

Global Challenges and Barriers to Sustainable Economic Growth in the Agribusiness Sector

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Abstract: - The paper presents four main megatrends of global economic development: 1) changes in value chains, 2) development of a new food system model, 3) redistribution of value chains in the agribusiness sector, 4) growing influence of large companies and individual countries on the global agrifood system. The aim of the paper is to investigate the macroeconomic global and national challenges of agro-industrial development that affect the sustainable development of the sector. Based on these megatrends and using a dialectical method, the authors have considered the main global and national challenges in agricultural development. They highlighted the following: demographic growth and hunger; resource scarcity and the crisis of the AIS 3.0 model; ethical risks and limitations; natural and climatic changes; recycling, recycling and valorisation of waste; political instability; challenges of innovative development. It is shown that identification of the main challenges facing the development of domestic agribusiness sector is the primary basis for the formulation of strategic development objectives of the agrarian sector. The global challenges identified in the paper represent the basis for the development of economic policy in the agribusiness sector, including the Russian agrifood policy, the development of quality formal and informal rules and institutions that support the economic growth of the agribusiness sector, and also allow risk-oriented approaching to agricultural development in different territories.

Keywords: - Agriculture, economic growth, challenges, risks, institutional environment.

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1 Introduction

Current estimates, [1], show that four major megatrends have emerged in the global agribusiness sector:

1. Change in value chains: concentration of value added in science-based sectors:

- increased cost of genetic and breeding process in crop and livestock production;
- development of digital (IT) and geo-information technologies;
- emergence of industrial design and engineering technologies that fundamentally change the reproduction process.

2. The development of a new food system model, where the agribusiness sector ceases to be a separate sector and becomes linked in value chains to the environmental and natural resources sectors, the public services market in terms of territorial connectivity, public welfare, etc. These processes lead to radical shifts in the structure of employment and the need for a new model of education and labor market.

3. Redistribution in value chains due to a confusion of values and choices such as:

personalization of products and clustering of consumers; emergence of new production and distribution models for agricultural products; growth of new markets in the agribusiness sector: healthy, nutritious food; organic products; products with improved and pre-defined properties for a specific group of consumers or a specific consumer.

4. The growing influence of large companies and individual countries on the development of the global food system – the development of global value chains in the agribusiness sector.

Agrarian trends lead to a new paradigm for the production of food of natural origin and the emergence of global challenges for the agro-industrial sector (AIS).

Current research focuses on the specific challenges facing agribusiness sector in the green revolution, [2], in the transition to AIS 4.0, [3], in digitalisation, [4], in climate change, [5], and environmental threats, [6]. However, there is a lack of comprehensive research aimed at examining the global challenges facing agriculture.

The aim of the paper is to investigate the macroeconomic global challenges of agro-industrial development that affect the sustainable development of the sector.

2 Methodology

The study is based on the dialectical method, which seeks to identify cause-effect relationships between agricultural development and the global challenges facing its development. Statistical and graphical methods were also applied in the progress of the study.

3 Main Part

In the modern mixed economy the market institutions and feedback mechanisms in agriculture prove to be unable to provide competitive and efficient regulation of agrifood market conditions and sustainable economic growth in the sector. Specific factors in the development of the world agricultural market lead to the formation of global challenges in the development of the industry, which are simultaneously faced by developed and developing countries, including Russia.

3.1 Demographic Growth and Hunger

By 2050, the world's population will have increased by 2.0 billion, approaching 9.7 billion. Nine countries will account for half of this increase: India, Nigeria, Pakistan, the Democratic Republic of the Congo, Ethiopia, Tanzania, Indonesia, Egypt, and the United States of America (in descending order of size), [7].

Yet already now (2020), the number of those who are undernourished has reached 2.37 billion – almost a third of the world's population. In just one year, the number of undernourished people has risen by 320 million due to both global warming and the coronavirus pandemic. There are no signs of improvement: despite measures taken to fight hunger, countries are not coping with the unfolding food crisis, [8].

Three factors have contributed to the sharp increase in hunger in recent years: climate change, pandemics, and military conflicts. Moreover, progress on hunger has not just slowed – it has reversed, [9] (Figure 1).

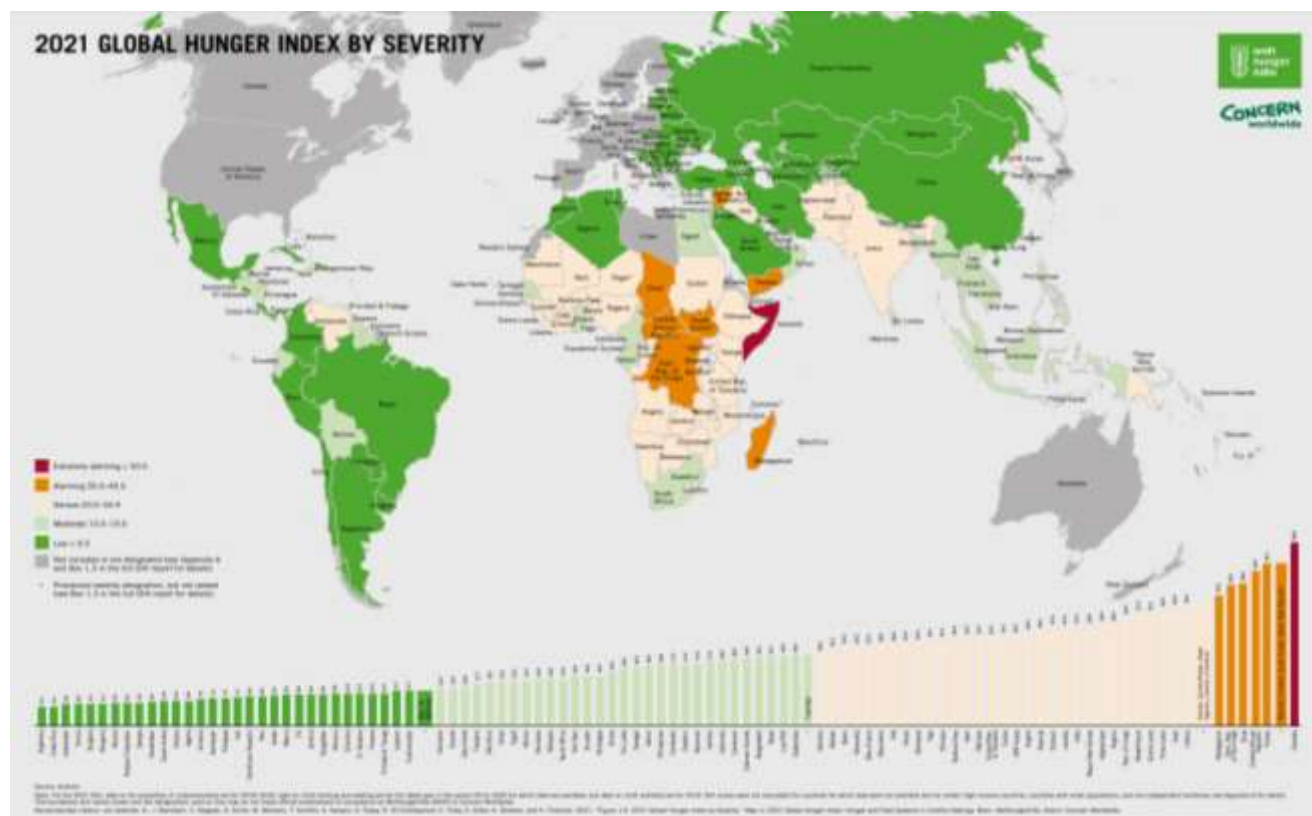


Fig. 1: Global hunger index in 2021, [10].

All this leads to an increasing problem of demographic growth of the world population and threats of increasing hunger in developed and developing countries, including Russia, [11].

3.2 Resource Scarcity and the Crisis of the AIS 3.0 Model

The crisis of food production and hunger is also exacerbated by the scarcity of the planet's agricultural resources and the exhaustion of the previous model of scientific and technological development of the agrarian sphere.

Studies show that by 2030, due to the declining agro-climatic potential of rural areas, the exhaustion of the effects of the Green Revolution, the growth of biosecurity threats, the increasing problems with food waste, the world will see a significant increase in demand for

- food by 35%;
- fresh water by 40%;
- energy by 50%, [1].

The scarcity of resources within the planet's agroclimatic potential and the inability of existing agro-industrial sector 3.0 technologies to cope with this deficit are leading to an acceleration in the development of agrarian R&D activities.

Between 2014 and 2020, investment in agri-food technology start-ups worldwide increased 8.2-fold (Figure 2).

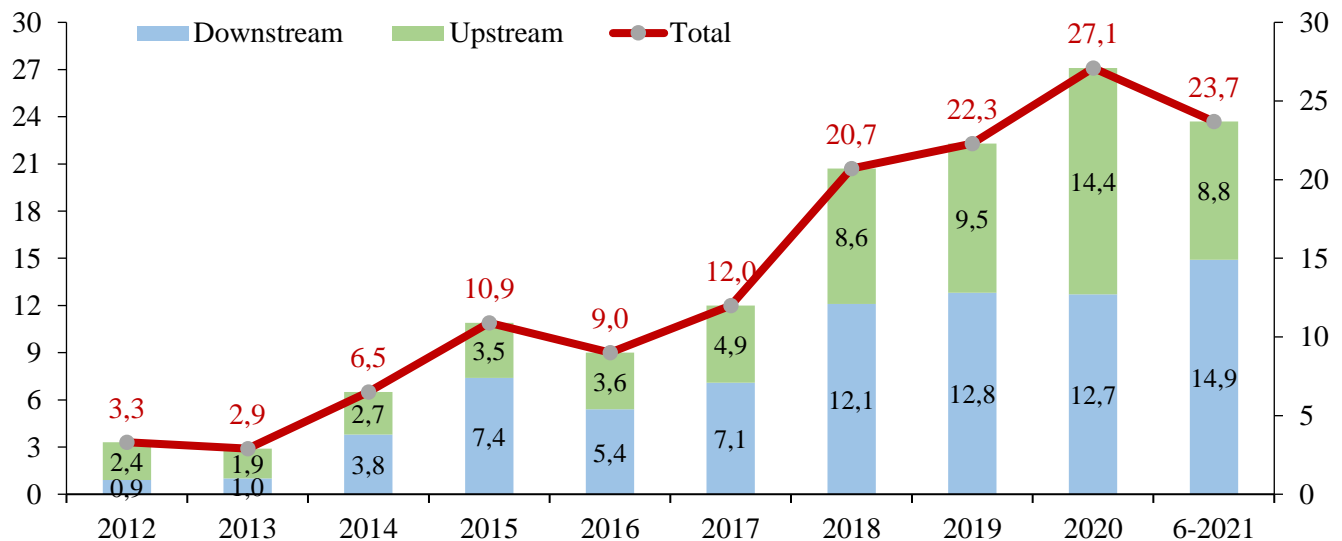


Fig. 2: Investment in agri-food technology start-ups 2012-2021, \$bn, [12].

However, addressing equitable access to food diversity regardless of location and seasonality, ensuring food quality and safety beyond the reach of conventional agriculture, and minimizing the losses and environmental impact of the

agribusiness sector remain important challenges to the sustainable development of global agriculture.

3.3 Ethical Risks and Limitations: New Value Orientations

The urbanization of the modern developed and developing world, leading to an increasing share of the urban population with the simultaneous increase in the economic, political and cultural significance of cities, [13], and the increase in the share of millennials in consumption patterns to 47% by 2025, [14], [15], lead to a shift in values in the development of the agribusiness sector with an emphasis on the development of personalized nutrition, the consumption of organic food, food with improved and predetermined properties for a particular consumer. These changes are transforming agricultural production and social reproduction in the agribusiness sector.

The problem of protein production (Figure 3) and the increasing pressure of this production on the ecosystem is of particular importance due to the growth of the world's population and the increasing share of the middle class in India, China, and Africa.

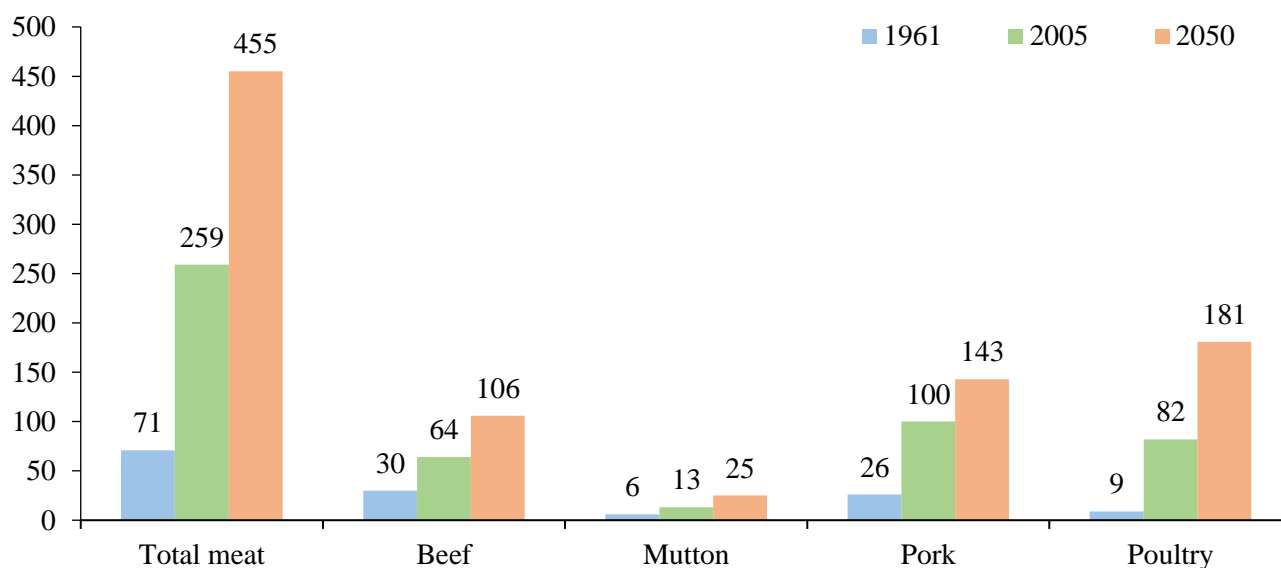


Fig. 3: World livestock production by livestock sector, mln t, [13].

Protein production from traditional sources – beef, pork, chicken – requires significantly more land and water than from non-traditional sources – algae, insects (Figure 4, Figure 5), which raises the

question of new value orientations of the growing population or the ethical risks of dealing with such issues.

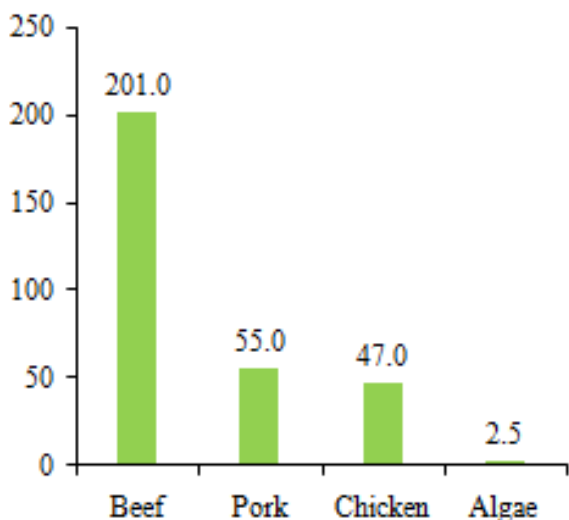


Fig. 4: Land area for production of 1 kg of protein, sq. m., [16].

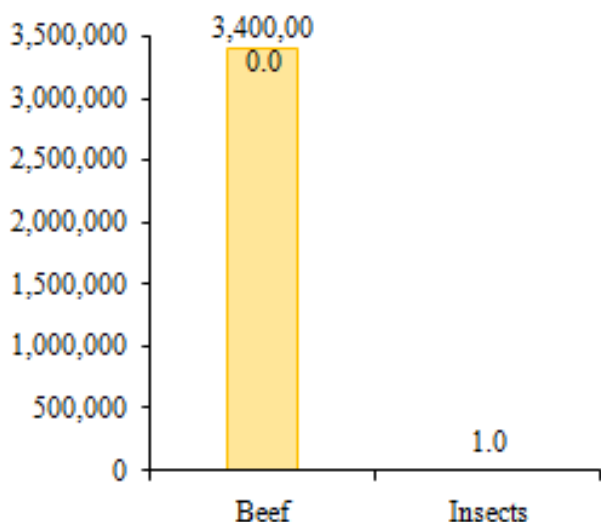


Fig. 5: Volume of water to produce 200 gr of protein, ml, [16]. Processes of personalization in food consumption, the development of the 'sharing economy', new values in the agribusiness sector (sustainability, ethics, safety, healthy lifestyles) are leading to the clustering (customization) of food consumers worldwide, which has a defining impact on the agricultural trade sector and is changing logistics chains in regions.

3.4 Natural and Climatic Change

The UN World Food Organization (FAO) estimates that agriculture is a major source of greenhouse gases, accounting for up to 12% of global emissions, [17]. When these figures are combined with the corresponding changes in land use, including deforestation (driven largely by agriculture), agriculture is responsible for a quarter of all GHG emissions. Agriculture has a high

mitigation potential and 74 per cent of this potential is found in developing countries. There is evidence that climate change is reducing the quality and sustainability of agricultural production, [18].

3.5 Recycling, Recycling and Valorisation of Waste

Today, about a third of global food production goes to waste – about 1.3 billion tons at a cost of about \$990 billion, [19].

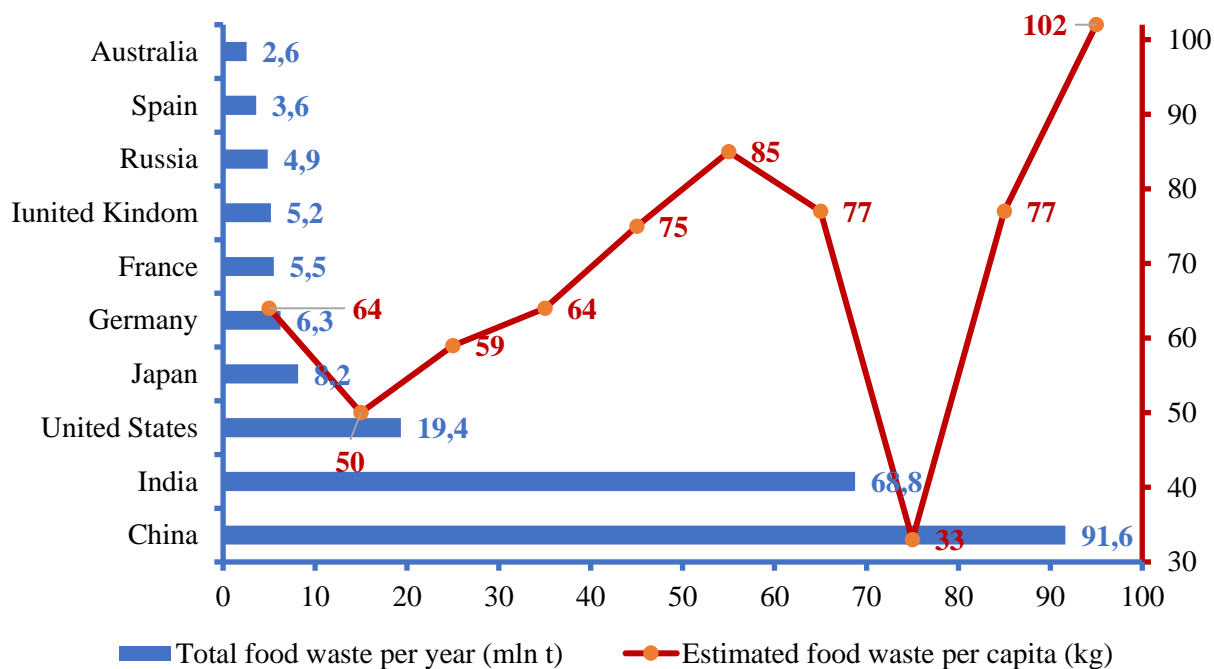


Fig. 5: The Enormous Scale of Global Food Waste (Total annual household food waste produced in selected countries), [20].

In developed countries, most waste is generated in households, restaurants and supermarkets. In developing countries, it is generated during transport or during storage. Our desire for convenience and packaged food is directly linked to the growth of plastic waste. It is estimated that there will be more plastic than fish in the world's oceans by 2050, [21].

3.6 Political Instability

Political-economic, institutional and structural challenges have become particularly acute in the third decade of the 20th century, resulting in:

- increased volatility of food prices;
- growing influence of large integrating companies in the development of the agribusiness sector within national economies and by multinational companies; and the impact of transnational companies on global food markets;
- increasing tendencies towards autarky in countries and a rise in protectionist regulations.

3.7 The Challenges of Innovative Development: Science, Education, Private Investment

Scientific advances over the last 50 years have led to a boom in biotechnology, and advances in computing systems have significantly reduced the time required to find the right solutions. Major advances include:

- DNA decoding.

- Microbiome analysis.
- Gene editing technologies (CRISPR/Cas-9, TALEN, etc.).

The development of digital technologies has a particular impact on the development of the agribusiness sector. To date, Russia has conducted a comprehensive study showing the potential of using digital technologies 4.0 in the domestic agribusiness sector based on the FAO methodology. The general conclusion of the study is that the transition of Russian agriculture to digital technologies will increase the potential output of agricultural products by 1.58 times at the same cost of agricultural resources.

The global challenges can only be overcome by coordinated action by the major global players in the food market: The world leaders in food and agricultural raw materials production, the world consumers and the main logistics players, based on current research of the influence of various institutions on the emerging agrarian market conditions, [22], [23].

4 Conclusions

The paper analyses the main global challenges facing the development of the global agribusiness sector, including the Russian Federation.

Today, the agro-industrial sector, in the context of the global transition from one technological

mode to another, has developed unique opportunities for Russian production and consumption of agricultural products, " windows of opportunities " for a radical transition to a new stage of development and to sustainable economic growth of the sector.

Based on a set of sources, the paper identifies the main global challenges facing agricultural development: demographic growth and hunger; resource shortages within the existing model of AIS 3.0; ethical limitations and risks; growing threats of the spread of dangerous infectious diseases; natural and climatic change; external geopolitical and sanctions pressure.

The given global challenges represent the basis for the development of economic policy in the agribusiness sector, the development of quality formal and informal rules and institutions that support the economic growth of the agribusiness sector and also allow risk-oriented approaching to agricultural development in different territories.

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Conflict of Interest

The authors have no conflict of interest to declare.

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