Global indices in assessment of the global food problem and its impact factor

Abstract. Globalization provides countries with new opportunities for development and brings them together in one world economy. However, the same trend allows global problems to penetrate every single society. Food problem is one of the central and most complex among global challenges to mankind. The purpose of the article is to identify countries most and least vulnerable in terms of food security by such categories as financial and physical accessibility, food quality, and safety. Grouping countries by components of the global food security level shows that the overwhelming majority of countries with low Global Food Security Index (GFSI) score are characterized by low accessibility indicator, but have medium indicators of food availability, quality and safety. The most important factor affecting food supply of a country, as well as its potential to achieve food security, is its economic development, a summary measure for which is GDP per capita. GDP growth ensures an increase in the food security level, provided that the system of national income distribution is fair.

Keywords: Globalization; Global Food Problem; Global Indices; Food Supply; Food Security

JEL Classification: F01; F14

DOI: https://doi.org/10.21003/ea.V161-04

1. Introduction

Globalization laid an economic foundation for reshaping the global food system, which in its present form emerged only in the 20th century. It is based on agricultural integration and internationalization of the agricultural products exchange, and includes main and auxiliary industries involved in food production. But in the early 21st century the efficiency of its functioning is influenced by two opposite processes: globalization of provision, manufacturing and marketing processes; traditional food consumption patterns in certain regions and countries. This hinders balanced development of the global food system causing disproportional development of world economic actors. As a result, according to former Director General of the Food and Agriculture Organization of the UN (FAO), Jacques Diouf, «globalization of the world economy and liberalization of the international food trade provides more opportunities for levelling sharp disparities for those having resources, information and expertise» [1]. But in those countries lacking such resources disparities become more extreme. Therefore, in order to provide the population with food it is necessary to increase both the volume of production and international food trade. Consequently, current global food system should perform social, economic and civilization functions, in other words, it should provide the world’s population with food in a sufficient quantity, range, of a certain quality, when necessary resources are available and there are economic conditions for food production, distribution, and exchange.

The processes of globalization have a significant impact on global food problem. Assessment of the global food problem requires application of comprehensive analysis tools, which include different global indices calculated by international organizations.

2. Brief Literature Review

The problems of food supply to the population, misbalances in food production, consumption and trade around the world have been reflected by many scholars, notably Berezin...
& Berezhina (2011), Bilorus et al. (2008), Braudel (2006), Vlasov, Sablik, & Lysak (2009), Dobrosotskyi (2000), Sablik, Bilorus, & Vlasov (2008), Sen (1981) [2-9]. In their assessment of the food problem on a global scale Suresh, Gajanam, & Prabuddha (2014) linked food supply security to limitations in consumer goods basket, and opted to devise adequate policy proposals for development of agricultural industry [10]. In Satinder (2015), Motarjemi & Leliyeveld (2014), Charis Galanakis (2016), Holden & Ghebru (2016) a system of indicators has been used to evaluate food problem [18-22]. The indicators are combined into three groups: correspondence between equivalent market food quantity and minimal needs of the public; correspondence between equivalent market price of food ration and income of all social groups; and those which characterize the realization of the two main quantitative criteria of food security situation. At the same time methodologies by international organizations to evaluate food problem by means of global indicators are still not investigated enough.

3. The purpose of the study is to identify countries being the most and the least vulnerable in terms of food security by such categories as financial and physical accessibility, and food quality and safety.

4. Results

Comprehensive assessment of the food problem on a global scale is provided in the Global Food Security Index (GFSI). Global Food Security Index, developed by the research unit of The Economist (Economist Intelligence Unit), includes main aspects of financial and physical food accessibility, as well as food quality and safety, and encompasses 113 countries of the world. Financial aspect of food availability is measured by the following indicators: share of expenditures on food in total expenditures of households, share of the population living below the poverty line, availability of credit for agricultural enterprises, level of import duties on food products, physical availability of food from agricultural production and its reserves. The conditions of production, such as volatility of agricultural market, political instability, corruption risks, development of agricultural infrastructure, and expenditures on R&D are also taken into account within this indicator. Food security quality indicator takes into account compliance of food products with internationally established standards for the content of micronutrients, vitamins, and structure of nutritional substances. The index is a dynamic quantitative and qualitative model based on more than 28 indicators, which measures the food security factors in the developed countries. Since May 2014, within the Index the impact of two factors, obesity and food loss, on the access to safe, nutritious and financially affordable food products is evaluated. Index defines food security as a condition in which people at given time have physical, social and economic access to food (in sufficient quantity and with sufficient nutrition value), that meets their dietary needs for a healthy and active life. In 2015 individual indexes ranged from 24.0 to 86.6 points. The United States found itself in 63rd place (Ukraine received 56.4 points and 52nd place in 2014), Belarus - 46th with 63.1 points, and Azerbaijan ranked 57th with 71.1 points [11].

The lowest indices were received by Burundi, Sierra Leone, Chad, Niger, Mozambique, and Haiti, whose GFSI was less than 30 points. Grouping countries by food security level shows that the largest group is formed by the countries with low food security level (Figure 1).

The group of countries having an index score of less than 50 points includes 42 nations; these are primarily countries with the highest percentage of undernourished people, with 53.4% of population in Haiti, 47.8% in Zambia and 34.4% in Chad. The calculation of the Global Food Security Index makes it possible to assess approaches to food problem in most countries of the world by its components. Grouping countries by components of the global food security level (Figure 2) shows that the overwhelming majority of countries with low GFSI level are characterized by low accessibility indicator while having medium indicators of food availability, quality and safety (Ghana, Myanmar, Uganda, Nepal, Kenya, Cameroon, Senegal, Russia, Nigeria, Mali, Tanzania, Ethiopia, Sudan, Malawi, Burkina Faso, Congo, Haiti, Niger, Chad, and Burundi), which indicates that population is unable to buy food because of low income level.

GFSI also allows to study the correlation between food problem and other global problems. For example, Haiti has the highest percentage of undernourished people (53.4%), and low food security index (29.4 points); the data by GFSI components shows that the availability indicator has the biggest impact, it is 24.6 points, and the country also has low GDP per capita - USD 830. Chad, Niger, Burundi, Burkina Faso, so, Malawi are also among those lagging behind. At the same time

Fig. 1: Division of countries by level of global food security

Source: Compiled by the author based on [11]
time, there are countries with relatively high GDP per capita, yet with low GFSI. For example, Congo with GDP per capi-
ta at USD 2,031, has percentage of undernourished people
at 30.5%; here availability is the all lowest component within
GFSI (21 points).

Thus, the most important factor to sustain national food se-
curity is country’s economic development, a summary mea-
sure for which is GDP per capita. High level of economic de-
velopment ensures necessary investments in agriculture and
processing industry, promotes development of food production
base. It is the foundation of the high standards of living, and
food accessibility for all categories of the population. Compa-
rison of the GFSI score with the size of GDP per capita shows
the robust relationship between these indicators (Table 1).

Countries with low GDP have low food security indices, with
only few exceptions. For example, in 2015 Angola’s GDP per
per capita was USD 4,062, but the country was ranked 101nd in food
security (GFSI at 34.7 points). This manifests the problem in
distribution of GDP, which do not contribute to the eradication
of poverty. Same conclusion may be applied to Sudan, Congo
and Nigeria. Despite these deviations, there is a certain rela-
tionship between the dynamics of both indicators: the growth of
the GDP per capita is accompanied by increase of GFSI.

Another global index that outlines opportunities for eco-
nomic development in certain countries is Global Competit-
iveness Index (GCI) produced by the World Economic Forum. It
includes 113 variables to determine the level of competitiveness
of the countries at different levels of economic development.

In order to include such significant number of factors, two-
thirds of variables come from the results of the global business
leaders’ survey, and one-third comes from statistical data and
results of studies that are regularly performed by international
organizations.

These variables are due to determine national competitive-
ness by 12 benchmarks: quality of institutions, infrastructure,
stable macroeconomic framework, health and primary educa-
tion, higher education and training, efficient market of goods
and services, efficient labour market, developed financial mar-
kets, level of technological development, domestic market size,
and competitiveness of companies, innovative potential. By deter-
mining countries’ opportunities for economic development it al-
so indicates the ability to solve the food problem.

Comparison of GCI and GFSI scores will allow us to trace
interrelation between country’s competitiveness and food secu-
rit (Table 1). GCI is calculated for 144 countries of the world.
In 2015 its score ranged from 5.76 points (the highest score,
Switzerland) to 2.84 points (the lowest score, Guinea). The ta-
ble shows GCI scores for countries with low food security level.
Analysis of these indicators shows that countries with low GCI
scores typically also have low food security level. For exam-
ple, Guinea is ranked last in GCI and 97th on food security ran-
kings; Chad is ranked 143th in GFI and 11th in GFSI (out of 113
countries). Higher position according to the competitiveness in-
dex correlates with higher place in food security ranking. For in-
stance, Philippines is ranked 74th according to GFI and 52nd
according to GCI, Guatemala is ranked 73rd and 78th respective-
ly. The analysis shows that in some countries high level of com-
petitiveness does not ensure the solving of food problem; in
case of Rwanda, ranked 62nd in GCI and 87th in GFSI, inefficient
agricultural policy may be the reason of failure in food security,
but this stipulation needs to be further examined.

The Corruption Perceptions Index is an important interna-
tional index that characterizes institutional conditions for ad-
dressing food problem. This is an annual ranking of countries
that reflects assessment of the corruption perception level by
the experts and entrepreneurs on a scale of one to ten; it is cal-

![Fig. 2: Division of countries by components of the Global Food Security Index](source: Compiled by the author based on [11])
The Transparency International Corruption Perceptions Index (CPI) is calculated for 168 countries of the world, and in 2014 its score ranged from 91 points (the best index assigned to Denmark) to 8 points (Somalia and North Korea, which are the countries with the highest levels of corruption). The impact of corruption on solving food problem is clearly negative since it prevents the development of entrepreneurship, normal functioning of the agricultural market, innovations, etc. Huge amounts of money, which could be invested in the development of agriculture, are flow out of countries’ budgets through different corruption schemes. The data on Corruption Perceptions Index (CPI) in Table 1 show that almost all countries with low food security level also have low points in Corruption Perception Index. Comparison of these indices shows that countries having relatively high economic growth (Angola with GDP per capita is USD 4,062 or Sudan with GDP per capita is USD 2,194), but high corruption perception level, have low food security levels.

In previous sections we already highlighted the essential role of human factor, i.e. the educational level of the population, qualification of workers in the agricultural industry, farmers, and their ability to adopt modern agricultural technologies and introduce innovative methods of economic management, in addressing food problem. The impact of human resources quality on food problem on a global level can be studied with the UNDP Human Development Index (HDI), calculated for 188 countries. HDI includes three indicators: life expectancy at birth; standards of living, measured by GDP per capita; educational level of the population. Comparison of HDI and Global Food Security Index makes it possible to trace correlation between these indicators (Table 2).

Almost all countries with low HDI fall into the group of countries with low food security index. Thus, the insufficient level of human development, education, first of all, is an obstacle to solve the problem of hunger. Therefore, strategies for development of agricultural industry in many countries aim to improve education and competences. For example, due to the fact that the Chinese government has set its sights on increasing the number of specialists for the national economy, in the next ten to twenty years the educational level in this area will increase significantly. In addition, by 2020 one hundred thousand students will account for thirteen thousand university graduates and thirty-one thousand with secondary education, literacy rate will fall to 3% [15].

The impact of environmental factors on food problem can be traced with help of Environmental Performance Index (EPI). This index was developed by team of scholars from Yale and Columbia universities. Index methodology has been developed...
The data on the Environmental Performance Index (EPI) in Table 2 show that almost all countries with low Environmental Performance Index also have low food security scores. Few exceptions are Philippines, ranked 66th on EPI and 74th on GFSI, and Tajikistan, ranked 72nd and 92nd respectively.

5. Conclusions

The study of the correlation between global indices shows that countries having low scores according to the Global Competitiveness Index, Corruption Perceptions Index, Development Index and Environmental Performance Index, have low food security scores. Few exceptions are Philippines, ranked 66th on EPI and 74th on GFSI, and Tajikistan, ranked 72nd and 92nd respectively.

References


Received 15.09.2016

So the states could compare their own progress and short-comings with those of other countries [16], they have low scores according to the Global Food Security Index. We conclude the existence of a significant correlation between global food problem and other global problems of humanity.

Solution of the food problem is the most urgent issue of the current global economic system. According to the FAO estimates, eradication of hunger in the world is the trend of last two decades. But as world population grow, the share of the starving people is reducing in far greater pace than the absolute numbers of starving people. Large share of population in developing countries still does not consume the food required for active and healthy life.

The following factors promote the solution of the food problem: international economic integration and development of foreign trade, liberalisation of foreign trade in agricultural products, activation of scientific research in the agricultural area, such as plant breeding and protection, distribution of highly-efficient seeds and animals. Taking into consideration high potential of the national agriculture and agrarian science, the country has potential to gain fair share of the world agricultural market.