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Tendencies and challenges in global agriculture

Abstract. The development of global agricultural market has been at the forefront of professional studies. Expert opinions have quite differing views as to whether the world's food production will be able to supply (and under what circumstances) the huge demand of growing population. Our paper provides a general overview of global agricultural trends, including alternative views on whether agricultural productivity increases will be able to keep up with food demand increases, price trends, and which regions of the world may undergo the largest food demand changes in the future. Our research has focused on the present state of the agricultural market and on the analysis of the key factors defining the tasks the agricultural sector faces in the near future, with a special attention to the case of Hungary.

Key words: globalization, market, technology.

Introduction

At the end of the 20th century, extremely significant changes occurred in the global agriculture, the accelerating technical development modified the economic processes. At the moment, the world's population is more than seven billion people and their daily food supply must be provided. Moreover, it is a widely accepted view that according to the UN estimates this figure will reach nine billion by the year 2050. Consequently compared with the present figure, by 2050 there will be three billion more of human beings and this number equals the total number of population of the globe in the 1950s. In the forthcoming decades the boost of population growth will be triggered by the underdeveloped regions. However, the centre of this situation will be shifted from China and India to Africa. The African continent in itself will contribute to half of the total population growth according to the calculations [Sippel et al. 2011].

Another reason for the problem is that not only the population will grow in the following forty years but the standards of living and the people's income as well and these result in a modification of consumption habits. In addition, there is a continuous growth of domestic consumption in the world; there is a growing demand for agricultural produce and food (this effect is significant in certain developing countries) and simultaneously there is more and more demand for producing industrial raw materials and developing 'non-food' agricultural crops. On the basis of the above mentioned facts, it is clear that the global demand for food products will double in the following decades and it also means challenges for the agriculture (along with mechanization).

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Research results

The world

There is a significant disagreement in opinions regarding the possibilities of supplying the growing demands. Even specialists do not agree on the question whether the global agricultural production is able to satisfy the rapidly growing new demands and under what conditions. There is a wide range of specialist literature dealing with the analysis of the changes in supply. On the basis of this, there is an optimistic approach, a traditional view, a pessimistic opinion and an approach focusing on the food production opportunities of the developed countries [Csáki 1999].

According to the optimistic view, there is no need to be worried about the global food supply perspectives regarding the near future. The food shortage after the Second World War lasted only for a few years in Europe. The quantity of harvested cereals doubled between 1950 and 1973; as a result it is believed that the food production will keep up with the new demands without having any problems in the following decades. These quantitative forecasts compare these supply forecasts with forecasts of population growth, changes in income and the following changes in demand; on the other hand the trends defining the growth of agricultural production [Agcaoli & Rosegrant 1995]. As they see it, the pace of population growth is slower than the output growth of agricultural production. The situation of the global food market will still be defined by a surplus and not by an unsatisfied demand. The deterioration of the natural resources and the ecological dangers are not treated as a significant limitation in the near future, but it is emphasized that there is a continuous need to invest in the agricultural research, mainly in order to improve the conditions of agricultural production and its infrastructural conditions.

The traditional view believes in the food supply and food safety as a national problem³. According to this view, there might occur problems in the food supply especially in the developing countries where the ecological reserves are getting to be depleted⁴ [Population... 1995].

According to the pessimistic view⁵ the ecological reserves of the Earth are turning to be depleted and the global food production has to face new ecological, environment-related burdens [Brown & Kane 1994]. They believe that there might be more serious food-supply problems and a significant increase in the price level of food products as well as a possible unbalanced situation in the supply and demand. Their view is justified by the changes in the global cereal production; the biological limits that have been reached by the sea fishing; the deterioration of quality of pastures; the continuous shrinking of agricultural production area; the limited quantity of irrigation water. Also, the amount of money spent on agricultural research has been decreasing in many countries. For example in the most populous country, China, there is a threatening danger that desertification and a decrease of crop producing areas will jeopardise the agricultural production and water supply.

According to the attitude focusing on the developed countries' food production opportunities, the developed countries will export processed industrial products and technologies to the developing countries in exchange for raw materials and commodities

³ Self-sufficient system

⁴ For example the size of arable lands is decreasing, the water reserves are needed as drinking water reserves.

⁵ That is typical of environment protectionists ("the green") and those specialists who deal with the natural-ecological conditions of the agricultural production.

[Carruthers 1993]. At the same time the developed countries are exporting more and more food products to the developing countries⁶ in exchange for manual-labour-intensive, processed products, consequently this is the solution to provide food supply⁷.

After comparing the four major attitudes, it is not easy to state that any of these concepts is absolutely correct as the problem in itself is many-folded and complex. What is sure, each of these attitudes is focusing on a particular group of factors that defines the future. In reality, these factors most possibly occur in close interaction with each other.

What is a fact, the prices are a significant factor. For many decades, the main agricultural products have had decreasing relative price levels, but in the recent period (since 2002) the global agricultural price levels have been increasing (Table 1).

Table 1. Annual real food price indices (2002-2004=100)

Year	Food price index	Meat price index	Dairy price Index	Cereals price index	Oils price index	Sugar price index
2000	93.1	98.7	98.3	87.7	69.9	119.5
2001	99.1	102.4	113.6	91.8	71.7	130.1
2002	96.6	96.2	88.4	101.5	93.5	105.1
2003	97.7	96.7	95.1	98.1	100.8	100.5
2004	105.1	106.3	114.7	100.5	104.9	95.1
2005	109.7	112.4	126.6	96.8	96.9	131.2
2006	116.6	109.1	117.8	112.0	103.5	192.9
2007	139.6	110.0	186.7	146.7	149.5	125.7
2008	164.6	126.3	180.9	195.9	187.2	149.6
2009	135.0	114.3	121.7	149.4	129.8	221.3
2010	158.3	130.0	171.2	156.0	165.9	258.0
2011	200.2	155.3	194.0	217.1	221.9	324.5
2012	194.8	162.1	179.4	204.2	219.5	304.4

Source: [FAO... 2012].

After a relatively steady trend, there were drastic price increases in 2008 and 2010, something that was not typical of agricultural markets earlier. The decades long trend reversed what had been previously suggested that the relative food prices showed a decreasing tendency and that consequently the global prices followed the global changes in trends with regional specialities. According to experts the food prices started to go up because there was a boost in demand for food products that contained a higher level of added value and for more processed food products as well as because of a significant increase in the population of the Earth.

According to the latest published figures by the United Nation's Food and Agriculture Organisation [Agricultural Outlook... 2011], the global food prices showed a slight decrease in April 2011. The reason for the previous price increase was higher prices of

⁶ The agricultural production in the developed countries mainly takes place in the temperate zone that is more favourable for production.

⁷ Tropical climate is typical of the agricultural areas in underdeveloped countries, which are especially sensitive ecologically and the opportunities to increase production capacity is limited.

vegetable oils and cereals and the global price drop was due to the decline in cereal and sugar prices. The food price index⁸ by FAO was 215.9 points in March 2012. In February the price increase was even higher than that, at that time the index was 2.6 points higher than in January. At the same time in 2012 the global food prices were lower than in February 2011, which was the peak period as the index was at the level of 238 points, a result of an increase in cereal prices. Despite the continuous decline of the prices in the second half of the last year, the average of the index was at 228, the highest since FAO started to record this index in 1990. The previous peak was in 2008, when the average value of the index was at 200 points and there were some hunger strikes in certain developing countries.

As for the near future, the price levels of crops seem to stay at a higher level and also we can expect an increase in agricultural production in the short term. The consumer food prices are expected to go up in most countries, therefore it will result in a higher aggregated value of consumer prices inflation. These might cause anxiety about the economic stability and instability of food supply in certain developing countries as well, because the spending power of low income population is decreasing.

The market of the European Union is significantly protected. The so called PSE⁹ level in agriculture is 25-28% on average; while at the same time it is around 10% in the USA, and it is lower than 10% in Brazil and New Zealand. In Hungary, the population spends 22% of its income on food, the same figure is 50% in India but it reaches only 10% in the USA [Producer... 2012]. Therefore the increase in food prices hits the poor more than the rich.

According to the OECD-FAO study [Agricultural Outlook... 2011], the per capita food consumption is most likely to increase the fastest in Eastern Europe, Asia and Latin America, in those areas where the incomes are increasing and the population is decreasing (Figure 1 and 2).

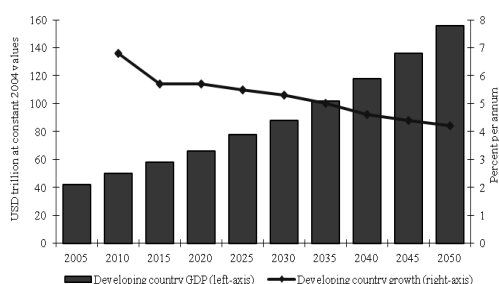


Fig. 1. Income growth in developing countries

Source: Simulation with World Bank's Envisage model from Baffes & Mensbrugghe [2009]

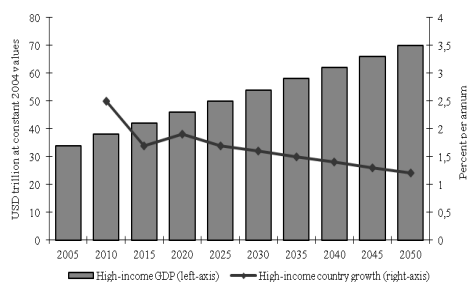


Fig. 2. Income growth in high-income countries

Source: Simulation with World Bank's Envisage model from Baffes & Mensbrugghe [2009]

In numerous supply fields, the available land for agricultural activities is more and more limited and the production must be expanded on less and less developed areas which can be described as having lower productivity and a higher risk of unfavourable weather

⁸ It is calculated on the basis of cereals, oilseeds, meat, dairy produces and sugar prices every month.

⁹ Producer Support Estimate is the proportion of public support for agricultural producers.

conditions. This means that significant investments are needed in order to boost productivity, so that the agriculture will be able to meet the growing demand in the future.

In the future, the environmental problems are more likely to happen more and more often and in a more and more severe way. A decrease of environmentally damaging effects of intensive production methods must be achieved with increasing efforts. Providing a sustainable agricultural production is a major challenge. Consequently, there is a higher demand for the development of environmentally friendly agricultural technologies all over the world as well as for the more emphasised vindication of the requirements of sustainable agriculture.

Beside the human consumption, the competition for fodder for livestock and for raw materials for the bioenergy production is getting to be more and more significant. The incentive to grow non-food crops has become in the forefront in agriculture [Agricultural Commodity... 2011]. The raw materials for energy production are not only biomass but also oilseeds and cereals. The fast growing prices and decreasing reserves of fossil fuels are making the opportunities of energy production in agriculture more precious.

In relation to the agricultural production in the future and the possible tendencies in the agricultural markets, important factors are the biotechnological opportunities, the development of bioenergetics, the increase in arable and cultivated lands, the growth of irrigated areas and the level of environmental damages caused by agricultural production capacities.

Hungary

The accelerated development of the world economy and globalization has had a significant influence on the agriculture. The global trends have reached Hungary, irrespective of whether these influences are positive or negative. The Hungarian agricultural development cannot be separated from these tendencies. One of the challenges of our times is to understand these changes and to phrase answers.

Hungary has good ecological qualities, its competitive advantages in agricultural production are well known, the favourable natural characteristics and historical traditions of the country are better than the European and global average. At the same time, Hungary is able to make use of its ecological advantages if its technical and technological development makes it possible¹⁰. If the country's agricultural development falls behind, then the otherwise available ecological advantage will not happen. If there is a proper level of technical and technological development, in that case the opportunities can be taken advantage of.

The most important factors are the enhancement of the competitiveness of the agricultural and food industry and the application of supportive measures. All these must be evaluated in environmental, production quality and sociological dimensions. One of the most crucial problems of Hungarian agriculture is the adaptation to the modified market circumstances. The implementation of market economy has not been finished, this process is still happening. Another important task is the creation of an efficiently operating institutional system, the foundation of legal frames, setting up the protection of quality. The future of Hungarian agriculture calls for a significant enhancement of efficiency, productivity and competitiveness.

¹⁰ For example: technological funds, production technologies, methods of storage and conservation, etc.

Before the change of political regime, there were clearly defined production systems in operation in Hungary, integrating the research and development and the production. Parallel with this structure, the innovation was provided by the self-learning attitude of the system. The structure, as 'system administrators', practically fell apart after 1990. On the production side, the problem is that there is no production system that operates in the whole spectrum of agriculture. A significant priority is a fast technological development based on scientific results. There is a demand for creating such production methods which are able to enhance specific yields without damaging the environment and shrinking natural resources. These are enormous challenges for the sciences of agriculture, biology and ecology with respect to fulfilling needs of the future not only by an increase in each product's growth potential but also in the general food production's productivity and quality. It is such a complex task that it must incorporate not only the enhancement of knowledge and information but also investments and development processes. In the present situation, the creation of production system based on research and development can be promising.

Conclusions

There has been an increasing attention to the safety of global food supply and providing the safety of environment and energy supply has also been in focus.

It can be concluded that the majority of countries still have a huge, untapped production potential. The necessary resources are available in the world to meet the growing demands; the globally needed food supplies can be produced, there are sufficient land and water reserves; at the same time the productivity and agricultural investments are decreasing whereas the production size is increasing. There is a need for more investments and research in the future. There is a need for financial resources; the institutional structure and the economic environment are defining the expected development in all countries. There is a need for higher level of international cooperation in order to make the agricultural markets stable and to provide the sustainable development. The food supply of the 21st century depends on positive answers to the following questions.

- Will the world be able to develop such complex agricultural production systems that can increase the specific yields without damaging the environment?
- Will the world be able to develop the agricultural policies and institutions in such a way that they provide more favourable economic and incentive methods for the agricultural producers?
- The more developed a country is, the more money it spends on subsidizing, supporting research and development. Will the world be willing to increase spending on the research and development in agriculture?

On top of the above mentioned facts, the real growth rate of GDP is another important factor and a special attention is needed to the quality and safety of food and the ecological constraints.

Research in agriculture should have an increasing attention as it plays a significant role in the increase of production. Consequently one way to reach an increase in economy might lie in the special governmental subsidies to research and development. Tendencies are long-run, therefore long-term economic development programs must be built on these. There is a need for integrated area and country development strategies and preparations for the

climate change are inevitable. Those enterprises which can introduce the results of research and development achievements can enhance their competitive advantages. A fierce competition is typical for the global markets but it is absolutely sure that efficiently grown food products will find their buyers and there is a demand for a competitive produce (including Hungarian products) in the world.

Reference

- Agcaoli M., Rosegrant M. [1995]: Global and Regional Food Supply, Demand and Trade Prospects to 2010. [In:] Population and Food in the Early Twenty-First Century: Meeting Future Food Demand of an Increasing Population. N. Islam. (ed.). International Food Policy Research Institute. Washington, D. C.
- Agricultural Commodity Markets Outlook 2011-2020. [2011]. OECD-FAO-FAPRI-USDA. [Available at:] http://ec.europa.eu/agriculture/analysis/tradepol/worldmarkets/outlook/2011_2020_en.pdf [Accessed: March 2012].
- Agricultural Outlook 2011-2020. [2011]: OECD-FAO. [Available at:] <http://www.agri-outlook.org/dataoecd/23/56/48178823.pdf>. [Accessed: March 2012].
- Baffes J., Mensbrugghe D. [2009]: The macroeconomic environment for agriculture and rural areas to develop over the next 50 years. [Available at:] http://www.fao.org/fileadmin/templates/esa/Global_perspectives/Presentations/Baffes_vdM_pres.pdf. [Accessed: March 2012].
- Brown L.R., Kane H. [1994]: Full House: Reassessing the Earth's Population Carrying Capacity. Worldwatch Institute, Washington, D. C.
- Carruthers I. [1993]: Going, Going, Gone! Tropical Agriculture as We Knew It. *Tropical Agriculture Association Newsletter (United Kingdom)* no. 13 (3), pp. 1–5.
- Csáki Cs. [1999]: Középtávú tendenciák a világ agrárpiacain. *Közgazdasági Szemle* vol. XLVI. pp. 297-336.
- FAO Statistics. [2012]: [Available at:] http://www.fao.org/fileadmin/templates/worldfood/Reports_and_docs/Food_price_indices_data_deflated.xls [Accessed: March 2012].
- Population and Food in the Twenty First Century. [1995]. N. Islam (ed.). International Food Policy Research Institute, Washington, D. C.
- Producer and Consumer Support Estimates database. [2012]. OECD. [Available at:] http://www.oecd.org/document/59/0,3746,en_2649_33797_39551355_1_1_1_1,00.html [Accessed: March 2012].
- Sippel L., Kiziak T., Woellert F., Klingholz R. [2011]: Africa's Demographic Challenges. How a young population can make development possible. Berlin Institut for Population and Development. [Available at:] http://www.berlin-institut.org/fileadmin/user_upload/Afrika/Africas_demographic_challenges.pdf. [Accessed: March 2012].