped with new PD-14 engines and has the widest fuselage in the class with a wing made of polymer composite materials—only three aircraft in the world have this: Boeing 787 Dreamliner, Airbus 350 XWB, and Bombardier CSeries. The airplane is focused on the commercial niche, where the Boeing 737 and Airbus A320neo are already leading. The direct competitor of the Russian airplane is the Chinese Comac C919, which is more focused on domestic demand and is supported more by the Chinese government. For the Russian airplane, the most important task—which is being actively solved in the conditions of sanctions and during the pandemic—was import substitution and increasing the number of components from Russian suppliers with a sufficiently high level of international cooperation in the aircraft manufacture. Ideally, it is difficult to compete with Boeing and Airbus, but there is potential for competition in niche segments of aircraft.

For example, great prospects are associated with the regional airplane Sukhoi Superjet 100, which has sales around the world (Mexico, Thailand, Kazakhstan) in competition with Bombardier C Series and Embraer E-Jet in different configurations. Because of the pricing policy, Embraer's position has become very strong, and the promotion of the Superjet in foreign markets has some problems.

Nevertheless, due to the pandemic, new favorable prospects have opened up, which should be included in the strategies of the Russian aircraft manufacturer. This is due to the fact that many flights, which were flown by large aircraft from Airbus and Boeing, are carried out with a low load, and it is more cost-effective for airlines to fly small aircraft with 100-passenger capacity, which will provide 100% load of the liner. Therefore, the Strategy 30/30 from Aeroflot Group is quite appropriate due to the planned diversification of domestic flights.

UAK is a state-owned corporation, so the government is actively implementing a policy of supporting the aviation industry by subsidizing Russian airlines if they have domestic-made aircraft in their fleet. This makes it possible to ensure the functioning of production chains and employment, as well as to improve the image of the Russian civil aircraft industry in the world. Therefore, the state strategy is focused on stimulating the aircraft industry and the development of air transport as an economically affordable and convenient transport in the large country of Russia.

Conclusions and Recommendations

The presence of a national aircraft industry is an indicator of the country's development, a reason to be proud, and a great incentive for innovation and technology development. Therefore, even during the period of the strongest crisis in the history of world aviation with the almost complete shutdown of traffic on international routes in the spring of 2020, governments around the world made great efforts to financially support this industry and to preserve qualified personnel and production facilities. This allowed this industry to partially weather the negative impacts the crisis had on the financial results of airlines and aircraft manufacturers.

Now, the airline industry is gradually coming out of lockdown. High expectations for passenger traffic growth are associated with the introduction of vaccines and testing. Strategies for overcoming the crisis for aircraft manufacturers are associated with the possibilities of technological

improvement of aircraft and increasing their fuel efficiency, when assessing the demand of the aviation market for medium-capacity aircraft.

Airlines design strategies must take into account the opening of borders and the development of domestic tourism in their countries, while noting the limits of saving operating costs and the inevitability of increasing costs (regarding ensuring the safety of passengers and crew in all travel processes). It is obvious that the air transport market will also be strengthened by business jets, which create a steady demand for aircraft manufacturers and the potential for premium airline strategies. In general, the joint strategic efforts of the aviation industry and governments are aimed at ensuring that after the pandemic, passengers again enjoy the speed and convenience of flying and enjoy traveling around the world.

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CHAPTER 9

China's Electricity Market Reform in the Post-COVID Era

Hu Jingqiu and Jiang Yi

Introduction

The CPC Central Committee and the State Council released official Regulation document "Opinions on the further reform of electric power system" (No. 9 document), as well as ten other supporting documents on March 15, 2015. It marks an official start of a new round of power system reform in China. The main idea of the reform can be summarized as "market liberalization, organization independence and system improvement." In specific, its goals include smooth transition to electricity price liberalization, except transmission and distribution price; liberalization of electricity distribution and selling businesses by allowing involvement of

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_9

social capital; gradual deregulation of electricity generation and consumption plans except for regulatory power use and public welfare power use; promote independence of trading institutions and standardize their operation; continuously conduct in-depth research on the development of regional power grid and power transmission and distribution system that is suitable for China's conditions; further strengthen the government supervision; further improve the overall planning of electric power; and further strengthen the safe and efficient operation and reliable supply of electric power. Since the No. 9 document set the target paths, China's electricity market reform has followed the institutional reform framework of "opening two ends and controlling the middle" and has some major achievements.

In terms of power transmission and distribution price reform, it has established a relatively complete price policy system of electricity transmission and distribution, covering inter-provincial and inter-regional special projects, provincial power grids, and incremental distribution networks. The price reforms for electricity transmission and distribution and for regional power grids that covering power grids over all provinces (except Tibet) have been fully completed, and the electricity transmission prices of inter-provincial and inter-regional special projects have been successively approved one after another. Supervision and examination of power transmission and distribution price have been carried out for two rounds, ensured the electricity price mechanism to run smoothly.

In terms of power market establishment, the power market system has taken shape. New power market system with "medium- and long-term trading market + spot trading market + ancillary service market" has been initially established. China's power market reform started with the direct transaction between power users and power generation enterprises, constantly enriched the transaction modes, and the power market scale is gradually expanding year by year.

The medium- and long-term trading of electric power now is basically at mature stage, and all pilot areas of electric power spot market have entered the stage of trial operation. Some provinces and districts have also carried out the development of ancillary service market. With all these efforts, the power market reform has covered all provinces, formed a trading system that covers annual, monthly and weekly trading, as well as spot trading in day-ahead market and real-time market. In addition, the transactions cover electric energy, ancillary services, renewable energy consumption weight, and so on.

In terms of the development of trading institutions, two national-level power trading centers were established in Beijing and Guangzhou at the beginning of the reform. Later on, with the deepening of the reform, 33 provincial power trading centers were successively established. Some significant improvements in the trading platform standardization were seen as the equity proportion of centralized power grid enterprises in each trading center gradually decreased, forming a relatively independent market trading platform.

In terms of power distribution and sales market, power trading is fully open. By the end of 2019, there are about 4000 power sales companies in China, indicating a competitive market has been formed. Social investment access has been opened in power incremental distribution network, and more than 400 pilot projects (in five batches) of power incremental distribution reform have been launched to attract social capital, realizing the diversification of investors.

Results

Impact of COVID-19 on China's Power Market Construction

China's economy has shown strong resilience when facing the epidemic shock. China became the only major economy with positive economic growth around the world in 2020. Its economic performance showed a "V" curve, with lowest point in the beginning of 2020, and improved quarter by quarter gradually till up to normal level. By the end of the year, China's total economic output achieved more than one hundred trillion RMB, with an increase in GDP by 2.3%.

The epidemic hit China's economy most badly in the first quarter: GDP growth rate dropped fast and turned negative in the first quarter, with 6.8% lower compared with one year earlier. GDP then grew steadily in following three quarters. Impacts of the epidemic on each industry show certain diversity. Different from other industries that suffered negative economic growth, export volumes of manufacturing industry rose during the period of relapse of the epidemic in other countries, as there were increases in net exports of goods and services that led to a 0.7% increase in GDP. However, as the main engine of economic growth, China's national consumptions in 2020 were at negative growth rate, with reduction of 3.9% in the total retail sales of consumer goods compared

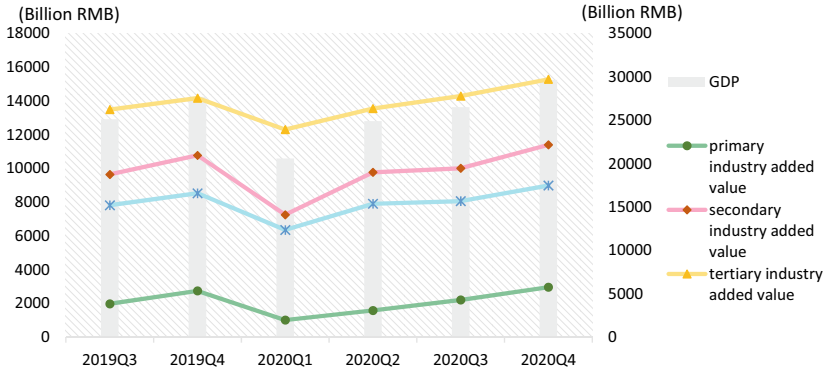

Fig. 9.1 Quarter GDP and added value of industries in 2019–2020 (*Source* National Bureau of Statistics (NBS), 2020)

with the previous year. The annual consumption expenditure reduction led to a 0.5 percentage drop in GDP (Fig. 9.1).

Impacts of COVID-19 on Power Supply and Demand in China

National power supply and demand drops in the first season of 2020, which is basically consistent with the economic trend. The total social electricity consumption is 7.51 trillion kwh, with a year-on-year growth of 3.1%. The growth rate of social electricity consumption was—6.5, 3.9, 5.8, and 8.1% in each quarter, which also showed a "V" curve. While looking from industries, the power consumption of the primary industry, secondary industry, and tertiary industry were 85.9 billion kwh, 5.12 trillion kwh, 1.21 trillion kwh, respectively. Year-on-year growth rates of the three industrial sectors are 10.2, 2.5, 1.9%, respectively. Industrial power consumption in the first quarter dropped significantly, and then higher goods and services consumption potential brought a mild increase of power consumption in the second quarter. With full control of the epidemic and recovery of import and export trade afterward, the electricity consumption of the tertiary and the manufacturing industry began to rebound. However, an unexpected extreme weather in winter of 2020 caused power consumption increased significantly in the whole society. The power demand pressure from both society and industries in the third

and fourth quarters resulted in power shortage in some provinces and cities (Figs. 9.2 and 9.3).

The epidemic crisis highlights the structural contradiction between various types of power supply and peak shaving. In recent years, the new energy installation and grid-connected power generation are constantly increasing, but the hours of coal-fired power generation are decreasing. Insufficient power supply leads to risks of peak shaving, and the epidemic situation further exacerbates those issues. The epidemic situation depressed the power consumption in a short period of time, caused

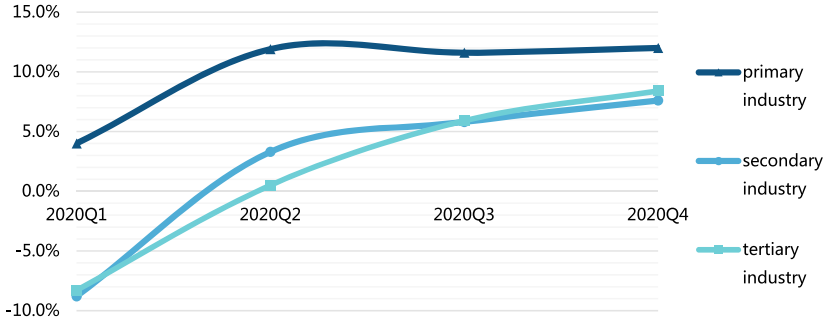

Fig. 9.2 The quarter growth rates of industrial power consumption in 2020 (*Source* NBS, 2020)

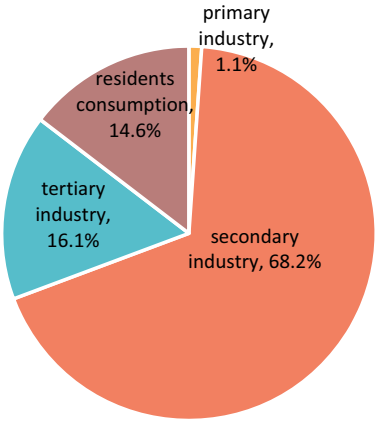

Fig. 9.3 Proportions of industrial power consumption for urban and rural residents (*Source* NBS, 2020)

reductions of incomes of power generation enterprises. As responses to the operation pressure, some power sources withdrew and some peak shaving resources were cut off, which inevitably lead to the structural power shortage when resumption of work and production started and power load rapid rose.

For the power grid, the repeated changes of power load caused by the epidemic raise the operation risks. Industrial power load normally has stable demand curve, and a shock in industrial power load is more difficult to recover, which causes declines in basic load demand of the entire power grid. Thus, the peak shaving pressure in electricity troughs will be extremely prominent, even causing risks of power failure due to grid overload.

The epidemic will also bring uncertainty to market transactions. On the one hand, the uncertainty of power supply and demand caused by the epidemic has increased the uncertainty of market participants' trading scenarios. Local market transactions are still proceeding as usual while demand is shrinking, which squeezed some power supply and power sales enterprises out of the trading market, and further compressed the trading space. On the other hand, epidemic prevention and control not only reduces the circulation efficiency of energy resources, but also restrains the power demand scale. At the same time, the shortage of upstream energy supply has an adverse impact on power production and supply, and the contradiction between quantity and price stipulated in the transaction contract may increase. Due to involvement of multiple players in the transaction, it is difficult to execute the negotiated volume and prices initially signed in contracts before the epidemic, or the long-term contracts were sometimes given up due to short-term low prices in spot market. Those chaos in transaction market led to conflicts and affect the equity relationship between the two sides of the power transaction as well as between the upstream and downstream of the power industry. In addition, it is sometimes difficult to forecast and arrange production plans for power generation enterprises and power grid, which affect smooth development of medium- and long-term transactions if there were a concentrated release of production and consumption demand and a rebound of power demand.

Discussion

Problems and Challenges in China's Electricity Market Reform

The design of electricity market trading system is not well prepared for huge risks. Pandemic caused factories to shut down, people to live in isolation, and services to stagnate. The power demand of the whole society continues to be depressed. As a result, the long-term association contracts signed before epidemic were facing certain difficulties in delivery, assessment, and settlement, which also lead to the vast majority of users and power sales companies facing greater risk of power deviation. In principle, large users and power sales enterprises need to pay the corresponding deviation assessment fines in this situation. However, because there is no advance plan to deal with such crisis, local governments have stepped up with patch policy in the short period of time to cope with this issue.

The power marketization reform is not thorough enough, as the market centralized trading is not coordinating well with real market supply and demand. It is counterintuitive to see that power trading prices remained stable when relationship between power supply and demand undergone dramatic changes in epidemic situation. Theoretically, prices are more sensitive to shorter contract length, and thus can reflect the real balance between supply and demand with more accuracy. However, during the epidemic period, the centralized trading market did not show close relationship among price, demand and supply. Therefore, it reflects that the existing power market system and market design is not efficient, let alone its role of guiding prices to balance power supply and demand.

The ancillary service market such as frequency modulation and peak shaving needs to be improved. At the later stage of the epidemic, many extreme events in China and other countries have sounded an alarm for the development of domestic power market. In China, with the economic recovery and the cold weather during the winter time of 2020–2021, the power consumption rose rapidly, giving huge pressure to the existing insufficient power supply. Some provincial power grids once approached their load limits. Hunan, Jiangxi, Zhejiang, Inner Mongolia, and other regions switched off and limited power in succession. The existing power system has shown lack of effective capacity, especially when considering that China has planned to connect it with a large number of new energy grid in the future. It demands to establish the corresponding capacity compensation mechanism, and speed up the construction of

ancillary service market such as frequency modulation, peak shaving, energy storage, and reserve.

In addition to the problems occurred during the epidemic, there are some inherent problems in China's power market reform. Those deep-seated contradictions have not been solved, which restrict the market-oriented reform in future.

The electricity price mechanism needs to be improved. In particular, we need better price approvement methods and refined economic analytical tools for monopoly market. There is still room for structural adjustment of power transmission and distribution price. Problems related to cross subsidy have not been properly solved. The cost dredging mechanism of various generating units still needs to be further clarified, and the power transmission mechanism has not taken full effects.

The power market system is not perfect, and the market structure needs to be optimized. The construction of electric power market is still in the primary stage, and the trading barriers among provinces are serious. The efficiency of electric resource allocation in power market cross regions and provinces is not high. In terms of power generation and supply, the state-owned capital still occupies the dominant position, thus the market structure is not diversified enough. Meanwhile, monopoly and collusion still exist in power market transaction processes in some regions, which affects normal operation of the power market.

The power regulatory system lags behind the reform practice. On the one hand, the regulatory system still needs to be improved. The boundary between the government and the market is not clear enough, with existing administrative barriers in the market. For those administrative functions that are delegated from government to the market, there are administrative intervention and unclear supervision responsibility problems. On the other hand, the revision of relevant regulations seriously lags behind the electricity reform process, and the failure of legislation establishment created lots of problems. In addition, the examination system of fair competition that is related to the practice of power market has not been established.

Domestic and international pattern has undergone profound adjustments due to the epidemic, and the reform faces more complicated situations.

Internationally, energy security is facing new challenges, which continue to squeeze the price of power supply chain, thus affecting the power market development. At present, the global political and economic

pattern is undergoing deep adjustment, the instability and uncertainty of the external environment are increasing significantly, the trend of anti-globalization is intensifying, the supply chain cycle of global industrial chain is blocked, geopolitical risks are rising, and the international energy supply and demand chain has changed significantly. All of those challenges have affected the stability of domestic energy supply and may cause damages to the power market when extreme events occur.

China's economic development has entered a new stage, the process of clean energy and low-carbon transformation have accelerated, and the structure of power supply and demand has changed. In particular, China has promised the world to reach the peak of carbon by 2030, to achieve carbon neutrality by 2060, and accelerate the development of clean and low-carbon energy. This promise means that significant changes will take place in China's power supply structure and power consumption in the future. New energy resources represented by wind power and photovoltaic power on the supply side will become the main power sources of energy increment, and more clean energy sources will be connected to the power system. On the demand side, electric energy substitution will be promoted, and power consumption may increase rapidly, which requires the establishment of an appropriate power market system and an improvement of existing trading system.

Progress of Power Market Reform in Post-COVID Era

COVID-19 has caused some negative impacts on the reform of the electricity market. Aiming to solve the inherent problems in China's power market and the new problems exposed in the development and trading processes of the power market reform, the central government issued several documents in 2020 to promote the reform to be more extensive and complete.

An official regulation document—"Implementation opinions on promoting the independent and standardized operation of power trading institutions" (Implementation Opinions)—was issued in the beginning of 2020. It directly specified quantitative shareholding ratios and work schedule, and put forwarded detailed requirements for the independent operation of power trading institutions. The Implementation Opinions clearly requires trading institutions to operate independently in terms of "human resources, financial management and material resources," and introduces third-party supervision with specific requirements. This

indicates that the power marketization reform entered into the "actual implementation period" from the "transition period." It is no longer limited to the pilot areas, but has effectively promoted the implementation and completion of the market mechanism. In the first half of 2020, the shareholding ratios of power grid enterprises in two regional trading institutions in Beijing and Guangzhou and all other provincial trading institutions all drop to less than 80%. The shareholding ratio of power grid enterprises continuously dropped to less than 50% by the end of 2020.

With further standardization of medium- and long-term electricity trading market and spot market, the construction of a unified, open, and orderly competitive electricity market system is steadily advancing.

As the "experimental field" of China's power market system, the development of spot market is the most complex design of power system. It undertakes the function of price exploration, and also bears the responsibility of exposing and solving various problems. In March 2020, "The notice on continuous work on the settlement of spot power market pilot projects" clearly stated that the power selling companies and power users should agree time-sharing settlement rules with the power generation enterprises in the medium- and long-term contracts, and should not set up an unbalanced fund pool. Each settlement item should be recorded independently, with clear classification and guidance.

Since the end of June in 2019, eight provincial spot market pilot projects have been fully launched. As of May 2020, Shanxi, Gansu, Shandong, Fujian, and other provinces have completed the third settlement trial operation. Gansu Province has realized the first full monthly spot market settlement trial operation in April 2020.

The pace of medium- and long-term electricity trading has not yet been suspended due to epidemic. In July 2020, "The revised basic rules for medium and long term electricity trading" (The Basic Rules) was issued to improve the existing rules as a supplement, including improving the access and exit rules, the types and methods of electricity trading, and modifying key rules in the price mechanism, etc. Later on, a new notice[1] in 2021 added contents of "promoting signing contract in different time divisions" and "widening the price differences between peak and trough." Those changes are made to strengthen the coordination, promote an

[1] The notice on regulating median and long-term power trading contract in 2020.

effective connection between the medium- and long-term market and the spot market, and reasonably determine the delivery mode in the spot market and the trading curve of the medium- and long-term contract.

Two regional trading institutions in Beijing and Guangzhou and all provincial trading institutions have issued detailed rules for medium- and long-term trading. They have realized a transformation from direct trading between single power generation enterprises and electric power users to medium- and long-term power trading system with multiple power sources and standardized trading processes.

As an important part of the power market reform, power transmission and distribution price have long been concerned. The main task of power transmission and distribution price reform used to be "mechanism establishment." At present, it has turned to a new stage of "strong regulation," and the regulations are becoming more and tighter.

In 2020, on the basis of improving the pricing system and strict cost supervision, the National Development and Reform Commission approved the power transmission price of five regional power grids, formulated the power transmission and distribution price of provincial power grids in the second supervision period, and issued regional and provincial electricity price approvement documents. Those actions further improved China's power transmission and distribution price supervision system. So far, the regional and trans-regional power grid transmission price verification has been completed. The guidances on the power distribution price formulation of local power grid and incremental distribution network have also been issued.

In the next step, China will take the second round of power transmission and distribution price verification as an opportunity to straighten out the formation electricity price mechanism, gradually eliminate cross subsidies, and transform the "price difference" mode to the "favorable price" mode. China will continuously learn from marketization experiences of power price settlement, research in relevant measures to expand market peak-trough price difference, introduce capacity compensation mechanism, promote different types of power generation units to enter market, and make the price mechanism meet diversified requirements of spot market.

Since the 13th Five Year Plan, China has promoted 483 pilot projects of incremental distribution network. Some challenges of incremental distribution areas have been broken through, and the reform of pilot projects is steadily advancing. The State Grid Corporation of China clearly

proposes to support, participate in and promote the incremental distribution reform. China Southern Power Grid also said that it will actively and steadily carry out reforms with mixed competition transformation for businesses such as power incremental distribution and power sales. Southern Energy Regulatory Bureau issued power business licenses to 18 pilot project owners to accelerate the reform of power incremental distribution.

Similarly, the establishment of ancillary service market in each province is also in full swing, with diversified transaction varieties, diversified participants, and gradually expanding the scope of resource allocation. In December 2020, the southern-region ancillary service market for power supply frequency modulation started trial operation. The ancillary service market expanded the original hydropower plants in Guangdong and partial areas of Guangxi to all regions in Guangxi and Hainan. This is also the first regional power supply frequency modulation market to enter trial operation in China, marking that the innovative development of power ancillary service in the "14th five year plan" is unfolding.

Conclusions

Future Trends of China's Electricity Market Reform

To sum up, China's power market reform is facing more challenges due to existing contradictions in the current energy load distribution system and the structure of power system, the complexity of power system reform, as well as negative impacts brought by the epidemic situation and profound changes in the international political and economic pattern. In specific, those challenges mainly include the contradictions between trading marketization and traditional dispatching mechanism, between new technologies/new forms of industries (such as energy Internet) and the existing energy planning and distribution system, and between the new energy access and the current imperfect consumption mechanism. Therefore, in addition to the steady progress of current reforms, China's power market reform will focus on the following goals in the future.

China will continuously expand trading space and the proportion of market-oriented power trading. In regard to trading market scope, China will gradually break down the trading barriers among provinces, constantly improve the proportion of cross-regional and cross-provincial

power trading, and gradually integrate the inter-provincial and intra-provincial markets to form a national unified electricity market. In regard to power market system, China will accelerate the construction and improvement of spot market, gradually establish a complete market system that is designed for short-, medium-, and long-term power trading, and gradually set up ancillary service market, capacity market, power transmission right trading, and financial derivatives trading based on the demands of market development.

With the rapid development of new technologies and formats in the energy industry, the industry boundaries of energy supply are blurred. Cross-industry operation has become the norm, and distributed energy has become an important supplement to centralized energy supply. With the help of smart grid, Internet, energy storage, and other technologies, the end-users' various energy needs are met as power allocation optimization can be realized with deep interaction within the power grid. In terms of transaction subjects, diversified small and micro-market subjects (such as distributed energy, micro-grid, virtual power plant (VPP), energy storage, and interactive energy consumption) should be allowed with wide access. China should also gradually expand participation scale in power market transactions and explore a user-centered energy service mode. In terms of distribution development of power system, China should gradually carry out market-oriented transactions of distributed power generation and micro-grid; form a regional "self-sufficiency + surplus trading" transaction mode; explore the coordinated operation of power wholesale market and retail market for balancing users' demands.

Clean energy is an important measure to achieve the goal of carbon neutrality in China. In the power generation side, China will promote coal power generation to reach the peak point as early as possible, speed up the conversion of coal power to electric power. Meanwhile, in consideration of the distribution capability of energy resources and load within the country, China should optimize the timing of new energy development by integrating local resources, power grid conditions, and load levels, etc. China will also improve the clean energy development and management mechanism, gradually abolish the feed-in tariff approval mechanism of clean energy, gradually increase the proportion of clean energy on the power generation side and promote more participation of clean energy in market transactions. The market-oriented trading policy of wind power and photovoltaic power should be continuously improved, as well as supporting the linkage between the full guaranteed acquisition and the

free power market transaction till full participate of new energy sources in the market-oriented transactions.

Social attributes play important roles in power emergency during the epidemic, which is very different from natural disasters. It is necessary to strengthen emergency capacity when develop power market in the future, changing from "emergency oriented" to "risk management oriented." In terms of power market system design, China should promote inter-provincial and inter-regional ancillary service market; improve the supportive mechanism on the demand side of transactions. In regard to power grid operation, China will improve risk control capability; closely track the economic trend, power demand, and weather changes; reasonably arrange the operation mode of power grid; preassess the power supply capacity and operation safety of power grid under various circumstances and formulate corresponding solutions. On the power supply side, China should enhance the complementary flexibility of various types of power sources; speed up the construction of large-scale interaction system with "Source-Network-Load-Storage" (refer to power source, power network, power load, and power storage); carry out strategic guidance and centralized control of flexible power load; make full use of user side resources; resolve the short-term conflicts between power supply and demand; and improve the ability to withstand and recover from extreme situations such as catastrophic natural disasters and accidents.

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CHAPTER 10

Creative Industries: A Review of the Effects of the COVID-19 Pandemic

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Introduction

At present, we are witnessing an expansion of the concept of "creative industries" into "creative and digital industries" ("Creative and Digital Industries") (Bourdieu, 1996; DiMaggio, 1977).

Urban theories and strategies of urban development give an idea of how the concepts of "cultural industries," "creative industries" and "creative industries," are represented in modern cities and described in the legislative documents of most countries: official sites of the Ministries of Culture of Russia, Great Britain, Australia, Denmark, and other countries (state legislative documents of cultural policy of Russia, Great Britain, and Australia, including the RF Law "On Culture," Federal Project "Culture of Russia," "Creative Britain. New Talent for new economy," «Creative Industries Task Force Report» (London: DCMS, 1998), "Creative

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_10

nation: Commonwealth cultural policy" (Australia, 1994), "Building a Creative Innovation Economy" (Australia 2008; Bilton, 1999).

The monograph "Cultural Industries" by D. Hazmondalsh and the series of publications by J. Hartley, J. Potts, S. Cunningham, P. Ormerod, a group of researchers from Queensland University of Technology (Queensland, Australia), who suggest considering creative industries as network markets, are particularly notable. Creative economy is a new concept related to the interface between creativity, culture, economy, and technology in the modern world, where images, sounds, texts, and symbols dominate. Today, the creative industries are among the most dynamic sectors of the world economy, providing new opportunities for developing countries to grow into new fast-growing areas of the global economy (Hesmondhalgh, 2007; Wolf, 1999).

The creative economy is now one of the most dynamic and fastest growing segments of the global economy, its share in world GDP is 3–6% (according to various estimates), annual export growth is 12%, services—4.3% (UNCTAD 2019). More than 30 million people work in the creative sectors, with the largest share of women and young people aged 15–29, as well as self-employed citizens (EY 2015—more than 30%). An analysis of the creative sectors of the economy in the world is presented in Table 10.1.

Table 10.1 Structure of creative entrepreneurship in countries with support systems for creative industries

Economy	*Contribution to the country's GDP, %*	*Number of jobs (mln.)*	*Share of total jobs (%)*	*Number of firms (thousands)*
Indonesia	8	17	16	No data
Australia	6	0,7	6	125
USA	5	3,5	2	673
Italy	5	1,5	6	414
United Kingdom	4	3,0	9	284
Germany	3	1,2	8	254
Netherlands	3	0,8	11	221
France	2	0,8	8	324

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There has been no systematic evaluation of the creative sectors' contribution to Russia's economy so far, but according to various estimates, their share in GDP is 2–4%, and the average share in GRP is 5%. At the same time in Moscow, where the number of people employed in the creative sector (153 thousand companies, 500 thousand people) has caught up with the base industry, the sector's share in GRP is 9.5%. The rate of development of the creative industry is much higher than that of conventional and classical industry and other sectors (Vlassis, 2021).

Results

When the whole world suddenly went self-isolated in 2020, the creative industries oriented themselves very quickly. Museums started launching virtual tours. Everywhere, from Argentina to Canada to Russia, they started organizing cultural events for which you don't have to leave your home. Theaters began streaming plays online, musicians began TikTok collaborations, artists organized real-time master classes, and designers organized salon-like digital presentations (Serafini & Novosel, 2021).

During "…the first quarter of 2020, arts and culture sector organizations around the world gradually limited their public activities and then closed completely due to the pandemic. Beginning in China, East Asia, and then around the world, by the end of March 2020 most cultural heritage organizations closed, and artistic events were postponed or cancelled either voluntarily or by government order. This included galleries, libraries, archives, and museums (collectively known as GLAM), as well as film and television programs, theater and orchestra performances, concert tours, zoos, music and art festivals."[1] Let's review the effects of the pandemic by country and industry (Wang, 2021).

For example, Britain's creative sector grew five times faster than the economy as a whole before the pandemic, employing more than 2 million people and contributing 111.7 billion pounds to the economy—more than the automotive, aerospace, life sciences, and oil and gas industries combined. However, the projected economic impact of the COVID-19 pandemic on the U.K. Creative Industries GVA,[2] fell by 29 billion pounds (−26%), with the creative industries losing twice as much as the more

[1] Impact of the COVID-19 pandemic on art and cultural heritage—https://ru.qaz.wiki/wiki/Impact_of_the_COVID-19_pandemic_on_the_arts_and_cultural_heritage.

[2] The Projected Economic Impact of COVID-19 on the U.K. Creative Industries (https://www.oxfordeconomics.com/recent-releases/The-Projected-Economic-Impact-of-COVID-19-on-the-UK-Creative-Industries).

Table 10.2 Forecast of losses of sectors of the creative economy in 2020

Name of sector	*Loss of income (pound sterling)*	*Reduction of jobs*
Media (film, TV, video, radio, and photography)	36 billion (57%)	102 thousand (42%)
Advertising and marketing	19 billion (44%)	49 thousand (26%)
Visual art	11 billion (54%)	178 thousand (57%)
Museums and art galleries	3,9 billion (45%)	7 thousand (8%)
Music industry	3 billion (50%)	114 thousand (60%)
Theater arts	3 billion (61%)	12 thousand (26%)
Fashion & design	2 billion (58%)	51 thousand (30%)
Architectural services	1 billion (24%)	2 thousand (2%)
Post-production and visual effects	827 million (58%)	-
The handicrafts sector	513 million (53%)	58 thousand (47%)

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developed sectors of the UK economy (the estimate for UK GDP growth in 2020 is −12.8%), the changes of which are presented in Table 10.2.

During the pandemic, the creative industries lost 409,000 jobs and 77 billion euros in revenue (−31%). Music, performing and visual arts lost €11 billion in revenue (−54%) and 57% of jobs (178,000), while theaters, recording studios, and concert venues remained closed throughout the pandemic.

Against this backdrop, the music industry lost at least €3 billion in GVA (50%) and 60% of jobs (114,000), with this sector hit hard by the collapse of live music and touring. Theaters also lost €3 billion in revenue (61%) and 26% of permanent jobs (12,000), although this estimate takes into account only current cancellations and does not take into account the reluctance of audiences to return to their seats (only 20% will return at opening night according to the Indigo survey) (Perry et al., 2020). Further research by British Theatre/SOLT shows that, without further intervention, the loss of permanent and freelance theater jobs is likely to be over 200,000 (over 70%) at the end of the lockdown. Film, television, video, radio, and photography would lose £36 billion in revenue (−57%) during the pandemic, with the sector projected to lose 42% of jobs (102,000) as social distancing restrictions affect theater capacity and film production costs. Post-production and VFX lost €827 million in revenue (−58%). Radio projected a loss of 186 million euros in revenue

(−21%) in declining advertising volumes. Crafts may lose £513 million in revenue (53%), with the craft economy predicted to lose 47% of jobs (58,000) as many craftsmen experience the effects of closed workshops and retail space. Design and fashion designers in the creative industries suffer losses of €2 billion in revenue (−58%) and 30% of jobs (51,000). When we look at the reach of design across the economy, the risk is much greater, with a potential drop of €37 billion (−47%) in the BBA and over 300,000 jobs they believe will be lost. Museums and galleries suffer a loss of €3.9 billion in revenue (−45%) and 8% of jobs (7,000) from self-isolation. Architecture is projected to lose €1 billion in revenue (−24%) and 2% of jobs (1,800 jobs).

Italy, as the most affected country in Europe in February and March 2020. The national closure was announced on February 23, 2020, with an initial physical opening date of March 1, 2020. Museums outside the "red zone" of heavily contaminated areas in the North were then allowed to reopen if visitors stayed within 1 meter of each other, later reversed, and all institutions were closed nationwide until at least April 3, then until May 18, 2020. The closure forced an indefinite postponement of the upcoming Raphael "mega-exhibition" to be held at the Scuderie del Quirinale in Rome. Originally timed to coincide with the 500th anniversary of the Renaissance artist's death, this was to be the largest number of the artist's works ever exhibited together. That same week in May, as many cultural venues began to open, the Palio di Siena 2020 biannual July and August editions were announced to have been canceled for the first time since World War II. Simultaneously with the gradual lifting of travel restrictions within Italy, cultural sites and museums cautiously opened under the new rules by early June; the first was the ancient Greek archaeological site of Pestum near Naples on May 18, 2020.[3]

Disruptions in the world's economies, as well as in the culture and arts sector, including the cancellation of cultural, entertainment, business, and sporting events (including the world-scale Tokyo Olympics) have triggered a crisis in subsectors and related areas: publishing, brand management, design, advertising, show business, merchandising, the fashion industry, the souvenir industry and others.

Thus, the average market capitalization of companies in the clothing, fashion, and luxury sectors fell by almost 40% between early January and

[3] The impact of the COVID-19 pandemic on art and cultural heritage—https://ru.qaz.wiki/wiki/Impact_of_the_COVID-19_pandemic_on_the_arts_and_cultural_heritage.

March 24, 2020, feeling a much sharper drop than the stock market as a whole. Global fashion industry revenues (apparel and footwear sectors) will decline by 27–30% in 2020. With 80% of officially listed companies in Europe and North America closing their stores within two months, a significant number of global fashion companies are predicted to go bankrupt between 2021 and 2022.[4] The drop in economic profits is 93% in 2020 after rising 4% in 2019.

Some sectors of the creative economy have seen revenue growth, such as streaming video. The size of the global streaming video (streaming) market in 2020 was estimated at $50.11 billion. It is expected to expand at a compound annual growth rate (CAGR) of 21.0% from 2021 to 2028. Innovations such as blockchain technology and artificial intelligence to improve video quality are expected to drive market growth.[5] The real breakthrough in this sector came during the lockdown period. Because of the coronavirus pandemic, billions of people were isolated in their homes and were looking for any means of entertainment available to them—so the popularity of streaming services was just doomed to skyrocket. Streaming content through a variety of applications, game consoles, and multimedia devices is turning the ecosystem of connected TVs into a very attractive and actively developing medium of mass information. The global OTT market has grown from $104.11 billion in 2019 to $161.37 billion in 2020, posting an astounding compound annual growth rate (CAGR) of 55.0%. Audiences for video streaming services have surged around the world, with several streaming video platforms, including Netflix, Amazon Prime Video, YouTube, and Disney, recording a surge in viewership around the world. In March 2020, for example, Netflix recorded an increase of more than 50% in first-time installations of its mobile app in Italy and more than 30% in Spain.

People around the world used various streaming platforms during the period of self-isolation to get the latest updates on the state of COVID-19 (Pratt, 2020), to entertain themselves, to play games, and to communicate. Increased consumption of digital content from various sources, including mobile apps, streaming TV, and games, was observed in China

[4] State of Fashion 2021: In Search of Promise in Dangerous Times—State of Fashion | McKinsey. https://www.mckinsey.com/industries/retail/our-insights/state-of-fashion.

[5] Video Streaming Market Size & Share Report, 2021–2028—Video Streaming Market Size & Share Report, 2021–2028 (https://www.grandviewresearch.com/industry-analysis/video-streaming-market).

and Italy during the pandemic. Thus, various live streaming platforms, including Twitch, YouTube Live, Facebook Live, among others, have become increasingly popular. For example, in March 2020, Twitch's audience grew by 31% as more people logged on to streaming platforms. The live streaming segment accounted for the largest share of revenue in 2020, with a market share of about 61%. This is due to the growing demand for digital media devices combined with a faster Internet, helping consumer's access media content remotely. In addition, several other factors are increasing live video streaming, such as ad-free content, mobile viewing, analytics tracking, huge audience potential, and high-quality streams (Owolabi, 2020).

At the same time, the music industry has suffered the greatest losses of all the creative industries, with its current value of more than $50 billion and generated from two main sources of income. The first, live music, accounts for more than 50% of total revenue and is derived mainly from ticket sales for live performances. The second, recorded music, combines revenues from streaming, digital downloads, physical sales, and revenue synchronization (licensing music for movies, games, TV, and commercials). Recorded music is nearing a pre-pandemic peak in the industry today, reflecting the growing adoption of streaming services by music labels and consumers alike. Streaming now accounts for nearly half of recorded music revenue.[6] In the first quarter of 2020, revenue from online music subscriptions increased 70.0% over the previous year. The number of users who pay for music online reached 42.7 million, an increase of 50.4% over the previous year. As long as the laggards persist, revenues from live performances will be near zero, effectively cutting total industry revenue in half. Ticket and merchandise sales, a six-month absence of concerts is estimated to cost the industry more than $10 billion; longer concert bans will be even more permissive. In addition, the post-pandemic outlook appears challenging, and live music growth forecasts are expected to be substantially revised. Restoring consumer confidence in the sector will be difficult (Keat, 2000). Today, without vaccination, less than half of American consumers plan to go to concerts, movies, sporting events, and amusement parks when they reopen. This

[6] Here's how COVID-19 affects the music industry—This is how COVID-19 is affecting the music industry | World Economic Forum (https://www.weforum.org/agenda/2020/05/this-is-how-covid-19-is-affecting-the-music-industry/).

will affect the creative industry in a big way—it generates about 75% of its revenue from live shows.[7]

However, the art market reacted to the pandemic in its own way. In the midst of the pandemic, traditional auctions with bidders in the room were impossible. Auction houses shifted their live sales to digital and created new types of Internet-only formats to increase online sales. Even though online sales channels were growing before the pandemic, digital-only auctions thrived in 2020. During 2020, sales totaling $444 million were made through online auctions at Sotheby's, Christie's, and Phillips, a 388% increase over $ 2019. This accounted for 13% of total 2020 H1 sales compared to a meager 1.5% in 2019.[8]

The imposition of pandemic-related health regulations has led to unprecedented closures of museums and cultural heritage sites. About 90% of museums worldwide (more than 85,000 institutions worldwide) were temporarily closed during the crisis, and the remaining 10% may never reopen due to significant economic hardship. Sharp drop in revenues (3 out of 5 museums in the European NEMO survey reported a loss and an average of 20,300 euros per week due to closures and travel stoppages),[9] charitable contributions and sponsors for public and private museums, have put the financial sustainability of museums at risk, especially smaller museums.[10] This led to pay cuts and layoffs for a number of employees. According to a survey conducted by the International Council of Museums, 6% of temporary museum staff did not renew their contract,

[7] Here's how COVID-19 affects the music industry—This is how COVID-19 is affecting the music industry | World Economic Forum (https://www.weforum.org/agenda/2020/05/this-is-how-covid-19-is-affecting-the-music-industry/).

[8] Michael L. Klein New buyers prove art market sustainability and more key research—New Buyers Prove Art Market Resiliency and More Key Insights | in other words | Sotheby's. https://www.sothebys.com/en/articles/key-data-trends-from-art-auctions-during-the-pandemic.

[9] (May 2020) UN Report: Museums around the world face COVID-19. UNESCO, Paris, https://unesdoc.unesco.org/ark:/48223/pf0000373530.

[10] Network of European Museum Organizations, A Review of the Impact of the COVID-19 Situation on Museums in Europe. Final Report. https://www.ne-mo.org/fileadmin/Dateien/public/NEMO_documents/NEMO_COVID19_Report_12.05.2020.pdf.

and 16.1% of freelance museum professionals were fired.[11] Any further drop in income will lead to a decline in museum research and cultural activities. This poses a structural threat to the survival of companies and freelancers working in the museum ecosystem, which in turn will affect other cultural and creative sectors that also rely on these professionals for creative content. In times of the COVID-19 pandemic and depending on the country context, it is important to consider including museums in job support schemes designed to help small businesses keep their jobs. It is also helpful to consider specific tax incentives for donations and charitable giving to support investment in the sector (e.g., to specifically support young creative professionals in relatively more fragile subsectors, such as the visual and performing arts) (Huynh, 2020).

Discussions

In the future, museums will have fewer resources and opportunities to contribute to the social and economic development of local communities. In recent decades, museums have become drivers of local development and anchor institutions for many communities. They have increased the attractiveness of their cities, towns, or communities as places to visit, live, and invest, and are increasingly seen as vital community centers at the center of urban renewal efforts (Kashima et al., 2021; Osipov et al., 2018). Distancing measures have led to a dramatic withdrawal of museums from local development projects, as well as the cancellation of cultural, social inclusion, and educational programs, only partially replaced by new digital offerings.[12] For example, museum exhibitions and events often deal with complex topics, such as intercultural dialogue or the integration of minorities and migrants, which may be more difficult to realize digitally. In the medium term, museums will have fewer opportunities to contribute to local development projects. There is a risk that museums will reduce the scope of their activities, in addition to reducing the level of activities.

[11] ICOM - International Council of Museums (2020). Museums, museum professionals and ***COVID-19***. https://icom.museum/wp-content/uploads/2020/05/Report-Museums-and-COVID-19.pdf).

[12] OECD-ICOM (2019), Culture and Local Development: Maximizing Impact, A Guide for Local Governments, Communities, and Museums. https://doi.org/10.1787/9a855be5-en.

In Russia, during the spring and summer months of 2020, the loss of the creative industries, according to experts, reached 150 billion rubles, and the industry lost a lot of talented professionals who will have to look for other work. The creative industries are made up of 50% self-employed and individual entrepreneurs. Creative businesses have difficulty accessing financial support because they are often based on intangible assets (skills, experience, reputation, connections) that are difficult to assess from the perspective of lending institutions. Among the negative side effects in the medium term, experts note: a drop in investment in the industry (both private and public), losses in income from sponsorship and copyright sales, lower marketing costs, a drop in demand for products and services (changing consumer habits due to the COVID-19 pandemic), reduced income and production activity due to social distance measures, and a decline in the share of the creative class due to lack of demand in the labor market (Flew & Kirkwood, 2021).

In addition to the immediate impact on jobs and incomes, the current crisis and measures of social distancing are likely to have long-term effects on the cultural and creative sectors. The combination of shocks to investment and demand, as well as expected reductions in public and private funding, could lead to the disappearance or significant reduction of other viable, private firms in the sector (Kay & Wood, 2020). The result would be a loss of skills for those creative professionals who would have to give up their creative activities and seek other work to earn a living. The impoverishment and decline of the cultural and creative sectors will negatively affect cities and regions not only in terms of direct economic and social impact, but also in terms of the well-being, vitality, and cultural diversity of cities and communities (Osipov et al., 2018, 2020; Yankovskaya et al., 2020).

The massive digitalization in recent months in culture and the arts is clearly not temporary and can create new forms of experience and business models with market potential. There is an opportunity for a major innovative breakthrough in terms of the deployment of modern technologies that enable "presence at a distance" (AI, virtual and enriched reality, Internet of Things, etc.) to build a new "experience economy." New forms of digitally mediated, decentralized creative production allow interaction with larger and broader communities not only on the receiving

end, but also in terms of content production. This trend can lead to more inclusive and innovative forms of collective creative content production.[13]

Conclusions

Drawing on the impact of the COVID-19 crisis on both education and the cultural and creative sectors, strategic complementarities can be developed. Both sectors have seen accelerated digitalization, which creates new opportunities for local and regional development, as well as risks of increasing inequalities without accompanying measures (Osipov et al., 2020). Such accompanying measures include, for example, the development of methodologies and technological solutions for distance and distributed learning with digitally mediated access to cultural resources and experiences. Blockchain and social distancing measures have also emphasized the importance of arts and culture for people's mental well-being and, perhaps through the increasingly documented psychosomatic effects of cultural access as well as health. This recognition provides a new opportunity to capitalize on the role of art and culture in preventing and treating disease across the lifespan, helping to address health and welfare systems, such as reducing hospitalizations or medication rates.[14]

In addition to the immediate impact on jobs and incomes, the current crisis and measures of social distancing are likely to have long-term effects on the creative and cultural industries. The combination of shocks to investment and demand, as well as expected reductions in public and private funding, could lead to the disappearance or significant reduction of other viable and valuable firms, personal and valuable firms, personal in the sector. The result will be a loss of skills for those creative professionals who will have to give up their creative activities and seek other work to earn a living (Durante et al., 2021). The impoverishment and decline of the cultural and creative sectors will negatively affect cities and regions not only in terms of direct economic and social impact, but also in terms of the well-being, vitality of cities and communities, and cultural diversity.

[13] World Economic Forum (2020).

[14] https://www.oecd.org/coronavirus/policy-responses/culture-shock-covid-19-and-the-cultural-and-creative-sectors-08da9e0e/#section-d1e112.

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CHAPTER 11

Impact of the COVID-19 Pandemic on the Housing and Construction Markets

Mariia I. Ermilova and Irena Zavrl

Introduction

Currently, all major sectors of the economy, including construction, are experiencing the consequences of the COVID-19 pandemic. The crisis, which is not economic in essence, has shown the need to transform several areas, which will enable future adaptation to various crisis phenomena. The pandemic highlighted digital imperfections and critical errors that were made by economic actors and prevented the acceleration of market development.

The housing and construction markets were some such spheres. These are the areas where the interests of a wide range of subjects are coordinated. Thanks to the development of these markets, large lists of

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_11

socioeconomic problems are being solved in various states. The housing and construction markets, as well as related industries, occupy a significant share of the country's economy.

To make an informed decision on the construction of residential real estate, a thorough analysis of information regarding both the construction procedure itself and the financing of the process actors (construction companies, home buyers) is required.

In the housing market, the interests of various subjects of these markets are combined and satisfied. The object of the research is the information infrastructure of the housing market; the subject is the economic relations formed in the housing market when making decisions on the construction and purchase of housing in the post-pandemic period. The aim of the study is to create an improved information infrastructure for the housing market in the context of the impact of the COVID-19 pandemic.

Within the framework of the study, it is planned to solve several problems:

- evaluate the existing information infrastructure of the housing market;
- explore opportunities to improve the information infrastructure of the housing market, taking into account the impact of the pandemic and the development of foreign markets;
- formulate the principles that the improved information infrastructure of the housing market should comply with under the influence of the COVID-19 pandemic;
- determine the impact of a developed information infrastructure on the functioning of the actors of the housing market, including in terms of their financing, in the post-pandemic period.

The hypothesis of the study is that improving the information infrastructure of the housing market makes the decision to build and purchase residential real estate more balanced and reasonable. In an era of the active digital transformation of the economy, alongside the ongoing consequences of the pandemic, a prerequisite for the functioning of any sector of the economy is the use of all information opportunities and ensuring the unity of approaches to the formation of information flows.

Methodology

In theory, scientists and experts have long believed that all market participants and actors have access to all information in the same volume. However, this point of view caused certain doubts, in connection with which a number of researchers continued their research in order to prove or disprove such an assumption. Kenneth J. Arrow in 1963 was one of the first to show the asymmetry of information (Arrow, 1963). By 1970, George Akerlof had developed a market model with asymmetric information (Akerlof, 1980); the results obtained and further research led to Akerlof and his team being awarded the Nobel Prize in Economics in the early 2000s for analyzing markets with imperfect information. In 1962, George Stigler studied the possible relationship between information flows and the labor market (Stigler, 1962). William Vickrey's research was devoted to the formation of a new inheritance tax in Puerto Rico, the development of stages of action in progressive taxation (Vickrey, 1947). Another work devoted to taxation became the basis for the analysis of the profitability of the taxation system, taking into account asymmetric information flows, which was published by J.A. Mirrlees; also in 1997, his book "Information and Incentives: The Economics of Carrots and Sticks" was published (Mirrlees, 1997).

Another well-known scientist who conducted research on the influence of the asymmetry of information on markets was Josef Stiglitz. He analyzed the functioning of insurance companies and the influence of information flows on decision-making (Stiglitz, 1979). A mechanism of "reverse market adaptation" was developed, the essence of which was that informed subjects of market relations receive information from more informed ones. Together with Sanford J. Grossman, the influence of information asymmetry on financial markets (the Grossman-Stiglitz paradox) was analyzed (Grossman & Stiglitz, 1980). These were not the only studies on the asymmetry of information and its impact on different segments of the economy; others include Green (1973), Kihlstrom and Mirman (1975), and Fama (1970). As a result, most researchers concluded that the insufficient efficiency of markets was due precisely to the fact that not all subjects received the same amount of information.

Analyzing the works of various authors (Boyd, 2014; Mccord et al., 2011; Mingazova, 2013; Murzin, 2013; Osipov, 2019; Reed & Wu, 2010; Sazhin & Inchina, 2010; Shim et al., 2013; Zhu et al., 2017),

we can conclude that, as such, an analysis of the influence of the asymmetry of information on the housing and construction markets is not fully presented. However, in modern conditions—and especially in the post-pandemic period—this is especially relevant and necessary. This will improve the efficiency of transactions in the housing market for all entities.

The use of the comparison method made it possible to determine how exactly the existing information infrastructure of the housing market can be changed into such an infrastructure to become as efficient as is able. In addition, comparison with other foreign information infrastructures of the housing market can be made to search for those elements that can be adapted in Russian practice.

The method of analysis allows both an assessment the current state of the infrastructure and further study into what advantages and disadvantages can be obtained through improving the information infrastructure of the housing market. With the help of synthesis, the results of the analysis of the existing information infrastructure of the housing market were combined and used to build an improved information infrastructure.

The deductive method allowed us to accumulate all the available information and formulate informed conclusions about what the principles should be, and then which will correspond to the improved information infrastructure of the housing market.

Modeling made it possible to build the version of the information infrastructure of the housing market presented by the authors, as well as to present the need to introduce a single information center in post-pandemic.

Thus, the widespread use of research methods enabled us to obtain the highest quality research results.

Results

The analysis of many studies made it possible to reveal that, as such, an approach to the definition of the information infrastructure of the housing market is not presented in the works. The presence of information asymmetry and its influence on economic actors has also not been fully investigated. The housing market, solving many socioeconomic problems, needs consistency and an effective information infrastructure of the market in the post-COVID economic revival era.

A prerequisite for the presence of asymmetric information on the market is the receipt of different amounts of information on the procedures for the construction and purchase of housing by market entities, as well as their interaction with financial markets.

If we evaluate the approaches to the definition of information infrastructure in general, then this is basically a list of various software products that can be used to collect information about the analyzed object. Of course, in this area, there may also be asymmetric information for different market participants. This is due, among other things, to different approaches to assessing the information provided. In the context of the digital transformation of the economy and the impact of the pandemic, the issues of information asymmetry are becoming even more relevant.

Information infrastructure in the housing market implies making the market more efficient. All the necessary information will be in a single center, including both information about private entities and information accumulated by the state. Thus, it will be possible to reduce the negative impact of the presence of asymmetric information. The multidirectional content of the data will be reduced to uniformity. In countries of emerging markets such as Russia, there is also a problem with the late provision of information from state organizations (e.g., Federal State Statistic Service of the Russian Federation (Rosstat)) (Osipov, 2016). There are organizations created by the state that concretize the collection of data in a specific segment (e.g., the mortgage market). However, at the same time, they can collect information from foreign organizations, such as Freddie Mac and Fannie Mae. Incomplete data also lead to information asymmetry.

It is the danger of getting into the risk zone that predetermines that market participants reduce their potential demand, or completely abandon transactions in the market. There are already problems with developers who cannot sell the constructed objects. The asymmetry of information is reflected in the formation of housing prices, which can affect the volume of its sales. This problem was especially acute during the pandemic.

An attempt to solve the previously mentioned problems may be just the creation of an improved information infrastructure, in which uniform information flows are assumed for all subjects of the housing market independently of lockdowns, pandemic, or the post-COVID era.

The multi-level housing market suggests that, to effectively build an information structure, it is necessary to start with a single-level information infrastructure system; after that, it is possible to gradually form the

final infrastructure to subsequently accumulate data into a single system. It is essential to consider the presence of regional subdivisions of state institutions that accumulate information about the market, as well as to focus on the procedures for accumulating information during crises, especially those not of an economic nature, as was the case during the pandemic.

The COVID-19 pandemic has shown that in many industries it was the lack of debugging in information processes that led to a slowdown in the procedure for obtaining information, a decrease in the efficiency of economic actors. It is essential to create a single platform as such, where economic actors and their interests will meet and where all information will be processed efficiently and promptly. It is important to include not only information on the domestic construction and housing market, as well as related industries, but also data on relevant foreign entities.

As a result, the information infrastructure of the housing market will provide its potential consumers with comprehensive information on the volume of construction, the value of land and real estate, interest rates on loans, other instruments for financing the construction and acquisition of residential real estate, data on market entities, as well as to reduce the number of illegal transactions. All this can be accessed only with the use of modern digital technologies. The pandemic pushed economic actors to use digital technologies to inspect and survey the objects, conduct negotiations and correspondence, and make other such changes, right up to online transactions using digital signatures and online filing of documents for state registration of rights.

Summing up, there are clear advantages of creating an effective information infrastructure for the housing market:

- the efficiency of obtaining data on the functioning of the housing market and the instruments for financing its subjects and transactions;
- transparency of the activities of all subjects of the housing market;
- the formation of an idea of the planned and forecast indicators of market development;
- access to a complete list of instruments for financing transactions in the housing market;
- increasing the attractiveness of the market for economic actors;
- the ability to quickly adapt markets to the consequences of the crisis, including those that do not have an economic essence (pandemic);

- development of housing and construction markets;
- the reduction of risks for economic actors, including individuals purchasing housing.

For the population, the information structure will allow them to have access to transparent, adequate information, which will allow them to make a more informed decision about investing in housing. It will also be a kind of tool for increasing the availability of residential real estate for citizens.

It is assumed that the information infrastructure of the housing market will be a built-in mechanism in the country's economic system. It is essential to create an information agency around which a mechanism for interaction between market entities will be built. This should further ensure the timeliness and completeness of information.

It is also assumed that the generated information flows should go to a single information agency, which will become the subject, which will present the data to interested parties. The formation of data should be carried out considering the parameters that will be set by potential users of information. It is important to consider that the structure must be adaptive. The adaptability of systems is one of the basic principles of the formation of effective systems for servicing the country's economy; the pandemic crisis has once again shown that.

The basic principles that the information infrastructure of the housing market on the example of Russia will comply with, considering international experience, are:

- the unity of the information base;
- wide coverage of information, allowing users to make an informed decision;
- operational information;
- ranking of information depending on the user's request;
- transparency of information;
- funding at the initial stages of operation for the creation of a news agency comes from state funds;
- online transactions without physical contact between people, which is important not only in a pandemic but also in a post-pandemic period.

Advantages of the news agency functioning in the system include:

- updating information for market entities;
- a high level of awareness of market entities about opportunities, including financing;
- growth in the level of demand from stakeholders;
- optimization of the level of various types of risks;
- reducing the volume of costs for market participants;
- more thorough justification of decisions on transactions in the housing market;
- increasing demand for various instruments for financing the construction or purchase of housing;
- transparency of activities of economic actors;
- creating conditions for reducing fraud in the housing sector.

There are, however, some disadvantages too, which should be highlighted:

- an increase in the amount of funding from the state to create a smooth operation for the agency;
- the complexity of the organization of this entity and ensuring the promptness of the provision of information by available information sources;
- the complexity of interaction with the subjects of the housing market at the initial stages of operation.

If the news agency is created within the framework of a national project, then it is also advisable to consider the regional structure of the country. The pandemic has shown that regions and their regional markets react differently to the consequences of the crisis, including the lack of digitalization of certain areas, which generally negatively affects the industry.

All subjects of the housing market are interested in the presence of an entity that will accumulate adequate, relevant information required for any transaction on the market. It is possible to envisage separate possibilities of financing from regional and local budgets, since the agency will operate not only in a single structure, but will also have branch offices in the regions (Osipov et al., 2020).

Summing up, we note that at present—after the pandemic and as different countries' economies recover from its consequences—it is required to significantly revise the processes in many sectors. The housing and construction market are no exception. Digitalization should solve several problems and reduce risks for market entities. Thus, any decision to build, invest, or purchase residential real estate will become much more justified.

Discussions

It is expedient to assess the impact of the information infrastructure of the housing market on the decision to build or buy housing when creating a single information agency.

Figure 11.1 shows that the presence of an information infrastructure and a single information center that accumulates data makes it possible to improve the quality of the financing process, both from the state

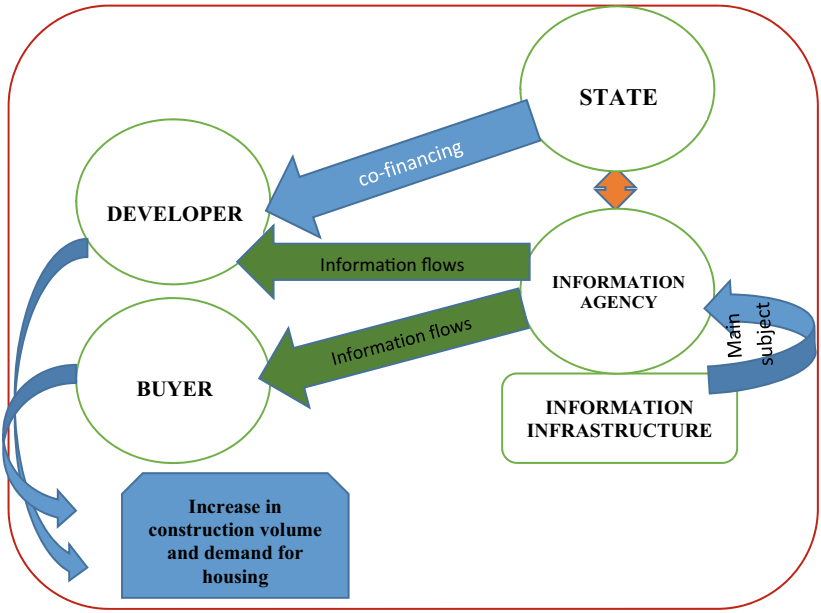

Fig. 11.1 Analysis of the impact of the information infrastructure of the housing market on the decision to build or buy a home (*Source* Designed by the authors)

and from other subjects of the housing market. Information flows that come to prospective developers and buyers allow making an adequate and informed decision about the planned construction or acquisition of residential real estate. After collecting complete information, it is analyzed in a single information agency. Further, this data for a specific request can be provided to various market participants who are interested in its maximum level of quality and completeness. The figure shows that the state is one of the information providers, and at the same time a consumer. The information infrastructure includes all information flows from various databases. The data is redirected to the information agency, which accumulates and analyzes it, forming information flows that are uniform for all in terms of content. The information agency can contribute to the development of the housing market, effective financing of subjects and construction projects.

The complete database, which is collected by the news agency, allows the subjects of the housing market to obtain the effect of increasing the volume of construction and increasing the effective demand from buyers to a greater extent. The data will not be stored separately, which means that they will be uniform in content and in the time of receipt and processing. An important principle is the promptness of the information received; it is necessary to ensure that information is received in real time. This will be able to solve the problems faced by market actors when interacting with Rosstat. Analyzing foreign experience, in many developed countries, information is accumulated as much as possible in a single source, for the convenience of its consumers (Gutbrod, 2020; Osipov, 2021; Sidorenko & von Arx, 2020; Yankovskaya et al., 2020, 2021).

Evaluating the presented Fig. 11.1, we can say that a certain system is being formed that will improve the functioning of the market and increase the efficiency of transactions carried out in the market. Unreasonable costs can be excluded.

An information infrastructure that considers both the current state of the markets and current or possible crisis situations should provide not only constant information flows that are uniform for all entities, but also financial flows that will allow solving the problem of housing affordability for the population.

It is also essential to assess the impact of the unified information infrastructure of the housing market on the financing of its subjects, especially in the context of digitalization and crises that do not have an economic essence.

Analysis of the market and its digitalization makes it possible to conclude that it is insufficient, and the market needs a continuous digital transformation in the post-COVID era. This can be confirmed by the decrease in market efficiency during the pandemic, and the fact that not all market entities were able to quickly respond to the new operating conditions.

The digital transformation of economies will continue, and there is no certainty that new types of crises that do not have an economic essence will not appear. Each market must be ready for the urgent need to adapt to new conditions. In the housing market, it is the information infrastructure that can, considering all external conditions, enable the painless adaptation to new economic conditions and so provide comfortable conditions for market entities.

Conclusion

Thus, as a result of the study, the following results were obtained and conclusions were formulated:

- the pandemic has shown the need for a serious digital transformation in markets, including housing, which solves a number of socioeconomic problems;
- the formation of a single information agency is required, which accumulates all information on the housing market and the possibilities of financing its subjects and objects into a common base;
- the information infrastructure of the housing market can have a significant impact on decision-making regarding the construction and purchase/sale of housing. The fragmentation of data creates an information "hunger." The presence of a single database makes it possible to increase the efficiency of the decisions made regarding the financing of the subjects of the housing market, especially in the context of the digital transformation of the economy.
- the influence of the developed information infrastructure on the functioning and financing of the subjects of the housing market was revealed, in the context of the digital transformation of the economy and the consequences of the COVID-19 pandemic, which suggests the possibility of a more effective redistribution of financial flows within the market, increasing its quality and ensuring the fulfillment of socially significant tasks of the state.

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CHAPTER 12

The Use of Artificial Intelligence in Automation of Planning and Operational Management of Organizational and Technical Systems in the COVID-19 Pandemic

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Introduction

Organizational and technical systems (OTS) include systems, at the objects of which decisions are made on the implementation of measures, coordinated with the actions of other objects (systems) or aimed at coordinating these activities. Technical-engineering systems have a hierarchical structure. Functioning of OTS (production, banking, medical, construction, military systems, and a number of others) occurs in conditions of uncertainty of the information processed in decision-making. Uncertainty

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_12

of information can be caused by its incompleteness, redundancy, unreliability, vagueness, and inaccuracy (Fertier et al., 2020). There are two types of information uncertainty conditions: statistical and non-statistical uncertainty conditions (Matorin & Zhikharev, 2019). As conditions of statistical uncertainty of processed information, such conditions of OTS functioning are considered, under which it is possible to implement the same decisions repeatedly (under fixed conditions of situation), as well as to collect and process statistical information about the course of implementation of these decisions. To assess the decisions made under these conditions, the methodological tools of probability theory and utility theory are used (Lee et al., 2019, 2020).

The conditions of the OTS functioning, in which there is a continuous change of the situation, leading to the uniqueness of the decisions made, correspond to the conditions of non-statistical uncertainty of the processed information. To assess the decisions made under these conditions, it is proposed to use the methodological tools of the theory of possibilities (Dyubua & Pred, 1990).

The conducted research allowed us to develop such an approach and prove that it can form the basis of creating a technology of automated OTS management, which involves solving the problems of developing a plan of upcoming actions, assessing the progress of its implementation and correction (re-planning in a short time) if necessary. The approach to the development of models for assessing the feasibility of decisions is based on the situational synthesis of models for assessing the capabilities of the system to implement management decisions that correspond to the considered situation of its functioning.

It is worth noting that solving the problems of automated planning and correction of previously formed plans for complex OTS is especially relevant in conditions of increasing risks and non-statistical uncertainty in the COVID and post-COVID period.

The proposed idea is to equip the control systems of the OTS facilities with intelligent decision support systems (IDSS). The core of the IDSS should include the means to perform the following functions:

- representation of the objective of object functioning and situations in a formalized form;
- identification of the current situation of object functioning;
- situational synthesis of the models for evaluating the decisions about the tasks to be made;

- formation of a rational strategy for management of the object;
- development of the plan of forthcoming actions;
- assessment of the implementation progress and automated correction of the forthcoming action plan (if necessary, re-planning).

To solve the tasks of modeling of the OTS, it is proposed to use expert systems combined in decision support systems (DSS) (Fertier et al., 2020; Zhang et al., 2020). However, there are no theoretical developments to ensure the creation of a system that controls the operation of DSS, and there is no approach to assessing the feasibility of human decisions under the conditions of non-statistical uncertainty of the processed information. The lack of these developments is the main reason that the existing approaches to the automation of management processes in the OTS are not focused on the implementation of such IS functions as the automated development of plans for upcoming actions, assessment of the progress of their implementation and correction. Theoretical tools of existing approaches provide the construction of AI and IS, providing the solution of primary information processing and only partially its secondary and tertiary processing.

Methodology

In existing approaches to the design and functioning of IS, a large place is given to the tasks of data access and primary processing. Modern information technologies allow solving the problem of information and technical compatibility and portability of software, and also allow solving the problems of data replicability and inoperability. The analysis of modern information technologies shows that the capacity to solve the problems of primary data processing clearly exceeds the needs determined by the existing approaches to automated OTS management.

First of all, we are talking about the fact that modern information technology is not focused on solving the main problems of the OTS. Such problems include the solution of problems of automated development of plans of forthcoming actions, assessment of the progress of their implementation and correction. The practical output of all existing information technologies is the organization of rapid access to data and their primary processing. The high value of these technologies for users in various OTSs is undoubted, but this value would be even higher if these technologies were able to solve the problems of secondary and tertiary information

processing. There are two main reasons holding back the development of information technology in this direction.

Secondly, it is the previously mentioned topical problem of developing models for evaluating the feasibility of decisions made under conditions of non-statistical uncertainty of processed information.

The plan of forthcoming actions developed in an automated way on some object of OTS management should be coordinated with the plans developed in the same way on its subordinate objects. The plan of forthcoming actions worked out at some OTS object is connected to a set of data in various databases which are created in the process of the plan development. The number and structure of databases are not known in advance, which is determined by the non-statistical nature of decisions made during development of plans of forthcoming actions.

The process of coordinated development of plans of forthcoming actions at all objects of the system involves the transfer from one object to another of substantial amounts of data, representing a version of the plan of forthcoming actions of this object or its fragments. Receiving this data object in advance does not "know" quantity and structures of databases in which it will be necessary to place the data from the transmitting object.

Thus, there is a problem of openness OTS on the logic of data processing. The solution to this problem is the transfer of the databases themselves. However, the data itself is of little value to the decision maker. For automated processing of the received plan, software is needed to reproduce this plan (formalized representation and processing of the plan in the computer memory, as well as visualization of the plan). Moreover, software code is needed, which contains a scenario of this reproduction (logic of the plan). Data transfer in the process of implementation of the previously formed plan requires the transfer of the same data, but with a shorter processing time. Hence, the problem of software portability arises when solving the problems of automated development of plans and their implementation. The solution to this problem goes beyond data transfer and database management technologies and requires a single software at each OTS facility, which may include:

1. tools for developing plans for upcoming actions, assessing the progress of their implementation, and correcting them;
2. tools to ensure the portability of software, including from one hardware platform to another.

This software should provide openness in data and logic of their processing not only between the objects of one OTS, but also between the objects of different OTSs.

Results

The proposed technology of automated control requires the availability of IDSS with a typical core consisting of secondary and tertiary data processing tools, which operate under unified rules, at the facilities of different OTSs. At the same time, it is possible to implement the IS on different hardware platforms.

Development of plans of forthcoming actions, evaluation of their implementation, and correction are made according to algorithms, common for objects of various OTSs. These algorithms include algorithms for developing a plan of forthcoming actions, evaluating the progress of its implementation and correction, and algorithms for modifying the subject area. The last algorithm is intended for the continuous analysis of available resources of the system and correction, in case of their change, of lists of situational features and control decisions, matrices of conformity, and other data forming the subject area of IDSS.

Integration with other OTSs is performed by means of coordination by the considered system of the plan of forthcoming actions with similar plans of other systems. The distinctive feature of this process from the process of development of the plan of forthcoming actions is the use of algorithm of modification of a subject area in the process of coordination of plans of forthcoming actions of integrating OTS. Subject domain modification in this case consists in increasing the number and volume of databases, as well as in expanding the lists of situational features and control decisions. Practical implementation of the algorithm of subject area modification is carried out by logical mechanisms of the IDSS kernel.

The intellectual system of the OTS object within the framework of the proposed technology is understood as a software shell, providing interaction between a computer and a person, and providing him with opportunities to control the functional equipment of the object when solving problems of developing a plan of forthcoming actions, assessing the progress of its implementation and correction. The basis of this shell is formed by a typical IDSS kernel.

Discussions

Let's consider the modular structure of the typical IDSS kernel and describe the tasks solved by each module.

The main task of the current situation identification module is to control the modules of identification of current values of situational features (MICVSF), which are elements of the application software. An improved method of situational management is proposed for the module operation. Conducted by authors of researches have allowed to draw a conclusion about possibility of setting correspondence of type "value of situational feature - set of control decisions." The validity of this approach is explained by the fact that each situational feature (SP) corresponds to a certain subject area, in which decisions are made that depend on the state of the object. Each SP corresponds to a finite set of its possible values, and each value corresponds to a finite set of decisions about the performance of actions (tasks).

Another disadvantage of the situational management method is the lack of means of evaluating the expediency of transition of OTS from one situation to another. To eliminate this disadvantage, it is proposed to evaluate the decisions aimed at transition of the system for each OTS from its current value to the required value. This evaluation is based on the analysis of the possibility, usefulness, and necessity of performing each control decision from the set of decisions corresponding to the current value of the SP.

A situational feature is considered to be a factor of the environment for identification of its current value, which requires analysis of the subject area corresponding to this factor. At present, the rules of selecting situational features and their values are being developed. Conducted researches allowed to distinguish three groups of situational signs: corresponding to external and internal factors of situation, as well as functional capabilities of the system.

Each MICVSF is an intellectual system, the task of which is to collect and evaluate the uncertainty of information necessary to identify the current value of the situational feature, identification of the current value and generation of control decisions, and corresponding to this value. Assessment of uncertainty of information consists in checking its consistency, reliability, and completeness.

The set of identified values of situational attributes at a fixed point in time forms the current situation. In other words, the current situation is

understood as a formalized representation of the state of the considered TS, processes, and conditions of its functioning at a fixed point in time.

The number of controlled MICVSF can vary, and one of the tasks of the module under consideration is to provide the decision maker (a person) with the ability to compose the structure of the situation (to determine the number of considered situational attributes). In order to process in the computer memory situational features, the values of which have different physical meaning and dimensionality situations are represented in the form of fuzzy sets of the second level (Melihov et al., 1990).

The MICVSF control is understood as the activation of each of the set of data modules according to the current value of its update period. It should be noted that the values of the update period for each MICVSF can change depending on the emerging situation. Changing of the update period is performed with the help of the timer of the Current Situation Identification Module.

The main task of the *plan development module* is development of a rational plan of forthcoming actions and its formalized representation in computer memory. A necessary condition for developing a plan is the presence of current and target situations. Identification of the current situation is continuously performed by an appropriate mechanism of the IDSS kernel. Formation of a target situation is also performed by an appropriate mechanism of the IDSS kernel.

The target situation is a set of required values of situational attributes, corresponding to the state of the system, to which it must be transferred. The presence of the current and target situations makes it possible to form the structure of the plan of forthcoming actions, which is carried out by the control strategy formation module. A management strategy is understood as a set of basic (intermediate) situations separating the current situation from the target one.

Thus, management strategy is considered as a structure of the plan of forthcoming actions. When forming a management strategy, several variants of the strategy can be obtained.

Developing a plan of forthcoming actions consists in working out successive plans of transition of the system from a situation to a situation on the "path" from the current situation to the target one. To work out such plans, modules for developing a plan for transition of the system from one situation to another are activated. Each such plan is a virtual model of predicted actions of the system during its transition from one

situation to another. Virtual model consists in the fact that it represents all possible combinations of various kinds of real models used in modeling the predicted actions of the system and the conditions of its functioning during transition from one situation to another. The list of real models is determined by the purpose of the system.

The description of synthesis of virtual models will be given when considering the work of the module of development of the plan of transition of the system from situation to situation. Logical links between real models are determined by the content of the situation under consideration, as well as by the content of the situation to which it is necessary to transition. Since the functioning of organizational and technical systems takes place in conditions of non-statistical uncertainty of processed information about the state of the system and conditions of its functioning, these links are unknown in advance and are formed directly in the process of developing the plan. On this basis, before the development of the plan of upcoming actions, the models of implementation of control decisions, forming the content of this plan, as well as the number, structure and volume of databases corresponding to these models, are unknown.

To each of set of plans of transition of system from one situation to another, forming the contents of the plan of forthcoming actions, there correspond values of the indicators characterizing opportunities and necessity of this transition. Consequently, as a result of development of the plan the distributions of values of possibilities and necessity of transition of the system from the current situation to the target one are formed. The processing of these distributions allows to obtain the values of indicators, which characterize the possibility and necessity of achieving the target situation. The offered approach to development of plans of forthcoming actions assumes realization of procedure of "return" by situations, situational attributes and control decisions with the purpose of achievement of required values of possibility and necessity of achievement of a target situation.

Integration of the system under consideration with other organizational and technical systems is performed at the level of plans for their upcoming actions and consists in the coordination of these plans. Two variants of coordination of plans are possible.

The first variant takes place when the structure of the plan of forthcoming actions is based on the structure of a similar plan of another system. In this case, the system in question acts for the benefit of the other system. An example is a team of electricians acting in the interests

of a complex team of builders. For systems that integrate in such a way, the target situation will be accompanied by the marks of situations (via data transmission channels) that reveal the structure (idea) of the plan of forthcoming actions of the system the system in whose interest the system in question will act.

The second option takes place when integrating systems agree their plans in order to eliminate conflict situations. In this case, restrictions caused by the functioning of other systems are imposed on the implementation of some or other control decisions that form the content of the plan of forthcoming actions of the system under consideration.

The task of the module of formation of a target situation is a formalized representation in computer memory of a goal of functioning of the system by transformation of a text, a speech message, and/or multimedia data into a set of values of situational attributes corresponding to their content. At the heart of the solution of the task is the processing of role situations, consisting of role frames and frames of concepts (Kuzior et al., 2019; Trunk et al., 2020).

The module of development of the plan of transition of the system from one situation to another is designed to develop a plan of this transition and provides the decision maker (human) with the ability to solve the following tasks:

a. matching control decisions corresponding to the current values of various situational attributes;
b. situational synthesis of virtual models for implementation of control decisions;
c. development and formalized representation of virtual plan of system transition from one situation to another;
d. evaluation of priorities of control decisions.

Coordination of control decisions consists in their evaluation for consistency, continuity, non-duplicity, and isolation in time. This evaluation is made in the process of structurization of the plan of transition of the system from one situation to another. The structurization is based on the process of "unfolding" the technological chains of executing the control decisions generated as a result of identifying the current values of situational attributes. In turn, the process of "deployment" is based on

the approach proposed by the authors of the article to the classification of control decisions on the execution of actions (tasks) (Eber, 2020).

According to the classification developed by the authors, all solutions are divided into three types: actions, tasks, and generalized tasks.

Generalized tasks are a set of tasks performed by heterogeneous objects of a system. For example, for construction: simultaneous work of several teams—painters, plumbers, electricians, etc.

The main idea of the proposed classification is the correspondence of each action, the model of its implementation by some OTS object in the considered conditions of the environment, taking into account the design and technical features of this object. This model describes the process of action performance and allows to estimate its feasibility. From action implementation models (the number of which for each object is small), synthesis of virtual models of feasibility of control decisions on execution of tasks and general tasks is performed. In this case, technology (structure of models) of implementation of control decisions on execution of tasks and general tasks is determined in the process of identification of current situations not only for the object in question, but also for objects subordinate to it. To transfer a system or object from one situation to another, it is necessary to develop models of implementation of generalized tasks, as well as to determine the predicted result of the implementation of control decisions on the execution of actions.

The procedure of structurization of a control decision consists in constructing a process chain for implementing this decision (it determines the list of control decisions to execute actions and lower-order tasks and the sequence of their execution). Formation of data objects consists in defining the initial, intermediate data, and the required result of the control solution execution.

Estimation of feasibility of a control decision is formed of a set of estimations, characterizing the capabilities of control decisions about the execution of lower-order tasks, included into the technology of the decision in question. The logic of the human-formed technology of the control decision under consideration is represented in a formalized form (coded). The coding process consists in activating an appropriate procedure, which is a part of the control logic processing system of the IDSS core.

Formation of an alternative variant of realization of the control decision on performance of an action (task) is performed at the level of setting

the identifiers of databases, data objects, and the code of logic of realization of the decision in this variant corresponding to the considered variant. Each variant is assigned one or more evaluations characterizing its quality (solution feasibility).

Selection of a rational variant is carried out by an appropriate procedure based on the processing of quality evaluation of all alternatives. It should be noted that this procedure is universal for various managerial decisions.

Assessment of the feasibility of control decisions under conditions of non-statistical uncertainty is carried out with the help of such a measure of uncertainty as a measure of possibility, which characterizes the feasibility of a decision under the conditions of the environment in question (Bogachov et al., 2020; Eber, 2020).

The availability of assessments characterizing the possibilities and the necessity of control decisions providing the transition of the system from one situation to another allow their convolution to determine the possibilities and the necessity of this transition. The presence of these evaluations for each of the set of control decisions under consideration allows to determine their priority, which is subsequently used by the control system of the IDSS kernel when prioritizing the processes it controls.

The proposed approach to development of a virtual model of the plan of transition of the system from one situation to another involves implementation of the procedure of "return" by situational attributes and control decisions in order to obtain the required values of assessments of the system's capability to perform this transition.

The module of realization of the plan of forthcoming actions (operative management) is intended for solving the following main tasks:

a. comparison of the current situation with its corresponding situation in the previously formed plan;
b. activation of the model of the previously formed plan of transition of the system from one situation to another;
c. situational synthesis of a virtual model of the system transition plan from the current situation to the required situation;
d. Evaluation of the expediency of maintaining the management strategy and the target situation;
e. integration of the system with other systems and its self-organization in critical situations.

The purpose of comparing the current situation with the corresponding situation in the previously formed plan of upcoming actions is to determine the degree of correspondence of the situations under consideration and to determine those control decisions and situational attributes that cause this discrepancy. If a mismatch is detected, the transition plan from the current situation to the next one is corrected. If necessary, the entire plan of upcoming actions or its separate fragments can be corrected, and the management strategy and the target situation can be adjusted. If correction is not necessary, the model of the previously formed transition plan is activated.

The assessment of the expediency of preserving the management strategy is carried out by activating the mechanism of forming the management strategy. The essence of the evaluation process consists in revealing a possible change in the management strategy as a set of basic situations, caused by a discrepancy between the current situation and the corresponding situation in the previously formed plan. It is necessary to identify two extreme cases, leading to the need to change the management strategy.

The first case can be caused by low values of possibilities of system on its transition from current situation to required situation under condition of coincidence of values of situational attributes in current situation with values of the same attributes in corresponding situation of previously formed plan.

The second case takes place when the current situation differs from the corresponding situation in the previously formed plan by values of situational attributes. As a result of evaluating the expediency of preserving the management strategy, a management strategy corresponding to the current situation is formed. Formation of this management strategy is also performed using the module of formation of the management strategy.

Changing the management strategy causes the need to develop a new plan of forthcoming actions directly in the process of the system operation. The need to change the target situation may occur when the current management strategy does not ensure the achievement of the target situation due to the absence or low capacity of the system to transition from the current situation to the target situation.

One of the most important problems arising in the operation of the IDSS is the assessment of compliance of data on the subject area with the conditions of the environment under consideration. To solve this

problem, it is proposed to introduce subject domain modification procedures into the upcoming action plan implementation module. Three cases of using these procedures are distinguished.

The first case occurs when there is a sharp change in the structure and resources of the system, leading to a change in the content of the lists of situational attributes and control decisions. For example, the illness of workers of certain specialties, which will cause a decrease in the ability to perform all tasks, the technology of execution of which includes this action.

The second case takes place when integrating the system in question with some other system. In this case the lists of situational characteristics and control decisions of a given system are supplemented by corresponding data about situational characteristics and control decisions of another system.

The third case takes place at self-organization of the system in the case when objects belonging to different systems are integrated into one system.

Thus, a virtual plan of forthcoming actions of a system consists of some set of real models and a set of objects-data of the first type necessary for creation of virtual models of implementation of control decisions that form contents of the plan, and also a control code defining the sequence and conditions of implementation of control decisions. In other words, into the external memory of the computer is written not the program code of virtual model of the plan (although in principle it is possible), but relatively small control code and data necessary for formation of the virtual model of the plan in the working memory of the computer.

The control system is intended for controlling the operation of the IDSS. Its main tasks are to manage processes, assess their priority, control and manage computational resources.

Conclusions

An artificial intelligent system supports interaction between the computer and a human in the process of planning and operational management. The result of this interaction is the synthesis and execution of programs that simulate human decisions. Automatic synthesis of these programs is performed on the basis of a description of decisions made by a human. The basis of an intellectual control system should be the core of the IDSS kernel. An IDSS kernel, "tuned" to a certain set of subject areas, forms

the basis of a control system of an OTS object. A subject area is described by lists of control decisions on performing actions (tasks) and situational attributes. These lists, as well as the software corresponding to them, can be modified in the process of functioning of the OTS object.

The development of a theoretical approach to the automation of planning and operational management processes, as well as the construction of a kernel of the IDSS, allowing the automation of these processes, leads to the close integration of artificial intelligence technologies and decision-making theory. Further development of this approach will make it possible to develop a methodology for the construction of IDSS, providing automation of the processes of planning and operational management of OTS objects.

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CHAPTER 13

The Changing Role of the Transport Facility Internal Audit in the Post-COVID Period

Artem I. Krivtsov and Tatiana M. Tarasova

Introduction

In May 2020, the Russian Ministry of Economic Development presented a forecast of the country's socio-economic development for 2020–2023, according to which the country's economy will return to the pre-crisis level only in the first half of 2022. As a result of the ongoing vaccination campaign and as quarantine restrictions ease, the active phase of economic recovery should begin in the fourth quarter and continue into 2021.

During the COVID-19 pandemic, Russia's digital economy received an additional boost since many processes had to be switched to the online mode. Many enterprises have moved from the offline system of communicating with customers and contractors to the online one, services for the

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_13

goods delivery have been actively launched, and the list of receiving state electronic services has expanded. At the same time, the general growth of Internet services' users has sharply increased the number of cybercrimes. In this regard, the issues of information security and the organization of the internal control system are of particular relevance. In this article, we will pay attention to the organization of the internal control and audit system.

The internal (control) environment is the atmosphere in the company and determines how the risk is perceived by the employees, and how they respond to it. The control environment sets the atmosphere of the organization, influencing the control creation of personnel. It is the basis for all other components of internal control, providing discipline and structure. The control environment factors include integrity, ethical values, management style, the system of authority delegation, as well as the processes of management and personnel development.

There are several approaches to assessing internal control: test procedures, the simplest mathematical models (a mathematical model that automatically correlates the costs of conducting control procedures with the costs of conducting them), analytical procedures (presented in this paper), and analytical models that characterize the effectiveness of all management systems.

The study deals with organizing internal control and audit of the transport enterprise on the example of JSC "Russian Railways," as the largest company of federal significance providing services for the transportation of passengers, cargo and cargo baggage in the conditions of the economy's post-market revival. It is important to note that the main impact of the pandemic was on value chains, their gap provokes a shortage of individual goods, as well as a sharp increase in prices for cargo transportation.

Internal control in JSC "Russian Railways" is a system that provides the necessary information to the management, analyses the activities and studies the features of the internal control system (ICS) in JSC "Russian Railways" in the digital form. Methodological features and principles of internal control of accounts receivable and payable were also identified, its reliability was assessed; a variant of the information and analytical support model for the ICS and an algorithm for its phased implementation were presented. Such a system will allow one to effectively manage the document flow and control procedures even in the event of new pandemics

and forced lockdowns with employees' transfer to remote work. The analysis is based on the requirements and needs of implementing the internal control procedure at the enterprises of JSC "Russian Railways."

Methodology

A wide range of domestic and foreign scientists have made significant contributions to research on creating and constructing ICS at different times and from different points of view, including Abbott et al., 2016; Alhajri, 2017; Allegrini et al., 2011; Badara & Saidin, 2014; Bednarek, 2018; Dal Mas & Barac, 2018; Dikici et al., 2018; Lenz et al., 2017; Letkiewicz & Mandera, 2019; Obydiennova et al., 2018; Omolaye & Jacob, 2017; Tackie et al., 2016; Tarasova, 2021; Trotman & Duncan, 2018; Turetken et al., 2020; Wohlin, 2014.

The main strategy for minimizing, reducing and preventing economic risks includes implementing internal control activities. Besides the economic risks, one should also take into account the organizational risks, which can also be minimized now, in the post-crisis period, when it became clear how to organize the work of the enterprise during the pandemic. It is the control activity that is aimed at identifying risks at the early stages and ideally preventing such situations even before they occur. Emergencies can always happen since the economy is a changing process that is also amenable to external influences. In such cases, one cannot but control the internal environment. Besides the main ICS activities, to achieve all the strategic goals, changes should be monitored and corrective actions taken at the right time. Such actions are designed to ensure the profitable use of resources, and the total cost of these resources should not exceed the income received with their help. When implementing economic activities, it is necessary to constantly take into account that internal control is characterized as a dynamic process that, although it prevents abuse, needs to adapt to the ongoing changes. Today, the range of economic, political and social problems is much wider, so one has to constantly monitor the ICS, which will ensure compliance with the goal of the enterprise (making profit with minimal losses)—the goal of internal control (checking documentation and identifying inconsistencies)—the goal of the Standard (available resources)—the goal of the state (economic and social environment).

JSC "Russian Railways" applies general, working and specialized audit Standards:

1. The group of common standards includes the Code of Internal Ethics for Auditors, the Regulation on Internal Control and the Training Standard, which now reflects the possibility to work remotely during the pandemic under the legal requirements.
2. The group of Working Standards includes Planning Standards, Audit Performance Standards, and Reporting Standards.
3. The group of specialized standards includes Standards of activities and Standards in certain areas of internal audit.

JSC "Russian Railways" uses its internal control system, because the management is focused on a Strategic Development Program. Under Article 295 of the Russian Civil Code, the property owner exercises control over the company's property use and safety. JSC "Russian Railways" considers implementing the internal control procedure to be a mandatory activity system.

The internal control procedures applied in JSC "Russian Railways" and its subsidiaries are divided into preliminary and subsequent ones. Preliminary internal control procedures are aimed at preventing errors and violations of the established activity order (monitoring the actual availability and condition of objects, authorization of transactions and operations, etc.). Subsequent internal control procedures are aimed at identifying errors and violations of the established procedure (reconciliation, supervision, etc.).

JSC "Russian Railways" applies such internal control procedures as confirming compliance between objects (documents) or their compliance with the established requirements; authorizing the operations which confirm their commission's legitimacy; reconciling data; controlling the objects' actual presence and condition; assessing if the goals and indicators are achieved; controlling the procedures related to information processing and information systems.

We present the internal control stages implemented by JSC "Russian Railways" under the internal corporate standards in Table 13.1.

Let us consider the key areas of internal control in JSC "Russian Railways." We will present internal control under the JSC "Russian Railways" corporate standards. ICS is based on operational audits, which is a chain of procedures. Operational audits include risks of business processes, internal control procedures, as well as detected violations and internal control shortcomings. These processes include analyzing regulatory documents in JSC "Russian Railways" areas of activity, as well as the

Table 13.1 Internal control stages implemented by JSC "Russian Railways"

Process steps			
Planning	*Preparing for the audit*	*Conducting an audit*	*Registering verification results*
1	*2*	*3*	*4*
Components			
Draft internal control and audit plan (proposals)	Verification program, work programs	Register of identified violations, shortcomings, and risks	Documenting control results and audit procedures (references, local reports, audit report)
Internal control and audit plan Inspections schedule	Orders and regulations Individual task	Verification report	Developing a plan of measures to eliminate violations

Source Created by the authors

violations, risks, and business processes. This allows creating a risk register where those responsible for control are indicated. In turn, creating the register entails developing a plan of measures for monitoring and systematizing previous inspections, creating a unified control and audit model. The above-mentioned detection of violations and shortcomings of the system entails the recommendations based on the results of inspections aimed at eliminating errors, as well as proposals for strengthening control procedures in certain areas. Based on the results of a well-coordinated audit, we can achieve the following results: audit materials (classifier of identified violations, risks, shortcomings); register of business processes' risk zones (action plan to eliminate violations, intensifying control procedures); monitoring report on how the measures are implemented. As a result, all the work allows us to update the internal audit and control model.

Results

JSC "Russian Railways" internal audit and risk management systems in the field of accounting, reporting, and tax accounting are subject to the audit organizations evaluating their effectiveness. They include the

Internal Audit Center "Zheldoraudit" and the Center for the Development of Risk Management and Outsourcing, as well as by tax authorities in connection with JSC "Russian Railways" transiting from 01.01.2019 to tax control in the form of tax monitoring. For this purpose, as well as to establish a unified procedure for documenting the internal control procedures performed and their results, the following documents have been developed and approved:

- Regulation on the Accounting and Tax risk management system in JSC "Russian Railways" dated 11.12.2017 No. CBS-63;
- Regulation on the Internal Accounting Control System in JSC "Russian Railways" dated 11.12.2017 No. CBS-64;
- The concept of a unified system of internal control procedures in accounting and tax accounting and reporting dated 02.10.2017 No. CBS-65.

We will also consider each stage of the proposed model of information and analytical support step by step.

The employees of the Volga Infrastructure Directorate (PrivDI) railcar companies were interviewed and then completed the test of the ICS reliability assessment methodology. JSC "Russian Railways" has a ready-made test form that consists of 26 questions in four sections: control environment, accounting system, tax accounting system, and controls. We decided to refine this model and introduce an additional fifteen indicators in the sections "risk assessment process" and "control actions" to more accurately and effectively assess the ICS reliability.

As a result the following data of test processing were obtained:

Operational car depot Astrakhan—28
Operational car depot Gorkiy—28
Operational car depot Anisovka—27
Operational car depot Atkarsk—29.

These results allow us to conclude that, in general, the internal control system is evaluated quite highly. It should be noted that the lowest points for all four car depots were awarded to the positions "Monitoring changes in the legal framework for accounting," "Atypical operations control," and "Monitoring changes in the legal framework for tax accounting."

Thus, this methodology and its additions let us quickly monitor the current state of the ICS, and can also act as feedback between accounting employees and the internal control system. We consider it appropriate to introduce this method of receiving feedback and evaluating the work of the ICS. Today, this method is implemented only in the Atkarsk car depot. The survey should be conducted once every three months.

We should also determine the percentage estimate of the actual ICS at the PrivDI enterprises' reliability. To do this, you need to divide the final test scores by the maximum possible number of points. We will perform the calculation using the formula:

$$W = \frac{s_1 + s_2}{(73 + 30)} * 100\% \tag{13.1}$$

where W is the reliability value of the current ICS, in %;

S_1, S_2—the number of points on the internal control system tests, respectively, according to the current methodology and its additional part.

The results of the calculations are the following:

Reliability of the existing ICS at PrivDI enterprises, %:

Operational car depot Astrakhan—93
Operational car depot Gorkiy—91
Operational car depot Anisovka—87
Operational car depot Atkarsk—92.

The next stage of making the conclusion about the ICS reliability implies using the following scale:

1. From 81 to 100%—very high degree of reliability;
2. From 61 to 80%—high degree of reliability;
3. From 41 to 60%—the average degree of reliability;
4. From 21 to 40%—low degree of reliability;
5. 0 to 20%—the degree of reliability is not determined.

If we take the current situation with the internal control reliability at PrivDI enterprises, we can say that it is "very high." We can also note that in this case, the operational car depot Anisovka has the lowest reliability value (87%) compared to other PrivDI car depots. This means that PrivDI has to pay attention to some shortcomings and adjust its current activities.

To do this one has to analyze the answers again, identify the questions, and conduct this questionnaire that will show the dynamics of improving the ICS.

The final stage of considering this methodology will imply determining the risk value. We can calculate it using the following formula:

$$Ir = 100\% - W \tag{13.2}$$

where Ir is the risk value of the internal control system,%.

According to the calculation results, the values of the ICS risk for the considered car depots are the following:

1. Operational car depot Astrakhan—7%;
2. Operational car depot Gorky—9%;
3. Operational car depot Anisovka—13%;
4. Atkarsk car depot—8%.

Then the results obtained should be evaluated qualitatively by the internal control risk scale of the internal control system.

1. From 80 to 100%—very high risk;
2. 60 to 79%—high risk;
3. 40 to 59%—average risk;
4. 20 to 39%—low risk;
5. From 0 to 19%—very low risk.

In this case, we define the risk of internal control as "very low." The final data obtained during the assessment allow us to conclude the ICS reliability and its effectiveness. One can make a list of recommendations for improving the internal control mechanism at the enterprises of the PrivDI wagon service.

Besides the obtained qualitative reliability assessment, we can add an expert assessment of the ICS reliability dynamics in the form of a corresponding correction factor—the dynamics coefficient, for calculating which we offer the author's approach:

1. All processes at the enterprises of the PrivDI car service are ranked and the most priority from the point of view of the internal control organization are selected;

2. The implementation of all risks and the distribution of all losses received for all processes are analyzed based on the losses belonging to a specific process;
3. We estimate the share of risk events for the selected processes in the total number of risk events for all processes, i.e., for example, the number of cases of risk implementation for the selected processes in the total number of risk events for all processes, and also perform a similar analysis in monetary terms (in roubles);
4. If the received share in the quantitative equivalent is not less than 80%, and is not less than 70% in the monetary equivalent, then we assume that the ranking processes quality in terms of risks and, accordingly, priorities in terms of internal control is high. Otherwise, we make adjustments to the method of selecting processes;
5. Subject to the high-quality process ranking, as well as taking into account the growing qualitative assessment of the PrivDI car service ICS reliability, the following condition has to be met:

$$\Delta S = S^{p^2} - S^{p^2} > 0 \tag{13.3}$$

where ΔS is the score assessment dynamics of the PrivDI car service enterprises ICS for the period (usually a year), measured in points;

S^{p1}, S^{p2}– the value in the points of assessing the ICS reliability in the initial period p^1 and subsequent p^2.

The correction factor (CF) is 5 points, i.e., $CF = 5$.

The proposed indicator is experimental requiring further development and testing. At the same time, one cannot but mention its practical value which lies in the ability to track the ICS development.

Conclusions

The developing practice of internal control challenges Russian science to carry out comprehensive scientific and practical research that can take into account numerous significant aspects of internal control in managing an organization. Effective work of organizations can be achieved through effective internal control, which can combine the internal environment, the accounting system, and controls aimed at creating reliable accounting (financial) statements. The risk-based model is very flexible and adapts to changes, as well as new risks.

It is known that today no organization can do without a well-functioning IT system: most operations are performed through IT, electronic document management, electronic signatures appear, and enterprises strive to replace paper media with electronic ones. This solution has certain disadvantages (a possible sudden power outage, a computer or information storage system breakdown, a human factor—at some point companies can lack a specialist with the appropriate qualifications), but at the same time, despite such risks, the IT sector occupies a leading position in many areas, both management and the main working mechanism. JSC "Russian Railways" is no exception. In this case, we propose to consider the model of the COBIT (Control Objects for Information and Related Technology) Standard (hereinafter—the COBIT Standard). This standard is a set of specific rules and techniques that allow you to maximize the benefits of using information systems in implementing internal control. It should be noted that the COBIT Standard cannot be implemented independently in the practice of JSC "Russian Railways"; when using and implementing this Standard in the production process, it has to be selectively introduced into the current ICS. Let us consider what parts of the COBIT Standard can be applied at the PrivDI car service enterprises. To do this, we will consider the COBIT System principles step by step.

The first principle of the COBIT System is to meet the stakeholders' needs. In our case, it is the balance between accounts receivable and accounts payable that makes the value for the interested parties, as well as the value for the normal stable operation of the PrivDI wagon service enterprises. As noted earlier, this Standard is quite impersonal and universal, so each company can adapt it to its needs. It should be noted that this principle is implemented in the internal control procedures of JSC "Russian Railways," since the internal control of JSC "Russian Railways" has its requests for internal control, has its performance standards, and has a clear management structure. The second principle is a comprehensive view of the enterprise: Russian Railways generally provides both comprehensive information and a more detailed one—it all depends on the purpose. The third principle of the COBIT System deals with seven types of factors influencing the control system at the enterprise: organizational structure (used in JSC "Russian Railways"), services, infrastructure and offers (used in JSC "Russian Railways"), culture, ethics, behavior (also used in JSC "Russian Railways"). We would like to draw the readers' attention to the remaining four types of factors, such as:

1. Principles, policies, and approaches;
2. Processes;
3. Information;
4. Personnel, skills, and competencies.

In our opinion, these factors are the main focus of JSC "Russian Railways," as they are the most changeable from the social, political, and economic points of view, and also require not only constant monitoring and attention but also changes, innovations, and improvements.

We can say that the principles discussed above, in general, correspond to the current work of JSC "Russian Railways" (also compatible with the COSO model). But with a more detailed study of the material, we understand that the fourth principle for consideration is completely incompatible with the COSO ethics, and does not apply to the current work of JSC "Russian Railways," which is why any implementation requires a deep check and analysis of whether the innovation is applicable in practice. We are talking about the principle of leadership and management separation. The COBIT standard draws a clear line between these concepts: according to the Standard, management is required to provide confidence in the company achieving its goals by determining the line of development and making appropriate decisions, monitoring performance, assessing the needs of stakeholders, the degree of how the obligations and meeting requirements are fulfilled. In turn, the role of management under this Standard is to perform and monitor the change in the company's activities following the specified line. The COBIT standard deals with 37 processes divided between management and administration. We consider separating the concepts of "management" and "administration" irrelevant in the current situation at JSC "Russian Railways." When making a decision, the administration should be guided by the reports of the management apparatus, as well as pay attention to the whole mechanism of JSC "Russian Railways." There are many nuances and features driven by certain interests (sometimes it can be getting maximum profit, and sometimes solving current problems). The needs of the parties are influenced by such driving forces as, for example, introducing new technologies, improving personnel skills, changing legislation, etc. It is on the needs and current situation that the goals of the enterprise should be based, and, therefore, the entire system, including the ICS, should be flexible and timely.

The main task is to unify and standardize control procedures, as well as synthesize them into business processes. This method is very flexible, since having new ideas we can also try to implement them using the following scheme: one can just replace some graphs with new ones, and we get a new improvement option, or rather a new model, using which we can get our results of improving the ICS and test them.

We can conclude that this scheme structures the management process, transforming the current big goals into clear goals not only for each department but also for each accountant as a whole. In this case, information technologies act as a basis for continuously monitoring the existing changes, and raising the accountant's awareness (or that of young professionals, which is also very important), as well as providing the necessary basis for conducting internal control. This indicates the direct impact of IT technologies on the accountant's daily activities, as well as on the entire ICS. Accounting and control automation can become the main tool for reducing the time and costs of conducting control procedures. The number of similar operations, the volume of the nomenclature list, the responsibility and the lack of qualified personnel—all this requires significant labor costs. Saving time is an important factor both in suspending the activities due to the pandemic, but it will also allow specialists to engage in more intellectual work in the post-pandemic period and pay attention to those points in the work that require human attention and knowledge.

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CHAPTER 14

The Economic Impact of the COVID-19 Pandemic on the Russian Automotive Industry

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Introduction

Economic crisis is an integral part of the market system and has many causes, including wars, political contradictions, natural disasters, epidemics, the economy's structural deformation, etc. The causes of economic crisis in different countries in different historical periods differ.

Globalization, especially intensive in the late twentieth—early twenty-first centuries, was expressed in production becoming internationalized, deepening international division of labor, markets' becoming more interdependent—all these factors determine the consequences of economic crises.

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https://doi.org/10.1007/978-3-030-83566-8_14

Until today, the 2008 global financial crisis has been considered the worst one since the Great Depression of the 1930s (Dullien et al., 2010). The crisis emerged in the US financial sector in the summer of 2007 and quickly spread to other economies, manifesting itself in the form of strongly declining main economic indicators, which later turned into a global economic recession.

The global financial crisis of 2008 affected the manufacturing industry, including the automotive industry, decreasing production and sales, as well as the automotive companies profitability, and reduced the number of employees in the industry (Madugba et al., 2016). The crisis accelerated the automotive production shifting to developing countries with high demand for cars and low wage costs (Pavlínek, 2015; Sturgeon & Van Biesebroeck, 2010), accelerated the global supply chain consolidation and final assembly, as well as automotive companies integration (Sturgeon & Van Biesebroeck, 2010). The governments of the countries where large car companies were located took unprecedented measures to support the automotive industry (Klier & Rubenstein, 2012; Sturgeon & Van Biesebroeck, 2010).

In contrast to the 2008 crisis, the 2020 crisis is associated with world-class epidemiological risk—the rapidly spreading new type of infection—the COVID-19 pandemic. The current crisis is very different from the financial crisis of 2008: It is more extensive, as it has simultaneously affected all countries and all sectors of the economy.

At the same time, the epidemiological risk is taken when the world economy is weak and one can witness a slowdown in the global economy, growing trade barriers, increasing geopolitical tensions, mainly due to the US-Chinese confrontation, and the economic sanctions against Russia in response to the Ukrainian conflict. The risk of stagnation in the global economy is growing.

In this regard, the question arises: What the economic consequences of the COVID-19 pandemic will be for the global and national economies. It is also rather interesting if the declining demand for global and Russian automotive products and destroying the global value chains can cause the recession in the automotive industry?

The paper analyzes the impact of the COVID-19 pandemic on the performance of the global and Russian automotive industry, identifies the key problems and risks that this branch of the Russian economy can face, and outlines the main ways of improving state regulation mechanisms that can contribute to further developing Russian automotive industry.

Methodology

We used the data obtained from the Federal State Statistics Service (Rosstat), the Russian Industry and Trade Ministry, the International Monetary Fund (IMF), the Organization for Economic Cooperation and Development (OECD), the United Nations Industrial Development Organization, the International Labor Organization (ILO), as well as the data provided by the "ASM-holding" analytical company and the Automobile Manufacturers' Committee of the European Businesses Association. We also used public reports of automotive industry corporations.

The study was conducted using the systematic approach and comparative analysis. It was based on the principles of consistency and complexity. General scientific methods were used: dialectical approach, system analysis and synthesis, formal-logical analysis, statistical and comparative analysis.

Results

Economic and Social Consequences of COVID-19 Pandemic in Russia and Globally

The impact of the pandemic on the global economy was so strong that the IMF officially recorded the beginning of a global recession in the spring of 2020. The IMF's April report described the current crisis as the worst since the Great Depression, with the global economy (real GDP) projected to contract sharply by 3% in 2020 as a result of the pandemic (IMF, 2020a).

Demand recovery in the third quarter of 2020 after the lifting of quarantine restrictions was accompanied by increasing economic activity. If we take the October IMF report, the global economy was predicted to contract in 2020 by 4.4%. The IMF expects a partial recovery from a deep recession in 2021, with real GDP growth projected at 5.2% (IMF, 2020b).

China was the first to suffer from the coronavirus pandemic. As a result of quarantine measures against infected cities, shutting down enterprises in the first quarter of 2020, China's GDP decreased by 6.8% compared to the same period in 2019, while increasing by only 3.2% in the second quarter, and the growth in the third quarter was 4.9%. If we take the situation in the United States and the European Union (EU), it was more difficult there. EU GDP declined by 2.7% in the first quarter of 2020, by

13.9% in the second quarter, and by 3.9% in the third quarter. US GDP increased by 3% in the first quarter of 2020, decreased by 9% in the second quarter, and decreased by 2.9% in the third quarter (OECD, 2020).

The COVID-19 pandemic has most strongly affected such sectors of the economy as tourism and transport, as well as the service sector, restaurant and hotel business. The real sector is also experiencing serious difficulties (Iida, 2020).

For example, global manufacturing output in the first quarter of 2020 decreased by 6% compared to the same period last year due to measures to contain COVID-19 (UNIDO, 2020a), while in the second quarter of 2020, the decline was already 11.2% compared to the same period last year (UNIDO, 2020b).

The pandemic and its associated controls have dramatically reduced consumption and investment and undermined labor markets. The total loss of working time in the world amounted to 495 million full-time equivalent jobs in the second quarter of 2020, while in the third quarter of 2020 it amounted to 345 million jobs. This, in turn, resulted in a 10.7% reduction in labor income (excluding income support measures) during the first three quarters of 2020 (compared to the corresponding period in 2019), equivalent to US $ 3.5 trillion, or 5.5% of global GDP for the first three quarters of 2019 (ILO, 2020a).

The COVID-19 pandemic has also had a serious negative impact on the Russian economy. Restrictions on the work of enterprises in some sectors of the economy, as well as other measures introduced to prevent the coronavirus from spreading, have affected the country's economic performance.

According to the Russian Federal State Statistics Service, the real GDP volume in Russia decreased by 3.4% or the first half of 2020 compared to the same period in 2019, the volume of investments in fixed assets decreased by 4.0%. Russian manufacturing industry's production volume increased in the first quarter of 2020 by 5.9% compared to the same period in 2019, while decreasing by 5.1% in the second quarter, and decreasing by 0.4% in the third quarter. The unemployment rate increased from 4.7% in January 2020 to 6.3% in September 2020. The real disposable income of the population for January–September 2020 decreased by 4.3% compared to the same period of 2019 (Rosstat, 2020a).

Thus, the COVID-19 pandemic and efforts to contain its spread have significantly affected economic activity and the population's income in all regions of the world.

The Impact of COVID-19 on the Global Automotive Industry

The automotive industry makes a significant contribution to global economic production. The automotive industry accounts for about 5.7% of global production, according to the global input–output database (Timmer et al., 2015) and 8% of global exports in 2018 (IMF, 2019). In 2017, the number of people directly employed in the global automotive industry was estimated at 14 million (ILO, 2020b).

The automotive industry is deeply integrated into global value chains. The global COVID-19 pandemic that broke out in China first had a serious economic impact on the Asian automotive industry, and then on the global one.

The city of Wuhan, which was the center of the coronavirus outbreak in China, has car and automotive component factories of several Chinese, European, American, Japanese corporations (Dongfeng Motor, SAIC Motor, General Motors, Honda Motor, Nissan Motor, Peugeot Group (PSA), Renault), which had to stop working to prevent COVID-19 from spreading. Then the plants in other Asian countries began to close, as well as the ones in Europe and North and South America.

As a result of government measures to contain COVID-19, car producers have been hit by production suspensions or cuts, mainly due to restrictions on employee travel to work sites and delays in parts delivery. Some dealers had to suspend their operations, reduce their opening hours, or reduce the number of services, such as warranty service and repairs.

Overall, the automotive industry has taken a triple hit: Factories closed, global supply chains were disrupted, and demand fell. As a result, the decline rate of the global automotive industry (production of cars, trailers, and semi-trailers) in the first quarter of 2020 was 15.7% compared to the same period last year (UNIDO, 2020a), while the decline rate was already 37.3% in the second quarter of 2020 (UNIDO, 2020b).

In China, the production and sales of passenger cars decreased by 15.5% and 15.4%, from January to August 2020, respectively, compared to the same period last year (CAAM, 2020).

In Japan, passenger car sales decreased by 19% from January to September 2020 compared to the same period last year (JADA, 2020).

If we take the EU, from January to September 2020, production losses due to COVID-19 accounted for 22.3% of the total production of passenger cars and light commercial vehicles in 2019 (ACEA, 2020).

The economic impact of the COVID-19 crisis on the automotive industry is very significant. The decline in car sales lowered the revenue and affected the corporate financial results.

In particular, Toyota Group consolidated sales for the fiscal year that ended on March 31, 2020. They amounted to 8,958 thousand vehicles, which is 0.2% less than in the previous fiscal year—the revenue decreased by 1.0% (Toyota Motor Corporation, 2020a). Toyota Group sales decreased by 19.9% in April–September 2020, compared to April–September 2019, and amounted to 4,366 thousand units, resulting in a 25.9% decrease in sales revenue and a 45.3% decrease in net profit (Toyota Motor Corporation, 2020b).

Volkswagen Group's consolidated sales decreased by 21% to 6,311 thousand units for the three quarters of 2020, revenue decreased by 16.7%, and net profit decreased by 84.5% compared to the same period of 2019 (Volkswagen Group, 2020).

According to the consolidated financial statements of Renault Group, car sales (including Nissan and Lada cars) sales decreased by 26% to 2,063 thousand units for the three quarters of 2020, resulting in a 26.8% decrease in consolidated revenue compared to the same period of 2019 (Renault Group, 2020a).

The automotive sector has thus emerged as one of the ones hardest hit by the COVID-19 pandemic. Declining demand and disruption to global supply chains have put pressure on the sector that had already faced huge changes to its traditional business model.

The key trends in the automotive corporations' strategic development in recent years include intensifying innovation (producing electric vehicles, unmanned vehicles), improving eco-friendliness and product safety (Zhurova & Turova, 2020). The COVID-19 crisis is driving fundamental changes in demand. Automotive corporations should focus on managing customer relationships and digital demand, as well as providing flexible offerings with low upfront costs, to actively counteract growing consumer uncertainty and purchases based on the total car ownership cost (KPMG, 2020). Dealmakers have to change their M&A strategies to reconnect their production and supply chains while keeping their technology strategies and investments in mind as the pandemic accelerates the new technologies adoption (PWC, 2020).

The Impact of COVID-19 on the Russian Automotive Industry

The automotive industry in Russia is represented by enterprises in all its segments (producing passenger cars, light commercial vehicles, trucks, buses). Both domestic and foreign-brand vehicles are produced in the territory of Russia. The production facilities of the world's leading automobile corporations—Renault, Volkswagen, Toyota, Hyundai, Nissan, etc.—are located in Russia (joint ventures, as well as enterprises wholly owned by foreign corporations), the predominant share of which operates in the industrial assembly mode.

The coronavirus pandemic and the subsequent restrictive measures have had the most negative impact on the car manufacturers and car dealers in Russia. The key reasons include the suspension of enterprises' activities due to non-working days, the lack of imported components, and decreasing demand.

According to Rosstat, the volume of motor vehicles produced in Russia decreased by 20.9% for the first nine months of 2020 compared to the same period in 2019 (Rosstat, 2020a). The decline in motor vehicles manufacturing had a negative impact on manufacturing automotive components: the number of components and accessories for motor vehicles in the first nine months of 2020 decreased by 16.5% (Rosstat, 2020c).

Table 14.1 shows the change in the manufacturing of new vehicles in Russia based on the data provided by the "ASM-holding" analytical company (the company has not published the statistics for the first six months and three quarters of 2020 on its Web site).

The number of motor vehicles produced decreased by 14.8% in the first quarter of 2020, compared to the same period in 2019 due to the shrinking car and truck manufacturing. A sharp decline could be seen in April–May 2020 due to the measures to contain COVID-19 and suspend or reduce manufacturing. When the quarantine measures were eased, there were signs of market recovery: In general, the number of all types of vehicles decreased by 28.7% in January-August 2020 compared to the same period in 2019.

The largest share of manufacturing foreign-made vehicles is accounted for by the passenger car industry (over 70%). Passenger cars and light commercial vehicles of domestic brands are produced by the AVTOVAZ Group (the LADA brand), the Sollers Group (the UAZ brand), and the GAZ Group (commercial vehicles). Russia is very attractive for foreign

Table 14.1 Manufacturing new motor vehicles in the Russian Federation

Types of motor vehicles	*2017*	*2018*	*2019*	*January–March 2020*	*January–May 2020*	*January–July 2020*	*January–August 2020*
Passenger cars, thousand units	**1348.0**	**1 563.6**	**1523.6**	**323.0**	**405.7**	**626.3**	**708.3**
change, %*	**+19.9**	**+15.9**	**−2.6**	**−15.6**	**−37.1**	**−29.8**	**−29.8**
Domestic brands, thousand units	349.8	414.9	410.7	866	105.6	171.1	191.3
change, %	+16.9	+18.1	−1.0	−18.7	−38.8	−29.2	−29.6
Foreign brands, thousand units	998.2	1 148.7	1112.9	236.4	300.1	455.2	517
change, %	+21.0	+15.1	−3.1	−14.5	−36.4	−30.0	−29.9
Share of foreign brands, %	*74.1*	*73.5*	*73.0*	*73.2*	*74.0*	*72.7*	*73.0*
Trucks (including category N1)	**160.8**	**156.7**	**155.3**	**27.0**	**43.6**	**63.7**	**76.1**
change, %	**+18.6**	**−2.6**	**−0.9**	**−8.1**	**−21.7**	**−22.1**	**−19.6**
Domestic brands, thousand units	133.0	127.4	127.2	21.1	35.6	52.2	62.4
change, %	+8.3	−3.5	−0.2	−11.5	−20.7	−21.0	−18.5
Foreign brands, thousand units	28.8	29.3	28.1	5.9	8.0	11.5	13.7
change, %	+2.1 times	+1.6	−4.0	+6.4	−25.6	−27.0	−24.2
Share of foreign brands	*17.9*	*18.7*	*18.1*	*21.6*	*18.4*	*18.0*	*18.0*
Buses (including the M2 category)	**42.9**	**47.8**	**41.2**	**7.0**	**11.6**	**16.9**	**19.2**
change, %	**−2.6**	**+12.5**	**−14.8**	**+1.8**	**−9.2**	**−13.6**	**−16.5**

Types of motor vehicles	*2017*	*2018*	*2019*	*January–March 2020*	*January–May 2020*	*January–July 2020*	*January–August 2020*
Domestic brands, thousand units	32.5	38.9	33.1	5.7	9.6	13.3	15.1
change, %	−5.8	+21.0	−16.2	−1.4	−11.1	−18.0	−18.0
Foreign brands, thousand units	10.4	8.9	8.1	1.3	2.0	3.6	4.1
change, %	+9.2	−13.7	−8.8	+18.2	+1.0	+7.1	+7.1
Share of foreign brands, %	*24.3*	*18.7*	*19.8*	*18.6*	*17.7*	*21.5*	*21.1*
Total:	**1551.7**	**1768.1**	**1720.1**	**357.0**	**460.9**	**706.9**	**803.3**
change, %	**+19.0**	**+13.9**	**−2.8**	**−14.8**	**−35.4**	**−28.8**	**−28.7**

*Compared to the same period of the previous year

Source Created by the authors on the base of data provided by the "ASM-holding" analytical company, available at http://asm-holding.ru/info/news/ (accessed 15 October 2020)

corporations' setting up passenger car manufacturing due to its large population, low motorization, and low labor costs.

Trucks and buses in Russia are dominated by domestic brands (about 80% each).

A comparison of the motor vehicles output structure shows that the share of foreign car and truck brands for January–August 2020 remained at the level of 2019, while the share of the foreign-brand buses output had increased slightly.

The overwhelming share of foreign ownership and control in the automotive industry contributes to the transfer of profits to the home countries of the world's leading automotive corporations. In this situation, it is clear that the future success of the automotive industry in Russia will be tightly linked to the competitive success of the Western European, American, Japanese, and Chinese automotive industries.

Sales of new vehicles in Russia, according to calculations made using the data provided by the "ASM-holding" analytical company, amounted to 983,781 thousand units in January–August 2020 (–12.2% compared to the same period in 2019).

Automotive products produced in Russia are mainly focused on meeting the domestic market needs and do not have significant export prospects. The volume of deliveries of passenger cars for export in January-August amounted to 40.4 thousand units, there was a decrease of 45.0% compared to the same period last year, trucks—7.3 thousand units, with a decrease of 16.3% (Federal Customs Service, 2020), which accounted for 5.7% and 9.6% of the car and truck output, respectively.

Table 14.2 shows the sales of new passenger cars and light commercial vehicles in Russia in terms of the top 10 groups of automakers—leaders in terms of sales in the Russian market by the end of 2019.

The biggest share of car sales is accounted for by the AVTOVAZ/Renault –Nissan-Mitsubishi alliance—over 36% in 2017–2019 and January–September 2020. The share of Lada cars produced by the AVTOVAZ Group in the Russian market was 21.1% at the end of 2019, and 20.8% at the end of the first nine months of 2020.

Car sales in the Russian market increased by 1.8% in the first quarter of 2020 compared to the same period in 2019.

After high sales in March 2020, dealers had to suspend or significantly restrict their activities in April, due to the situation with COVID-19, their sales fell by 72.4% compared to the same month a year before.

Table 14.2 Sales of new passenger cars and light commercial vehicles in Russia sorted by car manufacturer groups

No	*Automaker groups*	*Measurement unit*	*2017*	*2018*	*2019*	*1st quarter of 2020*	*2nd quarter of 2020* **	*1st half of 2020*	*3rd quarter of 2020* **	*January–September 2020*
1	AVTOVAZ/ Renault-Nissan-Mitsubishi	Units	578,077	648,795	639,464	148,596	89,040	237,636	160,424	398,060
		change, %*	+17.0	+12.2	−1.4	+0.1	−42.0	−21.3	−11.8	−14.3
	incl.:	Units	311,588	360,204	362,356	79,600	52,996	132,596	95,065	227,661
	Lada brand	change, %	+17.0	+15.6	+0.6	−3.4	−42.3	−23.9	+4.5	−14.2
2	Hyundai-Kia Automotive Group	units	357,586	407,684	406,986	93,877	51,864	145,741	108,756	254,497
		change, %	+21.3	+25.1	−0.2	−1.2	−50.9	−27.3	+6.2	−15.7
3	VW Group	units	175,639	211,420	216,931	50,227	30,505	80,732	69,087	149,819
		change, %	+12.1	+20.4	+2.6	+10.6	−44.5	−19.6	+27.9	−3.0
4	Toyota Motor Corp	units	117,931	132,804	125 992	31 794	18,389	50 183	*30,134*	80 317
		change, %	−0.6	+12.6	−5.1	+24.5	**−39.1**	−10.0	**−12.0**	−10.8
5	GAZ Group (commercial vehicles)	units	58,617	60,677	63 910	11 097	8751	19 848	11,899	31 747
		change, %	+5.0	+3.5	+5.3	−2.9	−39.1	−23.5	−27.7	−25.2
6	Daimler Group	units	44,246	44,822	44 373	10 705	6283	16 988	11,719	28 707
		change, %	+0.8	+1.3	−1.0	14.4	−41.9	−15.8	+29.6	−8.4
7	BMW Group	units	31,598	37,949	44,044	11 633	6581	18 214	13,277	31 491

(continued)

Table 14.2 (continued)

No	*Automaker groups*	*Measurement unit*	*2017*	*2018*	*2019*	*1st quarter of 2020*	*2nd quarter of 2020* **	*1st half of 2020*	*3rd quarter of 2020* **	*January–September 2020*
		change, %	+9.5	+20.1	+16.1	13.2	−38.9	−13.4	+20.2	−1.9
8	SOLLERS Group (UAZ brand)	units	41 632	41,252	38,892	7 293	4991	12 284	9334	21 618
		change, %	−14.8	−0.9	−5.7	−5.7	−44.9	−26.8	−2.2	−17.9
9	Mazda Motor Corp	units	25,910	31,683	30 576	7 585	4293	11 878	6282	18 160
		change, %	+20.3	+22.3	−3.5	+15.4	−38.7	−12.5	−23.8	−16.8
10	GM Group	units	33 436	31 197	22 796	554	225	779	636	1 415
		change, %	5.4	−6.7	−26.9	−90.9	−95.8	−93.2	−88.4	−91.6
	Other	units	1,017,660	1,151,796	1,120,068	249,922	148,401	398,323	298,422	696,745
	Total	units	**1,595,737**	**1,800,591**	**1,759,532**	**398,518**	**237,441**	**635 959**	**458,846**	**1,094,805**
		change, %	**+11.9**	**+12.8**	**−2.3**	**+1.8**	**−45.7**	**−23.3**	**+3.7**	**−13.9**

*Compared to the same period of the previous year

**Authors' calculations using the data provided by the Automobile Manufacturers Committee of the Association of European Businesses

Source Created by the authors using the data provided by the Automobile Manufacturers Committee of the Association of European Businesses, available at https://aebrus.ru/en/media/press-releases/ (accessed 19 October 2020)

The market volume of new passenger cars and light commercial vehicles for the first half of 2020 decreased by 45.7% compared to the same period in 2019. Sales of all groups of automakers declined.

The gradual lifting of restrictive measures, resuming the production of all types of cars and automotive components in Russia and abroad, the return of dealers to offline car sales, the impact of government measures to support the automotive industry, as well as the deferred demand of previous months, increased car sales in the third quarter of 2020.

The pandemic has revealed another risk, where force majeure in different countries can prevent them from supplying automotive components and disrupt global supply chains.

The regime of foreign-brand cars industrial assembly in Russia has resulted in reducing the share of domestic car platforms and as a result, reduced the demand for Russian automotive components. Producing the components for foreign cars mainly involves creating 100% subsidiaries of foreign manufacturers without access to the domestic partners' know-how. If we take many models of foreign-brand cars, their automotive components' localization degree does not reach even 50%. The Renault-Nissan-AVTOVAZ alliance has made the localization the deepest—its degree was 68% in 2019.

The low localization of automotive components provides for the added value formed abroad and low resistance to the external macroeconomic factors' negative impact.

To support the automotive industry, the Russian government has repeatedly allocated significant funding for implementing several programs (programs for passenger cars' disposal, subsidizing interest rates on loans issued for purchasing Russian-built cars, direct subsidies, and guarantees provided by AVTOVAZ JSC).

In April 2020, the Industry and Trade Ministry approved an expanded list of strategic enterprises that can count on state support in times of crisis (soft loans to replenish working capital, a six-month moratorium on filing bankruptcy cases). There were 12 automobile companies, including those that produce cars of foreign brands (JSC AVTOVAZ, PJSC GAZ, PJSC KAMAZ, JSC Ural, PJSC Sollers, CJSC Renault Russia, LLC Volkswagen Group Rus, LLC PSMA RUS, LLC Hyundai Motor Manufacturing Rus, LLC Nissan Manufacturing Rus, LLC Toyota Motor, JSC Avtotor Holding).

As of October 25, 2020, more than 220 thousand cars had been sold as part of state programs to stimulate demand for cars in Russia (preferential

car loans, preferential leasing, subsidies for gas-powered vehicles) (Russian Ministry of Industry and Trade, 2020).

17.5 billion roubles should be allocated in 2021 for systemic state support measures for the automotive industry (in particular, about 9 billion roubles should be allocated for the preferential car loan program, which will allow selling about 90 thousand cars).

The economic consequences of the COVID-19 crisis are also very serious for the Russian automotive industry.

According to Federal State Statistics Service, the turnover of the companies engaged in producing cars, trailers, and semi-trailers in January–September 2020 decreased by 12.9% compared to the same period in 2019. The balance of profits and losses of the companies engaged in this industry amounted to minus 4.1 billion roubles in January–August 2020 (compared to a positive balance of 40.5 billion roubles for the same period in 2019). The share of unprofitable organizations in the industry increased by 17%—from 25.1% in January–August 2019 to 48.1% (Rosstat, 2020a, b).

The average working time per employee in the first half of 2020 decreased by 9.5% compared to the first half of 2019 (from 819.9 h to 742.3 h), which affected the number of employees. The number of jobs filled at the industry's enterprises in August 2020 amounted to 246.8 thousand, having decreased by 7.9% compared to January. The average monthly salary in the industry for January–August 2020 remained at the level of the same period in 2019 (Rosstat, 2020a, b).

The decline in car sales lowered revenue and affected the automotive corporations' financial results.

For example, according to the results of the first half of 2020, the volume of sales of Lada cars (the AVTOVAZ Group—part of the Renault Group), including sales for export, decreased by 23.3% compared to the first half of 2019, and amounted to 152,714 units. The revenue of the AVTOVAZ Group for the first half of 2020 decreased by 30%, the corporation received a net loss of 316 million euros (Group Renault, 2020b). In January–September 2020, sales decreased by 14.6% compared to the previous period last year, reaching 259,167 units, the revenue decreased by 25.4% (Group Renault, 2020a).

Due to smaller foreign direct investment in the Russian automotive industry (according to the results of the first half of 2020, the decrease was 55.8% compared to the same period in 2019 (Bank of Russia,

2020a)) the Russian automotive industry is likely to be limited mainly to assembling low-value vehicles in the supplier sector.

Prospects for the Russian Automotive Industry Development

The global economy will recover gradually and we should not expect it to revive as soon as possible—the coronavirus pandemic has not ended and the second wave of the pandemic came in autumn 2020.

If we take the IMF October report, the world economy contracted was projected to contract by 4.4% in 2020, while in 2021, the growth rate of world GDP should reach 5.2%. The decline in Russia's real GDP should be 4.1% by the end of 2020, and in 2021 the GDP growth rate should reach 2.8% (IMF, 2020b).

According to the Bank of Russia's baseline scenario, Russia's GDP should grow by about 3–4% in 2021 after a decline of 4–5% in 2020, and 2.5–3.5% in 2022. In the worst-case scenario, the economy should have recovered to pre-crisis levels only by 2024 (Bank of Russia, 2020b).

The determining factor driving changes in the automotive corporations' strategies is the change in demand. In September, Moody's rating agency updated its forecast for a 19%-decline in the global market in 2020 to about 73 million passenger cars, while in 2021 sales are expected to grow to 80 million (Moody's, 2020).

The demand for lower-cost models is expected to increase after the pandemic, and consumers should buy more cars online. Interest in cars may be stimulated by another reason: The car seems more reliable than crowded public transport in the COVID-19 world. The Chinese producers are actively advertising the car as a reliable means of protection against the virus, for example, Geely advertises its products under the brand name "Project Healthy Car".

The Russian consulting agency Russian Automotive Market Research has created several scenarios for forecasting new car sales in the Russian market in 2020. According to the baseline forecast scenario, the decrease in passenger car sales should be 29.1% compared to 2019 (reaching 1,124.3 thousand units), the decrease in truck sales should be 18.0% (65.6 thousand units), the decrease in light commercial vehicle sales should be 21.9% (92.8 thousand units). Subject to re-introducing restrictive measures related to the second wave of COVID-19, the decline in passenger car sales may amount to 38.7%, while this rate may be 25.3% for trucks, 30.9% for light commercial vehicles (Russian Automotive Market

Research, 2020). The agency expects that car sales in 2021–2022 should be negatively affected by the current outstripping state purchases of automotive equipment, respectively, the demand of various departments and state-owned companies for the coming years must have already been met. That is why car sales will be slowly recovering and it should not be enough for positive market dynamics.

In this regard, the competition in the Russian automotive market is expected to further tighten, and automotive corporations have to adjust their development strategies.

The Russian market is still interesting for large automotive corporations: In 2019, two new full-cycle car factories were opened—one produces German Mercedes-Benz passenger cars and the other deals with Chinese Haval crossovers. In 2019, Hyundai Motor began constructing a plant for producing car engines in Sestroretsk. In July 2020, Hyundai Motor filed a petition with the Federal Antimonopoly Service to buy out the closed General Motors plant in St. Petersburg.

High competition in the market which is also aggravating, intensifying foreign car and automotive component manufacturers expansion, the deteriorating macroeconomic situation and the decline in population's income increase the role of the state in regulating the Russian automotive industry's development, requires a coordinated state and regional policy for developing this sector, balanced sectoral programs for developing the automotive industry.

However, the analysis of existing territories' strategic development programs (e.g., conducted by Moshkova and Afonichkin (2020) using the example of the Samara region) indicates a weak consistency of hierarchically related strategies for the regional development and projects for developing the regional automotive cluster.

The Russian automotive industry can gain a competitive advantage by improving the domestic automotive component industry (by increasing localization, reducing the car production cost, minimizing the impact of external macroeconomic factors).

To support the automotive component industry, the Russian Industry and Trade Ministry, together with the Industry Development Fund, plan to implement a grant program in 2021 for implementing investment projects to localize automotive component manufacturing (1 billion roubles are given for implementing the program, which is not enough to support the industry).

If we want to develop the domestic automotive component industry, we should encourage creating joint ventures of foreign and domestic automotive component manufacturers, provide Russian component manufacturers access to OEM supplies, create a preferential tax regime for joint ventures, provide them with access to preferential loans, primarily to support the purchase of modern technological equipment. In this regard, it is relevant to study the successful foreign experience in developing the automotive component industry, in particular, the Chinese one.

Conclusions

The results of the study allow us to formulate the following conclusions:

- The COVID-19 pandemic has affected all countries and industries and has had a strong negative impact on the global economy, accompanied by a decline in global GDP, a decline in industrial production, loss of working hours, and decreased household incomes. The IMF's April reports described the current crisis as the worst since the Great Depression. Restrictions on the work of enterprises in several sectors of the Russian economy, as well as other measures introduced to prevent the coronavirus from spreading, have also significantly affected economic activities and the population's income;
- the automotive industry was one of the sectors most severely affected by the COVID-19 pandemic, due to the factories' closing due to measures to counter coronavirus infection, reduced demand, and global supply chain disruption. The decline in car production and sales has affected the automotive corporations' revenue and financial results;
- the COVID-19 pandemic highlighted the existing problems and risks of the Russian automotive industry: its dependence on the world's top automotive corporations; the dominance of the foreign-made vehicles' share in manufacturing and sales; the focus of automotive products produced in Russia, mainly to meet the needs of the domestic market without significant prospects to start exporting their products; import dependence on critical automotive components, which caused supply disruptions. The mode of foreign-brand car industrial assembly and the low automotive components' localization mean that the added value will be created abroad and the

Russian automotive industry cannot resist the negative impact of external macroeconomic factors;

– rating and analytical agencies predict a slow recovery of the automotive market, including the Russian one, which is why further tightening the competition in the Russian automotive market is expected, the development strategies of automotive corporations should be changed to minimize risks in the supply chain and reduce costs. High competition in the market, which is getting even severer, the expansion of foreign car and automotive component manufacturers, the deteriorating macroeconomic situation, and the declining household incomes require coordinated state programs, sectoral, regional, and cluster strategic plans for developing the automotive industry. Further state support for car and automotive component manufacturers should be aimed at localizing automotive components to reduce import dependence, ensuring the growing automotive equipment and components exports (in this regard, it is very important to study the successful foreign experience in developing the national automotive industry, in particular, the Chinese one); creating the technologies for electrifying vehicles (electric vehicles, hybrids), in order to create prerequisites for creating a carbon–neutral transport complex by 2050.

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CHAPTER 15

Tourism in the Post-COVID Age

Tatiana V. Skryl and Marina Gregoric

Introduction

The tourism before and during the pandemic era has dramatically changed, not only in the frequency and the travel patterns together with the service delivery process of tourism and hospitality companies, but also in the tourist perception of certain tourist destinations and the tourism as a general concept. The freedom of travel versus travel restrictions and bans as well as differences in service consumption have changed the tourist needs, wants, and expectations during and after the pandemic. In terms of changing needs and consequences of lockdowns together with restrictions in the hospitality sector (the sector which is highly affected by COVID pandemic by being closed fully or partially for the pasts year, with the

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_15

tendency to continue so until the common immunity of world population is accomplished) there has been a significant shift in tourism concepts worldwide. Some destinations reacted fast and adapted to the situation by creating specific offers for domestic tourists and neighboring countries, while others closed their facilities and for the time being restricted international arrivals or banned them completely. Certain destinations were opening their borders during the summer season of 2020, while some still do not open borders for tourists but only for their residences and nationals.

Accordingly, the travel industry is adjusting its services and operations to offer safe and clean travel, while the tourism sector has to create a tourist experience with compliance to safe stays, distance, hygiene, controlled number of tourists in the destinations and sites, measures to enable the minimum risk of infection with COVID and maximum safety and security of tourists and guests. The challenge is seen in traffic control too, boarders crossing, crowds, traffic jams, and long hours of waiting while traveling by car to other destinations due to restrictions on the boarders, by busses, trains, but also by using public transportations in the destinations (taxi, tram, underground, bus, limo, trains, etc.). From the perspective of adjustments and restructuring to restart tourism, it is crucial to acknowledge the role and importance of all sectors involved in tourism and their interrelations (travel and hospitality, trade, ancillary services, amenities, and tourist attractions, together with agriculture, food production and food delivery to tourism and hospitality sector, small handicraft businesses, and infrastructure of destinations, etc.). The destinations must, more than ever, be able to offer medical services on the high level of quality and supply of medicines not only for COVID but also for other diseases because pandemic has led to the denial of many vital and necessary services and medicaments for other conditions and diseases of people worldwide. Understanding the issues with health and medical resources being limited in the past year of the COVID pandemic the tourism sector must adapt and offer tourist products ensuring tourists the safe stays in the destinations. There is a dilemma that needs to be answered and solved; how can destinations guarantee medical assistance to tourists, while at the same time not being able to accommodate their citizens. Those and many other issues are the new reality of tourism and new challenges of all destinations' management that needs to be answered and clarified if they want to retain and gain a certain market share. On the other hand, tourists seek new tourist products with the assurance of

destinations and tourist organizations being capable to satisfy new trends and needs influenced by the COVID pandemic as a disease but also by the consequences of lockdowns and restrictions, masks wearing, distance, self-centrism and psychological impacts on their mind, body, and souls. During the COVID pandemic, people changed mentally, and many are facing fearsome thoughts, depression, and other conditions which can be healed or improved by traveling, changing the environment, enjoying the tourist destination services of specific and selective types of tourism; nautical, medical, wellness, rural, eco, Eno-gastro, sports, cultural, etc. By acknowledging all the facts and circumstances, it is obvious that tourism is facing many challenges worldwide, and the task for destinations is not easy, to overcome the COVID pandemic crisis and recover, rethink, restart, and rebuild tourism into sustainability soon.

Methodology

As part of the research strategy, an extensive literature review has been applied and the analysis of the results is interpreted. The research is conducted using scientific methods of analysis and synthesis of recently published research papers and findings in the field of tourism, analyzing tourism trends during the COVID pandemic and predicting tourism development, and major changes in the future, known as tourism at the post-COVID age. The methods of induction and deduction in this research aim to identify the major trends and challenges in the tourism sector, but also to indicate the relevance and importance of changes in other sectors relevant for tourism success and modifications in tourist offers, creation of new and modified tourist products and services. The research is also conducted based on sources of domestic and international scientists, researchers, and scholars and their findings related to different aspects and consequences of the COVID pandemic on tourism and its relations to tourism, specific and selective forms of tourism, and the promotion of tourism in the digital era by using virtual and augmented reality.

Sustainable tourism has become a major goal of tourism worldwide intending to replace, reduce, and restrict mass tourism destinations and attractions with selective forms of tourism and compliance with the carrying capacity of destinations and sites (Oborin et al., 2018). The relevant sources of UNWTO and other tourist organizations are reviewed and

compared to destinations' compatibility with the UNWTO recommendations, and examples of good practices of selected destinations, tourism, and other supporting sectors worldwide are revealed.

Results

The previous year 2020 has brought many changes in the way people travel but also has created new opportunities in terms of tourism development. COVID pandemic and the crisis that affected economies worldwide had an enormous impact on tourism. According to UNWTO data, in 2020 the tourism declined by 60–80% on the global scale during the COVID pandemic in comparison to 2019 (https://www.unwto.org/COVID-19-and-tourism-2020). It resulted in 1 billion of international tourist arrivals loss and the loss in international receipts of 1.3 trillion US dollars with an estimated loss in global GDP of over 2 trillion US dollars. Tourism reached the level of 1990 which is 30 years ago with a total of 338 million international arrivals in 2020 (−74% in comparison to 2019). Such impact results in 100–120 million jobs in tourism at risk. (UNWTO, 2020). Considering the impact of the COVID pandemic on the global tourism situation, it is obvious that the recovery of tourism will need a different development approach and the new era of tourism will begin. Given the characteristics of today's life, COVID-19 has spread globally and become a global problem and global crisis (Matakovic, 2020).

The WHO (World Health Organization) on 30 January 2020 declared the outbreak of COVID-19 to be a Public Health Emergency of International Concern and issued a set of Temporary Recommendations. They emphasized that "tourisms response needs to be measured and consistent, proportionate to the public health threat and based on local risk assessment, involving every part of the tourism value chain—public bodies, private companies, and tourists, in line with WHO's overall guidance and recommendations" (WHO, 2020). Some denied entry to destinations completely for the period of few months while some kept the entry opened but under more control and with introduced testing before or on arrival, with home or hotel quarantine.

Figure 15.1 shows the most common COVID-19 measures taken by governments in destinations as recommended by WHO in most of the countries worldwide (WHO, 2020). WHO states that "tourisms response needs to be measured and consistent, proportionate to the public health threat and based on local risk assessment, involving every part of the

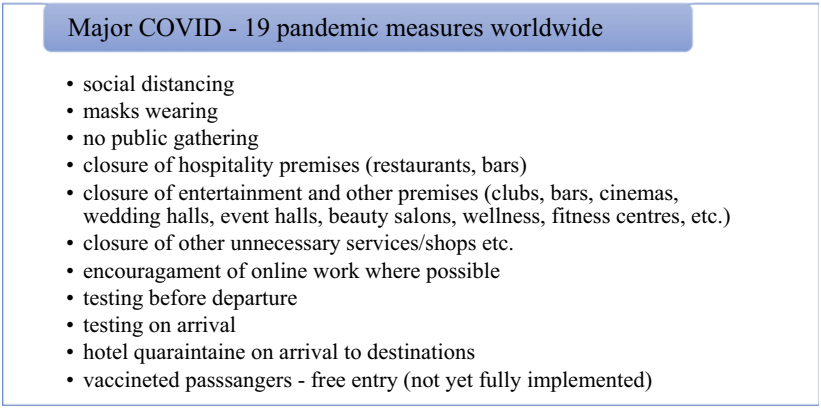

Fig. 15.1 COVID-19 pandemic measures worldwide (Source: authors' processing)

tourism value chain—public bodies, private companies, and tourists, in line with WHO's overall guidance and recommendations" (WHO, 2020).

Taken into account that destinations worldwide introduced certain measures in early 2020 and continuously improve them until today, while opening and closing destinations for tourists depending on the number of infected people and growth or drop in the epidemic volume, the change in people's habits, daily lifestyle, work styles (transition to online or remote working wherever possible) and overall behavior can be identified. Such changes in peoples' lifestyle have an impact on their needs and want when it comes to future tourism. Safe destinations are the fundamental fact and trend to be acknowledged and taken into account while creating new tourist products and offers (Osipov et al., 2018). The post-COVID era will be characterized by tourist products and offers but their root can be seen in the change of peoples' perception about tourism and change in their behavior while consuming tourist products and services. The following cases of different destinations and their solutions to keep tourism at a certain level and to adapt to changed requirements, and still provide tourism services in changed concepts, are presented in research papers of different international and national authors (Gureyeva et al., 2017; Skryl et al., 2018).

In his paper, *COVID-19 crisis, implementation of security measures, and tourism*, Matakovic analyses tourism in the post-COVID era in the

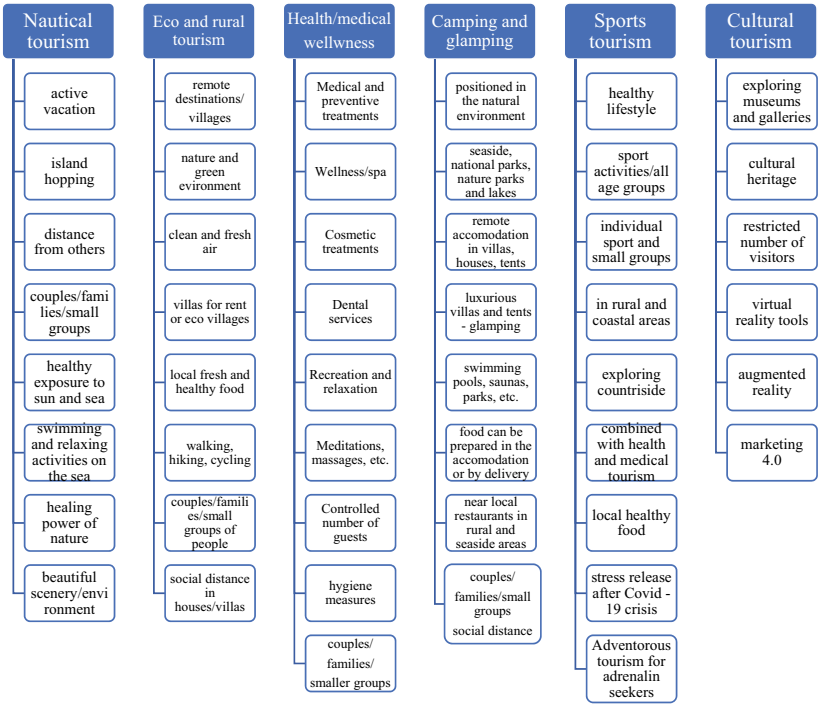

Fig. 15.2 Selective types of tourism and their adaptability to *COVID*-19 measures (Source: authors' processing)

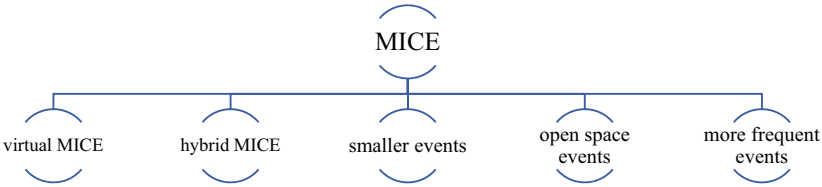

Fig. 15.3 MICE tourism as business tourism and its adaptation to *COVID*-19 measures (Source: authors' processing)

Republic of Croatia. He analyses measures taken by hotels in terms of detailed cleaning of rooms and their disinfection and concludes that it will still be present in the future because it was always done before too. However, measures of social distancing, such as wearing protective masks or security spacing have so far not been part of everyday life in tourism and it is difficult to assume what tourism will look like in the future. Matakovic predicts that even after the epidemic ends there will be the implementation of two types of safeguards, which should prevent a resurgence of the epidemic: One measure is a ban on foreign arrivals, and the second is the ban of trips abroad. There is also a solution for the Republic of Croatia to sign agreements with the Czech Republic, Slovenia, Austria, and Slovakia, around the opening of corridors for tourists in Croatia. Accordingly, the focus would be on the tourists who will travel by road transportation, mainly cars; not by air and the tourists will not travel too far. The main accommodation types would be campsites, accommodation in nature, private houses and villas, precisely because of the distancing opportunities (Matakovic, 2020).

The fact that Croatia is one of the safest countries in the world: Global Peace Index study from 2019 ranked Croatia 27th the safest country among the 163 countries in the world. Croatia has gone through the COVID-19 crisis less painful than other tourist superpowers such as Italy, Spain, or Austria. This can be seen as a comparative advantage in the future promotion of Croatia as a safe destination (Matakovic, 2020).

In the paper Tourism after Corona: What will be different? What can be better? (Kosuta Telisman, 2020) determines the following changes in future tourism:

1. Relations to space
2. Attitude toward health security
3. Relations to the environment
4. Human relationships and
5. Relations to technology.

All the changes are related to the consequences of the COVID pandemic and the need to adjust the number of tourists at the destinations, their behavior, distancing, travel and tourism patterns of behavior in compliance with pandemic measures, sustainability in all forms of tourism service consumptions and sites management, the relationship between

people with more respect and distancing and relations to technology by using different online possibilities of communication, presentation, and interaction with potential tourists and tourists.

Authors identified major problems in rebuilding its shattered tourism sector of Africa after the COVID pandemic and expect a slow rebuilding process of tourism with highlighting the fragility of the globalized tourism industry and Africa, being dependent on global visitation and global capital. The future may demand greater localization, higher levels of community engagement, and the capacity of policymakers and the private sector to listen to and respond to voices from these diverse African communities. (Rogerson & Baum, 2020).

According to Mekharat and Traore, global travel relies on departures from China, Hong Kong SAR, Germany, the United States, and the United Kingdom. They assume that the destinations relying on tourists from these countries will be affected by the speed at which these nations recover, as well as the changes in their customers' behavior (Mekharat & Traore, 2020). Authors identify the importance of location and access (especially if accessible mostly by air) and in the infrastructure of destinations where they divide it into local transport, healthcare infrastructure, and IT infrastructure. Digital infrastructure and informatization of destinations can improve not only the immigration process, informing tourists before and during the travel, minimizing touchpoints but also the promotion and enhancement of experience while visiting tourist destinations and tourist attractions, such as museums, castles, and other cultural sites. As part of marketing 4.0 and digital marketing, the tourism sector already applies augmented and virtual reality in the promotion and service delivery process (Gregoric et al., 2019). The augmented reality helps tourism destinations to reach wider audiences, serving as a technology for delivering attractive media content and mobile applications, tailored to different levels of knowledge of tourists and users and it is used in the promotion of destinations. Virtual reality as part of the 4.0 industry represents the concept of computer simulation that aims to create a sense of presence in a virtual environment (Roncevic et al., 2019).

Authors Roncevic et al. (2019) elaborate how the tourist as a user could be placed in front of some attractive locations or within the destination in northwestern Croatia (or in any other destination) intending to encourage interest in visiting the same. Before the COVID-19 pandemic, the research results show that potential tourists would like to gain insight into tourist destinations through new technologies and to promote tourist

destinations through industry 4.0 is a new step in the promotion to attract more potential tourists. (Gregoric et al., 2019).

The information is given to tourists before their travel could be done by using applications of virtual reality and introduce them to the whole process of arriving at the airport, departures, immigration process, tests sites at the airports, procedures, arrival to destination, quarantine hotels, sightseeing tours, health and safety issues in destinations, hotels, and other facilities, tourist attractions and health centers, if needed for the emergency purposes. The applications can be guides to tourists for the entire duration of the trip and assist them in infrastructural issues but also enhancing their experience in the destinations. Therefore, one of the major aspects to be considered in the post-COVID tourism era is the implementation of virtual reality in tourism to enhance the overall quality and satisfaction of tourists as well as the experience. The service industry, such as tourism is highly infused with experience, and today more than ever the tourism sector must create a memorable experience for tourists, especially after the COVID pandemic, when tourists are eager to travel, to relax, to revitalize, and to refresh their mind, soul and body. According to Pizam, the future of tourism could be perceived as a chance to add more quality to future tourist experiences (Pizam, 2010, as cited in Stankov et al., 2020). As a consequence, future travel will be less frequent, and it can be seen as an opportunity to be more valuable and specific. However, the results of market reports show that post-pandemic tourists will require more basic experiences especially as domestic tourists in domestic travel (staycation), and they will value more spending quality time with friends and relatives (Wootton, 2020, cited in Stankov et al., 2020). Stankov et al. (2020) "believe that the current pandemic could give rise to more mindful tourists whilst these, in turn, can give rise to more mindful and, ultimately sustainable tourist experiences". Authors suggest that it should prompt tourism providers to respond to a new demand by adjusting currently unsustainable product offers to mindful tourists who will be able to promote, connect and support the whole tourism ecosystem for the benefit of all.

The study from New Zealand as a destination with lots of natural and cultural attractions directs us to the potential of applying the knowledge, lifestyle, and culture of their indigenous people to be implemented in other parts of New Zealand or any other destination. Indigenous tourism operators can contribute to adaptations and planning for the future welfare of their businesses, the local environment, and affected

communities. "The tourism future can be one encapsulating the indigenous social, environmental and cultural values that underpin ways of being and undertaking business—opposite to neoliberal, corporate models pre-COVID-19" (Carr, 2020). The study conducted in Sri Lanka suggests the future trends in rebuilding tourism and the following is to be considered: the growth of domestic travel compared to international tourism, the growth of tourism demand for tourism products related to the healing, well-being, heritage, culture, ayurvedic and medicine, the drop in demand for big events and festivals, which can lead to a price reduction in that area, but the VFR (Visiting Friends and Relatives) as a tourist product will grow rapidly. The MICE industry was greatly affected, and the solution is found in virtual and hybrid events which should be done in the future too (Ranasinghe, 2020).

The report of World Bank Group, *COVID-19 and tourism in South Asia, Opportunities for the sustainable regional outcome,* states that tourism pause during the pandemic is an opportunity for reinvestment in the environment, in parks, and cultural monuments, maintain natural parks, plant trees to upgrade the infrastructure within national parks and protected areas, clean rivers, and water channels, restore wildlife habitats, remove invasive species, clean pollution, and other coastal infrastructure (Twining & McComb, 2020).

If we try to explain the relationship between climate change and the consequences of COVID-19, there is a significance in observing how much nature and climate changed globally. The research conducted by Crossley where the intersections between the COVID-19 crisis and climate change was explored to help the understanding of tourist consumer behavior in terms of "persistent attitude-behaviour gap concerning sustainable tourism". The author explores how the wildlife reclaiming urban spaces emptied by the coronavirus lockdowns, including famous tourist destinations, and much evidence is shared on social media. It can be seen as a "motif of environmental hope that symbolizes life, regeneration, and resilience". According to the author, there is a challenge to design tourism by harnessing and channeling environmental hope which will heal the natural world (Crossley, 2020). The COVID pandemic and crisis give the perfect opportunity to select the new direction in tourism development by adopting a more sustainable path with the collaboration of the public, private and academic sector toward a greener and more balanced tourism (Ioannides & Gyimóthy, 2020). As recommended by Ioannides and Gyimóthy the academics and scholars should

actively participate in "redesigning the curricula and educational activities to train students to gain skills in complexity-thinking, knowledge of post-capitalist economies and collaborative business models alongside with tourism scholars to build sustainable tourism". According to the Matrix of potential evolutionary pathways toward tourism transformation, (Brouder, 2020), there is an implication that tourism can transform when there is institutional innovation on both the demand and supply side which will see the emergence of new path creation in the region (Yankovskaya et al., 2020).

The forecasts of the future of tourism in some research studies imply the need to focus on the tourists' networks and movement of tourists toward different destinations. As per authors Jeon and Yang (2021), in order to satisfy tourist demand, various forms of tourism activities are taking place, evidenced by the discovery of previously lesser-known destinations and the use of contactless tourism services while the tourism market should be encouraged to promote local tourist attractions. Following this idea and research results of different authors we could say that the future of tourism in the post-COVID age has to focus on development of tourist supply and offer in less attractive destinations (which gives opportunity to investment, entrepreneurship, and rebuilding of tourism) while at the same time monitor and control the number of tourists visiting all (major, sites and less known) as well as to ensure so-called "contactless" services wherever possible. The study conducted in four tourist destinations in Japan shows that residents perceived moderate positive and negative impacts toward tourism in the region. The residents were strongly concerned about the effects of COVID-19 and engaged in infection prevention themselves. At the same time, residents felt a negative impact on the regional economy and tourism due to COVID-19. The residents understand the importance of tourism, but it is also important that destination managers can provide stakeholders, including residents, with proposed guidelines for tourists and discuss and modify the guidelines based on stakeholders' feedback. Such actions and rules will also help tourists feel secure in the area. According to the authors, some DMOs in Japan are considering employing digital platforms as a marketing tool that will include tourist mobility data and it is seen as a good opportunity to add information regarding COVID-19 (Kamata, 2021).

Discussions

The vaccination of people will play an additional role and there are already destinations accepting and planning to accept vaccinated people to enter destinations without quarantine and testing. The idea of introducing "COVID passports" may become a future reality, but there are some contradictions within the population on whether this is acceptable and in line with the freedom of people to choose. Some future development will show us the path when it comes to the treatment of vaccinated versus not vaccinated people. The authors recommend the following idea and model of redefining specific types of tourism. The model is based on the type of tourism perspective (creation of tourism supply) which can accommodate and satisfy the needs of tourists according to their preferences related to changed behavior due to the COVID-19 pandemic. The major characteristics of tourists' preferences to be included in all tourist products are related to health issues, hygiene, distance or contactless services, relaxation, passive and active sports and recreation, fresh air, sun and green scenery, wellness in a controlled environment, and availability of medical help (emergency).

The major corresponding types of tourism that could quickly adapt to COVID-19 measures are as follows:

- Eco and rural tourism
- Nautical tourism
- Health and Wellness
- Camping and glamping
- Sports tourism
- Adventurous
- Cultural tourism
- MICE

Other types of tourism can follow the examples of the proposed ones, but mass tourism such as SSS (sea, sand, and sun) must consider strong control over the carrying capacity at beaches, hotels, and resorts.

Besides health tourism, sports as one of the most important categories of tourism in the time of the COVID-19 pandemic, there is an opportunity to add value with the implementation of Aromatherapy and Aroma cosmetics to the post-COVID tourism forms. According to the research

conducted in Croatia, Aromatherapy and Aroma cosmetics are represented in some regions, but still, the majority of tourists are not aware of its healing effects on the human being. Authors find the aromatic positive impact in several different areas: from natural preparations, health food, festival of medicinal plants to festivals of certain aromas applied in the production of natural cosmetics which can be part of post-COVID tourism. Health tourism is seen as a positive contribution to tourism development, education, and the setting of new trends concerning the users of services appearing in health tourism can be applied in Croatia but in other countries worldwide too (Gregoric et al., 2020).

MICE tourism (meetings, incentive trips, conferences, and exhibitions) requires special attention due to its specific nature: business users, demanding guests, the most profitable tourism sector, high expenditures, seasonal character, and use of digital technology in organizing and delivering events, and follow-up activities. The most prominent cities in this sector of tourism Zagreb, Dubrovnik, Opatija, and Istria, and congress tourism represents an excellent way of promoting a destination because 40% of guests return to the destination in a private arrangement with their families or friends (Gregoric et al., 2017).

Considering current trends in the MICE industry, there is a growth of the demand of the buyers in MICE, for virtual events, and it will certainly be one of the trends that will continue in the post-COVID age.

Conclusion

Post-COVID tourism must focus on the development of new tourist products in the area of selective forms of tourism, emphasizing the well-being of tourists, health, safety, and security issues, and sustainability. In terms of the new selective approach the mass tourism is no more trend, the ways of travel change, aviation industry goes through a significant change of service concepts, COVID passports including vaccine certificates might be introduced and tourism on the global scale becomes known as rethink, rebuild and restart tourism.

The promotion of tourism and product development has already been introduced and will be more and more using virtual and augmented reality together with tools of marketing 4,0. In terms of benefits for destinations, domestic tourism already started to grow due to travel restrictions which will contribute to further development of destinations but also new opportunities for supporting industries. The challenges of

the tourism sector are many and there is a need for coordinated planning and restart of industry and strong cooperation with hospitality and travel sector that already started offering different services in line with social distancing, health, and safety, such as digital nomad packages, bubble trips and virtual meetings, virtual tours, etc. Some destinations already created new tourist products and are working on improvements taking advantage of the situation and improving the tourism results. In the future, it is expected competitive tourist market and sustainable destinations to be on the top of tourist choice.

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PART II

Social Development at Post-COVID Age

CHAPTER 16

Influence of COVID-19 on Healthcare System

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Introduction

The Russian healthcare system proved to be one of the best in the world in the COVID-19 test: Sharp peaks in the development of the pandemic were not occurred; hospital infrastructure was built on a mobile basis, armed with the necessary high-tech equipment and specialists. The pandemic showed what a new system for the construction of medical institutions should be. Thus, it should be pre-fabricated buildings for a period of about 20–25 years, in order to construct new ones that meet the requirements of the time with a change in technology.

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_16

Another conclusion that can be drawn from the results of the pandemic is that we have properly trained medical personnel in our country. They worked without sparing themselves; hundreds sacrificed their health and even their lives to fulfill their duty. No doubt, there were complaints, failures (especially in far regions), and the healthcare managers have something to develop, to determine what exactly needs to be improved in medicine. However, in general, the system worked effectively. The lessons of the pandemic must be learned by everyone—medicine, society, and government. The fight against the pandemic was going on at the limit of possibilities, and the further viability of the Russian healthcare system requires fundamental changes in the management and financing of the industry.

The coronavirus epidemic, which has spread to all parts of the world, has a significant impact on the pharmaceutical industry, because a large proportion of the ingredients are sourced from abroad. In this regard, industries need to adapt to new conditions and look for alternative supply chains in such a difficult period around the world. Therefore, it affects the quality of the products. Moreover, medications need to be produced many times more in the framework of a pandemic and a shortage of components. Such way, this problem applies to both developed and developing countries.

There is also a need for the prompt creation of both vaccines and new maintenance drugs, which contradicts the main goals of the manufacturer. Pharmaceutical companies are interested in a quick return on investment and profit purchasing equipment and investing in the creation of drugs. The rapidly changing global environment requires constant innovation in the pharmaceutical industry, which does not match the rate of return on previous investments.

This issue has an acute social significance, because the absolute need to meet the needs of society for food and medicine for self-preservation, self-reproduction, and self-improvement of the nation is the fundamental imperative of national security. Disruptions in the pharmaceutical industry's supply chain can lead to a shortage of essential drugs, which will significantly reduce the effectiveness of medical care in the country, which is especially not allowed during a pandemic.

The issue of changing global value chains is widely developed in the scientific literature. The global value chains perspective is primarily distinguished by its approach to economic globalization or, more precisely, globalization of production. Periods of globalized manufacturing begin

with economic downturns and end with economic recessions (Hopkins & Wallerstein, 1994). The current wave of globalization stems from the slowdown in demand in developed countries noted by Maddison (Maddison, 2001), from 5.4% a year in the 1960s to 2%–3% in the 1980s and 1990s. The main feature of the current phase of globalization is that it coincides with a general reduction in regulatory barriers to international trade, significant advances in communications technology, and lower transportation costs, which are contributing to the dispersal of productive activities in space (Gibbon et al., 2008).

Thus, current global value chains concepts have proven to be robust and still valuable, but they do not highlight the fragmentation of it or the smooth integration of real-time capabilities in advanced economies with fast-growing opportunities in places that were virtually outside the capitalist global economy just two decades ago, for example, in China, India, Russia, and Vietnam, according to a study by Stefano Ponte (Ponte & Sturgeon, 2014). The authors emphasize "While the rise of GVCs does not make this old view of global competition completely anachronistic, it is safe to say that the picture has become more complex and dynamic".

Other authors have proposed additional ways of understanding governance by including normative rather than tangible elements of global value chains, including quality agreements and broader expectations of corporate organization and strategy (Ponte & Gibbon, 2005). At the same time, it is clear that consumers shape chains through the choices they make, such as when they use the products and services they buy for unintended purposes, and even more so when their desires are reinforced by boycotts, collective lawsuits, or programmatic through the efforts of NGO (Ponte & Sturgeon, 2014).

In the framework of the importance of changing value chains, it will be important to note that the initial priority for the study was the global pharmaceutical industry, which received a lot of attention due to conflicting practices related to transfer pricing, differentiated drug labeling in different countries and the role of essential drug programs. funds in the developing world(Lall, 1973; Stefano et al., 2019). Pharmaceuticals was one of the sectors included in the original set of studies (Gereffi, 1983). The bargaining system has sparked intense debate about the limits of addiction, hypothesis testing, counterfactual analysis, and the potential for reversing addiction (Stefano et al., 2019).

Methodology

This chapter used a wide range of methods of scientific knowledge. Thus, methods of analysis, comparison, and synthesis make it possible to form a general idea of the change in the structure of global value chains. The method of generalization allows, on the basis of the variety of events and facts under investigation, to form a complete picture of a particular process. The conceptualization method presupposes a theoretical understanding of this process and its schematization into a system of similar processes. We would like to note some researches in the area of e-health system, IoMT, and digitalization of health care which influenced our study: Osipov and Skryl (2021), Bogoviz et al. (2019), Skryl et al. (2018).

Results

Since the 2000s, the concept of global value chains has become increasingly used as an analytical tool in various scientific fields, including to address the problems of international expansion and local fragmentation of product chains. Global value chains allow to describe the world economy as a complex of production chains of products, including intra- and inter-firm relations.

Currently, the global production process is formed within the global value chains. Global value chains enable countries and industries to exchange raw materials and various components to create a final product. The final product is then re-exported to consumers. This interaction at the international and local levels promotes productivity growth in developing countries, as well as the exchange of technology. Now almost all economies in the world are part of global chains, through which the pandemic directly affects all sectors of the world economy.

Thus, we could highlight, that the rapid transformation of the global economic and institutional scenario over the past few decades with the emergence of new competitive firms and countries (especially in Asia) has profoundly changed the way TNCs are structured and managed globally (De Marchi et al., 2013). At the same time, the crucial issue remains how much the value chains have changed during the COVID-19 pandemic.

The process of global value chains change occurred in all countries and Russia is not an exception. Nevertheless, we should consider the situation in a whole healthcare system. By the beginning of the epidemic, the Russian healthcare system, according to experts, was in a situation

of chronic underfunding (Zhuravleva & Reznik, 2020). Changes in the Russian health care system began long before the COVID-19 pandemic and are associated with the state reforms carried out for the second decade, carried out with varying degrees of effectiveness. The COVID-19 pandemic revealed the negative consequences of this process and had an additional impact on the entire national healthcare system. The first problem appeared during the period of COVID-19 morbidity related to the reduction of bed capacity in hospitals and day hospitals. By the beginning of the epidemic, Russian health care was in a situation of chronic underfunding. From 2012 to 2018, the provision of inpatient beds in state and municipal medical organizations decreased by 15% (by 160,000 units, being 15% lower than in Germany) (Zhuravleva & Reznik, 2020).

During the implementation of health care reforms, officials at different levels reported to the Government about the excessive number of beds in departments of various profiles, primarily infectious, about their unprofitability and the need to reduce them. As a result, for several years the bed fund was ruthlessly destroyed, the dynamics of such extermination and an illiterate attitude to cost management in health care can be illustrated by data provided by Federal State Statistic Service of the Russian Federation in open sources. In 2012, 1,202,590 beds were reduced in Russia, in 2013—1,167,709, which is 34,881 less than in 2012 and amounted to 97.1% of the 2012 level. The tendency was continued in 2014, so in the organizations of the healthcare system, there was another 40,863 beds less than in 2014 (1,137,997 beds were eliminated). In 2015, 1,097,134 beds were reduced and in 2016—1,074,382 units (97.9% of the 2015 level). Unfortunately, the data for 2017–2020 are absent and it is not possible to analyze the rate of reduction of the bed capacity in Russia. However, according to the above-mentioned data, it is proved that the domination of the laws of the market over common sense and the interests of people led at first to a sharp reduction in the bed stock, and during the period of the outbreak of the disease, beds had to be deployed not only in hospitals, but also in exhibition centers, shopping malls, etc.

The second problem, which appeared most acutely during the pandemic, was that low salaries of medical personnel led to a massive outflow of personnel from the industry and huge overloads of the remaining personnel. From 2012 to 2018, the provision of practicing doctors in state and municipal medical organizations decreased by 12% (by 46,000 people). In rural areas, in small and medium-sized cities, as well as in the “primary care” of health care, doctors are less than

the required number by one and a half times (by 36,000 people), nursing staff—1.8 times (by 66,000 people), paramedics—1.9 times (for 20,000 people). The healthcare system in Russia was optimized for the epidemic of noncommunicable diseases, and the sanitary and epidemiological services themselves were unable to prevent the outbreak of COVID-19 (Zhuravleva & Reznik, 2020). Thus, our country was not ready for a full-fledged and full-scale fight against the virus. Economists and doctors were united in assessing the ancestral situation and the impact of the pandemic on the Russian healthcare system, which can be considered in two main aspects:

1. The economic crisis caused by COVID-19 and manifested itself both in the production and in the social sphere, depending on the filling of budgets, inflation, etc.
2. The need of health care for additional resources aimed at combating COVID-19 (as an industry directly involved in the elimination of the disease).

If we consider in more detail the first type of influence (economic crisis), we could see the share the opinion of our colleagues from the Institute for Research and Expertise of Vnesheconombank of the Russian Federation, as well as the Research University of the Higher School of Economics and their extremely pessimistic forecasts on the level of impact on the country's economy of the pandemic (Central Research Institute for Organization and Informatization of Health Care "of the Ministry health care of the Russian Federation 2020). We can agree with their conclusions that the main damage to the Russian economy is not caused by the fall of domestic production due to various restrictions, self-isolation, prohibitions to work for citizens of a certain age, and other negative phenomena in connection with the spread of COVID-19, not by measures to support the economy and the population, and even, not sharply increased government spending on the fight against coronavirus (Central Research Institute for Organization and Informatization of Health Care "of the Ministry health care of the Russian Federation 2020). However, the main damage to the Russian economy is caused by the negative impact of the spread of coronavirus on the economies of three key economic centers: China, the United States, and the European Union.

It is quite evident that due to the coronavirus, there will be a decline in demand and prices for products imported by Russia, that is, our country will suffer the main losses due to insufficiently effective measures to curb COVID-19 from developed Western countries.

The second type of influence (the need for additional resources) will be considered indirectly through the factors of influence. The following factors can be identified that affect the financial situation of medical organizations in the context of the spread of coronavirus, and, therefore, lead to the consumption of additional amounts of monetary resources:

1. The sharply increased accounts payable of many state (municipal) medical organizations, formed in the past years and significantly complicating the current economic situation, as well as their lack of "safety margin". This debt is caused by mainly two reasons: a) additional costs to cover the obligations of medical organizations (not provided with adequate additional financial support) associated with the need to sharply increase the salaries of medical workers within the framework of the "May" Decrees of the President of 2012; b) a sharp increase in the cost of resources consumed by medical organizations as a result of the sanctions imposed against our country and the fall in the ruble exchange rate against other currencies;
2. Problems with the collection of budgetary funds, which are caused by a drop in the collection of taxes and fees to the state budget due to a decline in production during a pandemic and restrictions on the work of enterprises in the manufacturing sector, the sphere of consumer services, public catering, and the entertainment sector. In addition, there was a sharp drop in individual incomes, which led to a decrease in the amount of personal income tax to the treasury;
3. A decrease in the collection of funds in the systems of compulsory health insurance and voluntary health insurance;
4. A decrease in the income of medical organizations for paid services associated with a drop in personal income of citizens.

The impact of the spread of coronavirus on additional healthcare costs is complex. The studied industry incurred significant costs associated with the deployment of COVID hospitals either "greenfield" with appropriate equipment, or adaptation of other inpatient departments to hospitals with the upgrade of their equipment, the purchase of ambulances, personal

protective equipment, and others. At the same time, the dominant part of these costs should be considered not as budget losses, but as investments in the healthcare sector, since purchased cars, tomographs, analyzers, ventilators, oxygen stations (concentrators, ramps, etc.) will be used for several more years.

The impact of the COVID-19 pandemic manifested itself not only in a direct impact on the healthcare sector, although also in additional government spending on preventing the spread of coronavirus and eliminating its consequences:

- additional expenses directly on health care;
- measures to support business;
- measures to support the population—an increase in the size of social payments, an increase in the minimum payment for sick leave to the level of the minimum wage, etc.

The COVID-19 epidemic has led to strong growth in sales of preventive health products. According to statistics, retail sales of medical, pharmaceutical, and cosmetic products rose significantly in the spring, mainly due to masks and disinfectants. However, the supply of masks was highly dependent on imports that time: Fewer were produced in Russia compared to imported ones. Since the beginning of March, access to these products in Russia has been very limited and difficult. Likewise, the demand for ventilation systems is only partially covered by limited national production. Experts also reported that some hospitals find it difficult to operate specialized equipment of this type without sufficient medical staff trained in their use, and more generally in a context characterized by a historical shortage of nurses, which often requires chipper labor.

We can also note that the supply of those drugs that stop the symptoms of COVID-19 has increased dramatically. In the summer, sales of drugs aimed at combating the side effects of the disease in question increased. We can note that almost the entire drug market experienced growth. However, due to the closure of borders, the supply of goods was carried out unevenly, which destabilized the situation. Countries had to look for substitute products, the geography has changed. Thus, this period, namely spring–summer 2020, can be called the first part of changes in the pharmaceutical market.

That period showed, that until the virus mutated little, the pharmaceutical industry had little or no economic interest in developing drugs specific to COVID-19. The situation complicated by patent issue. Repositioning patented drugs can be financially beneficial if proven to be effective. However, there is no incentive tool to facilitate repositioning of generic drugs. If the repositioned drug proves to be effective, it cannot be protected by a new patent designation that would guarantee it a price that would allow the manufacturer to return at least the cost of its development. The drug is generic and produced worldwide at cost.

Pharmaceutical companies are generally known for the reliability of their supply chains. Because these companies often supply life-saving drugs to their customers, they not only have economic incentives, but they must also comply with regulatory requirements. However, the relationship between global value chains and the demand-side pandemic should not be underestimated. A study by Andrea Coveri noted that, firstly, government measures to contain the virus, such as drastically reducing people's mobility and closing almost all commercial and recreational activities, immediately entail a reduction in consumption(Coveri et al., 2020). Some of them will be delayed, but many others will probably never be rebuilt. The most severe impacts will affect the service sector, in particular the transport, tourism, accommodation, and catering sectors, and will affect some countries (e.g., Italy) more than others (Coveri et al., 2020).

Moreover, a sharp slowdown in production is expected to increase the unemployment rate, leading to a reduction in household disposable income, starting with those who are hired on a temporary basis. If this reduction affects mainly the poorer segments of the population (with a higher marginal propensity to consume) the impact on aggregate consumption will be even greater. The study concludes that the global decline in consumption and investment simultaneously intensifies the reduction in value added, further restricting external sales markets and, consequently, slowing down the dynamics of net exports of both final and intermediate goods.

With a sharp jump in demand, as in the case of COVID-19, such a system is able to quickly increase the production of necessary drugs (Mamedyarov, 2017). Nevertheless, so far only a few manufacturers in the United States have switched to it despite all the obvious effectiveness of the new model—only companies creating the latest innovative drugs.

There are two main reasons: investment and bureaucratic regulatory procedures.

Discussion

The process of changing of global value chains continues. Most medium and high-tech industries are more focused on the production of final products, rather than semi-finished products in global value chains (pharmaceuticals, auto and railway transport, electrical machines and equipment, etc.), while the production of intermediate products in these industries makes a small contribution to the aggregate value of Russia in the GCDS. Nowadays, most of the export of medium and high-tech products is significant (over 70%) depends on imports: electrical machines and equipment, auto and railway transport, medical and computer technology, pharmaceuticals (Higher School of Economics, 2020).

The study of the characteristics of companies from countries with emerging markets is a promising context for research in the analysis of global value chains at the present stage of development of this scientific field. The growing influence of companies in the global economy is due to the constant renewal of competitive advantages and strategies. It is critical to find new ways to develop them in global value chains (e.g., choosing more profitable production processes and moving away from standardized low-margin operations). Nevertheless, we should take into account the initial disadvantage of companies from emerging markets compared to companies from developed countries.

However, during the process of developing projects for the studies and financing them, it is necessary to take into account that the leading position of the American currency, which is used as a world reserve, is under threat. As a result of the global pandemic, debt will accumulate, and the dollar may weaken due to an unprecedented rise in the price of gold and the strengthening of the euro. The US public debt in 2019 exceeded the country's total GDP, which grew even more in 2020. All of the above bears risks that the acceleration of inflation in the United States will push other countries to artificially accelerate inflation, that is, to overrate their balance sheets and create excess supply money. Growing deficits in the budget, trade balance and current account combined could scare away investors from the US market, causing the currency to depreciate.

Summing up the final results of the study, it is possible to identify the main threats to the world economy, which at the present stage indicate the imminent onset of the global economic and financial crisis, including:

- bankruptcy of numerous enterprises due to restrictive measures in a pandemic;
- decrease in prices for hydrocarbon raw materials;
- serious problems in the economies of leading countries and, as a result, a decrease in the interest rate down to 0 and negative values, which indicates unfavorable trends in the world economy;
- trade wars and customs barriers that destroy the foundations of economic globalization.
- the cumulative impact of negative factors increases the likelihood of an economic crisis and its large-scale destructiveness.

Conclusion

The pandemic of a new type of coronavirus has shown that there is a time of a number of changes in the healthcare system, requiring amendments and additions to the current legislation on health protection, especially in the field of drug circulation, the regulatory framework of which, as it has been adopted, does not fully meet the country's needs in emergency situations (Petrov, 2020). We can share the opinion of representatives of the State Duma Committee on Health Protection that Russia needs to create a state system of drug safety and a single center for managing the production and procurement of medical goods. At the moment, this department is divided into 5 centers that make decisions and act independently and independently of each other: the Ministry of Health, the Ministry of Industry and Trade, Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing, Federal Service for Surveillance in Healthcare, Federal Biomedical Agency, which does not allow to quickly solving emerging problems.

In addition, we consider it necessary to create a federal register of patients in the status of a law in order to effectively manage finances, treatment, and drug purchases. An objective necessity, occurred under the influence of the pandemic, was the creation of a reserve fund of drugs and medicines.'

In Russia, it is necessary to complete the section of legislation on the usage of unregistered drugs and to simplify the registration system in principle. Today this process takes from a year to one and a half years, which in critical conditions is unforgivably long. The doctors themselves, drug developers, pharmacists are invited to determine the safety and clinical efficacy of the drug—register it, and conduct the subsequent phases of clinical trials in the post-registration period, with the maintenance of all documentation, fixation of each side effect, payment for this work to doctors, etc. This position should be heeded by medical officials. A positive example of this practice was the situation during a pandemic, when it was required to quickly register the use of already known off label drugs not for the intended purpose and not according to the instructions. It was immediately done. Thus, such experience should also be included in the legislative framework so that doctors are not afraid to use the drug in the interests of the patient, but not according to the instructions. In the conditions of modern realities, doctors are threatened with criminal liability for this. It is suggested that the physician be given more authority to make decisions.

As we mentioned earlier, the pandemic has highlighted an acute shortage of qualified medical personnel in the regions of the country. The solution to this issue can be the centralization of the health care system as a prerequisite for solving the problem of personnel shortage in the industry in the regions.

Pandemic paralyzed the economy, the authorities and the medical community will agree on many issues. For example, healthcare managers and physicians themselves believe that it is necessary to more actively involve the private sector in the compulsory health insurance (CHI) system, creating conditions for a reference price, at which public and private medical organizations will be in equal conditions. We completely agree with this proposal, since we believe that patients should be given the opportunity to choose and pay for the choice of doctors, and not for the choice of insurance companies.

We also completely agree with representatives of the medical community, who propose to combine funds of the compulsory medical insurance, federal and regional budgets, transfer the functions of private insurance medical organizations to the state, make territorial branches of the compulsory medical insurance company financial divisions of regional health authorities, and transfer medical organizations to payment according to estimates with elements of reward for quality and volume

services to ensure uninterrupted financing of medical care and optimal planning of patient flows.

Among other measures, it is necessary to create a mobilization infectious disease service, maintain a reserve of oxygen-equipped hospital beds created to combat COVID-19, and form an order for the medical industry for personal protective equipment and the necessary equipment.

Thus, according to the above-mentioned recommendations, our country has a lot of work to improve the health care system, both directly from medical organizations and enterprises belonging to this area (production of medical equipment, consumables, pharmacology, construction, etc.). However, their solution to the tasks set will have to be carried out against the background of global economic problems that have developed as a result of pandemic.

The chapter shows how pharmaceutical industry's value chains have changed, the features of this process. Thus, the pandemic has severely affected the studied industry. Nevertheless, changes continue in relation to both the pharmaceutical industry and the entire economy as a whole.

We can conclude, that companies recognize the risk of supply disruptions often build resilient chains using emergency stocks. Unfortunately, many companies still hope that there will be no such disruptions. In this case, companies must find creative solutions to manage their business continuity. If they don't have a sustainable supply chain, they lose sales and therefore have to leave the market. For the Government, the changes affected through the need to look for new sources, develop the national industry, and sometimes create new drugs or own equipment.

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CHAPTER 17

Government Protection of Both Parties in the Operation of the Post-epidemic Labor Market in China

Meixia Shi and Wangli Zhu

Introduction

The COVID-19 outbreak, which started in early 2020 worldwide, has not subsided today and may worsen in some countries and regions such as India and Brazil, posing a serious threat to human life, health, and security, while inflicting an unprecedented impact on the economies of various countries.

Under the strong leadership of the Communist Party of China (CPC) and the joint efforts of the whole nation, China, as the first country to discover and report the COVID-19, quickly and effectively brought the epidemic under control with its economy gradually recovering from the

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_17

stagnation at the beginning of the year. According to the data released by the National Bureau of Statistics of China, China's GDP in 2020 reached nearly 102 trillion yuan, with a growth rate of 2.3%, making it the only major country in the world with a positive economic growth. In 2020, a total of 11.86 million new urban jobs were created, only 1.66 million fewer than the previous year. By the end of 2020, the surveyed urban unemployment rate was 5.2%, and the registered urban unemployment rate was 4.2%. Besides, the total number of peasant labors in China was 285.6 million, down 1.8% from the previous year, of which, 16.959 million were the rural–urban migrant labors, down 2.7% and local peasant labors reached 116.01 million, down 0.4%.

COVID-19 has hit industries hard, especially the labor market. To solve the problem of employment in the labor market is a challenge for China, a developing country with the largest population and the largest labor market in the world. In recent years, to meet the demand for high-quality development, China has undergone profound changes in its economic development pattern and made profound adjustments to its industrial structure. At the same time, due to a variety of factors, such as the global economic downturn and the rise of protectionism in some countries that led to a decline in external demand, the downward pressure on China's economy is increasing, which has brought about not only a general but also a structural problem in employment. To cope with the difficulty in stabilizing employment in this context, the state has introduced various measures to stabilize employment, to ensure the stability of the labor market. The COVID-19 has once again intensified the difficulty of employment in the labor market, which has exerted a great impact on both labor supply and demand subjects. Data released by the National Bureau of Statistics showed that the GDP growth rate in the first quarter of 2020 was −6.8% year on year, the first significant negative growth. According to Okun's Law, the decline of economic growth rate will lead to the rise of unemployment rate, which has a negative impact on the job market. Under the double blow of demand and supply, a large number of enterprises with difficulty in financing and weak ability to resist risks are facing survival crisis, as result of which, a large number of labors are facing the practical dilemma of unemployment and difficulty in finding jobs. From the trend of the national surveyed urban unemployment rate, the unemployment rate from February to June reached 6.2%, 5.9%, 6.0%, 5.9%, and 5.7%, respectively, and the high unemployment rate remained at about 6% for half a year.

"Employment is the most important thing for people's livelihood". The Communist Party of China (CPC) with General Secretary Xi Jinping at its core has stepped up efforts to keep employment, the financial sector, foreign trade, foreign and domestic investments, and expectations stable, namely "six stable" and further put forward the measures of "six guarantees (including people's employment, basic people's livelihood, market entities, food and energy security, industrial chain and supply chain stability, grass-roots operation)" with the stability of employment in a prominent position. In addition to implementing effective measures such as supporting the development of the real economy to keep the foundation of employment stable, creating more jobs in line with the trend of economic transformation and upgrading, encouraging people to find jobs and start their own businesses through multiple channels, increasing services for employment and entrepreneurship and providing basic living allowances, the state strengthens protection and policy support for both sides in the labor market and give equal priority to creating more jobs and maintaining the stability of existing ones, which, despite mounting downward pressure on economic growth, have kept employment basically stable and contributed to a stable and positive employment situation. Meanwhile, in the post-epidemic era, China has introduced a series of prudent monetary policies and proactive fiscal policies to boost economic development and provide corresponding protection to both labor market players. At present, such policies and measures of government protection have been adjusted in a timely manner and continued well, which has effectively ensured the stability of China's labor market.

Methodology

The methodology of institutional analysis, comparative analysis and system approach were used in frame of the research. Some statistical methods we used for calculating the financial results and indicators of the policy. The following researchers influenced on our study: Dong Baohua (2020), Wang Zhen (2020), Qian Xiaoyan (2020), Chao Xiaojing (2020), Osipov Vladimir et al. (2021), Osipov Vladimir (2019), Yankovskaya et al. (2020), Liu Dun et al. (2020).

Some information and data were taken from official sites in the Internet: http://www.mohrss.gov.cn/ and http://www.stats.gov.cn/.

Results

Government Protection of Enterprises, the Demand Side of the Labor Market

The impact of COVID-19 has caused serious differentiation of enterprises in different industries, forming a sharp contrast. Due to the flow of people, logistics, capital chain and other factors, industries like retail catering, accommodation and tourism, transportation, culture and entertainment, manufacturing, real estate, construction, and energy and mining suffered the biggest impact, with revenues falling so much that they could not sustain them until they went bankrupt. Especially the micro-, small- and medium-sized enterprises, which occupy an important position in China's national economic system and are distributed in all walks of life, are facing greater difficulties. Among the registered enterprises in China, 90% are micro-, small- and medium-sized enterprises(MSMEs), which constitute a very important link in China's economic system. Therefore, the healthy development of MSMEs has a far-reaching impact on the national economy and must be the key subject of government protection in the epidemic period and post-epidemic period. MSMEs contribute 50% of China's tax revenue, more than 60% of GDP and 70% of technological innovation, and provide about 80% of urban jobs. Thus, in the post-epidemic era, the importance of MSMEs is self-evident. To protect MSMEs is to safeguard the economy, maintain the stability of the labor market and protect employment. Generally speaking, the Chinese government's protection policies for enterprises are mainly classified into four categories.

1. Make every effort to ensure the resumption of work and production and the normal operation of enterprises.

To stabilize the operation of the labor market, the government should first ensure that enterprises can carry out normal production and business activities. An important part of the government's efforts to stabilize the Labor market throughout 2020 is to ensure as much as possible a return to enterprises as usual. On February 11, 2020, after COVID-19 was basically under control, Chinese Premier Li Keqiang held an executive meeting of the State Council, pointing out that "while making every effort to prevent and control the epidemic, enterprises should

be encouraged to resume work and production in an orderly manner". Specific measures include: First, cities with a low number of infected people should resume work and production in an orderly manner. Second, the government focuses on helping enterprises of medical materials for prevention and control to reach production as soon as possible and coordinate and solve problems of equipment, labor, capital, and raw materials. Third, the government organizes the return of migrant labors to their posts in an orderly way. In 2020, special buses, trains, and chartered flights have been organized to transport more than 6 million peasant labors back to work point-to-point, including over 1.6 million poor labors. The government will help them get out of their homes, get on the train door and enter the factory seamlessly. Fourth, the government strengthens support for coal, electricity, oil, and gas transportation to ensure the normal operation of major transportation arteries and key logistics hubs. Fifth, the government promotes the early start and construction of major projects. On July 31, 2020, Premier Li Keqiang held another meeting, calling for greater release of the potential of final demand and stronger measures to stabilize growth, so as to break shackles on the development of market entities, create more jobs, and support enterprises to maintain stability.

2. Vigorously cut taxes and fees to reduce enterprises operating costs.

Hit by the outbreak, a large number of enterprises had been forced to suspend production, with their operating income falling sharply or even losing their source of income. What's worst, they had to bear the corresponding costs, especially the taxes, salaries, social insurance, etc., which further aggravated the plight of enterprises, especially MSMEs. To protect enterprises is to protect employment. Having been timely aware of the difficulties faced by enterprises, the central government and local governments at all levels, after the epidemic was brought under control, introduced various fiscal policies, such as tax and fee reduction policies, in order to reduce the operating costs of enterprises and help them recover as soon as possible. In addition, governments at all levels established support mechanisms to ease the difficulties of enterprises, especially MSMEs, including reducing or exempting rents of state-owned properties, VAT, social security fees, unemployment insurance premiums, etc., and using the surplus of unemployment insurance benefits to help

enterprises stabilize jobs. These policies introduced during the epidemic prevention and control period have been continued with the support of the government in the post-epidemic period, and some of them have even been extended to the end of 2020, such as the policy that enterprises in difficulty may defer payment of social insurance premiums. In 2020, the Ministry of Human Resources and Social Security's policy of "exempting, reducing, postponing and lowering social security premiums" reduced the burden on enterprises by 1.54 trillion yuan, issued 104.2 billion yuan of unemployment insurance to 6.08 million enterprises, and spent hundreds of billions of yuan on employment subsidies and special awards and subsidies. These policies have effectively helped enterprises to reduce cost expenditure, and the cost savings have effectively supported them to put into production and accelerated the pace of their return to normal operation.

3. Finance and carry out "blood transfusion" enterprises to help them survive.

After being hit by the epidemic, a large number of enterprises are on the verge of death. Tax and fee cuts are conducive to reducing enterprises' "blood loss", while helping enterprises to finance and carry out "blood transfusion" is another key measure to ensure their return of to normal operation. In order to provide financial support to all kinds of enterprises, in terms of monetary policy, the government lowered loan interest rates, increased credit supply, credit loans and medium- and long-term loans, expanded financing guarantee services, innovated financing products and services, and accelerated the promotion of equity and services. For example, the "Chaoyang District Financial Integrated Service Platform for MSMEs" in Beijing is a platform dedicated to solving the financing difficulties for MSMEs, which thirty-five financial institutions have entered to provide debt financing, equity financing, intermediary services, guarantee and credit enhancement, policy services, etc. Since its establishment, the platform issued 2.46 million loans in five days and generated 50 million loans in two weeks. Since the epidemic prevention and control stabilized, by the end of May 2020, more than 1,600 enterprises had raised more than 5 billion yuan through the platform, strongly supporting the recovery and development of enterprises in the post-epidemic period.

4. Provide all kinds of convenience for enterprises.

Due to the prevention and control of the epidemic, the flow of people was restricted. Even in the post-epidemic period when the epidemic is under control, the small-scale outbreaks of local epidemics have brought some inconvenience to the flow of people and the operation of enterprises. Under such circumstances, governments at all levels launched various policies to facilitate enterprises, such as adjusting salaries, job rotation, shortening working hours, and so on to stabilize jobs under the condition of consensus with employees, so that enterprises can minimize layoffs. In addition, enterprises in the Beijing are allowed to conduct online recruitment and sign e-labor contracts online, and the legal effect of e-labor contracts has been recognized by the Ministry of Human Resources and Social Security.

Discussions

Government Protection of Labors, the Supply Side of the Labor Market

The outbreak of COVID-19 affected not only enterprises but also countless labors, as can be seen from the high surveyed urban unemployment rate in 2020. With the world's largest labor force, the total number of labors affected in China is even larger than the total population of the United States. The labors affected fall into four categories. The first is labors who have lost their jobs or been laid off as a result of the outbreak, when their businesses have gone bankrupt or become unsustainable. The second is labors who cannot return to work because of epidemic prevention and control and can only telecommute or take time off work. The third is college graduates who are about to enter the labor market. In 2020, the number of people in this category reached 8.74 million, a record high. The fourth is the unemployed who are already out of work and looking for work. These labors may face a sharp drop in income or no income at all, thus suffering from mortgage, car payments, and great pressure to survive.

The fact that so many labors have been affected by the epidemic is a huge test for economic development and social stability. The Chinese government is clearly aware of the problem, so the first of the "six stable" and "six guarantee" policies is to keep employment stable and guarantee employment. These policies have basically been implemented throughout

the epidemic prevention and control period and have continued up to now, mainly in the following four aspects.

1. Promote and expand employment-related policies

The Chinese government has been implementing various employment policies since the beginning of 2020, including joint recruitment service, employment service for enterprises in key industries, employment service for key groups, flexible employment promotion service, entrepreneurship guidance service, high-quality training service, labor cooperation service, employment poverty alleviation service, supply and demand information monitoring service, human resource service industrial park, and other comprehensive employment services.

2. Formulate policies for college graduates

In 2020, 8.74 million college graduates will enter the labor market in China, which is an unprecedented challenge. In order to promote the employment of this group, Chinese government has introduced nearly 40 policies: For higher education, policies have been introduced to expand enrollment of majors urgently needed by national strategy and the development of people's livelihood for master's degree, upgrading from junior college student to university student, and the second bachelor's degree. For community-level employment, policies have been introduced to expand the number of applicants for the "special post program" and the "three supports and one assistance program", to increase the number of urban and rural community and community-level medical care posts, and to create jobs for research assistants. For enlisting in the army, policies have been introduced to increase the preferential level of admission to higher education, to optimize the physical examination standards, and to recruit non-commissioned officers directly into the army. For vocational qualification conditions, the policy of "first working in the post and then obtaining the certificate" has been introduced for teacher's certificate and other vocational qualifications.

In order to improve the efficiency of job matching for this group, new communication channels of online services such as "Cloud Publicity", "Cloud Recruitment" and "Cloud Management" have been provided.

The Ministry of Human Resources and Social Security launched a 100-day online recruitment campaign to provide more than 10 million new jobs where 2.08 million employers posted 27.61 million positions, and performed "cloud services" such as video recruitment, remote interviews, and precision matchmaking to help college graduates find jobs. According to statistics, the "National College Graduates Online Signing Platform" has promoted nearly 900 colleges and universities in 11 provinces to carry out online signing, with about 645,000 graduates finishing online signing. At the same time, special employment assistance will be provided for college graduates from poor families.

3. Implement policies aimed at improving employment skills and providing employment services

The Chinese government has constantly stimulated the social responsibility and initiative of human resource service agencies, offering supports to those that have played an outstanding role in promoting employment, such as space rent reduction, incentives and subsidies, awards to honest service agencies, and selection of key enterprises in the industry and guiding human resource service institutions, especially MSMEs, to fully enjoy tax and fee reduction, loan subsidies and other relevant support policies. Furthermore, the government made great efforts to carry out various kinds of job training and skills upgrading, appropriating 100 billion yuan from the surplus of unemployment insurance funds to accelerate the promotion of vocational skills upgrading and help enterprises with difficulties in providing job-transfer training. More targeted employment services and supportive policies have been introduced for key groups such as college graduates and demobilized military personnel. Also, the government strived to strengthen employment assistance for people who have difficulty finding jobs, ensure that labors are not laid off when they are transferred to other jobs during structural adjustment, and create more work opportunities and conditions for rural migrant labors.

4. Expand employment in new forms of business, promote gig market and flexible employment, and foster new areas of growth in employment

While destroying traditional jobs and employment, the epidemic has also created a large number of new forms of employment by virtue of the advantages of Internet + , mobile intelligence, and e-commerce. After the outbreak, with the continuous development of the "Internet + ", new industries and new forms of business, such as online retail, online medical care, and online classroom, are growing rapidly, creating more opportunities for flexible employment. In this context, China's new employment model has shown explosive growth, giving birth to a variety of jobs and well playing the role of "reservoir" and "buffer" for the labor market. Although the outbreak of the epidemic has damaged the traditional economy, it has created opportunities for the creation of new forms of employment, providing strong support for economic recovery and stable employment. During the epidemic prevention and control, the "online economy" and "house economy" prevailed, with fresh delivery, telecommuting, classroom in the air, online medical treatment, and employee sharing springing up. In the post-epidemic period, these new forms of business have also been maintained. The Chinese government continues to roll out policies to support flexible employment through multiple channels, which not only greatly promotes the gig market and gives full play to the advantages of flexible employment, but also creates a large number of jobs and promotes stability in the labor market.

In this new form of employment, both labor market subjects are beneficiaries. For employers, the gig economy can minimize employment costs and risks, and improve work efficiency and for the vast majority of labors, the gig economy offers not only an exchange of talent, efficiency and income, but also the possibility of owning multiple part-time jobs, earning more for their work and having more discretionary time. The gig economy can reduce the idleness and waste of labor force in the whole society, and provide employment channels for people without permanent occupation or temporary unemployed. Some employers have thus found new employment needs and new development paths. This "all-win" situation has quickly made the gig economy a new employment trend. However, some problems exist in this new form of employment, such as unclear labor relations, incomplete social security, repeated violation of labors' rights and interests. In this regard, President Xi Jinping has stressed that the most prominent issue at present is the legal protection of labors in the "new form of employment". In promoting flexible employment, the Chinese government has attached great importance to

safeguarding the labor rights and interests of this part of the workforce, studying and formulating labor and security policies for platform employment, clarifying the responsibilities of Internet platform enterprises in the protection of labors' rights and interests, guiding Internet platform enterprises and affiliated enterprises to negotiate with labors on matters such as labor remuneration, rest and vacation, and occupational safety guarantee and leading the industry (local) trade unions to negotiate with industry associations or representatives of industry enterprises to formulate industry norms such as labor quota standards, working hour standards, rewards, and punishments.

Conclusions

The employment problem in the labor market mainly lies in the mismatch between labor supply and demand, as well as the unimpeded information transmission between labor supply and demand.

In the post-epidemic period, when the epidemic prevention and control initially achieved results, The Chinese government's protection of both side in the labor market is embodied in three aspects. First, monetary, fiscal, and employment policies work together to stabilize employment, strengthen protection for both sides, and ensure the sound operation of the labor market. Second, the forms of employment are standardized and diversified in accordance with the law to effectively protect the legitimate rights and interests of labors and give enterprises greater flexibility and convenience in employment. Third, special assistance is offered to enterprises in difficulty, key employment groups, and the unemployed.

In the post-epidemic period, the Chinese government's various protection measures have achieved remarkable results. China created 11.86 million new urban jobs in 2020, exceeding the previous target of 9 million and completing 131.8% of the annual target, according to data released by the Ministry of Human Resources and Social Security. Moreover, by the end of December 2020, the number of employees covered by old-age insurance, unemployment insurance, and work-related injury insurance in Chinese enterprises increased by 16.19 million, 11.47 million, and 12.91 million respectively compared with the end of 2019, with the largest year-on-year growth in the past five years, which is a strong proof of the Chinese government's efforts to protect labors in the post-epidemic period.

On the protection of enterprises, the review of the work of the Chinese government for 2020 shows that over 2.6 trillion yuan of economic pressure has been reduced for market entities in 2020, including 1.7 trillion yuan in social insurance premiums reduction, 2 trillion yuan in additional central government funds to establish a mechanism for direct access to the community level, banks' targeted increases in lending and lower interest rates, deferring repayment of principal and interest on loans to MSMEs, an increase of over 50% in loans by large commercial banks to MSMEs, and the financial system's surrendering 1.5 trillion yuan in profits to the real economy.

Through unremitting efforts, has not only succeeded in preventing and controlling the epidemic, but also made a perfect result in stabilizing the labor market in the post-epidemic period, setting an excellent example for other countries in the world and bring hope for the recovery of the world economy. Both sides of the labor market, with a lot of help from the government, have quickly returned to normal, as evidenced by the fact that China's GDP grew by 18.3% in the first quarter of 2021, which was still slightly lower than expected. In the future, the epidemic situation in the world will remain severe, and China's economic transformation and upgrading will still face new challenges. In terms of enterprises, the social security premium rate of Chinese enterprises is still very high, especially the pension insurance premium rate. Although the premium rate has been lowered continuously, the current level still brings great pressure to enterprises. In terms of new forms of employment, with low employment quality, a large number of gig economy labors still need to be protected. Therefore, there are still many issues that need to be further explored on how to balance the interests of both sides in the labor market while protecting the labors. However, the government will continue to implement the protection of both labor market players and provide continuous impetus for China's economic growth and the global economic recovery.

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CHAPTER 18

Flexible Employment Development in Post-COVID Economic Revival

Xiliang Feng and Yuan Geng

Introduction

The COVID-19 pandemic is not only a public health emergency, but it also leads to a global economic shock which has an enormous disruption on the labor market. The social distancing measures and stay-at-home orders imposed in many countries and areas negatively affect employment, leading to a sharp rise in unemployment and reduced hours of work. According to the International Labor Organization, about 1.6 billion workers in the informal economy are significantly impacted by lockdown measures and/or working in the hardest-hit sectors.[1]

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_18

As the only economy that has grown GDP in 2020, China has been at the forefront of the global recovery from the COVID-19. Compared with regular employment, flexible employment begins to show more unique advantages due to its flexibility in time and space, especially the development of new forms of employment such as platform employment, crowdsourcing employment, socioeconomic employment, and shared employment. "New forces" such as "contactless distribution", "isolation economy", and "logistics" have risen. Groups such as takeout riders and Didi drivers have also played a prominent role in the resumption of work and production. On July 28, 2020, the General Office of the State Council of China issued the "Opinions on Supporting Flexible Employment through Multiple Channels", which clearly stated that "supporting flexible employment is an important measure to stabilize employment and ensure the employment of residents, clear and remove unreasonable restrictions on flexible employment". This pointed out the development direction of flexible employment at the national level and clarified the regulatory trend for the institutional arrangements of flexible employment market policies. The central "14th Five-Year Plan" proposal also mentioned "improving and promoting a more guarantee system for flexible employment through multiple channels". This requires us to adhere to both market guidance and government guidance, open and invigorate and regulate orderly, provide top-level design for flexible employment development, and encourage flexible and diverse employment such as self-employment and part-time employment. At present, the success of the resumption of work and production in China has had a positive impact on economic recovery and employment promotion, and most barriers preventing flexible employees from returning to work have been removed, supporting flexible employment development has become the consensus of the government and society. With the development of new digital technologies and the transformation of economic development mode, flexible employment has developed rapidly in China; at the same time, due to the severe employment situation caused by the COVID-19 epidemic, flexible employment is gradually becoming one of the most important forms of employment in China.

Methodology

The system and institutional analysis methodology were used in the research. The study of Akkermans et al. (2020) about influence of

COVID-19 pandemic on career and labor market was very important for us. The research of Chen et al. (2019) is assessing the value of flexible employment on the example of Uber, and it is also very influencing research. Flexible employment was in the focus of researches of Spurk and Straub (2020) and Tomlinson et al. (2017). Labor market development at digital economy was in the focus of Kost et al. (2020), Dun et al. (2020), Osipov (2019), Osipov et al. (2021), Qian (2020), and Yankovskaya et al. (2020).

Some data were taken from the official site of International Labor Organization (2020) (https://www.ilo.org/global/topics/coronavirus/impacts-and-responses/WCMS_767028/lang–en/index.htm).

Results

The COVID-19 epidemic has greatly increased the pressure to stabilize employment in China. The surveyed urban unemployment rate target proposed by the government work report in 2020 is as high as 6%.In this situation, stable employment has become one of the most important goals of national social and economic development. Flexible employment, represented by non-standard employment on the Internet platform, odd jobs, self-employment, and other forms of employment, has become a new form of employment. It is not only an important measure to stabilize employment and ensure people's employment, but also contributes a lot to the economic recovery in China.

First of all, flexible employment has been widely recognized by both the supply and demand sides under the impact of the epidemic and has become an important channel to stabilize employment. At present, although the epidemic in domestic China has been brought under control, the global epidemic remains grave and the world economic situation is still complex. On the one hand, downward pressure on the global economy has increased, and companies urgently need to reduce costs and improve efficiency due to soaring costs. Because of the decline in economic expectations, companies facing the COVID-19 epidemic are more cautious in recruiting regular employees. In this situation, flexible employment improves the ability of enterprises to deal with uncertainties and helps enterprises to meet the seasonal, cyclical, and personnel needs in different periods. For example, the business of epidemic prevention enterprises is booming and needs to recruit workers in the short term. At

this point, workers are more likely to accept flexible employment. On the other hand, flexible employment expands the consumer market, improves the convenience of service consumption, and organizes a large-scale labor force to meet the needs of widely dispersed consumers. According to a survey by the Chinese Academy of Labor and Social Security Sciences, 67% of job seekers are considering jobs such as odd jobs, delivery, and food delivery, an increase of 40% points from before the epidemic.

In the post-COVID era, flexible employment, characterized by large employment capacity and low entry and exit barriers, continues to play a positive role in ensuring employment, including job-sharing methods adopted by many enterprises during the epidemic, as well as traditional labor dispatching, temporary workers and outsourced workers. Since the beginning of 2020, the CPC Central Committee and the State Council have issued many policies to support the development of flexible employment. As national laws, regulations and policies become more and more standardized, more and more companies are beginning to focus on flexible employment to meet the requirements of compliance and cost reduction. By means of flexible employment, job seekers can find a job anytime and anywhere, breaking through the shackles of the original stable labor. The number of flexible workers in China had reached about 200 million by August 2020, according to the Ministry of Human Resources and Social Security. "China Flexible Employment Development Report (2021)" issued by the School of Labor and Human Resources of Renmin University of China shows that the proportion of flexible employment of enterprises reached 55.68% in 2020, an increase of more than 11% year-on-year. Taking Meituan as an example, in the first half of 2020, the number of riders earning income from Meituan platform reached 2.952 million, providing income opportunities for a large number of groups with relatively low education, skills, or temporary unemployment due to the epidemic. With the development of the digital economy, flexible employment has become a natural form of employment. This will become an effective way to solve the employment problems of key groups such as rural migrant workers and college students during the "14th Five-Year Plan" period. It is also an important way to alleviate the recruitment difficulties of individual industrial and commercial households, small and micro-enterprises, and high recruitment problems.

Furthermore, with the developmentof the digital economy, labor productivity and employment quality of flexible workers have improved significantly. The rapid development of new digital technology has

changed the traditional space–time activity mode, given birth to many new economies and new forms of business, and thus triggered the transformation of human consumption, life and production activities. With the change of the mode of production organization, the participation mode of labor force, that is, the form of employment, as one of the main factors of production, has also undergone great changes. On the one hand, flexible employment continues to develop on the basis of the original standard employment. On the other hand, new digital technologies are used to realize online platform employment, short-term part-time, remote new forms of work, and other flexible employment on the basis of traditional flexible employment such as independent employment and part-time employment. The new digital technology decomposes the original relatively complete production tasks and divides them into simpler and more specific tasks that are convenient for standardized operations. At the same time, it also decomposes the various labor skills that workers have, production tasks, and labor skills. After the decomposition, it is reintegrated to make the division of labor more refined. Decomposition and integration make professional work tasks match professional labor skills, and further improve production efficiency; meanwhile, worker's freedom has also been improved along with the increase of workers' autonomy in choosing working hours, working methods, and working places. The refinement of the division of labor brought about by decomposition and integration has increased the sense of gain of both employers and employees in the labor process. Compared with traditional flexible employment, in the era of digital economy, the Internet platform uses digital technology to effectively match the geographical location, service time, service process, etc. of workers and employers, which can greatly improve the labor productivity and employment quality of flexible employees, mainly manifested in more secure income, flexible working hours and so on. A questionnaire survey by the Meituan Research Institute shows that among the current flexible employees on the platform, 40.4% have a monthly income of 3001–5000 yuan, and 42.8% have a monthly income of more than 5000 yuan. Besides, nearly 70% of flexible employees take flexible employment as their main source of income. Flexible workers have diverse working methods and flexible working hours. They can earn income according to their own specialties, skills, and resources, which broadens their growth boundary. 56.8% of flexible employment workers in the life service industry still engage in flexible employment in the post-COVID era. Thus, the rapid development of

flexible employment will become an inevitable trend in an era when new digital technologies lead to the fragmentation of labor processes and labor relations.

Finally, due to the rapid growth of flexible employment, the accompanying flexible employment platform and human resource service industry also show new development trends. First, flexible employment platforms appeared. It refers to the network carrier that links flexible employment (management) users and enterprise users by means of information and provides a series of services such as business release, contract, forwarding, settlement, and guarantee. According to "China's Sharing Economy Development Report (2021)" released by the State Information Center, flexible employment platform has maintained a relatively fast growth although the overall employment situation is facing considerable pressure.[2] The number of employees on the platform was 6.23 million, an increase of 4.2% over the previous year. The number of participants in the sharing economy reached 800 million, of which 78 million were service providers, up to 4% year-on-year increase. In general, China's flexible employment platform is still in the period of exploration and growth and has great potential for future development. Second, the traditional human resource service industry has shown a development trend of flexible employment. On the one hand, human resource service covers the whole life cycle of employment, facilitates the internal organizational reform of enterprises, enhances the resilience and organizational flexibility of human resources in front of risks, and thus improves the efficiency of human resource management. On the other hand, the new generation of employees is more in pursuit of the realization of self-worth at work, human resource service providers provide them with a multi-scenario service platform. The slash youth and SOHO are no longer odd career choices, but instead help them gradually find a suitable career development path.

Discussions

The current economic shock caused by the globalization of the epidemic and the normalization of epidemic prevention and control measures has

[2] China's Sharing Economy Development Report (2021), the State Information Center (Administration Center of China E-government Network). http://www.sic.gov.cn/News/557/10779.htm.

severely affected flexible employment in China through the demand effect, generating tremendous pressure on the quantity and quality of flexible employment. Specifically, the impacts are mainly reflected in the following aspects.

First, the international epidemic has directly affected foreign trade and its industrial chains, thus has had a negative impact on flexible employment workers in relevant enterprises. As the world's factory, China exports more than traditional goods such as clothing, toys, and daily necessities. In the global supply chain of ICT products, China is at the center of the world and has the most exposure to the world. According to the data of 2018, 40 jobs can be created for every US$1 million of goods that China exports. The global economic recession caused by the global spread of the epidemic has seriously affected China's foreign trade manufacturing industry, which is dominated by overseas orders. Compared with the same period last year, exports in the first three months of 2020 fell by 13%. A large number of domestic foreign trade orders have been canceled, and export processing and manufacturing are directly facing weak external demand and reduced orders. It also affects related enterprises through the upstream and downstream of the industrial chain, and the unemployment risk of flexible employment such as labor dispatch and temporary workers increases, among which there are many rural migrant workers. In this case, the rural migrant workers in the affected industries are confronted with the difficulties of "resuming work" and "returning to their hometown", especially in the poor areas. According to the 2020 Report on Monitoring and Investigation of Migrant Workers issued by National Bureau of Statistics of China, the proportion of rural migrant workers engaged in the tertiary industry is 51.5%.[3] Due to the reduction of flexible employment opportunities caused by sluggish production, rural migrant workers who left for work have begun to return to their hometown due to since April 2020. In particular, workers from poor areas are further negatively affected by the global epidemic because of their unstable income, inadequate social security coverage, and shortage of employment opportunities in their hometowns, which has slowed the process of poverty alleviation and increased their chances of returning back to poverty again.

[3] 2020 Report on Monitoring and Investigation of Migrant Workers, National Bureau of Statistics of China, 2021.
http://www.stats.gov.cn/tjsj/zxfb/202104/t20210430_1816933.html

In addition to foreign trade and manufacturing, China's service industry has become the second most directly and severely affected area under the impact of the global epidemic, and catering, tourism, accommodation, entertainment, education, training, transportation, and other seasonally strong industries have been greatly affected. The products and services provided by these industries are "immediate", that is, different from the fault stage of industrial product production or inventory adjustment. Without consumption and services, there will be no work and labor income. The impact of the global epidemic has wreaked havoc on flexible employment in these sectors. According to the relevant data of the fourth economic census, in the tertiary industry, transportation, warehousing and postal industry, wholesale and retail industry, accommodation and catering industry, leasing and business service industry, resident service, repair, and other service industries are the main industries for flexible employment of individual economy. In these industries, flexible employment accounted for 67.3%, of which 40.3% were employed in wholesale and retail industries. These flexible workers may have to face a certain risk of unemployment. At the same time, the long-term shutdown of the service industry may also lead some flexible employees into poverty due to incomplete social security coverage, unstable income, and weak ability to fight against the epidemic risk of flexible employment. Taking the tourism industry as an example, flexible employment in China's tourism industry mainly exists in the form of homestays, tour guides, and individual businesses. Faced with the impact of the global epidemic, China's homestay industry, which has already suffered a lot, will be further hit by the global tourism recession. Even families that continue to offer homestay services will have to deal with the health risks of viruses brought by short-term tenants. In particular, due to the uncertainty of future economic development and the weakness of the consumer market, the homestay industry may need to be prepared to cope with the impact of the epidemic in the long term. As early as February 2020, Airbnb, the world's largest home-sharing company, saw its business in China declined 96% month-on-month because of the outbreak of COVID-19; In Lijiang, Yunnan Province, Hangzhou, Zhejiang Province, Chengdu, Sichuan Province, and other places, B&B practitioners have encountered difficulties. According to data from the Department of Market Management of the Ministry of Culture and Tourism, the current number of tour guides in China has reached more than 1.2 million. Especially, tour

guides mainly engaged in international business still need to be "unemployed" in the case of the spread of the international epidemic. This group may not only face the risk of unemployment for a longer period of time, but also cause deeper problems due to the income gap, insufficient social protection, and other reasons.

Third but not least, the global spread of COVID-19 has increased the employment pressure of college graduates and hindered the path to graduation. In 2020, there were 8.74 million college graduates in China, 3.4 million of whom applied for the postgraduate entrance exam. The COVID-19 epidemic occurred during a critical period in the recruitment of fresh graduates, and it had a negative impact on both graduate employment and corporate recruitment. The surveyed unemployment rate of the 25–59 age group of the main labor force is still controlled at 5%, and the long-term unemployment rate is lower than the overall survey, which means that the unemployment rate of the youth groups aged 24 and below is relatively high, and the epidemic will have a great impact on the employment of college graduates, who are dominated by the youth groups. Under the severe employment situation, flexible employment is gradually becoming an important way for college graduates to get employment. Moreover, the epidemic outbreak had a negative impact on the international flow of talent and the overseas study of university graduates. So far, more than 60 countries, including the United States, Germany, Australia, and other large institutions, have begun to restrict entry measures that will impede an important way for college graduates to study abroad after graduation.

Conclusions

In conclusion, with the development of new digital technologies, flexible employment has become an inevitable trend in the post-COVID era. In China, it is necessary to make sure that flexible employment development conforms to the requirements of economic and social development, and strengthen the policies and measures of the central government comprehensively to stabilize employment. Specifically, the following suggestions can be considered.

First, strengthen policy support to ensure that the development of flexible employment in China is orderly and healthy. Flexible employment, especially the new forms of employment such as shared employment

and platform-based employment, have played a prominent role in stabilizing employment, and are also the most potential development mode for human resource management innovation in the post-COVID era. The research and revision of labor security laws and regulations should be accelerated to establish the legal status of new forms of employment. Develop a non-standard labor relationship system that meets the characteristics of the new employment form, and establish labor standards for workers in the new form of employment, so as to implement the rights and interests of workers in the new form of employment in terms of working hours, vacation time, work injury identification, labor disputes, etc., and protect the basic rights and interests of workers in the new form of employment. In addition, social security policies and service systems should be improved to accommodate flexible employment. Exploring the establishment of multi-level payment standards according to the working characteristics and actual income levels of flexible employees, building a convenient, transferable, calculable, and portable record system of social security rights and interests, and innovating flexible social security payment methods. Provides social security services for flexible employees with the help of the platform. Publicize policies related to employment and social security to people with flexible employment and new forms of employment, and guide those employed on the platform to participate in insurance actively. Give full play to the platform's data and technical advantages, innovate the mechanism and model of labor insurance protection, and improve the security measures for flexible employment, so as to promote its development better, and ensure the stable growth of both employment and economy.

Second, continue to increase policy support for small and micro-enterprises and self-employed businesses. The current global economic crisis caused by the spread of the COVID-19 still requires China to make long-term preparations in terms of securing employment, stabilizing employment, and promoting employment. Small and micro-enterprises and self-employed businesses in China have played an important role in creating jobs, and it is necessary to continue to expand their employment creation effects, especially to provide special support policies for small and micro-enterprises and self-employed businesses. Encourage Internet financial institutions to provide emergency loans to small and micro-enterprises and self-employed businesses affected by the epidemic, increase mortgage loans for emerging commercial enterprises appropriately, expand the ratio of interest discount funds provided by the central

government, and guarantee loans for entrepreneurship in severely affected areas, and lower the threshold for small and micro-enterprises and individual industrial and commercial households to apply for secured loans for entrepreneurship. Promote the prosperity development of small and micro-enterprises and small shops, make the market more flexible, and extend training subsidies and other policies to flexible employment groups such as new economic forms.

Third, broaden employment channels and support key groups such as rural migrant workers and college graduates to find flexible employment through multiple channels. On the one hand, low-risk areas are encouraged to speed up the resumption of work and production, increase the demand and supply of daily protective equipment for resuming enterprises, establish an input–output prevention and control mechanism, and establish a point-to-point service channel for rework. Besides, encourage the development of new agricultural operators, increase investment on rural water conservancy projects, roads and transportation, living environment, community governance, poverty alleviation seminars, and other improvement projects to attract rural workers to find jobs nearby. On the other hand, for small and medium-sized enterprises receiving higher education graduates, additional expenses such as education and urban construction should be reduced, and state-owned enterprises are encouraged to expand their employment scale. Expand the field of grass-roots services, and encourage graduates to join the army and take postgraduate entrance examinations. Support the training of higher education graduates to establish basic professional services and increase the number of public procurements of professional services. Encourage and support enterprises to participate in public investment projects, carry out employment internships and research projects to expand the scale of graduate internships. Implement the expansion of undergraduate enrollment and the second undergraduate education, and implement flexible employment measures.

Fourth, make full use of digital technology to strengthen the information management of flexible employment. In the digital economy era, the following two aspects can be considered. First of all, the flexible employment operator platform should be vigorously developed to seamlessly link the government, platform enterprises, and flexible employees together, so as to achieve a multi-win–win situation. For flexible employees, they can cooperate with enterprises equally as regular market entities and enjoy efficient and fast flexible employment and entrepreneurship

services through the platform; for enterprises, Internet technologies lower the risks faced by enterprises in the transformation of flexible employment and promote enterprises to reduce employment costs and improve management efficiency. In addition, the big data collaborative governance platform jointly built by enterprises and the government realizes the transition from government supervision to collaborative governance of the new economy, new business forms, and new platforms, thus promoting the healthy development of flexible employment. Secondly, encourage the development of distinctive third-party human resource outsourcing companies. Learning the advanced enterprise management mode of developed countries, support the distinctive third-party human resource outsourcing companies to play a leading role in flexible employment, explore and study partial exemptions from the application of labor laws for small and medium-sized enterprises, pay attention to the financial and tax incentive policies for small and medium-sized enterprises' independent innovation and the training of scientific and technological talents, so as to further promote the development of flexible employment.

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CHAPTER 19

The Impact and Response of Artificial Intelligence on Labor Market in Post-epidemic Era

Hui Dashuai

Introduction

China is a large population and a large labor market. By the end of 2019, China's urban and rural employment reached 770 million, of which 440 million, accounting for more than 57 percent. The proportion of the first, second, and third industries is 26.1, 27.6, and 46.3%, respectively, among which the third industry has the largest number of employment. Especially in the critical period of epidemic prevention and control, the current job market was faced with many difficulties and challenges due to the combined effect and mutual restriction of the factors such as the limited movement of people, the delay in the resumption of work in enterprises, and the influence of various isolation measures. The demand for employment in enterprises is affected by the epidemic situation, and there is an

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_19

urgent need for more stable production capacity, and artificial intelligence can precisely meet the needs of enterprises. As a strategic technology leading a new round of scientific revolution and industrial transformation, it brings new competition to the labor market.

After experiencing the economic downturn, some studies have found that the digital economy plays an important role in the epidemic. The survey data from these reports show that the operation of large and medium-sized enterprises in China has been seriously affected by the epidemic, especially in the consumer service and construction industries, and more than half of the enterprises have cut their annual revenue targets by about 20 percent. However, due to the impact of the epidemic, speeding up the digital transformation, realizing business online (53.3%), increasing investment (37.26%), and increasing intelligence (23.11%) have become the medium- and long-term choices that entrepreneurs prefer. At present, global science and technology are experiencing the era of industry 4.0. Artificial intelligence has become a subversive technology leading the future development of the world and an important symbol of the level of modern science, business, and life. At present, intelligent robots developed by artificial intelligence technology in China are mainly used in manufacturing industry. Although the research on artificial intelligence technology started late, it has made breakthrough achievements in many fields. However, artificial intelligence technology has made new progress in many jobs, but also caused people to panic about unemployment.

Different from industrial technology and information communication technology, the growth of artificial intelligence application scale is nonlinear. Over the past 10 years, the number of robots in the country has increased by about 20 times, and the number of robots in 2017 is 364 times that of 2000. Artificial intelligence realizes the transformation of computing from obedience to cognition, and computers can create new abilities through machine learning, and quickly and directly copy and spread high value digital products in the field of decision-making. With the deep penetration of artificial intelligence technology in value creation and labor process, its influence on labor market is becoming more and more sudden.

Methodology

Many-models method and system approach were used for our research. Some critics of digitalization of economy and its influence on labor market was very useful for understanding risks and threats for employee. Labor market and its statement were in the focus of researches of Stanley (2020), Jiang and Wang (2019), Zhao and Yang (2020), Qiu and he (2020), Cao and Xu (2020), Liu et al. (2020), Vladimir et al. (2021), Vladimir (2019), and my own research Dashuai (2017).

Results

The rapid development of artificial intelligence after the new crown epidemic is a complex situation for employment. Manufacturing employment will continue to improve with the resumption of work, while the full resumption of traditional services still has restrictive factors. Artificial intelligence will have a great impact on employment, mainly in the following aspects:

1. Impact of artificial intelligence on labor market jobs

Throughout the historical process of human scientific and technological revolution, technological progress generally brings about machine substitution labor. For example, the first industrial revolution, with the invention and use of steam engine, coal, steel, and so on, brought about the power and energy revolution, realized the transformation of workshop handicraft industry to machine big industry, caused the impact to the traditional workshop handicraft industry practitioners and factory workers, and then the workers smashed the machine. The second scientific and technological revolution, with the wide use of electricity, electrical appliances began to replace the traditional machines, human beings entered the “electrical age”, but also had an impact on the employment of traditional industries. This third scientific and technological revolution, marked by the invention and use of atomic energy, computer, aerospace technology, etc., especially the rapid development and wide use of computers and the Internet, affected the employment of workers in traditional industries. With the development and application of artificial intelligence, more and more physical and mental labor may be replaced by artificial intelligence, and technical unemployment will also occur. For

example, traditional diving operations are being replaced by diving robots, cargo transshipment at ports is also being replaced by smart devices, and accounting firm accounts processing is also being replaced by artificial intelligence systems. The traditional teller of banks is also being replaced by intelligent robots. The use of artificial intelligence will inevitably affect the production of employed people in traditional industries.

2. Artificial intelligence puts forward higher requirements for workers' vocational skills

The development of artificial intelligence will put forward new requirements for workers' vocational skills. For example, in an artificial intelligence environment, workers need to master new skills such as machine learning, data mining, and information technology. At the same time, artificial intelligence will also have an impact on the wage system of workers. From the influence of the previous three scientific and technological revolutions on the salary system, the use of new technology will certainly have an incentive effect on the workers with new skills and will have an elimination effect on the people who cannot master the new technology. The large-scale use of artificial intelligence will make the workers who master artificial intelligence technology get higher labor remuneration and will have a crowding-out effect on those who do not master the new technology. From the current situation, the average wage of workers engaged in artificial intelligence R & D and design industry has exceeded the social average wage level.

With the use of artificial intelligence, the traditional protection of workers will also appear new changes. On the one hand, the use of artificial intelligence equipment can better complete the traditional difficult, dangerous and complex work tasks, through the substitution effect, to bring better labor protection to workers. On the other hand, the use of artificial intelligence will also require new labor protection, such as the radiation problem of information equipment, the monotony in interpersonal communication, and the challenge of high speed and high response of artificial intelligence equipment to human body, intelligence, and psychology. The use of artificial intelligence will also have an impact on labor relations faced by workers. In the process of human–computer interaction, workers not only face the supervision and control of traditional employers, but also may face the control of intelligent devices, that

is, they may face the problem of technology control over people. In the era of highly developed artificial intelligence, workers will face such dual control.

3. Artificial intelligence poses a new challenge to the social security system of workers.

The rapid development and wide application of artificial intelligence may bring about revolutionary changes in economic industries and jobs and subvert the traditional industry and employment classification. When artificial intelligence impacts the existing labor market, in addition to the need to create more jobs and train a number of new jobs to meet the new economic needs, the social security system based on traditional industry and employment classification will face great challenges in raising funds, paying standards, etc. If not adjusted in time, it may reverse the development of scientific and technological innovation and artificial intelligence. At the same time, on the basis of this part of the deployment of workers and maximum development. The "unemployed group" of society can be roughly divided into two parts: One is the middle class affected by artificial intelligence. For example, due to the information analysis of enterprises, organizational supervision and other links to achieve different degrees of intelligence, the original management of the relevant people will lose their jobs. This part of the population has a good educational foundation and economic foundation, the original enterprises are more willing to provide training opportunities for this part of the population or individuals have the financial ability to bear the long-term training costs, Therefore, this group after a certain period of training can regain innovative job knowledge and skills, return to work. Second, the long-term group engaged in simple physical and mental work, that is, the so-called digital poor. When this group of workers is squeezed out of the labor market, it is difficult to get training, so once unemployed is permanent unemployment, become the "redundant person in the modern economic system".

Discussions

1. Transfer of wealth accumulation from capital to knowledge

From the point of view of general equilibrium, the rise and rapid development of artificial intelligence technology and information and communication technology promote the direction of labor market wealth accumulation from capital to knowledge. The third Industrial Revolution completed the transformation of wealth from land to capital, while the new round of scientific and technological revolution represented by artificial intelligence accelerated the accumulation of wealth in the field of knowledge agglomeration. Promote the transformation of human society from industrial society to knowledge society. The application of algorithms and data as the main supporting basis of artificial intelligence in many traditional fields can optimize production process, improve production efficiency, and provide the basis for new products and services in combination with consumer preferences. It has become an important factor of production in economic growth. The end result is that the owners of knowledge (such as big technology companies) have replaced the traditional industrial class, enjoyed the newly created value, and mastered the power to distribute this part of the value, exacerbating social and economic divisions.

2. A surge in labor market liquidity

From the point of view of local equilibrium, artificial intelligence shapes a dynamic labor market and strengthens the tendency of "externalization of labor force". The internal labor market represented by large and hierarchical organizations has a clear labor pricing distribution system, hierarchical post ladder, and clear internal promotion mechanism, which absorbs about 80% of the labor force. Since the 1990s, the development of artificial intelligence technology has weakened the dependence of workers on organizations, reduced permanent jobs in the labor market, and expanded the scale of the external labor market. The main reasons are as follows: First, artificial intelligence technology provides task-based rather than post-based technical support in many industries, enabling enterprises to choose a diversified employment model. In the labor market, there is a loose network composed of a large number of human resources intermediaries; temporary contracts replace the permanent employment system and become an important employment strategy for enterprises to gather specialized resources, avoid employment restrictions, and reduce wages and welfare expenses.

Secondly, artificial intelligence reduces the transaction cost of the external labor market. Artificial intelligence technology provides technical support for labor supply and demand matching, project management, and human resource management in the external labor market. Digital platforms (e.g., worldwide work-matching platforms), translation techniques, and video analysis systems reduce search costs, information costs, and oversight costs; applications of augmented reality (AR), virtual reality (VR) in flexible workplaces further optimize remote workflows.

Finally, the artificial intelligence technology as a production tool has the ability of intelligent characteristic and regular thinking at the same time, which stripping out some of the workers' original proprietary knowledge and skills from human assets and reducing the employer's dependence on employees. From the point of view of rational open system, the systematic decline of the degree of specificity of human assets is more conducive to the formation of external labor market and diversified social and professional structure. In the dynamic labor market, the wide application of machine learning and automation algorithms in the fields of physical strength, repetitive labor, and specialization has reduced the probability of obtaining reliable and permanent jobs for blue-collar, white-collar, professional and technical personnel, and even senior management.

3. Changes in the nature of the job

As far as the specific position of the enterprise is concerned, the multiple attributes of artificial intelligence have reshaped the existing jobs from different dimensions. Artificial intelligence automation attributes that handle multitasking, complex program work make jobs easier to replace. The International Robotics Federation's 2017 survey shows that between 2010 and 2030, the global inventory of industrial robots will increase at an average annual growth rate of 14 percent; by 2030, the global stock of industrial robots will reach 11.3 million, nearly 11 times that of 2010. According to different calculations, an industrial robot will replace 2–6.2 manufacturing workers. In addition, non-creative tasks in positions that require professional skills are partly replaced by intelligent robots. Because of the difference in demand elasticity of intelligent applications such as sensory perception, data collection and processing, structured learning, pattern recognition, optimization and

prediction in different work tasks, artificial intelligence automation further causes job hollowing in the labor market, especially increasing the risk of middle-aged, low-skilled and low-educated workers being replaced.

In the short term, manual and cognitive procedural work will be first challenged by artificial intelligence, while non-procedural work will benefit from the application of artificial intelligence. The application range of enterprise artificial intelligence is limited, the range of post change is still small, and the influence of artificial intelligence on the change of job structure is showing preliminarily. In the long run, with the breakthrough of key technology, it is bound to lead to a large change in the structure of employment skills, and the mismatch between technological progress and labor skills is more prominent.

Conclusions

1. The future labor market needs to strengthen the role of policy guidance. Under the new situation, we should take more measures to promote the healthy development of the new occupation and stabilize the employment of the new occupation. For the new occupation, it is necessary to protect the new policy. We should issue a stable employment policy for the new occupation as soon as possible. It is necessary to introduce relevant legal policies to adapt to the employment of new vocational practitioners, incorporate employment support and subsidy policies for new vocational practitioners into the policy system, reduce unreasonable system provisions that restrict the development of new occupations, and solve the demands of new vocational practitioners on employment subsidies, training subsidies, employment guidance, skills development, and so on.
2. The future labor market needs a more perfect labor legal system. It is necessary to strengthen the protection of the rights and interests of workers in the new form of work. The existing protection system of workers' rights and interests is mainly aimed at the employment relationship between enterprises and workers, and it is not perfect for flexible employment personnel although it has some provisions. To clarify the legal relations of all parties, to renew the concept of labor relations, to change the legislative concept based on "factory system", and to study and formulate the definition standards and scope of different types of legal relations, including labor relations. This paper studies and formulates the relevant labor standards of

the platform enterprises suitable for the development of the new employment form, such as labor employment and wage payment, and establishes the labor standards for the protection of the labor rights and interests of the new employment form personnel. This paper studies and formulates the labor dispute handling system and the labor security supervision system suitable for the new employment form, and earnestly protects the labor rights and interests of the practitioners. Many employees in new employment forms are at greater risk of industrial injury or unemployment, so we should speed up the pilot work of occupational injury insurance and unemployment insurance for new employment forms, and establish relevant social insurance systems as soon as possible. So that workers in the risk of occupational injury or unemployment, timely compensation, and assistance. Improve the pertinence and accuracy of social security policy, so that more platform employees can enjoy social security subsidy support policy. For platform enterprises to use or help disabled people, poor family labor force, zero-employment family members, and other employment difficulties to increase social security subsidies.

3. The future labor market needs to improve the level of workers' vocational skills. With the new occupation stable employment, the employment service organization needs to provide the technical support to improve the quality of the new vocational practitioners. It is necessary to pay attention to the cultivation of professional and technical talents in the new professional field, formulate incentive measures, form a mechanism that mainly allocates talent resources by the market and promotes the flow of talents, create an environment in which talents stand out and meet the needs of the continuous development of the industry. In view of the emerging new occupation and the demand of the new occupation population for the promotion of vocational skills, it is necessary to strengthen the matching degree between the talent training and the social needs, and put the comprehensive quality education in a more important position. Only if the laborer has good knowledge and quality reserve, can he better adapt to the development and change of the future society. Enterprises give full play to the main role, strengthen the training of enterprise staff and workers' post skills, strengthen the training of high-skilled personnel, and realize "the post is suitable". Through general education, on-the-job training, and other

ways, we can establish a new vocational employment training system with strong applicability and high matching degree, and make bold innovations in professional setting, curriculum arrangement, etc., so as to effectively integrate skills training and career development, improve staff skills and achieve sustainable and healthy development.

It is necessary to strengthen the pertinence of training, innovate the contents and methods of training and new vocational skills training, adhere to the people-oriented, extensively investigate the training needs, and form specific solutions. training programs should change the traditional single centralized teaching, spoon-feeding teaching, and other models, and gradually promote the integration of work and learning, new enterprise apprenticeship system, national basic vocational training package, cooperation between schools and enterprises, "Internet + vocational training", multimedia resources training and other flexible and diverse training methods. It is necessary to follow up and investigate the training situation, revise and improve the teaching materials and curriculum problems found in the training in a timely manner, and encourage trade associations, training institutions, and enterprises to develop new courses adapted to the needs of the market. In particular, new vocational courses that meet the requirements of enterprise transformation and upgrading and digital economy and artificial intelligence technology development. With the new occupation steady employment, needs to raise the public employment service level.

The future labor market needs to construct more reasonable worker's salary and welfare system. The establishment of labor security system separated from labor and salary and social welfare is the guiding concept to deal with the impact of artificial intelligence, so it is necessary to establish and improve the unemployment security system and social security system to support retraining and labor mobility. Reducing the risk of unemployment by delinking the benefits of employment from work and separating social security and benefits from work allows people to freely take risks, start businesses, participate in training, and switch jobs. This policy design will enhance resilience against the impact of technological advances in artificial intelligence, provide workers with a certain amount of basic security to help people get rid of the poverty caused by unemployment caused by artificial intelligence substitution, and promote consumption and Economic uncertainty creates fear and insecurity, causing many social

problems. In addition, since artificial intelligence technology is used to replace human workers and provide the unemployed with basic living expenses, it helps to provide them with sufficient breathing space to enable them to switch to other jobs.

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CHAPTER 20

The Impact of the Coronavirus Pandemic on the Healthcare System in Poland

Maria Płonka

Introduction

The COVID-19 pandemic is a turning point in the approach to the health market globally and nationally. It made governments and citizens aware that the health security of a society determines economic security and national security.

The aim of the study is to identify the key changes in the health care system in Poland caused by the pandemic and to determine the prospective implications of the pandemic on the healthcare system in Poland. This impact should be understood in the short term (actions related to the mitigation of the effects of the pandemic) and in the long term (systemic changes that will increase the health safety of society and the effectiveness and resilience of the healthcare system in the future).

The basic research method is a comparative analysis of the Polish health care system against European Union and EEA countries in the period

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_20

before and during the pandemic, which will allow for the drawing of postulated conclusions regarding long-term changes to the system in the future.

This study is a voice in the discussion on the assessment of the existing health care system and the necessary changes to this system, so as to increase the quality of medical care, the effectiveness of the public healthcare system, and its resistance to shocks in the future.

Methodology

In the pre-pandemic period, numerous studies by institutions such as the World Health Organization (WHO), Global Health Observatory (GHO), or the OECD (among others) analyzed the state and health care systems globally and in different countries, comparing them and creating indexes that would allow for the creation of an optimal healthcare model (Björnberg & Phang, 2019; Bogoviz et al., 2019; GHO, 2016; Klapkiv et al., 2020; OECD, 2018; Osipov & Skryl, 2021; Yermoshenko & Trynchuk, 2016).

The shock of the pandemic meant that the fight against COVID-19 was carried out in crisis conditions: a lack of preparation, stress, and chaos, as indicated by numerous publications from 2020 and reports (Anderson et al., 2020; EC, 2020; Iyengar et al., 2020; OECD, 2020; OECD/European Union, 2020; Our World in Data, 2021). There was a shared motivation around the world to develop strategies to protect people from the pandemic, to control infections, and to act in due response to a crisis. In addition to daily monitoring of the health situation on a global, regional, and national scale, research was done on the impact of social distancing measures on physical and mental health, and the impact of the pandemic on the quality of health care for vulnerable groups (the elderly, the chronically ill, disabled people) (Douglas et al., 2020; Holmes et al., 2020; Luceño-Moreno et al., 2020; Mental Health Europe, 2020). Research shows that the virus has disproportionately hit older people and those with underlying health conditions. In nearly all countries, at least 90% of COVID-19 deaths were among people aged 60 and over. The COVID-19 pandemic highlighted the shortages of health workers in many countries, and the need for mechanisms to mobilize human resources quickly in times of crisis. These shortages were thrown into sharp relief during the COVID-19 pandemic, when health workers were put under intense pressure. Even so, the health impact reaches well

beyond these numbers. As well as some COVID-19 cases and deaths going undetected, COVID-19 has had a major indirect impact on people that did not contract the virus. For example, people with emergency health needs have sometimes struggled to receive timely acute care, and those with chronic health conditions have faced disruptions to routine care. In addition, the pandemic and the subsequent economic crisis have led to a growing burden of mental ill-health, with emerging evidence of higher rates of stress, anxiety, and depression, compounded by disruptions to health care for those with preexisting mental health conditions (OECD/European Union, 2020).

Another focus of research was the implementation of telemedicine solutions in crisis conditions (Alonso et al., 2021; Colombo et al., 2020; ECDC, 2020; Gadzinski et al., 2020; McKinsey, 2020; Oliveira Hashiguchi, 2020). They indicated that the development of telemedicine applications and e-health services could significantly help in better managing the pandemic and health around the world. In many countries, telemedicine and advanced technologies have been integrated into a wide range of healthcare processes, including diagnosis, disease prevention, treatment, and health research. Telemedicine and e-health technologies help patients who require observation or medical and psychological assistance, reducing their exposure in hospital facilities.

Research into the resilience of health systems has gained importance. Kutzin and Sparkes (2016) have argued that "resilience is not an action to be implemented but rather a dynamic objective of investments and reforms". Hanefeld et al. (2018) developed a "3 + 2" model, covering the three functions of the health system—health information system, funding mechanism, and health professionals—plus two cross-cutting dimensions—values and governance. The OECD report (2020) identifies the core attributes of resilient systems, within the context of tensions between resilience and efficiency. Expert Group on Health Systems Performance Assessment defines three core resilience capacities (absorptive, adaptive, and transformative) and extends it to include a fourth dimension—preventive (i.e., the ability of a health system to anticipate the advent of a shock and create the necessary conditions to minimize its potential future impact). The model takes into account three states: (1) pre-shock state, (2) response to shock, and (3) post-recovery state (hyper-resilient, resilient, partially resilient, brittle) (EU, 2020).

A large group of reports and publications is also devoted to the state's policy, ensuring the economic security of social groups affected by the

pandemic. The socioeconomic impacts have also been dramatic. In the second quarter of 2020, seasonally adjusted GDP fell by 13.9% across the EU compared with the same quarter in 2019. Thanks to the widespread use of various short-term work schemes, employment was comparatively less affected, although there was still a registered decrease of 2.9% over the same period. The COVID-19 pandemic has therefore put an immense strain on European countries, testing the resilience of every country's government and people. (OECD/European Union, 2020).

Results

1. **Polish health care system before the pandemic**

There are public–private health care systems in European countries. Health expenditure by type of financing in 2018 (or nearest year) had the following distribution in the EU 27 and Poland (OECD/European Union, 2020):

- Government schemes: 32% EU 27; 10% Poland,
- Compulsory contributory health insurance: 41% EU 27; 62% Poland,
- Voluntary health insurance: 5% EU 27; 6% Poland,
- Out-of-pocket payments 22% EU 27; 20% Poland.

The healthcare system in Poland is based on universal health insurance. The obligatory health insurance contribution of 9% of earnings is transferred through the Social Insurance Institution (ZUS) to the National Health Fund (NFZ), which finances the health services provided to the insured and reimbursed drugs. In the case of some social groups (e.g., students or the clergy), health insurance contributions are financed from taxes. People insured in the National Health Fund do not incur any other costs of treatment, apart from the insurance premium, unless they want to benefit from commercial treatment themselves. The entities performing medical activities also include medical, dentist, nursing, and midwife practices, pharmacies, and other service providers who provide services under agreement with the NFZ.

Under these conditions, the distribution of publicly available medical services was and remains politically regulated (the list of guaranteed

health services, drugs, and reimbursed treatments), and thus nontransparent and limiting universal access to medical services. The malfunctions of the public health system are solved through supplementary—not complementary—out-of-pocket payments, financing, and private health insurance (Płonka, 2017). The key problem in Poland is one of the longest queues for deficit medical operations in Europe. This situation forces many to choose the fully paid option of financing such an operation without a queue, despite the constitutional right to a free operation. The impossibility of co-payment in Poland, which occurs in many European countries, makes the queues for limited operations and specialist medical consultations longer (Płonka, 2019a).

Poland is also a country that was systematically in one of the last positions in the EHCI index (Table 20.1) compared to other European countries. In 2018, only Hungary and Romania showed a lower index of the index (Björnberg & Phang, 2019). The effectiveness of the Polish health care system was also one of the lowest in the examined European countries (Płonka, 2019b). Selected indicators of the healthcare system in Poland before and during the pandemic, next to the average in the EU and EEA, are presented in Table 20.1.

Comparative data of the public health care system in Poland with the EU average only partially explains the reasons for its low efficiency. The root cause is underinvestment in the system: people-reported quality of health services are in the group's penultimate place, practicing doctors per 1,000 population in last place, and waiting times for surgery are almost always in the last or penultimate place. The shortage of doctors and medical personnel is petrifying queues and overburdening medical personnel, regardless of the pandemic.

A positive direction of change was the fledgling implementation of digital solutions before the pandemic: E-sick leave, e-prescriptions from 2018, e-referral from 2020, and Internet Patient Account (IKP), and electronic medical documentation from 2021. The Internet Patient Account is an integrated tool to facilitate the convenient use of digital services for patients and to organize the previously scattered medical information about the patient's health in one place (information about the patient's past, current, or planned treatment). Electronic medical documentation is an electronic document enabling the recipient to obtain health care of a specific type. It contains the most important data and information about the patient's health, as well as past, current, or planned healthcare services,

Table 20.1 Selected indicators of the health care system in Poland before and during the pandemic, next to the average in the EU and EEA countries, with the highest and the lowest values of the index

No	*Problem*	*Page*	*EU 27*	*Poland*	*The highest and the lowest values of the index, comments*
	Before the pandemic				
1	Health expenditure per capita, 2019, EUR	159 (1)	2,572	1,511	EU (High: Germany, 4,504; low: Romania, 1,292) Switzerland 5,241
2	Health expenditure as a share of GDP, 2019, %	161 (1)	8.3%	6.2%	EU (High: Germany, 11.7%; Low: Luxembourg, 5.4%)
3	People-reported quality of health services, 2016	183 (1)	7.3/10	6.5/10	EU (High: Austria, 8.4; Low: Luxembourg, Greece, 6.0). Poland is ahead of Greece
4	Out-of-pocket spending on health as a share of final household consumption, 2018	207 (1)	3.3%	2.3%	(7.5% Malta; 1.3% Croatia) Poland is in the middle
5	Practicing doctors per 1,000 population, 2018	213 (1)	3.8	2.4	EU 27 (High: Greece, 6.1; Low: Poland, 2.4)
6	Number of doctor consultations per person, 2018	215 (1)	6.7	7.6	EU 27 (High: Slovakia, 10.9; Low: Sweden, 2.7)
7	Practicing nurses per 1,000 population, 2018	219 (1)	8.2	5.1	EU 27 (High: Finland, 14.3; Low: Greece, 3.4)
8	Ratio of nurses to doctors, 2018	219 (1)	2.3	2.1	EU 27 (High: Finland, 4.4; Low: Bulgaria, 1.0)
9	Hospital beds per 1,000 population, 2018	223 (1)	5.0	6.5	EU 27 (High: Germany, 8.0; Low: Sweden, 2.1)
10	Average length of stay in hospital, 2018, days	225 (1)	7.5	7.1	EU 27 (High: Hungary, 9.6; Low: Netherlands, 5.1)
11	Waiting time for cataract surgery, 2019, days	227 (1)	No data	250	EU 27 (High: Italy, 25; Low: Poland, 250)
12	Share of the population aged 65 and over, 1 January, 2019 (%)	231 (1)	20.3	17.7	EU 27 (High: Italy, 22.8; Low: Ireland, 14.1)

(continued)

Table 20.1 (continued)

No	*Problem*	*Page*	*EU 27*	*Poland*	*The highest and the lowest values of the index, comments*
13	EHCI Index, 2018	25 (2)	No data	585	EU (High: Netherlands, 893; Low: Romania, 549) 893 Switzerland
	During the pandemic				
14	COVID-19 confirmed cases (up to end of October 2020 per 1 million population)	30 (1)	14,197	9,552	EU 27 (High: Czech Republic, 31,466; Low: Finland, 2,920)
15	Reported COVID-19 deaths (up to end of October 2020 per 1 million population)	30 (1)	390	148	EU 27 (High: Belgium, 1,015; Low: Cyprus, 30)
16	Excess mortality (March-June 2020 per 1million population)	30 (1)	372	107	EU 27 (High: Spain, 1,021; Low: Bulgaria, 192) Negative rates are indicative of fewer deaths overall between March and June 2020 compared to previous years
17	GDP growth in the second quarter of 2020, compared to first quarter of 2020, %	31 (1)	-11.4	-8.9	EU (High: Spain, -17.8; Low: Finland, 4.4), 19.8, UK
18	Daily number of tests per 100,000 population 30 days after the country recorded 10 deaths per million population (averaged over a week)	36 (1)	86	56	EU (High: Denmark, 250; Low: Bulgaria, 17)
19	Central government additional COVID-19 health spending commitments per capita, 2020 (between March and September 2020) EUR	44 (1)	120	80	EU (High: Germany, 302; Low: Latvia, 21) 446, UK

(continued)

Table 20.1 (continued)

No	*Problem*	*Page*	*EU 27*	*Poland*	*The highest and the lowest values of the index, comments*
20	Total number of vaccination doses administered per 100 people in the total population (9 April 2021), %	(3)	14.59	13.65	EU (High: Hungary, 28.58; Low: Romania, 11.47) 47 UK

Source Calculated by author on the basis of (1) OECD/European Union (2020), (2) Björnberg and Phang (2019), (3) Our World in Data (2021), (accessed 11 April 2021)

including an electronic document enabling the recipient to obtain health care of a specific type.

The digitization of the health care system will increase its transparency and minimize the scope and number of unnecessary medical services. It becomes an important implementation challenge and a problem in the case of the older, nondigital group of patients who most often use medical services.

2. Polish health care system during the pandemic

The COVID-19 pandemic has further exacerbated previous problems related to healthcare in Poland. Poland had more time to prepare for the pandemic, which meant that during the first wave of the coronavirus it obtained more favorable results than the EU average. In the long term, the medical staff shortage has reduced the ability to respond to the epidemic. In crisis conditions, the following actions were taken:

1. mobilizing health care students (medical, nursing, and other),
2. mobilizing retired and nonpracticing health workers,
3. transferring health workers to localities with greater needs.

The pandemic limited access to healthcare for the entire population. In particular, the situation of chronically ill patients, cancer patients, and patients with medical emergencies (silent victims of the pandemic)

has worsened. Access to medical services, including preventive examinations, diagnostics, therapy, and surgical treatment, has significantly worsened (Fałek et al., 2020). The number of benefits in March–May 2020 decreased by 20 to 70% (Infarma, 2021).

During the pandemic, the use of previously introduced e-health solutions increased: e-waivers, tele-consultations, and e-prescriptions. The change in the form of providing medical services from personal to remote enabled their greater availability, which quantitatively accelerated the increase in the number of tele-consultations (Płonka & Stanienda, 2020), but their quality was assessed differently. The respondents ($N = 500$) only understood that in the conditions of a pandemic, tele-consultation is a better solution than the risk of contracting a virus or the lack of advice in the conditions of overloading institutions with patient care (Płonka et al., 2021).

The Polish government released additional resources by offering shielded financial packages that were used to protect jobs and businesses and to enhance health. It is only a short-term solution and the problem of systemic solutions ensuring health and economic security remains open.

Discussions

Proposals for changes in the healthcare system in Poland

The COVID-19 pandemic has revealed the need for deep, long-term changes to the health care system in Poland, including:

1. *Conditions and values based on the concept of Value-Based Health Care* (Porter, 2010):

   Health security should be a priority because it is the basis for sustainable social and economic development and for the stable functioning of the state, economy, and society. Additionally, the system should also be adapted to the conditions of an aging society. A wise investment in the health of citizens leads to the improvement of one of the basic economic resources—human capital.
2. *Increasing the financing of the health care sector*

   Financing the health sector should be seen as an investment in sustainable socioeconomic development. The principles of financing health services should include a complementary system of additional health insurance and the possibility of co-paying patients (direct payments to health services) for some medical services.

3. *Implementation of an integrated medical information and documentation system*

   Computerization, the development of telemedicine solutions, and the use of artificial intelligence in management decisions will enable more transparent and effective information for the patient and medical staff, and the harmonization of internal procedures for medical entities with the procedures of public institutions and the state.

4. *Organization and management aimed at strengthening the system's resilience to shocks*

   "A resilient system (or society) can face shocks and persistent structural changes in such a way that it does not lose its ability to deliver societal well-being in a sustainable way (i.e., deliver current societal well-being, without compromising that of future generations)" (EU, 2020). Monitoring of critical health care resources should be a permanent element of risk management and resource allocation, allowing for risk prediction and developing absorptive capacity, adaptive capacity, and transformative capacity.

Conclusion

Health is a fundamental value both personally and socially. The COVID-19 crisis taught the nation lessons about the imperfections of the Polish health care system when in crisis conditions; this may provide an impulse to carry out thorough corrective changes to the Polish healthcare system in the future.

The COVID-19 pandemic has made the inherent problems clearer than before. The state, the economy, and society are on the verge of a new order, with new values that should constitute the basis for developing the future standards of a post-COVID society.

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CHAPTER 21

Back to the (Ab)normality: Eastern European Labor Markets After Pandemic

Ekaterina A. Smirnova, Vadim G. Kvachev, and Katalin Lipták

Introduction

Pre-Pandemic (Ab)normality: Global Tendency Toward Neoliberalization of East-European Labor Markets

Since the early 1990th after the fall of socialist regimes the predominant ideology of economic reforms was essentially neoliberal (Harvey, 2005). Eastern European countries were perceived as a "laboratory for economic knowledge" (Bockman & Eyal, 2002). As it was shown recently

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_21

by Steadman (2012), it was an international "thought collective" of scientists, intellectuals, businessmen, and politicians who developed and promoted different versions of neoliberal consensus, often adopting these ideas to the national and regional contexts (Yankovskaya et al., 2020).

Neoliberal economic policies in general are characterized by promoting and introducing free-market operations in the public sphere and thus rearrange the state regulations in order to serve this goal (Mirowski, 2018). In the labor markets, this would mean a tendency to cut social benefits and other forms of support from state and promote self-employment and entrepreneurship instead.

In Eastern Europe, neoliberalization of labor markets usually means developing employment flexibility: simultaneously lowering the quality of jobs and deregulating state control over terms and conditions of work in order to create any possible employment and thus decrease formal level of unemployment (Smith et al., 2008); and "responsibilization" of individual agents in labor market for their employment in order to amplify competition and push forward self-management (Inozemtsev et al., 2020; Pyysiäinen et al., 2017).

This policy leads to the segmentation of labor market into separate submarket with highly differentiated characteristics, including remuneration and conditions of work. Labor market segmentation reflects the rising inequality creating "good jobs" and "bad jobs" (Kalleberg, 2011). "Bad jobs" are of a low quality in terms of working conditions and low-paid and in many cases designed by employers in order to avoid tax or labor law enforcement. This type of employment is thus often unreported and exerted in the gray economy.

The data published by Federal State Statistics Service in 2018 shows that there were about 20% workers employed in the gray economy (Russian Federal State Statistics Service, 2019). More than a half of Russian workers in one degree or another are exposed to different displays of vulnerability in labor relations (Bobkov et al., 2018).

In Hungary, many researchers deal with the precarious employment and their forms (we mostly used the term atypical employment forms) (Bankó, 2001; Csoba, 2010; Eckert, 2005; Huzyak & Overmyer, 2012; Lipták, 2021; Mélypataki, 2019). These forms (home office, telework, part-time employment) got more and more role under COVID-19 situation in Hungary. The gray economy is not a well-researched area in Hungary.

German sociologist Ulrich Beck described the upcoming socioeconomic conditions as "risk society" where old inequalities are paralleled with the risks distributed throughout all levels of society (Beck, 1992). Neoliberalized and segmented Eastern European labor market with a lot of vulnerable jobs were naturally open to the global crisis produced by the pandemic and followed lockdown. The most defenseless low-quality jobs were at the same time exposed to the risks of illness at workplace and to the labor market shrinkage.

Methodology

Comparing Labor Market Policies in Russia and Hungary

The ongoing processes in the labor market of various countries require an analysis of the state of the markets and an assessment of the effectiveness of measures taken to support the labor markets. The object of the research was the labor market. The subject was the processes taking place in the labor markets regarding the processes of employment and unemployment of the population, as well as measures of improving the situation on the labor market.

The information base for the research was the statistical databases of the European Union, Hungary, and Russia, scientific papers devoted to the analysis of the pre- and post-COVID labor markets, as well as monitoring the effectiveness of socioeconomic measures taken by the countries to restore employment and incomes of the population to the pre-COVID level.

The next methods were widely used within the framework of the study to ensure the objectivity and reliability of the results obtained: the study and analysis of theoretical sources, statistical materials, labor legislation; analysis; comparison; synthesis; systematization of the information received.

A comparative analysis of the pre-pandemic situation on the labor markets in 2019 in Hungary and Russia revealed the fact of positive trends in the markets: an increase in employment and a decrease in unemployment. However, the pandemic has made its own adjustments. According to the available data in the authors' study, labor market tensions increased sharply after the outbreak of the pandemic and the introduction of restrictive measures in the second half of March 2020. Comparative analysis of employment and unemployment rates in the labor markets of Hungary

and Russia is complicated by the difference in the statistics presented (statistical data is presented by different age groups). Among the main negative consequences of the pandemic are a decline in employment and a rise in unemployment, a drop in the level and quality of life of the population. The positive trends include the increased use of distance employment by workers of various professions. To eliminate the negative impact of the pandemic countries have taken numerous socioeconomic measures to support employment and incomes of the population, as well as applied economic instruments for additional financial support for SMEs.

Results

1. **Russian labor market during pandemic**

In December 2019 no one spoke about the possibility of a socioeconomic crisis on a global scale.

According to the official data, the unemployment rate in 2019 in many countries of the world has reached its minimum. So, in Russia the unemployment rate at the end of 2019 was 4.6%. The labor market, in general, was stable. The employment rate of the population was approaching 60%.

However, the rapid development of a new type of coronavirus COVID-19 across the world has changed plans. In February 2020 the unemployment rate in Russia was 4.6%, in March – 4.7%. However, this data shows the situation on the labor market before the establishment of non-working days at the end of March 2020.

The introduction of the COVID lockdown in Russia was accompanied by a decrease in employment, a drop in entrepreneurial activity, and an increase in the level of unemployment in the Russian labor market. The lowest employment rate in 2020 was observed in May–June and averaged 58%, which is about 1.3 percentage points lower compared to the same period in 2019 (Fig. 21.1).

The unemployment rate in the Russian labor market peaked at 6.4% in August 2020 that was 2.1 percentage points more compared to the same period in 2019 (Fig. 21.2). If we consider the unemployment rate by gender, the maximum unemployment rate for both men and women was 6.5% in 2020. In February 2021 there was a steady decline in the unemployment rate to 5.7% (Federal State Statistic Service—Rosstat).

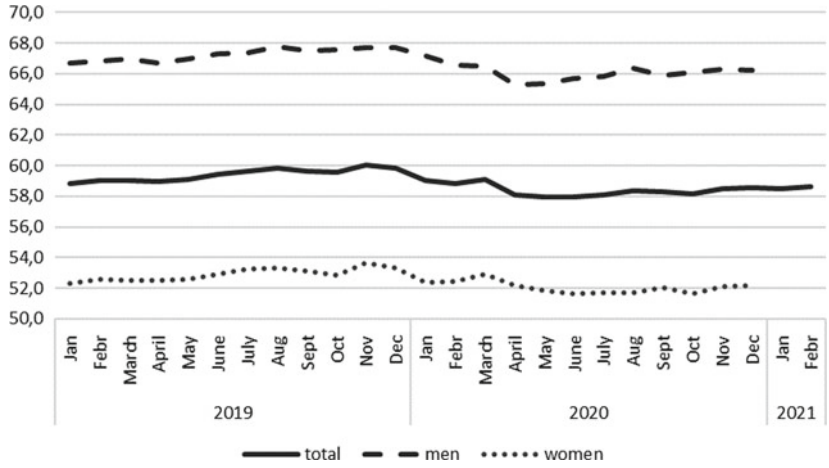

Fig. 21.1 Employment rate (%) in Russia, 15+ years old (*Source* Created by authors on the basis of Rosstat Data)

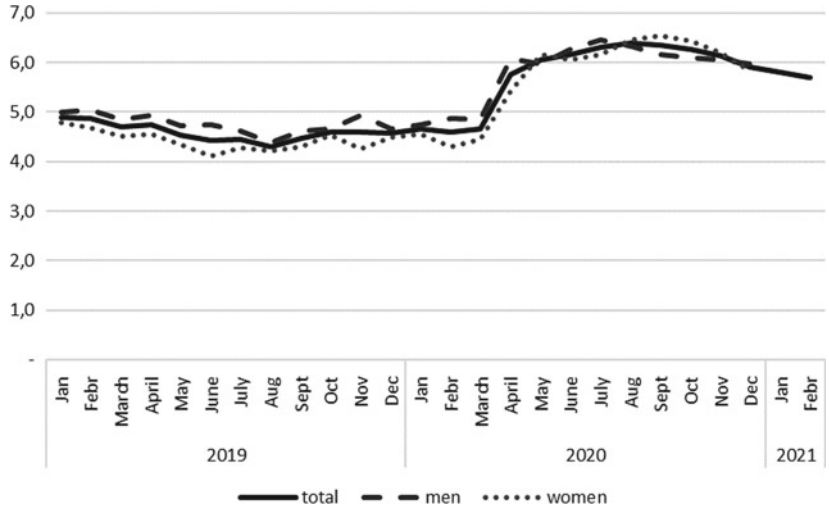

Fig. 21.2 Unemployment rate (%) in Russia, 15+ years old (*Source* Created by authors on the basis of Rosstat Data)

One of the negative consequences of the coronavirus was the growth of tension in the labor market due to a decrease in demand for labor, a decline in the number of jobs. The number of officially registered unemployed in employment services has grown significantly: their number amounted to 2.5 million at the end of January 2021, which is 3.6 times higher than a year earlier (Ria Novosti, 2021).

Some companies were forced to cut some of their staff, other organizations in order to reduce the financial burden reduced the number of working hours of employees, i.e., transferred workers to part-time work.

The population was forced to be included in the sphere of secondary employment in order to maintain income as a result of partial or complete loss of earnings. It was revealed a tendency of the growth of secondary employment of the population in 2020. So, if in February 2019 the growth rate of the number of users of the online platform for consumer and business services YouDo decreased (Zhukova, 2019), then from March 30, 2020, to April 5, 2020, the number of new performers increased by 38% (Skrynnikova, 2020). Among the works the following prevailed: translation from Russian to English, video dubbing, transcribing audio recordings, reinstalling Windows.

For comparison according to the information of the International Labor Organization, the world financial crisis of 2007–2009 left without work from 20 to 30 million people according to various estimates (UN, 2020), while the unemployment rate across OECD countries was 8.6% in September 2009 (Pchelintsev, 2019). In Russia in 2009 the unemployment rate was at the level of 8.3%, there were registered about 2.1 million people as unemployed in the employment services at the end of 2009 (Rosstat, 2021).

As a part of supporting and stimulating the economy in the context of the spread of the coronavirus, the state has taken various measures aimed at preserving jobs at enterprises, maintaining employment and incomes of the population. These measures can be conditionally divided into several groups: social; economic; digital (Dun et al., 2020; Osipov et al., 2021).

Measures for social support of citizens: increasing the maximum unemployment benefit to the level of the minimum wage—12,130 rubles; organization of new retraining programs and additional vocational education with the possibility of further employment for citizens who have lost their jobs due to the pandemic, people over 50 as well as women with small children; payment of state subsidies to employers for the employment of citizens who were registered at employment services before

January 1, 2021; additional social support for citizens recognized as unemployed in accordance with the established procedure and having children under the age of 18.

Economic measures: measures to support SMEs, including wage subsidies; a six-month deferral for all taxes, except VAT; favorable credit facilities; loans at reduced interest rates; deferral of loans; lease deferrals; a moratorium on tax audits; reducing the requirements for securing government contracts. Self-employed workers were able to receive full income tax refunds for 2019, as well as take advantage of an additional tax deduction equal to one minimum wage.

Digital: teleworking of employment services; remote submission of documents to the employment services and remote registration as unemployed; remote application for additional social benefits for children.

Currently, it is possible to give only a preliminary assessment of the socioeconomic consequences of the pandemic, but now it is worth saying that the pandemic has a tremendous impact on both the labor market and the level and quality of life of the population.

As a result, it should be said that the situation in the Russian labor market is stabilizing: Unemployment is steadily declining and is approaching its April 2020 level, and the demand for labor is increasing. The Russian government intends to recovery employment to the level of 2019 (59.4%) by the end of 2021. Although the consequences of the crisis have not yet been overcome, the labor market remains tense and the incomes of citizens have not recovered.

On the other hand, it is important to note that the pandemic has not only quantitatively but also qualitatively changed the labor market: Labor legislation has been updated; the use of teleworking has been expanded and its regulation in labor legislation has been ensured; the structure of employment of the population has been changed; a new segment of professions has appeared that can be implemented in a remote format (teacher, purchaser, accountant, etc.).

2. **Hungarian labor market during pandemic**

Employment policy is an external regulatory system of the labor market that seeks to influence the labor market in such a way that its operation is more harmonious and at the same time social functions prevail. The model of full employment starts primarily from the point of view of social

policy, which the Hungarian government represents. In order to achieve policy goals that include the social dimension, employment policy and the government make employment a quasi-mandatory norm, and on the other hand, it creates and creates enough jobs to fully absorb labor supply, even then also if this results in a significant amount of hidden in-house overemployment (internal unemployment) (Islam, 2014).

The instrument system of employment policy consists mainly of active and passive instruments. Active assets are those that are most aimed at increasing employment. Legal, financial and investment schemes to help create jobs and employment opportunities can be included here, which aim to promote the employability, willingness, and opportunity of employers. The function of active tools is to provide a meaningful, lasting solution to labor market tensions. These tools focus primarily on job creation. Passive employment policy instruments thus serve to provide job seekers in times of unemployment. These benefits are essentially social in nature and are intended to make up for lost income (Halmos, 2006).

In Hungary, the main employment targets for the period 2014–2020 were to achieve full employment:

- facilitating access to the labor market (improving the employability of disadvantaged unemployed and inactive people),
- sustainable integration of young people into the labor market,
- promoting lifelong learning by supporting and developing vocational and adult education,
- improving the adaptability of workers and enterprises to the labor market,
- supporting the social economy and non-profit employment programs.

At the beginning of 2020, according to statistical data, there was no cause for concern in the Hungarian labor market, the level of employment was high (72%, Fig. 21.3), unemployment was low (3.8%), and wages were constantly rising. Thus, economic growth is not omnipotent in the labor market and does not solve structural problems (difficulties in finding employment in low-skilled people living rural areas). It was uncertain where Hungarian employment policy would go in the beginning of 2020, after essentially achieving its biggest political goal, full employment, and mobilizing additional labor reserves that could be

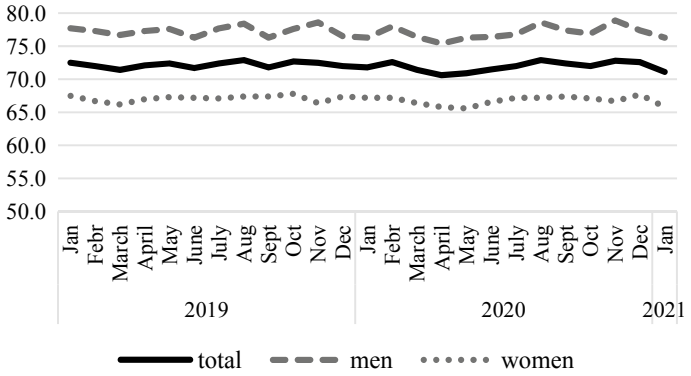

Fig. 21.3 Employment rate (%) in Hungary 15–64 years old (*Source* Created by authors on the basis of Eurostat Data)

mobilized became more and more expensive, while promising less and less economic and political benefits. Further increases in employment alone may become more expensive as the cost of activation increases for groups that can still be involved, while the benefits of involving them are reduced. Thus, in addition to extensive growth, it can be important and useful to develop activities (adult training, human services, individual skills development and improving corporate productivity) that are not reflected in employment data, but in productivity and ability rankings. (Borbély-Pecze, 2020).

In the spring of 2020, the coronavirus epidemic also reached Hungary. Despite the fact that the restrictive measures only came into force in the second half of March, labor market data for the first quarter as a whole painted a worrying picture: The proportion of the unemployed and inactive among the employed increased significantly (Fig. 21.4).

In addition to the significant social impact and the human dimension, the coronavirus epidemic has caused a serious economic shock to the European Union and required strong economic coordination. The spread of the virus is disrupting global supply chains, leading to volatility in financial markets, shocks consumer demand, and adversely affects important sectors such as travel and tourism. In order to provide immediate assistance to severely affected SMEs, the EU budget will use its existing instruments, complemented by measures taken at national level. Specific measures are needed to mitigate the employment impact on individuals

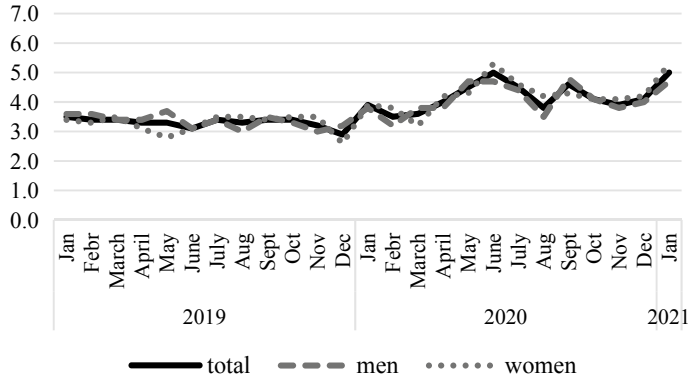

Fig. 21.4 Unemployment rate (%) in Hungary 15–74 years old (*Source* Created by authors on the basis of Eurostat Data)

and the sectors most affected by production disruptions or declining sales (Konina, 2021). Where possible, workers should be protected from unemployment and loss of income so that they do not suffer unduly as a result of the epidemiological situation. Reduced working time schemes have proven to be effective in many EU Member States, as they allow for a temporary reduction in working hours while maintaining workers' incomes. The job-destroying effect of the restrictions imposed by the epidemic has been mitigated by the fact that many are able to work from home via the Internet (EC, 2020). The introduction of teleworking has saved many jobs in Hungary as well.

As a result of the coronavirus crisis, Hungarian employment policy instruments have also changed. One of the first direct economic effects of the coronavirus epidemic is that some workers have lost their jobs. Illness and the care of patients at home and the quarantine of workers may have caused difficulties, but school closures have also placed a significant burden on both workers and employers. Increasing the number of days off after children is a typical tool. Another group of measures is tools to keep jobs. Of these, direct financial support to companies serves to preserve the solvency of companies and avoid bankruptcy. The Hungarian government has made loans at reduced interest rates available to companies, similar to the Austrian or German solutions. The deadline for companies to file tax returns has been extended. Wage subsidies were given to workers in the

sector hardest hit by the crisis. In Hungary, temporary changes to labor regulations have made it possible for employers to order telework unilaterally. The benefits available in Hungary mainly affected different types of job retention, while the support for the unemployed did not, and the support for those who lost their jobs appeared only to a small extent among the measures. (Makó & Nábelek, 2019).

Discussion

Labor Markets Neoliberalization and Pandemic in Eastern Europe

Cross-country labor market research is always complicated due to many socioeconomic differences among countries. However many Eastern European countries have similarities not only because of the common socialist past but also in regard to similar policies adopted in market-transition period. These neoliberal policies still have huge impact on the current socioeconomic situation and labor market policies.

As we have seen on the examples of Hungary and Russia, the labor market of the countries had similarities just before the pandemic outbreak: low unemployment level followed by deterritoriation of the quality of workplaces (rising precarity and instability of jobs); moderate economic growth and general labor market stability. The design of the labor market policies remained neoliberal for decades and can be summed up as following: "get rid of the rigidities in the labor market to remove unemployment and spread education and skills to increase the supply of skilled workers". (Haque, 2004).

During the pandemic, this type of policy was partly reviewed. Both in Hungary and in Russia direct incentive were deployed in order to sustain the socioeconomic stability. Usually neoliberal policy strongly advice against direct incentives to workers in labor market giving preference to indirect spending on developing human capital and stimulate business activity. Lockdown required short-term measures to sustain the socioeconomic stability.

Conclusion

Back to Abnormality: Some Speculations on the New Situation

Measures that were undertook during COVID-19 by Hungary and Russia in relation to labor market where clearly necessary and essential. But the

scope of influence of the pandemic on the countries' labor markets was defined not only by the level of economic downturn caused by a lockdown but also by the constructed instability created by neoliberal market policies in previous decades.

For the short time, the basic principles of these labor market policies were reviewed and direct involvement of the state was provided in order to keep economic and social stability. During the pandemic, the idea of returning to normality was running like a golden thread through media and public discourse. Although the critical situation itself revealed the level of abnormality of the situation in which unstable but essential jobs were at most risk in terms of workers' health and social security. The flexibility of labor market showed its weaknesses especially in terms of critical situation where preserving human life is the major goal.

Pandemic case is unlikely to immediate change labor market policy philosophy in Eastern Europe but this experience can be a start in changing views on the goals and orientations of the state in relation to social sphere. Researchers and policy makers definitely can learn a lot from this experience on how to build a more stable and equal society through labor market policy, a society that can withstand against future unpredictable emergency conditions.

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CHAPTER 22

Health Insurance Problems of Unknown Infections

Lyudmila I. Tsvetkova

Introduction

The COVID-19 pandemic has presented humanity with the challenge of overcoming the enormous losses it has faced as a result of mass diseases and implementing measures to prevent their spread. The pandemic made us think of the place of insurance protection against expenses and economic losses, both for individual families and entrepreneurs and for national economies as a whole (Bogoviz et al., 2019; Osipov & Skryl, 2021; Osipov et al., 2021). The perceived risk gave rise to the use of insurance protection tools and the corresponding proposals of insurance companies. However, the meaning and quality of these proposals, in our opinion, cannot be considered appropriate to the needs that gave rise to them.

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_22

The models of insurance products offered in the Russian insurance market include insurance protection against accidents and sudden illnesses or medical insurance options.

For example, the market offers policies with insurance coverage that involves fixed payments for death and hospitalization (Soglasie IC).

An extended version of this coverage is offered by the insurance company "Zetta Insurance", which is ready to pay a fixed amount for each day of hospitalization.

The insurance product of the company "Alfa-Insurance" considers the confirmed fact of illness and death as an insured event involving the occurrence of payment obligations.

Large companies that have insured their employees under VHI often supplement contracts with anti-virus policies. Payments under the contract are provided for in case of emergency hospitalization, temporary disability, and death.

At the same time, the inclusion of COVID-19 risks in VHI policies is limited by its presence in the list of diseases that pose a danger to others (Government Decree No. 66 of 31.01.2020). Therefore, treating this disease is carried out free of charge in state medical institutions. Nevertheless, given the often objective lack of funds to help patients with COVID-19 in medical institutions, especially in the early stages of the epidemic, many insurance companies have expanded insurance coverage for this case in VHI policies.

RESO-Garantia included the risks of COVID-19 in the corporate VHI programs, as well as individual contracts concluded before July 1, 2020. If we take the policies issued by individuals after this date, COVID-19 treatment and diagnosis is an exception to insurance coverage.

Ingosstrakh can include COVID-19 treatment in the VHI policy as a separate option for policyholders living in cities where the hospitals that have the right to work in the VHI system are located. This option includes all manipulations that can be performed in the hospital for a patient with COVID-19. They include intensive care treatment, using a ventilator and managing special medications (Noskov, 2020).

Insurance products offered in 2020 turned out to be extremely profitable for insurers, payments amounted to about 840 million roubles, while premium amounted to 88 times more, that is, 74 billion roubles. Besides, there was a high refusal rate in insurance payments—13% (Kolobova, 2021). Such a low loss rate indicates that the insurance cover is inadequate for its price and can be explained solely by the current

circumstances in which we find ourselves. However, insurance in case of an epidemic of an unknown infectious disease should be a kind of social protection and be present as guarantees of such protection in every period. The inadequate price of the policy if compared to the risks covered prevents people from buying such an insurance plan and exposes all members of the society at risk of the epidemic. This implies the need to create an appropriate insurance product, at a price that is adequate to the consumer capabilities and anxiety in the event of an epidemiological disease in the absence of its direct threat (Medyanik, 2020).

Methodology

Solving the problem of insuring the risks of the consequences of unknown infections, that is, creating insurance products and organizing their turnover in the insurance market, first of all, requires determining the insurance needs and the principles of forming the insurance capital corresponding to these needs (Tsvetkova, 2019).

To this end, a hypothesis is put forward that the insurance needs of those at risk of a pandemic are similar to the insurance needs of those at risk of natural disasters. If such a hypothesis is accepted, the financial expression of the protection provided and its price should be determined to create an appropriate insurance product, while the principles of creating and managing insurance capital can be borrowed from the principles of organizing insurance against natural disasters and catastrophes.

An unknown infection is an infection for which, at the time of the first case of the disease caused by it, its causation, infection channels, treatment, and prevention methods were not known. The risk of the main consequences when this infection penetrates the human population includes the occurrence of an epidemic and a pandemic.

An epidemic is the progressively spreading infectious disease, significantly exceeding the usually recorded morbidity level in a given territory and capable of causing an emergency (Jodelet, 2020).

Results

For the disease to be recognized as a pandemic, it must cover at least two continents. That is, the concept itself is primarily geographical. There is another condition for recognizing a pandemic: The disease must spread across different territories.

Now this concept is primarily associated with virus transmission. The virus transmission is characterized by a high rate; besides, it is this pathogen that can quickly mutate. As a result, it can hardly be blocked on a specific territory. All this causes a pandemic.

What characterizes the emergence of an epidemic, especially a pandemic?

1. Unpredictability
2. Society and the systems created by it are not ready to counteract morbidity, as well as its economic consequences, to implement effective measures for such counteraction.
3. A large number of human casualties or persons requiring medical attention.
4. The large number and volume of economic losses (Shevchuk et al., 2020):
   - losing employment earnings;
   - population and entrepreneurs lose solvency, which can lead to bank failures and other financial system crises;
   - losing rented housing due to rent non-payment;
   - losing the ability to pay for utilities, which can provide for the utilities going bankrupt;
   - entire sectors of the economy, science, and education have been locked down for quarantine.

These consequences can be described as the population losing life, health, property rights, and financial security in the regions of residence (Table 48.1). The extremely difficult situation and the risk of spreading the consequences of infection make it obligatory for the state to organize measures to prevent its spread and compensate for the resulting losses at the expense of the budget.

If we draw an analogy between the impact of a pandemic from an unknown infection and a natural disaster, we can see that these events have well-traced common features. A natural disaster is a destructive natural phenomenon, or a process of significant scale, as a result of which people's life and health may be or have been threatened (Kutty & Melwin Joy, 2020).

Table 22.1 10 deadliest epidemics/pandemics

Rank	*Death toll, million*	*Event*	*Place*	*Date*
1	2	3	4	5
1	75–200	The Black Death	Europe, Asia, North Africa	1346–1353
2	50 + (17–100)	The 1918 flu pandemic	On a global scale	1918–1920
3	35 (as of 2020)	The HIV/AIDS pandemic	Global	1981–present
4	30–50	The Justinian Plague	Europe and West Asia	541–542
5	12 (India and China)	Third plague pandemic	On a global scale	1855–1960
6	5–15	The Coliseum Epidemic 1545–1548	Mexico	1545–1548
7	5–10	Antonine Plague	Roman Empire	165–180 (maybe up to 190)
8	5–8	1520. Mexico, smallpox epidemic	Mexico	1519–1520
9	2.5 (as of February 2021)	COVID-19 pandemic	On a global scale	2019–present
10	2,5	1918–1922, typhus epidemic in Russia	Russia	1918–1922

Source Created by Author on the basis of G. Costa, W. Cota, S. Costa Ferreira. (2020). Outbreak diversity in epidemic waves propagating through distinct geographical scales. Physical Review Research. 4(2). https://doi.org/10.1103/PhysRevResearch.2.043306

Indeed, the pandemic's sudden occurrence and the nature of its consequences fully correspond to the definition of a "natural disaster", as an extreme natural phenomenon of a catastrophic nature that suddenly disrupts normal activities in the region that has experienced its consequences (Table 48.2).

To be classified as a disaster, the phenomenon must have serious environmental consequences and/or human casualties. At the same time, disasters are very often linked to financial losses.

The data in Table 48.1 and Table 48.2 shows that in terms of the death toll, pandemics exceed natural disasters, while their level of surprise and compensation complexity are comparable.

If the triggering events persist, the randomness factor affects both groups.

Table 22.2 The ten deadliest natural disasters by the highest number of deaths, excluding epidemics and famine

Rank	*Death toll, thousand*	*Event*	*Place*	*Date*
1	4000	The flood of 1931	China	July 1931
2	2000	The flood of 1887	China	September 1887
3	830	Shaanxi earthquake	China	January 23, 1556
4	655	Tianshan earthquake	China	July 28, 1976
5	500 +	Bhola cyclone	East Pakistan (now Bangladesh)	November 13, 1970
6	316	The earthquake in Haiti	Haiti	January 12, 2010
7	300 +	Antioch earthquake	Byzantine Empire (now Turkey)	May 526
8	300	Haiphong typhoon	Vietnam	October 8, 1881
9	273,4	Haiyuan earthquake	China	December 16, 1920
10	229	Typhoon Nina	China	August 7, 1975

Source Created by Author on the basis of A. Faggian, M. Modica. (2020). Natural disasters and the economy. Review of Regional Research, 40(2): 107–111. https://doi.org/10.1007/s10037-020-00146-3

1) If there is a trigger, epidemics are random.

Epidemics occur in conditions favorable for large-scale infection, but the first case is caused by a random combination of circumstances (Çağrı Uçucu, 2020).

2) A natural disaster also occurs and spreads under various climatic and seismic conditions, but its immediate onset and development are of a probabilistic, random nature.

Besides the probabilistic nature of natural disasters and catastrophes' causes and consequences similar to that of the emerging epidemics of unknown infections, many scientists say that there is a link between their causes. For example, researchers cite climate change as a common threat to these phenomena (Langendonck, 2007). The risk of animal and

human habitats' convergence is caused by climate changes, and modern epidemics are usually of zoonotic origin (Geladari et al., 2020).

According to a report by the World Health Organization (WHO), "climate change, one of the global environmental changes currently occurring, will have a wide range of consequences for infectious diseases to occur in humans" (Patz et al., 2003).

According to several scientists who published their article in Annals of the American Thoracic Society, if climate change displaces wild animals in the human habitat, they will bring a significant number of their zoonoses. This article notes the following: "Climate change may change the habitat and make wildlife, crops, livestock, and humans come into contact with pathogens to which they have had less exposure and immunity" (Mirsaeidi et al., 2016).

The emergence of COVID-19 is not considered by experts as a result of climate change, but its very appearance and the resulting pandemic can create a food shortage for humanity, provoking contact with wild animals. Similarly, falling crop yields or dying livestock as a result of floods, droughts, heat waves can make people hunt wild animals and eat their meat. For example, experts say that Ebola may have been caused by the local people kill and eat chimpanzees in 1996. Scientists associate the new outbreak of this disease in 2007 with eating bats. Deforestation and other forms of human intrusion into natural ecosystems also increase the risk of the virus passing from animals to humans.

Besides the similar nature and impact of climate on both risk groups, the measures to counteract these phenomena are also the same.

For example, scientists conduct preventive epidemiological surveillance similar to the early warning systems for monitoring natural disasters. For example, epidemiological observations of the Congo Basin, the Mekong region, the Amazon, and the Ganges Plain have been coordinated in the United States under the new pandemic threat surveillance program since 2010.

There are special organizations that control the information posted on social networks, microblogs, and forums. One such organization, HealthMap, had detected the spread of Ebola nine days earlier than the World Health Organization announced it, while another, AscelBio, had detected a cholera outbreak in Haiti a week before it was officially recognized.

Discussions

Today, epidemiologists are monitoring the dangerous zones to promptly detect new dangerous pathogens (Jia, 2020; Record, 2020). Such places include markets, slums where extremely low-income citizens live, as well as agro-industrial complexes where people enter the wild (Besner et al., 2020). Just as meteorologists predict cyclones and geologists monitor earthquake hazards, epidemiologists collect a wealth of data that allows them to predict pandemics.

Mami Mizutori, the head of the UNDRR (UN Office for Disaster Reduction)stated that "the odds are against us when we fail to act on scientific evidence and early warning and invest in preventing, adapting to climate change and reducing disaster risk" (McGrath, 2020).

Petteri Taalas, the head of the World Meteorological Organization, said: "Early warning systems are a prerequisite for effectively reducing disaster risk and adapting to climate change". "The ability to be prepared and ready to respond at the right time and in the right place can save many lives and protect the livelihoods of communities around the world" (TASS, MARCH 2020).

The medical community also points to the possibility and necessity of building an early warning system for epidemics. In particular, their studies analyzing outbreaks of infectious diseases, conclude that measures for preventing and early detecting infectious diseases are becoming increasingly popular and effective, which reduces the number of infected people. In other words, early warning measures similar to disaster prevention are also effective in dealing with pandemics of unknown infections (Vianello et al., 2020).

The population similarly assesses the possibilities and consequences of both risk groups in terms of the need for protection (Osipov, 2010). Phenomena defined as "natural disasters" and "life-threatening diseases" are stressors from the viewpoint of the people affected. According to Tarabarina N. V., they are perceived as an external, difficult-to-control event and manifest themselves in the impact's suddenness and unpredictability, the scale of the influence, the lack of control, and the manifestation complexity. In other words, "both stressors are characterized by an awareness that a person's life is threatened, as well as the subsequent threat to the social and economic stability of the region in which they occurred, and the threat that the event can repeat" (Tarabrina et al., 2017).

Comparing natural disasters and epidemics of life-threatening diseases, the researchers suggest the similarity of these high-intensity stressors' impact on the psychological state of the people experiencing their consequences (Wang et al., 2018), and the search for prevention and compensation tools (Mesquita de Carvalho et al., 2021).

All in all, we can consider the hypothesis that a natural, climatic disaster and a pandemic are similar from the following points of view:

- they both have disastrous consequences for the population of the region in particular and humanity in general;
- they happen suddenly;
- they can be observed and predicted with a certain degree of probability;
- their consequences can be managed through creating an early warning system;
- similar psychological effect on the population caused by the possibility and potential consequences of both stressors;
- the causal relationship between the factors of climate change that cause natural disasters and epidemics of zoonotic aetiology.

The analysis of similarities and analogies between such phenomena as natural disasters and pandemics allows us to draw a fair conclusion that similar approaches to using the tools to compensate for the losses should be taken.

The social significance of damage from natural disasters and natural disasters as well as from epidemiological infectious diseases determines the need for all measures that reduce these risks. The international experience of using insurance instruments for these purposes proves the effectiveness of using insurance to compensate for the consequences of rare destruction risks. According to the author, in the conditions when the Civil Code does not allow introduce compulsory personal insurance at the expense of citizens, the most effective tool for introducing insurance against losses caused by epidemics is mutual insurance. Mutual insurance is the most effective method for the policyholder, since:

it is cheaper due to the lack of a profit goal;

- the liability of all members of mutual insurance companies is joint and subsidiary for its obligations;

- all policyholders are interested in preventing insured risks;
- members of the company have the right to return the contributions paid if there is an excess of the insurance capital formed or to increase this capital using these surpluses;
- the company is managed by members of the mutual organization (Albrecht & Huggerenberger, 2017).

A comparison of commercial and mutual insurance aimed at organizing insurance protection against the risks of epidemics of unknown infections makes us favor mutual insurance (Janowicz-Lomott & Śliwiński, 2017) (Table 48.3).

Today, mutual insurance can be organized using blockchain technology. This technology allows you to effectively implement the P2P

Table 22.3 Comparative characteristics of mutual and commercial insurance

	Mutual insurance	*Commercial insurance*
Nature of insurance	People can join the mutual insurance company ex gratis	For a high degree of penetration, mandatory insurance is necessary
Covered risks	The ability to insure only the risks of a catastrophic nature	Lack of interest in insuring catastrophic risks
Contract price	It is low since there is no need to make a profit and the costs of doing business can be minimized	It is high, due to the task of making a profit and the cost of running the business and maintaining the staff
Capital formation	- contributions upon joining the company, - insurance premiums	- share capital; - insurance premiums
Results for equity holders	- insurance reserves; - the ability to refund overpaid contributions	- dividends to shareholders
Interest in risk prevention	High interest in saving the contributions paid	Low interest, since the interested owner and the management are separated from each other
Interaction with insurance market participants	For risk reinsurance	For direct insurance
The role of the state and state-owned companies	A guarantor of last resort at the expense of special funds	A reinsurer

Source Created by the Author

approach, that is, to create networks of computers, each of which provides its user with equal rights, resource sharing, and equal relationships. The network is decentralized and suitable for organizing connections when jointly creating and using capital. As soon as a member of the network has a claim to use this capital to compensate for losses, the smart contract ensures payment. A smart contract is an automatically executed computer algorithm used when the necessary conditions occur. When all network users make the joint decision, the remaining part of the generated capital can be distributed among the participants, minus the cost of servicing the P2P platform. This option is used in peer-to-peer insurance, that is, insurance without a special insurance company involved, with an equal position of all network participants. This approach is best suited for implementing the mutual insurance mechanism, which has long existed in Russian law.

The role of smart contracts deserves special attention. For example, when a claim is filed, the smart contract can automatically confirm coverage and trigger a request, if necessary, to manually verify losses that meet certain criteria.

According to BCG, smart contracts can save property and accident insurers more than $200 billion a year in operating costs and reduce their operating ratio by about 5–13 percentage points (Sharma, 2020).

In epidemic insurance, instead of making insurers and healthcare providers reconcile patient data in separate databases, a blockchain system of medical records can store a cryptographic signature for each record in a distributed ledger. The signature cryptographically indexes the contents of each document and marks it with timestamps, without actually storing any sensitive information on the blockchain.

Each time a document is changed, it is recorded in the general ledger, which allows insurers and providers to audit health information in different organizations. Meanwhile, the blockchain can allow detailed permission settings to comply with the rules while allowing data to be anonymized and shared for research.

For example, when using the MedRec blockchain, a decentralized content management system for medical records at the Massachusetts Institute of Technology, instead of storing medical data directly on the chain, the smart contract indexes it on the blockchain, allowing access to the records to those medical professionals who have been granted permission. This is designed to help ensure patient confidentiality, as well as create an audit trail that makes it easy to find and verify patient information on the blockchain.

Conclusions

Digital technologies are perfectly adapted for servicing mutual organization's activities, so we will formulate a feature of the mutual insurance mechanism, which can be successfully used to insure the risks of epidemics of unknown infections and implemented using blockchain platforms on the P2P principle (Shashkova et al. 2020).

Since all participants in the epidemic risk insurance system, regardless of their level, are united by one group of goals: Preventing the disease from spreading, providing timely and high-quality medical care to the sick person, compensating for the loss of earnings during the medical leave and rehabilitation, helping to fulfill credit obligations, one of the fundamental principles of the catastrophic risk insurance system is its multi-level nature, which implies the system participants' interaction to achieve the main goal of the system at various levels.

1. Policyholders' level

At this level, the object of insurance is determined—the property interests of the policyholders associated with the loss of working capacity (earnings) for the duration of treatment and rehabilitation, in excess of the receipts under the social insurance policy, with payment for medical manipulations that are not included in the list provided under the MHI system, payment for medicines and equipment that are objectively absent at the treatment sites, the cost of paying for credit obligations that cannot be fulfilled due to the loss of working capacity of a person for the duration of treatment.

As you can see, property interests that may be damaged by the epidemic can be protected by different types of insurance: accident and sudden illness, health insurance, and liability insurance. They fall under the

2. Mutual organization level

The system of insuring the risks of epidemics of unknown infections proposed by the author provides for introducing a specialized insurance product. This product gives the participants of the mutual organization the right to form it from a limited set of options, characterized by costs compensated to the patient. Policyholders who choose the same list of

coverage make groups that form the insurance capital for the expected payments with the right to return its balance at the end of the insurance year or to pay additional insurance premiums if the formed capital was not enough, which traditionally involves mutual organizations.

3. Reinsurance level

Reinsurers of epidemic risks can include mutual reinsurance companies. This reinsurance can be carried out on a disproportionate basis of the excessive losses, where the parameters of reinsurance are determined based on data on the losses that occurred and estimates of the maximum possible loss.

4. State guarantee level

State reinsurance can be carried out within the framework of a National Reinsurance Company, or a specialized insurance company.

Results

The proven analogy between the risk of an epidemic of an unknown infection and that of natural disasters and catastrophes allowed us to justify the validity of the approach to insuring epidemic risk based on the principles of insurance against natural disasters by peer-to-peer insurance using blockchain technology.

Blockchain technology allows us to implement accruals and payments in an automatic mode, through smart contracts. Blockchain provides for mutual insurance on the peer-to-peer principle, optimizes the time for settling losses, and ensures the obligations' fulfillment. Such P2P insurance will allow one to implement parametric insurance and microinsurance. At the same time, each participant of the blockchain can check the information in the database at any time, and no one can change it. In the foreseeable future, some P2P insurance platforms will begin to use smart contracts to define relationships between participants, solving many of the current problems, including providing digital asset transfers or accessing private data to personalize insurance.

However, at the moment, such mutual insurance does not fully comply with Russian legislation. The Russian Central Bank suggests that we

should change the insurance legislation so that we could introduce P2P insurance by connecting an insurance company to it. If the insurance company is not included in the chain, this activity cannot be called insurance, since such a network is defined by the insurer in the Law on the Organization of Insurance Activities and the insurance contract, which is defined in the Russian Civil Code, may be considered illegal. The Russian Central Bank offers such a P2P model, in which part of the group members' fees is sent to the created fund, and part is transferred to the insurance company. The insurance company will act as a third party to the contract and pay compensation only if the damage is greater than the deductible. If the damage is less than the deductible, the compensation is paid to the participant from the fund.

In the case of insurance against the risks of an epidemic of unknown infections, it can be a state insurance or reinsurance company that provides additional guarantees of payments to victims of the epidemic.

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CHAPTER 23

The Impact of the COVID-19 Pandemic on the Labor Market in Poland

Jolanta Stanienda

Introduction

The COVID-19 pandemic has caused a global health and economic crisis. To limit its effects, countries around the world have taken unprecedented measures (lockdown, social distancing, vaccinations). The freezing of the economy and the restriction of civil liberties had a very significant impact on the labor market.

Therefore, the aim of the study is to diagnose the labor market in Poland and to present the directions of changes taking place in the post-COVID era. The main research question was formulated: How did the COVID-19 pandemic affect the Polish labor market?

Studies of the literature on the subject allow us to conclude that before the coronavirus, the development of the labor market was indicated in

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_23

the context of the requirements related to revolution 4.0,[1] which we are witnessing (Östman, 2019). It has significantly changed the nature of the economy and society through digital technologies, breakthrough solutions in the production of materials and biotechnology, new methods of production, consumption, communication, and movement (Schwab, 2018; Polinkevych et al., 2021).

The indicated features of economy 4.0 dictated and still dictate the direction of changes in the labor market. Competence and technological skills are required. STEM (science, technology, engineering, and mathematics) skills are of fundamental importance—(Report of the Polish Agency for Enterprise Development: The Fourth Industrial Revolution and its Impact on the Labor Market, Warsaw 2020). As a consequence, the demand for new jobs is increasing (Report: The Future of Jobs Report, 2018, World Economic Forum, Geneva 2018), the demand for a competent workforce (Mosley, 2015) and the skills requirements are changing in many professions (Griffin & McGaw, 2012). Employees with know-how and hard competence are in demand, who, as participants of revolution 4.0, must develop the ability to constantly learn and constantly develop themselves (Barwińska-Małajowicz, 2020). The ability to collaborate and solve problems in the digital information environment has become crucial (Griffin & McGaw, 2012).

Due to this background, the competency gap is growing in the global labor market, as evidenced by research conducted by the Korn Ferry Institute and ManpowerGroup (ManpowerGroup, 2018). According to them, in 2030, the lack of specialists in the field of new technologies will amount to over 85 million people. The ongoing changes lead to a shortage of talent, and thus to the development of the concept of talent management (Schuler et al., 2012; Scullion et al., 2010; Tarique & Schuler, 2010). For the first time, the "war of talents" was presented as an upcoming challenge for the labor market in a 1997 McKinsey & Company study. Since 2014, the Global Talent Competitiveness Index (GTCI) has been developed, which is the basis for the creation of a global talent market.

[1] More on the fourth industrial revolution in K. Szwab, (2016), The Fourth Industrial Revolution, World Economic Forum, Davos 2016; J. Naisbitt, (1982), Megatrends—Ten New Directions Transforming Our Lives. New York: Warner Books;Y. Chen (2012), Challenges and opportunities of Internet of things, 10.1109 / ASPDAC.2012.6164978, IEEE, 978-1-4673-0772-7 / 12/2012 IEE, Sydney.

It measures the ability of countries to develop, attract and retain talent (Monteiro, 2020).

Results

1. Research trends in the labor market during the COVID-19 pandemic

The COVID-19 pandemic caused massive disruption to the labor market by introducing lockdown and remote work on a massive scale. In many countries, measures were taken to support the labor market with various instruments. They support maintaining employment or subsidize wages, e.g., extending the repayment date or lowering the rates of advances for income tax and social security contributions (Bank Gospodarstwa Krajowego, 2021).

Bringing the labor market unstable by the pandemic is a challenge for the economies of many countries and concerns not only the protection of sectors critical to economic development, but also the assets of workers.

Since the beginning of COVID-19, many studies have been carried out, including: in Germany (Adams-Prassl et al., 2020), in Italy (Del Boca et al., 2020), in the UK (Smith, 2020), in Poland (GUS, 2021), regarding its impact on various socioeconomic areas. Extensive research on the relationship between the pandemic and the labor market has been carried out in Australia (Biddle et al., 2020a, 2020b). They show that the recession caused by the pandemic affected employment levels, labor supply, financial situation, levels of life satisfaction, and the mental health of society. In this context, it is predicted that negative shocks in the labor market (unemployment, shortened working hours, lower wages) will affect the level of financial well-being, the key sources of which are current and future earnings (Botha et al., 2021; Biddle et al., 2020a, 2020b).

One should also pay attention to one more aspect of the modern labor market, which is the rapid increase in demand for new technological competences, the increased risk of exclusion of less resourceful people, young people, and the change and weakening of social relations due to the pandemic. In the post-COVID period, this implies the need to sensitize the society to social problems and thus the increased demand for forms of social entrepreneurship focused on caring for the excluded. It is predicted that the labor market in the post-COVID era will require

not only new hard skills and talents, but also new soft skills necessary to rebuild relationships weakened by the pandemic. This is confirmed by the research of the International Labor Organization emphasizing the need to move toward intangible resources and human resources (Vaiman et al., 2012), including social capital (Polish Economic Institute, 2021).

Extensive research conducted by the Polish Economic Institute shows the effects of changes in the labor market caused by the pandemic. According to them, the most vulnerable people are the least stable professionally and young people (15–34 years old), including those who have just finished their education and are looking for their first job. The short-term impact of COVID-19 on the global labor market in terms of lost earnings of young people due to the pandemic was $ 1.29 trillion in 2020, while the long-term impact (by 2035) will be $ 21.1 trillion (Kutwa, 2021). On an individual level, the average working person will lose $ 1,610, and annually—$ 1,879 (the loss will be 10.1% of an employee's salary) (Kutwa, 2021). The total long-term costs of the COVID-19 pandemic for the younger generation will exceed $ 44 trillion (Kutwa, 2021).

The 15-year pandemic's rise in unemployment will be most severe in higher middle-income economies ($ 7.3 trillion), and greater in sub-Saharan Africa ($ 74.7 billion) and Europe and Central Asia ($ 103.0 billion) (Kutwa, 2021).

According to the pessimistic scenario of the development of the labor market, the young generation begins to be described as the generation lost due to COVID-19. The pandemic causes stress, anxiety, and loneliness that not every young person can handle on their own. The demand for psychological care is expected to grow significantly (the demand for mental health services of the young generation increased by $ 407 billion in 2020) (Kutwa, 2021). The pandemic may also create a generation of precarious people (Standing, 2011), i.e., socially awkward, insecure, and unemployed young people.

According to the International Labor Organization, more than one in six people aged 18 to 29 have stopped working since the start of the pandemic. Young people experience many shocks in the form of: disruptions to education, training, and learning in the workplace; greater difficulties for job seekers and people entering the labor market; loss of jobs and income, and deteriorating quality of employment (Lee et al., 2020). The COVID-19 crisis shows how important social capital (Stanienda, 2019, 2020), trust, solidarity, cooperation, and responsibility

are to overcome its effects (Hartley & Jarvis Darryl, 2020; Cairney, 2020; Cairney & Wellstead, 2021).

2. The COVID-19 pandemic and the labor market in Poland[2]

The labor market in Poland, as in many countries affected by the pandemic, has changed dramatically. The statistical data of the Central Statistical Office concerning the fourth quarter of 2020 are presented below.

The employment rate in Poland in the fourth quarter of 2020 was 54.7% of the population aged 15 and more (the number of employed persons was 16 555 thousand people) and remained at a similar level compared to the third quarter of 2020. However, it should be noted on the decline in the employment rate by 5.3 percentage points among the youngest (15–24 years old) participants of the labor market compared to 2019.

The number of people who had work, but did not perform it, increased significantly (in the fourth quarter of 2020 it was 1,211 thousand people—they constituted 7.3% of the total number of employees). Almost 30% of this group (323 thousand people) did not work due to the pandemic. The lockdown conditions imposed by COVID-19 and social isolation have resulted in changes to the workplace that have moved en masse to a remote area. In the fourth quarter of 2020, as many as 1,009,000 people performed work remotely, it was by 478 thousand people more than in the third quarter of 2020.

According to the LFS methodology, the unemployment rate in Poland was 3.1% in the fourth quarter of 2020, an increase of 0.2 percentage points in relation to the fourth quarter of 2019. The group that was most affected by the changes in the labor market caused by the pandemic were the youngest (15–24 years old). Among them, the unemployment rate increased both in relation to the previous quarter and compared to the fourth quarter of 2019 (by 0.3 percentage points and 4.9 percentage points, respectively).

In the fourth quarter of 2020, among the previously employed unemployed, 116 thousand (29.5%) cited the situation caused by the pandemic as the reason for discontinuing their recent work (107,000 in Q3). In

[2] Data source Central Statistical Office.

the analyzed period, among the previously unemployed, as many as 116 thousand. (29.5%) indicated a pandemic as the reason for stopping work (there was an increase by 9 thousand people compared to the previous quarter of 2020).

An upward trend was shown by the unemployment rate registered in labor offices,[3] which in December 2020 was 6.2%, which constituted 1046.4 thousand professionally active people.

Characteristic for the labor market at the time of the pandemic was the lower number of job vacancies. In Poland, in the fourth quarter of 2020, 263.4 thousand jobs were reported to labor offices. job vacancies, it was 16.1% less than in the third quarter of this year.

The structure of the labor market is presented by the share[4] of economically inactive people in the total population aged 15 and more. In the fourth quarter of 2020, economically inactive people accounted for 43.5% of the total population aged 15 and more. Importantly, in the economically inactive group, as many as 195 thousand indicated that the reason for not seeking work was a direct link with the pandemic. Out of this group, 38 thousand people were convinced that due to the pandemic situation they would not find a suitable job, and 27 thousand people decided that because of the pandemic they had exhausted the possibilities of finding a job (these two groups were called discouraged by ineffectiveness of job search).

To deepen the analysis of the labor market during the pandemic, Eurostat, in cooperation with the EU countries, publishes additional indicators for the group of people aged 20–64:

- indicator of unused potential labor resources,[5]
- absenteeism at work,

[3] The discrepancy between the quarterly unemployment rate and the registered unemployment rate results from a different methodology (the LFS unemployment rate is calculated on a quarterly basis, and the registered unemployment rate is calculated monthly).

[4] The economically inactive group includes both people who have not yet entered the labor market (learning youth), people who have finally left the labor market or will never enter the labor market (some retirees, pensioners, people who make a living from other sources than work), people who entered the labor market, later partially deactivated and after a break, they will want to return to the labor market.

[5] It includes the unemployed and people on the borderline between work and unemployment, as well as unemployment and inactivity.

– an index of the total number of hours actually worked at the main workplace.

When analyzing the indicator of unused potential labor resources, it can be concluded that in the fourth quarter of 2020 it amounted to 969 thousand people. On the other hand, professionally inactive people who were not looking for a job, but were ready to take it, accounted for 269 thousand people.

Discussions

The diagnosis of absenteeism due to reasons (interruption in the activity of the workplace, vacation leave, illness, and other reasons) allows for a more accurate analysis of the situation on the labor market and to indicate the direction of potential changes in the future. The number of people who had a job, but did not do it in the analyzed week, amounted to 1,176,000 people and increased by 243 thousand compared to the same period of 2019.

The index of the number of all hours actually worked in the main workplace[6] shows that in the fourth quarter of 2020 it was lower than in the third quarter of 2020 by 3.7 percentage points. and in relation to the fourth quarter of 2019, it decreased by 1.7 percentage points.

A characteristic feature of the labor market in Poland since the outbreak of the pandemic is the shearing effect, which is an increase in the number of self-employed and a decrease in the number of employees in the private sector. The reason for this may be the tendency for companies to reduce costs and the government offering support instruments to self-employed persons, which in some ways promoted sole proprietorship in relation to precarious jobs (Unton, 2021).

As indicated in the conditions of the economy shaped by the pandemic, the importance of intangible resources (social capital) in the labor market is growing, whose role in the post-COVID era will be to rebuild and strengthen cooperation, relations, and trust. Therefore, the following section presents the results of the own research, which are part of

[6] The total number of hours actually worked is the total number of persons working and the number of hours worked by each of them (2006 base year).

a broader study of social capital[7] and were conducted in the fourth quarter of 2020. They present the opinions of social entities on the relations shaping the labor market in the COVID-19 era. The survey was conducted using the CAWI technique. The selection of the sample was determined by the research objectives, therefore the deliberate sampling method was used, taking into account the assumption that social entities, due to their mission, undertake quick and effective response to social challenges of the world (COVID-19) and that their specific resource is social capital triggering these abilities.

The study was conducted on a group of 428 associations, foundations, social cooperatives, social enterprises, and supported employment establishments in Malopolska. The following research question was posed: Whether and how did social capital change as a result of the COVID-19 pandemic, the manifestation of which is cooperation, trust, and relationships.

The results of the respondents' opinion surveys were summarized in the form of a differential (Fig. 49.1), the basis of which was the arithmetic mean of preferences of all respondents on a scale of 1–5 (on the horizontal axis). The respondent defined the opinions on the given scale, the numerical values of which meant:

[1] definitely yes,
[2] rather yes,
[3] it's hard to say,
[4] rather not,
[5] definitely not.

The first area of research is an attempt to answer the question:

Q1. Has the cooperation of your organization with other entities moved to the virtual space (e.g., the Internet) after the COVID-19 occurrence?

According to the opinion of social entities, after the pandemic, cooperation moved to virtual space (the average response value was 1.41).

The second area of research concerned the answer to the question:

[7] *This project has been financed by the Ministry of Science and Higher Education within the "Regional Initiative of Excellence" Programme for 2019–2022. Project no.: 021/RID/2018/19. Total financing: 11 897 131,40 PLN.*

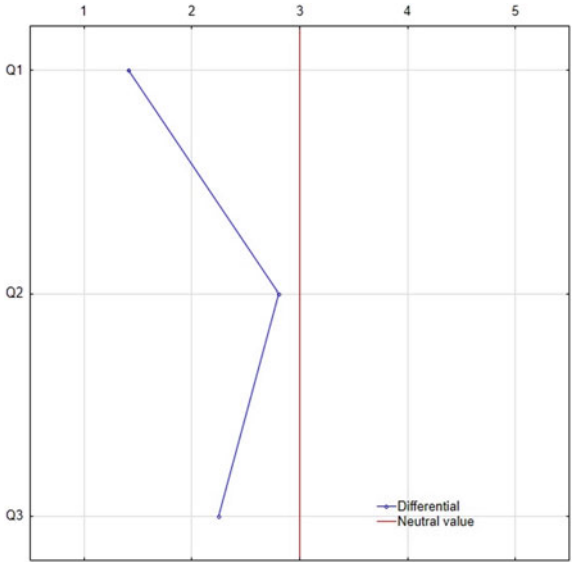

Fig. 23.1 Synthetic profile of opinions of social entities from Poland (N = 428) on social capital after the outbreak of COVID-19 (*Source* Created by Author)

Q2. Has your organization's trust in other entities increased after COVID-19?

The responses of the respondents oscillated around the neutral value, which means that they did not state unequivocally whether the level of trust between entities operating in the market increased after the pandemic (average value was 2.80).

The next research area concerned the mutual relations between entities, the question was formulated:

Q3. Has the mutual relations of your organization with other entities strengthened after the occurrence of COVID-19?

The opinions of the respondents are between the values of rather yes, and it is difficult to say what the lack of a clear opinion on the strengthening of mutual relations between the entities after the pandemic (the average value of the respondents' preferences was 2.25).

The presented results of primary research are an attempt to verify the research question and therefore allow to conclude that as a result of COVID-19, social capital has changed. According to the respondents, cooperation, which is its manifestation, has moved mainly to virtual space. At the same time, the respondents are not able to clearly state whether the level of trust has increased and whether mutual relations have strengthened. This may indicate the lack of an unambiguous opinion on the effects of the pandemic, which is due to the fact that the research was conducted six months after its outbreak and the consequences of the pandemic in the form of growing socioeconomic problems and the need to solve them have not yet been severely externalized for respondents.

There is a high probability that the changing pandemic situation may change the respondents' opinions on changes and the importance of social capital in the labor market.

Conclusions

Economies around the world, including Poland, are struggling with the effects of the ongoing COVID-19 pandemic. The crisis it triggers has a significant impact on the labor market, reducing the living conditions of the population and exacerbating socioeconomic problems: rising unemployment, reducing the economic activity rate, and increasing inactivity. Remote work is a massively used form of work.

One of the most important socioeconomic and political problems is the deteriorating situation of young people on the labor market. The COVID-19 crisis is adversely affecting this group by disrupting education, difficulties for job seekers and entering the labor market; loss of job and income. The term "lost generation" appears. To prevent this from happening, in the post-COVID era, it will be necessary to undertake interventions concerning young people (e.g., employment guarantee program, stimulation of fiscal policy, active support in the field of retraining, and changing the industry) (Polish Economic Institute, 2021).

At the same time, the pandemic changed values and opened an opportunity for the labor market in the form of new professions and skills that will be crucial in the post-COVID era. It is predicted that it will be necessary to sensitize the society to social problems and to rebuild the relations, trust, and cooperation weakened by the pandemic. There will be an increase in the importance of intangible resources and human resources, especially social capital.

The presented results of primary research allow us to conclude that social capital has changed as a result of the pandemic. According to the respondents, cooperation, which is its manifestation, has moved mainly to virtual space. According to the respondents, changes in the level of trust and mutual relations are difficult to clearly define as positive or negative on the day of the research (six months after the outbreak of the pandemic). This may be the result of socioeconomic impacts caused by COVID-19 by social actors being too low. It should be noted that changing pandemic situation and the resulting growing problems may change the opinion of the respondents, therefore further in-depth research will be necessary.

Summing up, the permanent damage caused to labor markets by the COVID-19 pandemic makes it necessary to look for ways to bring the disturbed labor market to a state of equilibrium, which is why it is and will be an interesting field of research.

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CHAPTER 24

Analytical Review of the Market for COVID-19 Vaccines: Production, Cost, and Distribution

Julia V. Gnezdova

Introduction

An outbreak of COVID-19 (new-type pneumonia) coronavirus infection began in late December 2019. The first cases of pneumonia of unknown origin were detected in residents of Wuhan City, Hubei Province, central China. The illness was linked to the local animal and seafood market. On December 31, 2019, Chinese authorities reported the outbreak of unknown pneumonia to the World Health Organization (WHO). On Jan. 30, WHO recognized the new coronavirus outbreak as a public health emergency of international concern. On February 11, 2020, the disease was named COVID-2019 (officially called SARS-CoV-2), a new coronavirus pneumonia.

Current statistics for coronavirus as of May 2021 worldwide are as follows:

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_24

– total infections - 165,578,681;
– fatal cases - 3,432,106 people (2.1%);
– cured - 144,635,633 people (87.3%);
– currently ill, 17,510,942 (10.6%).

The leader in the number of confirmed cases is still the United States, where 33 million infected people were diagnosed. India is on the second place (25.7 million). Brazil is on the third place (15.8 million), France is on the fourth (5.9 million), and Turkey is on the fifth (5.1 million). Russia is in sixth place on the list.

Vaccination itself performs a useful function and certainly saves lives and health. Some scientists (including the WHO) attribute the dramatically lower mortality rate from the coronavirus in Russia and Eastern Europe precisely to mass vaccination during the Soviet era, including against tuberculosis.

Today, the COVID-19 pandemic has been compared to the "Spanish flu" in terms of the spread around the world and the aggressiveness of the disease. However, "Spanish Flu" in 1918–1920 was contracted by 550 million people worldwide—nearly 30% of the world's population. Estimates of the number of deaths from Spanish Flu vary—from 25 to 100 million, but in any case, this epidemic was the largest in the history of mankind.

In addition to the damage to health, the pandemic causes serious damage to the economies of all countries. For example, the US GDP fell by 33% in the second quarter, the largest drop since 1940. The IMF predicts that for the entire year 2020 the American economy will lose 8%, the EU economy—10%, Russia—6.6%.

Since the beginning of the epidemic, vaccine development has been a priority for all developed countries. According to the WHO (January 26, 2021), more than 60 vaccines worldwide are already in clinical trials. More than 170 more are being tested on animals. The main—final—phase of trials has already been or is underway for 22 vaccines. Several vaccines have now shown promising efficiency and safety in clinical trials and have passed regulatory trials at the national, regional, and global levels. However, production and supply have become massive obstacles to global access and equitable distribution of the vaccine to countries around the world. Leaders around the world look at production estimates and delivery schedules to see when supplies will be delivered. The manufacturing landscape is very dynamic, expanding and contracting daily. New

partnerships, including among competitors, are exponentially increasing capacity, while optimization and scale issues, as well as the limited availability of certain raw materials, have led to reduced projections.

Methodology

Due to the fact that the topic of vaccines against coronavirus is incredibly relevant and important, a fairly large array of scientific articles have already been published on this issue. Comparative analysis was the most important method of our research. Current information on vaccines is concentrated in online publications. These sites were used in frame of the research:

1. What Coronavirus Vaccines Are Used Worldwide - [Electronic Resource] - https://www.rbc.ru/photoreport/29/03/2021/5fd073399a794729a7f92fa7 (12.05.2021)
2. Cost of the coronavirus vaccine - How much does the COVID vaccine cost - [Electronic resource] https://coronavirus-control.ru/stoimost-vakcziny-ot-koronavirusa/ (12.05.2021).
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Great influence on our research had such scientific publications about vaccines and new candidate vaccines as Anaki and Sergay (2021), Attwell et al. (2021), Benham et al. (2021), Berry et al. (2021), Edwards et al. (2021), He et al. (2021), Kumar et al. (2021),Matrajt et al. (2021), Morokutti-Kurz et al. (2021), Prompetchara et al. (2021), Steinbuck et al. (2021), Wintachai et al. (2021).

Some problems of V-passportization and anti-vaccination movement were in the focus of Capece & Bazzica (2021), Germani and Biller-Andorno(2021), Prieto Curiel and González Ramírez (2021).

Some information was taken from the interviews of HealthCare Minister of Russia Murashko and some scientists in virology and epidemiology to understand the current situation and forecasting of pandemic.

Our research is aimed at increasing knowledge of the COVID vaccine market and does not promote or endorse any of them.

Results

Let's review the vaccines that have been tested, registered, and placed on the market.

Sputnik V vaccine

Sputnik V, developed by the Gamaleya Center for Epidemiology and Microbiology, received state registration from the Ministry of Health in August 2020. The vaccine was registered after the second phase of trials, and the third final phase began in September 2020. The efficacy of Sputnik V was estimated by the developers to be higher than 95%. These data were obtained in a study of volunteers who received two injections of the drug. "Satellite V" is developed in two forms: frozen (liquid "Gam-Covid-Vac" stored at a temperature not higher than minus 18 °C) and lyophilized (powder "Gam-Covid-Vac-Lio" stored at a temperature of plus 2 to 8 °C). The drug is administered twice at three week intervals. December 5, 2020, Moscow became the first Russian region to begin large-scale vaccination with Sputnik V, and mass vaccination throughout Russia began on January 18, 2021. Belarus was the first foreign country to register the Russian drug. The authorities of Argentina, Venezuela, and some other countries took the same decision.

Pfizer/BioNTech vaccine

The German company BioNtech developed the vaccine together with the American Pfizer. In the third phase of clinical trials, the drug showed 95% efficacy. The vaccine has a mandatory condition for use: It must be stored at a temperature not higher than minus 70 degrees Celsius, and after defrosting it is suitable for five days. Pfizer-BioNTech development is administered in two doses three weeks apart. The UK was the first country to approve the use of Pfizer and BioNTech, followed by Canada, the United States, and countries in Europe and the Middle East. Mass vaccination in the United States and Canada began on December 14, 2020, and in European countries on December 27, 2020.

Moderna vaccine

The effectiveness of the American pharmaceutical company's Moderna vaccine was 94.5% and 100% for severe cases. The vaccine is administered in two doses four weeks apart. The drug can be stored for up to 30 days at 2–8 degrees Celsius. Moderna plans to release 600 million doses this year. On Dec. 18, 2020, the United States approved Moderna and ordered 200 million doses with an option to buy another 300 million. It followed approval in Canada, Israel, the United Kingdom, and Switzerland. On Jan. 6, 2021, the European regulator approved the US-made drug.

AstraZeneca and Oxford University vaccine

The vaccine, developed by the British company AstraZeneca together with Oxford University, has been shown to be 70% effective, and 90% effective for one route of administration (half a dose first and the full dose a month later). The drug has two advantages: It can be stored at the same temperature that a regular refrigerator allows, and its cost is $4–5. It is administered twice at intervals of 4–12 weeks. The UK was the first in the world to approve AstraZeneca and ordered 100 million doses. The drug has been approved for use in India, Argentina, the Dominican Republic, El Salvador, Mexico, and Morocco. In March 2021, a scandal erupted around AstraZeneca's drug. More than 15 countries in Europe, including Germany, France, Spain, and some countries in Asia and Africa partially or completely abandoned the drug. This decision was made amidst reports of blood clots and deaths among vaccinated patients.

The company itself points out that there is no evidence that the vaccination caused the deaths of patients. On March 18, 2021, the European Medicines Agency (EMA) concluded that AstraZeneca does not increase the risk of blood clots. The WHO also continues to recommend the use of the drug. Following these statements, European countries, except some Scandinavian countries, have resumed immunization with AstraZeneca.

EpiVacCorona vaccine

The peptide vaccine EpiVacCorona from Novosibirsk Vector Research Center received registration approval in October 2020. It, like Sputnik V, was registered after two stages of clinical trials. The vaccine is administered twice intramuscularly at two to three week intervals. The drug can be stored at temperatures from 2 to 8 degrees above zero. Rospotrebnadzor (Russian State Service for consumer protection) notes that the vaccine is suitable for the elderly and people with chronic diseases.

"EpiVacCorona" entered civil circulation in five cities—Moscow, St. Petersburg, Rostov-on-Don, Tula, and Novosibirsk. After post-registration clinical trials are completed, mass vaccination with EpiVacCorona may begin in 2021.

Sinovac Biotech vaccine

The inactivated CoronaVac vaccine, developed by China's Sinovac Biotech, is stored in a refrigerator at plus 2–8 degrees Celsius. Sinovac said it will produce 300 million doses a year. Two doses are needed to immunize, which means that 150 million people—a little more than a tenth of China's population—could be immunized with CoronaVac. Evidence on the effectiveness of the Sinovac vaccine varies. The latest trials in Brazil showed 50.4% efficacy, while Indonesia and Turkey showed 65.3% and 91.5%, respectively. The vaccine has been approved for emergency use in high-risk groups in China since July. The use of this vaccine was approved by Turkish authorities on January 13, 2021. Several Asian countries-Singapore, Malaysia, and the Philippines-as well as Brazil and Ukraine have signed CoronaVac purchase agreements.

CanSino Biologics Vaccine

Another Chinese vaccine, Ad5-nCoV ("Convidection"), based on human adenovirus type 5, was developed by CanSino Biologics, a pharmaceutical company. It has the advantage of being administered once and can be stored at temperatures between plus 2 and plus 8 degrees Celsius. In November 2020, documents were submitted to the Russian Ministry of Health for registration of the vaccine. In December, the Ministry of Health issued a permit to conduct the third international phase of the Ad5-nCov clinical trial. If the vaccine shows high efficacy and safety, CanSino Biologics and Russia's Petrovax will organize its production in Russia. According to the interim results of the third phase of clinical trials in Russia, Ad5-nCoV showed an efficacy of 92.5%. The final results of the study will appear in mid-2021.

CNBG vaccine (Sinopharm)

Other Chinese inactivated vaccine was made by China National Biotec Group (CNBG) (a division of Sinopharm). It does not require negative storage temperatures and is administered in two doses two weeks apart.

On December 30, 2020, Sinopharm announced that the drug was 79% effective in Phase III trials. However, the United Arab Emirates, which approved Sinopharm's vaccine in May 2021, said the vaccine was 86% effective. In addition to China and the UAE, Sinopharm vaccine is undergoing clinical trials in Bahrain, Jordan, Peru, and Argentina. In China, Sinopharm has been used as part of an emergency vaccination program since July 2020, and the State Administration of Medicines of China approved the drug for widespread use on December 31, 2020.

Johnson & Johnson Vaccine

This vaccine of the US corporation Johnson & Johnson was approved by the EU on March 11, 2021. Earlier, the US Food and Drug Administration (FDA) approved the emergency use of the drug. The drug is also on the WHO's emergency use list. During clinical trials with 44,000 participants from the United States, South Africa, and Latin America, the drug showed efficacy of 67%. Janssen vaccine is stored at −20 degrees Celsius. But it has a peculiarity—during three months, it can be kept at

the temperatures from 2 to 8 degrees Celsius. The main advantage is single-dose administration.

Let's look at the geography of vaccination by country:

- North America is vaccinated with mRNA vaccines from Moderna and Pfizer/BioNTech;
- Israel—Pfizer/BioNTech;
- In China—their own developments (inactivated CoronaVac and vector Convidecia);
- in the EU—vector vaccines AstraZeneca and Janssen from Johnson & Johnson, as well as mRNA from Pfizer/BioNTech and Moderna;
- Three vaccines are registered in Russia: vector vaccine Sputnik V (Gamaleya Research Center), inactivated vaccine CoviVac (Chumakov Research Center), and EpiVacCorona (Vector Research Center of Rospotrebnadzor). In fact, now it is mainly Sputnik that is inoculated.

Despite the importance of production to the availability of COVID-19 vaccines, the production landscape itself is opaque. Publicly available information about production, including partners, locations, roles, and projections, is scarce and fragmented, making it difficult for policymakers and government to fully understand the various supply chains, assess risks, and take urgent action where it is most needed.

Approximately 11 billion doses are needed to vaccinate 70% of the world's population. This situation is often seen as the threshold for achieving herd immunity, the level of vaccination coverage that limits the spread of infection and protects those who cannot be vaccinated from infection. Today, to meet the global demand for the more than 12 billion doses projected in 2021, production must increase on a scale we have never seen before. Capacity expansion will not be evenly distributed among vaccine manufacturers.

However, global needs may change. For example, the emergence and spread of new strains of the virus could mean that a new generation of vaccines will be needed by the end of 2021. Studies done today do not show how long vaccine immunity will last, and regular booster shots may be needed to maintain immunity and to fight new strains of the virus. Today, no vaccine has yet been approved for use in children under

16, but several vaccines are being tested in children. Approval of one or more vaccines for children could once again change the global picture of vaccine supply and demand. Some countries may also decide to purchase and retain surplus doses of vaccines to manage future risks, reducing the immediate supply to other countries. Countries are contracted to supply 8.6 billion doses of COVID-19 vaccine; the total potential for global vaccine manufacturers is 12 billion doses for 2021.

Pharmaceutical companies around the world are now working hard to develop a viable vaccine against coronavirus. Many drug makers have promised to keep prices low, but soaring prices and inflated costs have hampered vaccine introduction worldwide in recent years. Experts agree that health insurance companies will cover the coronavirus vaccination, the cost of the vaccine could be passed on to consumers by increasing insurance premiums.

Many factors affect the cost of vaccine production, including the manufacturing process and technology, the availability of ingredients, the number of doses required, and how the vaccine must be stored and transported.

The net cost of the Sputnik V coronavirus vaccine (selling price) is made up of several components. The amount the manufacturer is willing to sell it for includes the cost of production and tax costs. It is usually less than the price at which the drug is sold at wholesale and retail. The state regulates the cost of vaccination for Russian citizens.

Price of Sputnik V: A pack with 10 (5 doses each of the first and second components) vials of the vaccine costs 9,710 rubles. The cost to vaccinate one person is 1942 rubles.

The cost of 10 vials of EpiVacCorona is 9,541 rubles. One dose of the drug will cost 954.1 rubles. Vaccination is carried out in two stages. Two injections of the immunopreparation cost 1,908 rubles.

Pfizer: A vaccine developed in the United States and Germany for the European Union costs $18.34 or 15.5 euros per dose. Two doses will cost $39. The drug is not officially sold in Russia.

Gam-Covid-Vac: Two-component vaccine costs 1,942 rubles (1 and 2 doses). Like other domestic drugs for coronavirus infection, it should be administered to citizens of the country for free.

Moderna: The manufacturer's stated price is the highest among all coronavirus vaccines. It ranges from $50 to $70 for both doses. The exact amount the coronavirus vaccine costs depends on the size of the order-the larger the order, the cheaper the drug will cost the country.

The prices listed above are the prices at which different countries will be able to purchase immunopreparations from manufacturers. They give you an idea of how much you will have to pay for the vaccine when you buy it at a pharmacy.

Vaccines are purchased according to the price registered with the Federal Antimonopoly Service, based on the production capabilities of the sites where they are produced. Four vaccines against coronavirus are registered in Russia. Sputnik V has 7 manufacturers, Sputnik Lite has 8, EpiVacCorona has 3, CoviVac is produced only at the site of its creator—Chumakov Center.

Today it became known that the Federal Antimonopoly Service has agreed on the maximum selling price of the Sputnik Lite vaccine. It will amount to 342.36 rubles excluding VAT per dose. After the price registration, the vaccine will enter civil circulation.

The marginal cost per dose of each vaccine is about the same. The cheapest is EpiVacCorona—842 rubles, in second place is CoviVac—866 rubles, the most expensive in the list is the vaccine Sputnik V, its cost is 866.81 rubles per dose.

Volumes of vaccine production will be increased by the end of the year. For this purpose, private investments are attracted as well. For example, 28 billion of them are directed to the production of the vaccine Sputnik V.

Based on current and up-to-date data, the number of vaccinated people is increasing in all countries. The top three are the United States, China, and the United Kingdom. Israel is slightly behind. Although, if we take not absolute numbers, but the number of vaccinated per 1 million people, it is far ahead of all other countries. The leader in the number of vaccinated citizens has become the United States—according to official data, 10,278,462 people have been vaccinated there, or 3.17% of the population. They are followed by China, where over 10 million people have been vaccinated, but it is a small percentage of the Chinese with only 0.73%. In third place is the United Kingdom, with about 3.1 million vaccinated residents or 3.7% of the population. In fourth place by the number of vaccinated is Israel—2,047,880 million people. Israel is the world leader in anti-vaccination, with 23.98% of the country's population already vaccinated.

Today the top ten is as follows:

1. United States

2. China
3. United Kingdom
4. Israel
5. Uae
6. Germany
7. Italy
8. Turkey
9. Spain
10. India

Thus, Russia is not yet in the top of the leaderboard—it is currently in eleventh place. At the bottom of the ranking are Singapore, the Isle of Man, and Kuwait.

In the United States, vaccination began on December 13, 2020. By the end of January, the Americans are going to cover more than 50 million people. They use BioNTech-Pfizer and Moderna products. In the EU, vaccination officially began on December 27, 2020, but some countries began vaccinating earlier. The EU uses BioNTech-Pfizer. It is also used in the UK, Norway, Switzerland, and Israel. Pfizer products are also used in the UAE, although the country's authorities initially objected. The reason is the presence in the composition of pig fat. China uses its own vaccines, developed by Sinopharm and Sinovac.

The United States expects that thanks to mass vaccination, the American economy will begin to recover quickly. On the prospects of the economy and monetary policy of the regulator say representatives of the Fed.

Not everyone has a positive attitude toward vaccination against coronavirus. In Germany, for example, anti-vaccination sentiment is strong. However, against the background of the pandemic, there are also supporters of tough measures against COVID-19. Bavarian Prime Minister Markus Söder advocates compulsory vaccination for some occupational groups in areas at high risk of infection, particularly nurses and caregivers of the elderly and infirm. Söder is concerned that only half of the nursing home staff agree to be vaccinated against COVID-19. However, the German Minister of Labor Hubertus Heil opposes such a measure and considers it unacceptable to talk about compulsory vaccination.

Russians, on the other hand, are in no hurry to be vaccinated against the coronavirus. According to All-Russian Center of research of public

opinion (VTsIOM), 52% of Russians do not plan to be vaccinated. According to a SuperJob poll, 42% of respondents categorically refuse to be vaccinated and only 32% want to be vaccinated.

Residents of Russia are not sure about the new vaccine, are skeptical about government initiatives, and some do not believe in the serious danger of the coronavirus either. Respondents aged 35 to 44 years are least afraid of contracting COVID-19. Overall, according to SuperJob, 58% of respondents fear of contacting the coronavirus.

"The coronavirus in Russia turned out to be hardly more dangerous than the usual flu, and most of the population is vaccinated with it naturally"—academician Gundarov believes.[1] According to Healthcare Minister of Russia Murashko, today antibodies were found in 23–24% of residents of Moscow region (4.8 million people).[2] At the same time, the total number of those who have contracted the disease in the region, according to the official data, is estimated at about 315,000 people. It turns out that the share of asymptomatic carriers is more than 93%. But if this is true, then the mortality rate from coronavirus is about 0.12% (a total of 5,750 people died in Moscow and Moscow region), about the same as for ordinary flu. "A person is found with the virus, they say he is sick, but sort of asymptomatic carrier. But you can also say that he is a healthy carrier of the virus"—argues academician Gundarov.

If everyone is tested for herpes virus, it will be found in 95 percent of the population. Could be say that the disease runs in a latent form. It would be more correct to say that these are healthy people, but they carry the virus inside them. And if we have a normal immune system, we're just healthy carriers of this flora.

The threat of COVID-19 is greatly exaggerated, at least against the background of how the epidemic is developing in Russia,[3]" says Academician Vladimir Sergiev of the Russian Academy of Medical Sciences. I don't see the point with the vaccine at all. This is an ordinary seasonal flu in terms of danger. Onishchenko, who called the coronavirus a "goody-goody" partially agrees. "I'm sure that there won't be a total need for the vaccine. At least not as much as with influenza, when every year tens of

[1] https://www.business-gazeta.ru/article/494672.

[2] https://www.rbc.ru/society/20/04/2020/5e9d33bd9a79472333c02642.

[3] https://www.sechenov.ru/pressroom/news/vladimir-sergiev-koronavirus-sars-cov-2-nelzya-otnesti-k-patogenam-obladayushchim-vysokim-epidemiche/?sphrase_id=1423167.

millions of people in our country alone are vaccinated. Because the virus behaves quite predictably,"[4] he says. The coronavirus is not as mutable as the flu, which produces a new strain every season and needs a new vaccine against it," he says. It is unlikely that the coronavirus vaccine will be mandatory. However, the demand for the vaccine grows.

Vaccination may be coerced indirectly, for example, under the threat of not allowing certain categories of citizens to work. Previous virus outbreaks—SARS, avian flu or swine flu—around the world have been accompanied by spending gerrymandering. The main motive now is to allocate money for a vaccine. There is even an expression: An epidemic ends when the funds to fight it end.

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[4] https://www.rbc.ru/rbcfreenews/6041a1239a79476570086a10.

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CHAPTER 25

Judicial Institutions and Legal Services in the Post-COVID Period

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Services as a type of economic activity are likely to suffer the most losses due to the coronavirus pandemic, as one of the characteristics of services is the close interaction between the customer and the producer providing the service. Thus, consumer services, beauty salons, hairdressing salons, consulting, and tourist services suffered more because of the lockdown than other sectors of the economy. Legal services were no exception, which during periods of crises, on the contrary, reveal an increase in demand due to non-payments, violations of contractual obligations, non-fulfillment of delivery conditions, etc.

Legal services should be viewed from several points of view. Thus, the consideration of disputes and the punishment of the guilty are attributed to the competence of the courts, and the activities of the institutions

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V. S. Osipov (ed.), *Post-COVID Economic Revival, Volume II*,
https://doi.org/10.1007/978-3-030-83566-8_25

of the judiciary require separate consideration from the services of legal bureaus, private lawyers, notaries, and advocates.

Like any other crisis, the coronavirus caused a wave of claims to the court from citizens and legal entities, however, due to the lockdown, the institutions of the judicial system were forced to suspend their activities, which caused a slowdown in the consideration of claims in courts. The post-COVID period is characterized by a decline in the quality of judicial procedures and verdicts, since the courts are forced to consider not only current claims, but also those previously postponed due to the pandemic.

At the same time, the legal business, as a service sector, experienced all the negative consequences of a lockdown. Not all firms were able to resume their activities, as running costs in the absence of customers and profits simply ruined them. However, there were also those who were able to organize the online work of law offices, when lawyers consulted and prepared documents remotely, and law offices raised fees by reducing their share of profits, but increasing new clients by actively attracting them through online advertising.

The institutional method of state legal science proposed by Professor Osipov was used by us in this work to show how the structure and market architecture of the legal services market has changed in connection with the pandemic, as well as to predict the digitalization of legal business in the long term. We have used the same method to characterize the activities of the institutions of the judiciary during the pandemic and post-COVID period. The institutional method of statehood science is a special, real, complementary, synthetic, structural, and functional method of legal science, which serves to determine the normative and actual scope of powers of the state apparatus and its individual parts, branches of government, institutions, and personalities exposed by power (positions) and connections between them (Osipov, 2021b).

The activities of the courts during the coronavirus pandemic were considered in (Baldwin et al., 2020; Finck, 2020; Gonzalez, 2020; Greener, 2021; Gürses, 2021; Harris, 2020; Hecht et al., 2020; Legg, 2021; Liu, 2020; McIntyre et al., 2020; Puddister & Small, 2020; Romano, 2020). Human rights and state's behavior at the pandemic were in the focus of research of Botherway (2020), De Souza and Lima (2020), de Vasconcelos et al. (2020), Gori and Pahladsingh (2020), Jovičić (2020), etc. Economic crisis as follower of pandemic and its influence on court system were discussed in studies of Saurugger and Terpan (2020), Smyth et al. (2020), Wonyra et al. (2021).

As logic, experience, and research of the classics of the economic theory dictate to us, business reacts faster to changes in the external environment, adapts to new conditions than the state and its bodies do. It follows that the ways, means, tools, and mechanisms of adaptation of the institutions of the judiciary and legal business are different from each other. In this study, we will consider the mechanisms of adaptation of the judiciary and law firms, highlight the characteristic features of the adaptation process, general and specific points in it.

The institutions of the judiciary constitute a branch in the separation of powers. Great Montesquieu proposed this principle, and there is no reason to believe that in the modern world it is outdated and irrelevant. The judiciary, as before the pandemic, is responsible for law enforcement, dispute resolution, and the use of legal violence against lawbreakers (Bogoviz et al., 2020a, 2020b; Dahl, 1989; Lloyd, 1964; Mathieu, 2017; Sells, 2014; Waldron, 2012).

The courts consist of judges who, like all people, were in remote access during the pandemic. These people can also get coronavirus, like everyone else, and just like everyone else, they do not want to get infected. In this regard, the closure of courts for proceedings appears to be the norm within the framework of pandemic lockdown. As a result, a sharp suspension of the consideration of court claims, the issuance of verdicts, the issuance of writs of execution, court orders, etc.

The closure of borders between states significantly reduced the volume of international cooperation, which affected the consideration of the following categories of claims: international arbitration, interstate disputes, and disputes over the maritime law (Andhov et al., 2019).

It should be noted that the courts quickly took advantage of the success of the digitalization of public administration and moved to consider civil and administrative claims remotely (Osipov, 2021a). The submission of materials to pending claims, as well as new claims, has been automated. On the Internet platform of the judicial system, it is possible to file a claim electronically after an identification procedure. The case with the consideration of criminal claims was more complicated, since an in-person presence is required to give explanations.

The institutional basis for the suspension of the activities of the judicial system was the joint Resolution of the Presidiums of the Supreme Court of the Russian Federation and the Council of Judges of the Russian Federation dated March 18, 2020, No. 808 “On the suspension of personal reception of citizens in courts”, which established that from March 19,

2020, to April 10, 2020, legal proceedings will be carried out in a limited mode.

The limited mode included the suspension of personal reception of citizens in courts; recommendation to citizens and legal entities to submit documents only through electronic Internet receiving courts or using postal services, in particular the Russian Post. The courts were ordered to consider only those categories of claims that are of an urgent nature (on the selection, extension, cancellation, or change of a preventive measure (or restriction), on the protection of the interests of a minor or a person recognized as legally incompetent in the prescribed manner, in the event that the legal representative refuses medical intervention necessary to save life, etc.), as well as in the order of simplified proceedings.

In practice, simplified proceedings have also been suspended. By the same decree, the courts were ordered, if it was technically possible, to initiate the consideration of claims by using videoconferencing systems. The last paragraph of the Resolution opened the possibility for a quick transition of the judicial system to digital platforms for the provision of public services—access to justice. Practice has shown that not all courts followed the instructions contained in the Resolution, and some courts continued to consider claims after March 19, 2020, without the presence of the parties or their plenipotentiaries.

It should be noted that the trial of the claims in the absence of the parties, without proper notification and without their consent to be trialed in their absence, constitutes a limitation of the right to access to justice and a fair trial (Article 47 of the Charter of Fundamental Rights of the European Union).

The violation of the right to access to justice was also expressed in the fact that some courts ignored the recommendation of the Supreme Court of the Russian Federation and the Council of Judges of the Russian Federation to citizens and legal entities to submit documents only through electronic Internet receptions of courts. Thus, the Moscow Arbitration Court did not accept documents through the electronic Internet reception "My Arbitrator" from March 27, 2020, to April 06, 2020, by order of the Chairman of the Moscow Arbitration Court dated March 26, 2020, No. 6-k. The recommendation of the Supreme Court of the Russian Federation and the Council of Judges of the Russian Federation indicated the possibility of sending documents to court using postal services, but post offices were also closed due to the lockdown. It is important that the judicial authorities did not suspend the statute of limitations due to the

pandemic and the lockdown, which, together with the lack of access to court procedures, could lead to violations of the rights of access to justice. The restoration of the missed statute of limitations was possible only if the party to the claim had medical documents about the coronavirus disease.

Decree of the President of the Russian Federation of March 25, 2020, No. 206 "On the announcement of non-working days in the Russian Federation" established that the period from March 30 to April 3, 2020, becomes non-working, with the employees retaining their wages for this period. This period was prolonged many times. It is important to note that the Presidential Decree does not apply to employees of continuously operating organizations; medical and pharmacy organizations; organizations providing the population with food and essential goods; organizations performing urgent work in emergency conditions, in other cases, endangering the life or normal living conditions of the population; organizations carrying out urgent repair and loading and unloading work.

As we can conclude, legal services, notary services are not classified as continuously operating, and therefore are subject to closure on lockdown. Some notary offices continued to operate as notary offices on duty. They had to inform the Notary Chamber of the constituent entity of the Russian Federation about this, which posted the relevant information on its Web site for clients.

Notarial activities and attestation can't be carried out remotely, since the notary is obliged to verify the legal capacity and identity of the client, in addition, the notarial act itself can't be performed remotely. It follows that the majority of notaries could continue consulting activities, but they could not carry out notarial acts themselves, which was reflected in the economic activity, including registration actions, amendments to the constituent documents of legal entities, etc. The suspension of notarial acts significantly complicated the exercise of citizens' powers to draw up wills—this could have been done with great difficulties by the notaries on duty, for whose services the demand had grown sharply. Accordingly, citizens who had risks to their health or life could not prepare for the execution of their will in the event of opening an inheritance.

Separately, it should be noted the complexity of the activities of trustee of a bankrupt's estate and creditors of companies and individuals to collect debts. Self-regulatory organizations of insolvency practitioners were forced to send appeals to the federal authorities to clarify the procedure for their activity during a pandemic. This contour of affairs indicates that the pandemic and lockdown have led to the fact that all meetings of

creditors, all procedures carried out in the framework of bankruptcy cases can be challenged in the arbitration court as carried out in violation of the order of work during a pandemic.

The tax authorities also stopped accepting citizens and representatives of legal entities in connection with the decree of the President of Russia on the announcement of non-working days during the pandemic, however, the time corridor for submitting tax reports was expanded. Thus, the tax authorities tried not to create difficulties for taxpayers and did not create grounds for filing claims in arbitration courts. Here it should be noted the positive approach of state bodies to solving the problems of taxpayers caused by the lockdown.

The attorney's and lawyer's companies, as we noted above, quickly adapted to the difficult working conditions during the pandemic. Here messengers and human-centered design machines (HCDM: Zoom, TrueConf, Skype, etc.) played a great role. Clients were sympathetic to working with their lawyers and attorneys online, because the main thing was that clients received the necessary legal assistance and even in a shorter time frame than before the pandemic. The digitalization of the legal business accelerated thanks to the pandemic and lockdown, because the service industry simply had no other choice to provide communication channels with their clients.

An example of a successful exit from a lockdown and even rapid development in the post-COVID period was demonstrated by a new form of interaction in the triangle of "attorney's business -lawyer (attorney)-client" in the form of a cloud-based lawyer service. Cloud-based lawyer firms have been providing online services to clients since the turn of the century, such as the American firm FisherBroyles. The online format for the provision of lawyer services immediately became their feature. The same feature in the banking business is possessed by Tinkoff Bank, which does not have offices for customer service, since all financial services are performed online using the bank's web application (Konina, 2021).

LegalTech turned out to be a winning strategy during the pandemic and post-pandemic period, as during the pandemic clients managed to get used to the new format of providing the legal services they need. Cloud-based lawyer's firms were not only able to predict the direction of development of this specific service market, but also in time to hire lawyers and attorneys who appeared on the remote mode, forced to obey the rules of the lockdown. For lawyers, the choice was obvious—it is better to work for a cloud service than not to work and not receive a salary

at all. While lawyer's firms scrambled funds to pay for idle offices and downtime, cloud-based lawyer's firms hired new employees, expanded their advertising, and built a client base.

It turned out that lawyers were not only comfortable working from home online using human-centered design machines, but also much more profitable compared to offline, because cloud-based lawyer's firms offered higher fees. The distribution of customer payments went up to 20% to the cloud-based firm and 80% to the lawyer/attorney. For comparison, pre-COVID era law firms offered lawyers 20–35% and kept the rest for themselves. It is important to note that lawyers quickly got used to the new conditions of remuneration for their labor, and in the post-COVID period they are unlikely to return to their old conditions. For a cloud-based lawyer's firm, it turned out to be profitable not only to attract clients through advertising and social networks and Internet platforms, but also to reduce the "organizational" costs and shift them to lawyers who had to deal directly with the client. Due to economies of scale, cloud-based lawyer's firms were able to show high financial results during the pandemic and post-COVID periods, which confirms the viability of the new architecture of the lawyer's services market.

High motivation and fees of lawyers, freedom to manage their time and methods of communication with clients were complemented by an increase in the efficiency of their job by optimizing work processes, more convenient organization and rest time, as well as more comfortable working conditions due to the employer's trust in their decisions, which are very essential for professionals.

Classic lawyer's and attorney's firms are faced with the need to retain employees (especially professionals) in the post-COVID period, to make significant efforts to create more comfortable and profitable working conditions so as not to lose their business completely, especially after the disastrous year 2020 (Osipov et al., 2020). It should be noted that classic lawyer's and attorney's firms did not actually have the same volume of work until mid-2020 and were limited to consulting their clients, drafting documents, and preparing for the resumption of litigation. Such activities were not very profitable, but rent payments, taxes, and wages were subject to monthly payments. Around the middle of summer 2020, the demand for legal services began to recover, and for some firms even returned to the before pandemic level. This is typical for those lawyer's firms whose client base is very limited, sustainable, and the relationship with clients is deeply business in nature, so that clients are not ready

to change their lawyers and attorneys, to which they are accustomed over the years of cooperation. Nevertheless, even classical lawyer's firms had to master the digital technologies of LegalTech and maintain their use in the post-COVID period, as clients got used to the new format of communication with consultants and the speed of responses to their inquiries on legal problems. It uses popular messengers for communication between clients and lawyers, and human-centered design machines for online consultations at the moment a client's need arises. This is how the value co-creation system was formed in legal business services. The client became involved in the process of providing the service more deeply than was typical for the before pandemic period.

We can't ignore the fact that in 2020, many clients and lawyers got the coronavirus infection or receive a vaccine against the virus in the first quarter of 2021, which opened up opportunities for offline communication between clients and lawyers in the habit format. However, the architecture of the market has already changed and the clientele turned out to be focused on online quick consultations.

It turned out that a lawyer may well work without an office, since the digitalization of processes, which significantly accelerated during the pandemic, showed the inefficiency of the traditional approach in terms of time and financial costs. It turned out that an effective result of interaction between a client and a lawyer can be achieved faster, with less cost, without unnecessary time wasted.

Some cloud-based lawyer's services are owing to the pandemic for expanding their businesses and re-architecting the legal services market that could not have happened so quickly without the pandemic.

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