



# 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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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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