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## ECOLOGICAL CONSTITUENT OF BIOFUEL USE: ECONOMIC ASPECT EKONOMICKÉ HLADISKO EKOLOGICKEJ ZLOŽKY VYUŽITIA BIOPALÍV

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The state of ecology in Ukraine and world and the impact of emissions from the use of mineral and biological types of fuel on the environment are briefly analysed in the given article. Comparisons are carried out and some conclusions concerning the state of bioenergy development and its influence on the environment are made.

**Key words:** bioenergy, raw biomaterial, biomass, renewed energy sources, greenhouse gases, emission of greenhouse gases

Global processes taking place in the modern world spur us to take a fresh look at and appraise the situation in the social domain, economy, and especially in ecology connected with continuous changes and transformations, to search challenging mechanisms of the state administration to manage these processes as well as new alternative energy sources.

### Material and methods

The policy of gas emission reduction made by all industries of economy and formation of appropriate legislation are main obligations of Ukraine within the Scope Convention of UNO and Kyoto Protocol (Kyoto..., 1997). It anticipates comprehending in the brand new way current strategies of developing sectors of energy, transport, industry, rural, dwelling and municipal economies in Ukraine in order to minimize harmful impact of further economic development on the climate. All the more, the developed countries plan to reduce the emission of carbon by 80 % till 2050. (It will make possible to double the decrease of general emission of carbon in the air all over the world).

Hence, we must limit the use of fossil fuel to the level on which the world natural environment is capable to manage the emission. In the future, one should not pay attention to supply of all fuel, but to the amount, which can be utilized without serious damage to ecosystems serving as guards of our future.

Basic principles of reducing volumes of anthropogenic emission and increasing absorption of greenhouse gases are the following:

- sustainable economic development of Ukraine;
- formation of stimulant and favourable environment for business activities focused on the application of ecologically effective technologies and high-water marks aimed at reduction of anthropogenic emission and increase of greenhouse gas absorption;
- development and fulfilment of the state policy and measures, specified in the article 2 of the Kyoto Protocol according to the national regulations;
- stimulation of energy complex development based on bioenergy, transport, municipal economy, resource saving production, house building and corresponding services, improvement of the ecological situation and life level in Ukraine;

- ensuring economic attractiveness of investments focused on the increase of ecological efficiency and reduction of the emission of greenhouse gases.

The Agro-Industrial Complex (AIC) of Ukraine takes a leading place in this system at the present-day development. Traditional approaches to the AIC as a producer only of food and raw material for vital functions of a man do not engulf all the spectrum of problems. Nowadays it is not enough to provide the production of necessary amount of products for the society, these products ought to meet the international standards of quality, the major components of which are ecological constituents of all that is made and consumed, including production and consumption of the biological types of fuel as one of the factors of ensuring ecologically safe environment (Agro-Industrial..., 2009).

According to the analysis of research results and publications, a number of problems have not been solved either by scientists or practical workers. The problems are as follows: methodological fundamentals of development of a new sector of economy; providing of equivalence of profit gained from the production of raw biomaterial and biofuel; organization of production of these types of products by cooperatives and integrated associations; transition to the production of machinery as major biofuel consumers.

It is economically expedient to outline, conduct research on concrete objectives and substantiate their practical decision under the real conditions of Ukraine. The objectives are as follows: meeting the needs in energy resources and decline of power dependence through the use of raw biomaterial as one of major problems of the society on the modern stage of its development should be solved and grounded by both research and practice; providing of growth and not decline of the food production in the process of increasing volumes of raw biomaterial for the biofuel production; substantiating the effective economic relations of producers of biofuel and raw biomaterial.

The forecasted reduction of natural energy sources and strengthening of ecological requirements impartially induce the developed countries to involve additional alternative non-traditional energy sources. The most favourable solution of the problem has become a search for and use of renewed energy sources, among which the most popular are energy sources of biological origin, or biofuel: biodiesel, bioethanol, biogas.

Science and practice of the recent years have been heading for research and practical application of renewed energy sources, accumulated by a living substance by means of photosynthesis, utilization of the closed cycle of exchange of energy consumption and recreation.

In accordance with the theory of F. Keene about 'net product' and 'added value' of S. Podolynsky, who proved that all of the solar energy accumulating on the Earth through labour as an absolute added value is created exactly in agriculture and wood industry. However, in practice added value as an economic display of the accumulated energy on the initial stage is developed in agriculture, and further its lion's share is produced in other industries of the agro-industrial complex. According to the calculations of scientists, added value developed in the AIC is distributed approximately in this way: agriculture – 15–18 %; processing industry – 25–32 %; trade – 60–50 %.

Exactly in this connection of distributing of the added value agriculture as a branch of the national economy is indigenously lagging behind industry and trade, which in turn requires a scientific approach in decision making in the process of management. It is possible to solve this old problem, namely the improvement of rural areas and increase in profitability of agriculture in the development of market of raw biomaterial and biofuel that is practised on a large scale in many countries of the world.

Considering the Ukrainian alternative component of this problem, the use of renewed energy sources along with the solar, wind, water, geothermal energy is a strategic point of development of the country's economy, especially its agro-industrial complex. A number of assignments should be carried out by the state: ensuring energy safety and decline of dependence on the import of energy sources; sustainable development of agricultural production; creation of new workplaces in rural areas; increase of the state funding and investments to agriculture; and improvement of the environment.

Recent research have persuaded that it is high time to satisfy public needs in energy sources by means of renewed energy sources as alternative to the present-day carbohydrates. Biomass takes a prior place in Ukraine with its rich and varied flora. In this connection scientists must focus on the use of agricultural crops, i.e. biomass of plants having high energy content, which will form considerable advantages over extractive carbohydrates. Their use will facilitate the preservation of natural resources and their rational use an improvement of the environment.

Energy attractive crops of the European soil-climatic area to which Ukraine belongs are the following: one-year crops with high content of sugar and starch (sugar beet, cereals, corn, potato, Jerusalem potato, sorghum), which can be utilized for the industrial production of bioethanol; oil-yielding crops (rape seed, sunflower, soy beans, oil-bearing flax) oil and biodiesel are made from them; grassy perennials (sugar cane, site-specific hybrid of sorrel, millet, Pennsylvania mallow, etc). Science and world practice have proved that it is possible to make ethanol and biodiesel from biomass of agricultural and wood origin, which gradually, at first as additives to the traditional fuel, will substitute for extractive carbohydrates.

After joining of Ukraine to the Directives of 2003/30/EU and taking into account the land potential and necessity of solving a problem of dependence on the import of energy sources we can outline a real possibility to make considerable amount of biofuel, obtaining considerable economic benefit and not to break the level of the food safety.

A separate part of research of economic efficiency of the biofuel production is presented in the following calculations. There is a calculation of providing population with food according to the norms of consumption and necessity in sowing areas. The method of Derzhkomstat of Ukraine was taken as the basis of calculations, namely: it is necessary to involve 0.5–0.6 hectares of farm land in the agricultural production to provide one person with enriched ration.

- $S_{\pi, \epsilon} = 50\,000\,000 \times 0.55$  hectares = 27 500 000 hectares of farm land
- Or  $27\,500\,000 \times 0.778 = 21\,395\,000$  hectares of plough-land
- All of plough-land in Ukraine – 32 500 000 hectares
- Plough-land is free of the food providing
- $S_{\beta io} = S_{\epsilon} - S_{\pi, \epsilon} = 32\,500\,000 - 21\,395\,000 = 11\,105\,000$  hectares
- $S_{\epsilon}$  – is general area of plough-land in Ukraine
- $S_{\pi, \epsilon}$  – is area which provides the level of the food safety in Ukraine
- $S_{\beta io}$  – is area for growing of raw biomaterial

Formula of calculation of production cost of 1 ton of bioethanol:

$$Ber = Lc \times Kc + Tp \times Kc + 3n - B\epsilon$$

Where:

$Bem$  – cost of production of 1 ton of bioethanol

$Lc$  – price of raw material

**Table a** Calculation of competitiveness of bioethanol and biodiesel

	Sugar beet (5)	Molasses (6)	Corn (7)	Wheat (8)	Rape seed (9)	Soy beans (10)
Price of 1 ton of raw material (UAH) (1)	210	700	650	700	2 100	1 500
Charges of raw material on 1 ton of oil, on 1 ton of bioethanol (t) (2)	12.5	4.46	3.1	3.57	2.69	10.0
Transport charges + cost of processing (UAH/t) (3)	2 455	2 300	2 600	2 500	1 120	811
Cost of production of bioethanol and biodiesel after minus of cost of marketing oil cake and grain stillage (waste) (UAH/t) (4)	4 100	3 500	3 233	3 450	6 355	7 100

**Tabuľka a** Výpočet konkurencieschopnosti bioetanolu a biodízelu

(1) cena 1 tony surového materiálu, (2) náklady na 1 tonu oleja, 1 tonu bioetanolu, (3) prepravné náklady + cena spracovania, (4) náklady na produkciu bioetanolu a biodízelu po odrátní nákladov na marketing pokrútín a výpalkov (odpadu), (5) repa cukrová, (6) melasa, (7) obilie, (8) krmná pšenica, (9) semená repky olejnej, (10) sója



$Kc$  – amount of raw material  
 $Tp$  – transport charges  
 $3n$  – expenses on processing on a bioethanol  
 $B\bar{c}$  – cost of grain stillage marketing

Formula of calculation of production cost of 1 ton of biodiesel:

$$B\beta\delta = \bar{L}c \times Kc + Tp \times Kc + 3r'n \times Kc + 3r'r'n - B\bar{m}$$

Where:

$B\beta\delta$  – cost of production a biodiesel  
 $\bar{L}c$  – price of raw material  
 $Kc$  – amount of raw material  
 $Tp$  – transport charges  
 $E'n$  – expenses on processing of oil  
 $E'n$  – expenses on processing for biodiesel  
 $Bm$  – a cost of oil cake marketing

Research and results of calculations show that on condition of the use of sowing areas (Sáfi) under growing of raw biomaterial and its processing on biofuel the currency funds of the country for purchasing oil or transport fuel would be reduced by 1.5–1.7 milliards of US\$. The use of oil cake and grain stillage (waste) would enable to increase the production of meat and milk to more than 50 milliards of UAH. The state and local budgets would get additionally 10–12 milliards UAH of receipts.

The Table 1 demonstrates the general idea of problems with ecological state in Ukraine presented by total emission in the atmosphere, which in the last few years increased substantially and made over 7 million tons in 2007.

It should be mentioned that energy and transport are main pollutants of the environment (Agro-Industrial..., 2009).

The use of oil products as energy sources is considered ecologically dangerous for population. Hydrocarbons, oxide of nitrogen, carbon oxide, oxide of sulphur, different compounds containing lead, soot and exhaust steam together with exhaust gases are emitted in the air while using mineral fuel. Carbon oxide getting in the organism of a man reduces concentration of oxygen in the blood that is dangerous for people having cardio-vascular diseases. Carbon oxide and hydrocarbons are the source of ozone and constituents of acid rains. Carbon dioxide is the basic constituent of greenhouse gases; surplus emission of latter in the atmosphere is the reason of greenhouse effect and global increase of average annual temperature on the planet.

In 1997 specialists of the Ukrainian Transport University and DerzhavtotransNDIproekt developed technical conditions

and technological regulations on the production of motor petrol with addition of ethyl alcohol. Standard petrol with octane number 76 was utilized as petrol basis, and technical alcohol of the A category, experimental part of which was produced at the Andrusiv Distillery (Vinnytsia region) was used as alcoholic additive. Some components of coke and chemical production were added to stabilize the mixture. Petrol-alcohol composition with octane number 84.0 was obtained by the motor method.

On recommendation of the State Department of Motor Transport of Ukraine, nine cars of different brands participated in the operating tests of petrol with addition of ethyl alcohol. 7 000 litres of experimental mixture were spent.

Fuel-economic and starting peculiarities of cars as well as the content of exhaust gases were estimated during the test drive. Petrol with addition of ethyl alcohol of the A category was stated to be a valuable agile fuel for cars with petrol engines. Its use does not demand any changes in a car's adjusting. The tests demonstrated that an engine on combined fuel emitted carbon oxide (CO) in twice less on the average, hydrocarbons in 1.6 times less in comparison to a standard petrol engine due to more complete combustion of fuel, which is especially important for the cities with complicated ecological situation (Food and processing..., 1997).

The ecological aspect of the use of biofuel produced from rape oil implies a substantial decrease of the emission of carbon oxide by 15–98 %, carbohydrates – by 38–92 %, soot – by 31–68 %, besides the emission of sulphur dioxide is practically absent.

The European countries differ in priorities in the production of biofuel, e.g. France gives the green light to the production of biofuel from corn, wheat, sugar beet; Germany is so far oriented on the production of biofuel from rape seed. Waste of agriculture, food processing and wood industries (straw, corn-stalks, stem, sunflower husk, sawdust, etc) is being utilized now as sources for the biofuel production. Though they are not considered as priorities, they are able to become a rather important raw material source in the future. Wood waste or fast-growing varieties of trees and grass, e.g. selected fast-growing varieties of poplar trees as well as new crops such as silver grass are being used as raw material for producing biofuel (Kaletnik, 2008).

An extraordinarily important factor in the increase of the efficiency of the biofuel production is selection of plants (on the content of useful matters) for producing bioethanol and biodiesel. Modern methods of biotechnology will play a leading role in solving this assignment, namely, the increase of productivity and resistance of plants to abiotic and biotic stresses, the change of biochemical features of grain or other

**Table 1** Calculation of competitiveness of bioethanol and biodiesel

	Indices (1)	Years (2)				
		2000	2004	2005	2006	2007
1	Emission of pollutants in the air, thousand of tons (3)	5 909	6 326	6 616	7 028	7 380
2	Emission of carbon, million tons (4)	105	127	152	179	218
3	Contaminated sewage emission to surface water objects in general drainage in % (5)	30	37	39	44	43
4	Waste, placed in special places or objects in % (6)	29.1	45.6	39.3	44.6	38.3

**Tabuľka 1** Výpočet konkurencieschopnosti bioetanolu a biodízelu

(1) ukazovatele, (2) roky, (3) emisie škodlivín do vzduchu, tis. ton, (4) emisie uhlíka, mil. ton, (5) emisie kontaminovanej odpadovej vody do objektov povrchovej vody v kanalizácii, %, (6) odpad umiestnený na špeciálnych miestach alebo v špeciálnych objektoch, %

products (content of pentosanes, correlation change of amylose and amylopectin, etc).

It is necessary to underline that fundamental science could contribute to the development of bioenergy through the creation of new genotypes of crops, more adapted to the use of their produce and biomass for the production of biofuel as well as non-traditional crops with increased coefficient of transformation of energy of photosynthesis into necessary biomass at the comparatively insignificant charges of fossil energy for their production, transportation, and storage. Genomics, in particular genetic engineering, and also botany, biochemistry, phytophysiology will play a considerable role in the solution of these tasks.

It will facilitate intensification of research and development concerning alternative renewed energy sources, the use of which must be the priority in the economy of Ukraine.

## Results

1. Substitution in Ukraine of mineral fuels by the biological types of fuel (bioethanol and biodiesel) will substantially promote ecological safety and lessen local pollution of the environment.
2. In order to enter new perspective market of consuming ecologically safe renewed energy sources, including bioethanol, biodiesel, different fuel components, biogas and others it is necessary to accelerate the implementation of the following measures:
  - to develop legislatively legal acts concerning the obligatory use of biofuel in Ukraine;
  - to forbid the use of methyltertbutyl ether (MTBE) as extraordinarily strong pollutant of surface and underground waters;
  - to make obligatory norm of consumption of biofuel by transport vehicles in cities with population over 500 thousands of people.
3. Development of production and consumption of biofuel will stabilize activities of the AIC.
4. The biofuel market in Ukraine is a key factor to energy independence and ecologically safe environment of the country.

## Súhrn

V danom článku stručne charakterizujeme stav ekológie na Ukrajine a vo svete, ako aj environmentálny dopad emisií z minerálnych a biologických typov palív. Na základe komparácií vyvodzujeme závery, ktoré sa týkajú stavu vývoja bioenergie a jej vplyvu na životné prostredie.

**Kľúčové slová:** bioenergia, surový biomateriál, biomasa, obnoviteľné zdroje energie, skleníkové plyny, emisie skleníkových plynov

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## CLUSTER – A PERSPECTIVE FORM OF AGRARIAN PRODUCTION IN REGION KLASTER – PERSPEKTÍVNA FORMA POĽNOHOSPODÁRSKEJ VÝROBY V REGIÓNE

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In this paper the approaches to identification of clusters as consolidation of enterprises according to the vertical and horizontal principles are generalized. The classification and main advantages of such new formation are given and a range of problems to be worked over within territorial and branch clusters is determined.

**Key words:** agro-industrial formations, clusters, horizontal integration, vertical integration, cooperation, small-scale enterprises, medium-scale enterprises, large-scale enterprises, competitive advantages

Agrarian production of Ukraine under modern conditions means a great number of independent enterprises having almost no connections in the process of production activity. Under absence of common directing authority each enterprise uses its own discretion planning, production organisation and marketing of its produce, defending, in case of necessity, its interests, getting over various difficulties caused by both economical and political situation in the country. Market economy has restricted functions and possibilities of branch authorities at all levels as well. It is high time not only for scientific, but also for practical implementation of construction of integrated formations, qualitatively differing from the existing ones.

### Material and methods

Great number of scholars considered issues of development and economical substantiation of efficiency of functioning of agrarian enterprises of different business forms, improvement of their interconnections, optimization of agricultural enterprises size, formation of strategic development directions under current conditions. Recognized scientists A. Fayol, B. Milner, V. Lieberman, V. Zinovchuk, Y. Zavadsky, L. Melnyk, M. Kropyvko, M. Malik, M. Porter, P. Makarenko, R. Grant, R. Fakhrutdinov and others worked over organization structures and enterprise management structures and introduced them into practice of production. During the soviet times horizontally and vertically integrated production structures were formed, their expediency was grounded and cost-effectiveness was calculated. Market economy made certain corrections in classification of the forms and types of production organization. Integration issues regained relevance. Meanwhile, theoretical grounds and practical recommendations on regional consolidation of enterprises, working in the same or related branches and on the same territory, are worked out insufficiently.

### Results and discussion

In the history of development of agricultural production in the former USSR countries there were examples of consolidating

enterprises of agrarian branch into agro-industrial enterprises, agro-industrial consolidations, scientific and production enterprises and consolidations, inter-sector enterprises and consolidations, and others. Such consolidations were created to solve the problem, which was common for all the enterprises, included in these consolidations. They relied on help of district economic and party authorities. Legislation of Ukraine provides four types of economic unifications: association, corporation, consortium, and concern. We consider corporation to be the most expedient type of economic unification out of them. Though, relations between partners, level of centralization and delegation of management functions, determined by the agreement terms, and their financial independence do not facilitate the achievement of strategic goals.

For example, in the first half-year of 2009 production of agricultural produce dropped in comparison with the corresponding period of the previous year. Still, industrial production of provision, drinks and tobacco goods dropped even more considerably (table 1).

According to the figures of the table 1 the production of the plant cultivation produce at the agricultural enterprises fell by 42.1 %, the total output of the agricultural enterprises fell by 27.3 %, and the production of the plant cultivation produce at all categories of farms fell by 25.6 %.

Current economic situation forced all economic subjects to solve their problems themselves. Agrarian branch is known to demand careful attitude to itself from the side of the state, scientific, technological and financial support, and improvement of legislative and regulatory base. Besides that market system of economic relations considerably raised standards of competitive ability of both agricultural produce on world markets and enterprises themselves as producers of this produce. Competitive ability must be conditional on availability of material and technical, labour, financial resources, providing production of certain kind of produce under favourable natural and climatic conditions. Though, it is known to be conditioned first of all by efficiency of their usage, accessibility of these resources, level of formation and proximity to the outlets, presence of strategic calculations on its demand.

A modern form of up-to-date production consolidation according to the territorial and branch similarity is a cluster. In M. Porter's opinion, a cluster is a group of interconnected



**Table 1** Total output rates of agricultural production, industrial production of provision, drinks and tobacco goods (percentage wise to the corresponding period of the previous year)

	2008	2009						First half-year of 2009 to 2008
		January	2 months	1 quarter	4 months	5 months	first half-year	
Total output of farming								
All categories of farms	117.5	100.5	101.1	101.7	102.1	102.3	103	-14.5
Including: plant cultivation	130.5	—	—	—	—	—	104.9	-25.6
livestock farming	101.0	—	—	—	—	—	102.3	1.3
of them:								
agricultural enterprises	135.2	107.6	106	107.0	107.3	107.1	107.9	27.3
including: plant cultivation	155.6	—	—	—	—	—	113.5	-42.1
livestock farming	106.6	—	—	—	—	—	107.3	0.7
private farms	105.8	95.7	96.7	97.7	98.4	99.0	98.9	-6.9
including: plant cultivation	112.6	—	—	—	—	—	98.2	-14.4
livestock farming	97.6	—	—	—	—	—	99.0	1.4
Production of provision, drinks and tobacco goods	99.1	85.7	87.8	88.9	91.3	92.7	94.2	-4.9
including:								
production of provision and drinks	98.6	86.2	87.5	88.5	90.6	92.8	94.9	3.7
of it:								
— meat and meat produce	102.6	81.3	79.2	80.9	80.8	81.4	83.6	-19
— dairy produce and ice-cream	97.1	85.3	83.5	83.5	84.5	85.8	87.1	-10
— oil and animal fats	84.4	106.3	112.1	119.2	127.4	135.0	141.4	57
— inegridcereals and flour	111.2	100.2	104.3	103.4	100.5	96.2	94.5	-16.7
— bread and baked goods	104.2	92.0	89.3	89.5	89.2	89.6	89.6	-14.6
— drinks	103.1	78.2	81.6	82.1	86.5	91.8	96.1	-7
— processing and tinning vegetables and fruit	92.6	79.6	79.2	73.7	75.3	75.6	76.1	-16.5

**Tabuľka 1** Celková úroveň výkonových noriem poľnohospodárskej produkcie, priemyselnej produkcie potravín, nápojov a tabakových výrobkov (percentuálne vzhľadom na zodpovedajúce obdobie predchádzajúceho roka)

complementary companies and related to them organizations, located close to each other, acting in a certain sphere, that are characterized by common activity (Porter, 2002). There is also an opinion that clusters are concentrated according to regional principle forms of economic activity, performed within corresponding sectors, connected with educational infrastructure, scientific and research establishments and higher educational ones.

V. Bondarenko identifies cluster as a community of economically closely connected and closely located firms with related profiles, mutually facilitating general development and competitive ability increasing (Bondarenko, 2005). Leading role of large-scale firms and involving small- and medium-scale business for industrial cooperation and their active interacting in business and information space are meant. Generally accepted classification divides clusters into three main types:

- clusters created according to territorial similarity, to certain kind of economic performance within related subbranches. Such clusters are usually connected with scientific organizations and establishments;
- clusters created on the basis of vertical integration. The core is large-scale enterprises. Industrial connections encompass processes of supply, production, sale;
- clusters created according to branch similarity, having very high level of interaction.

What direction must enterprises clustering follow: bottom-up or top-down? Practice of creation of different consolidations of production and non-production sphere of activity is formed by one of the two ways: as a result

of implementation of state or regional programme of regional development, reorganization of state branch establishments and organizations, including them to the cluster and providing state presence in the cluster, or as a result of initiative from the side of agrarian enterprises, organizations of production and service infrastructure. In the second case the state takes no part in the functioning of such cluster.

As an integrated formation a cluster is a combination of horizontal and vertical integration, that is why it is considered to be a net agro-industrial group, whose success is conditioned by possibility and intersector activity of small and medium-scale enterprises.

Cluster structures unlike other enterprises and consolidations are characterized by the following distinctions:

- Existence of a large enterprise, which is the leader not only in industrial, but in innovation activity, and has possibilities to distinguish the development strategy of its activities as well as of activities of the whole consolidation.
- All enterprises that form the cluster function at the territory of one region.
- Existence and constant character of economic relations between all the members of cluster structure. These relations within the cluster prevail over the other relations.
- Long-term coordination of cooperation of all the cluster members within its industrial program, innovation activity, common systems of management, quality control etc.
- Clustering is a perfect ground for founding new associations, support for the sphere of education and university science.

Modern approach to regional development based on clusters meets understanding of state and regional authorities. Reforming of enterprises in agrarian sphere of Ukrainian economy led to destruction of powerful agricultural enterprises – collective and state farms. On their base numerous small and medium-scale enterprises were created. Though, economic development of some newly formed enterprises led to their consolidation, strengthening of their material and technical basis. Such enterprises show interest in studying and further usage of scientific and technical progress achievements and as well as world experience in the sphere of modern agrarian technology and engineering.

Existence of several competitive enterprises conditions competitiveness of the whole region (Grant, 2008). Clustering raises competitiveness of the region but that requires a strategic programme of region innovation development, which determines the role of such clusters. We should stress that cluster should be formed when the region has all corresponding factors, resources and competences, which have reached a certain degree of development and become significant in the current economic activity or have all the preconditions for having stable competitive advantages at the expense of higher efficiency, development of innovations, new directions and kinds of activity.

This approach is shared by A. Migryan, who distinguishes cluster as a concentration of the most effective and cooperating forms of economic activity, which is the union of interconnected groups of successfully competing firms, creating the spine of the state economic system and ensuring its competing positions on the branch, national and world markets.

Clustering is a perfect base for development of new forms of generalization and multiplying of knowledge; it stimulates the emerging of new scientific and technical directions and their industrial usage, and supports the sphere of education and university science, is used for constructive dialogue between the representatives of business sector and state, allows to higher the interconnection of private sector, state, traders, research and educational establishments in innovation process.

A cluster is characterized by the following features:

- Cluster is formed by the enterprises belonging to one industrial-engineering chain.
- Enterprises have common territorial and industrial connections.
- Cluster has modern industrial infrastructure to spread knowledge and technologies to its branches.
- The membership and structure of the cluster is flexible, without severe restrictions.
- Cluster is an open system.

Cluster policy realization is connected with the problem of economic and administrative mechanisms formation. But when enterprises are united with the single aim, it would raise competitiveness of all cluster participants at the expense of synergism. Inner specialization and standardization would also provide additional competitive advantages, minimize industrial and innovation spends.

Positive experience of agriculture cluster formation is already seen in Khmelnytsk, Vynnytsia, Ternopil, and Ivano-Frankivsk regions. These associations use regional inner resources, including resources of scientific and educational establishments, and financial and bank structures. Undoubtedly, support of the regional administrations has great importance in realization of strategic plans of the cluster.

Let us clear up the list of problems which can be solved by regional agro-industrial clusters:

- Facilitating of producing and processing enterprises interests.

- Meeting the requirements in home produced resources at the expense of inner resources and efficient redistribution of income based on inner subsidies.
- Procurement of private sector activation in growing labour-intense produce, which is unprofitable when produced by large-scale enterprises and providing the market for it.
- Introduction of complex produce quality control system and control system for resource saving usage due to the consolidation according to technological principle.
- Introduction of wasteless technologies and complex usage of saving technologies.
- Concentration of considerable financial resources for providing high investment attractiveness of the branch.

In such a way, initiative and joining of efforts of consolidation members and administration of the region are those factors which stimulate and support territorial cluster structures development.

### Conclusions

Regional cluster structures formation is a ground of development and support of competitive environment. Combination of cooperation and integration in the process of integral consolidation of agrarian enterprises is a base for stable development of the branch. Involvement of financial, intellectual, industrial resources for obtaining synergism effect would promote adaptation mechanism formation to respond the changes of macroeconomic and outer institutional environment.

### Súhrn

V rámci nášho článku vygenerujeme modely na identifikáciu klasterov na konsolidáciu podnikov podľa vertikálnych a horizontálnych princípov. V článku sa rozvíjajú rôzne aspekty klasifikácie ako sa aj identifikujú hlavne výhody aplikovaných metód. V rámci článku determinujeme spektrum problémov na riešenie z pohľadu územných a sektorových klasterov.

**Kľúčové slová:** agro-priemyselné formácie, klaster, horizontálna integrácia, vertikálna integrácia, spolupráca, malé podniky, stredné podniky, veľké podniky, konkurenčné výhody

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## DETERMINANTS OF COMPETITIVENESS OF FRUIT PRODUCTION IN SLOVAKIA DETERMINANTY KONKURENCIESCHOPNOSTI VÝROBY OVOCIA NA SLOVENSKU

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This paper deals with current issues of the most important determinants of competitiveness of fruit production in Slovakia. The economic analysis of Slovak fruit growing was based on the yield per hectare, the production systems, the costs, and the targets of performance. Total production of selected kinds of fruit was analyzed in detail, and the yields per hectare were compared with those of the EU producers. The analysis of the real costs of each type of fruit was done with the aim to find the most profitable fruit. Considerable attention was paid to the competitiveness of Slovak fruit within the EU. To ensure competitiveness of fruit it is necessary to acknowledge crucial influence of building modern irrigation systems and introducing new resistant varieties of fruit. Fruit development in Slovakia is well-founded in terms of production skills and traditions of fruit growing.

**Key words:** determinants, production potential, price, consumption, cost, competitive

Slovensko má dlhodobú tradíciu vo výrobe a v predaji všetkých druhov ovocia mierneho pásma. V druhej polovici minulého storočia na území Slovenskej republiky sme pestovali ovocie na výmere devätnásť tisíc hektárov, ktoré boli obhospodarované poľnohospodárskymi družstvami, resp. štátnymi podnikmi. Ak neberieme do úvahy samozásobovanie ovocím drobnými pestovateľmi, tak môžeme konštatovať, že v tomto období prakticky neexistuje súkromné vlastníctvo ovocných sádov. Samozásobovanie ovocím na našom území je spojené so začiatkami pestovania ovocia vôbec. Odhad výmery záhrad samozásobovania jednotlivými druhmi ovocia je približne 5,3 tisíc hektárov. I napriek uvedenej skutočnosti je situácia v odvetví výroby ovocia neuspokojivá. Vývoj plôch a produkcie má klesajúcu tendenciu, spotreba nie je pokrytá domácou produkciou, dovoz v značnej miere prevyšuje vývoz. Uvedený stav je pre rozvoj ovocinárstva neúnosný. Slovensko má nedostatočnú spotrebu v celom sortimente pestovaného ovocia mierneho pásma.

Zabezpečenie konkurencieschopnosti slovenských ovocinárov vyžaduje odstránenie faktorov determinujúcich nežiaduci vývoj ovocinárskej výroby na Slovensku. Jeden z prioritných determinantov vo výrobe je budovanie intenzívnych sádov a plantáží drobného ovocia na základe nových vedeckých poznatkov a výskumov v danej oblasti. Výber správnej rezistentnej odrody voči chorobám a škodcom sa javia ako fundamentálny faktor kvality, ktorý ovplyvňuje realizačnú cenu produktu. Vypestovanie kvalitného ovocia je závislé od zavlažovania, hnojenia a chemickej ochrany. Ďalším významným faktorom je budovanie klimatizovaných skladov s riadenou atmosférou, ktoré v značnej miere ovplyvňujú výšku realizačnej ceny ovocia.

Po vstupe do Európskej únie prišlo k zmene dotačnej podpory na ovocie čo vyvolalo pokles produkcie. Základnou pohnutkou bolo neefektívne presadenie sa na trhu, nízka rentabilita výroby vzhľadom na veľmi lacné dovozy zo zahraničia. Negatívom producentov na Slovensku je nízka organizovanosť ovocinárov, následkom čoho je, okrem iného, aj ich nejednotný postup pri obchodných rokovaniach so zástupcami obchodných refazcov a spracovateľov ovocia.

Obnova a výsadba nových sádov pri poskytovaní dotácií a tiež príspevkov z Európskej únie vytvára priestor pre výrobu

kvalitného a rentabilného ovocia, ktoré bude možné realizovať hlavne na domácom a zahraničnom trhu. Znižovanie nákladov a zvyšovanie produktivity práce je možné iba pri štíhlych vretienách a zahustených výsadbách, ktoré sú v súčasnom období najintenzívnejším spôsobom pestovania jabloní.

### Materiál a metódy

Cieľom nášho príspevku je prostredníctvom analýzy identifikovať rozhodujúce determinanty konkurencieschopnosti výroby ovocia na Slovensku. V podmienkach trhovej ekonomiky so zameraním na výsadbu intenzívnych sádov, produkciu, spotrebu, dovoz, vývoz, náklady, realizačné ceny a intenzifikačné faktory. Sledovali sme súčasný stav ovocinárskej výroby celého diapazónu ukazovateľov nákladovosti a efektívnosti. Analyzovali sme kalkulácie vlastných nákladov jednotlivých druhov ovocia, ktoré sme získali od dlhoročných a uznávaných slovenských pestovateľov ovocia. Značnú pozornosť sme venovali jablkám – najrozšírenejšiemu druhu ovocia čo do objemu produkcie, ale aj spotreby, ktoré sa pestuje na takmer štyroch tisícoch hektárov ovocných sádov. Pre hodnotenie ekonomickej efektívnosti ovocných sádov a návratnosti prvotného vkladu na výsadby jablonoňových sádov sme použili statické, ale aj dynamické ukazovatele hodnotiace investičné projekty. V článku analyzujeme obdobie rokov 2003 až 2008. Pri získavaní podkladových údajov sme využili materiály z VÚEPP, Ministerstva pôdohospodárstva SR, Štatistického úradu SR a z internej evidencie poľnohospodárskych podnikov a súkromných pestovateľov ovocia.

Podkladové údaje sme spracovali s podporou štandardných metód analýzy, syntézy, komparácie a indexovej metódy.

### Výsledky a diskusia

Počas sledovaného obdobia rokov 2003 až 2008 bola úroda pri všetkých druhoch ovocia kolísavá, pričom najnižšia bola dosiahnutá v roku 2007 vplyvom nepriaznivého počasia. Nočné



mrazy na začiatku mája v značnej miere znížili úrodu. Expertný odhad tohto nepriaznivého vplyvu na úrodu stromov a kríkov bol asi 26 %. Najvýraznejšie sa nepriaznivý vplyv počasia prejavil pri broskyniach, kde úroda klesla približne o polovicu, pri jablkách o 32 % a drobnom ovocí o 10,8 %.

V roku 2008 sme zaznamenali druhú najvyššiu úrodu v sledovanom období, pričom najvyššiu zaznamenávame v roku 2003. Ročný nárast úrody v roku 2008 bol 64,82 %. Najvýraznejšou mierou k tomu prispela takmer dvojnásobná produkcia jablák (+94,29 %), vysoká produkcia broskýň (+75,53 %), marhúl (+38,16 %) a hrušiek (+27,77 %). Takisto vzrástla produkcia jahôd, čerešní, hrozna stolového, višní a sliviek. Úroda ostatných druhov ovocia klesla od -26,32 % (maliny šľachtené) po -2,61 % (ríbezle).

Jadroviny predstavujú 75,95 % produkcie, z toho takmer celý objem tvoria jablká, hrušky predstavujú len 4,92 %. Z ostatných päť rokov sa striedal vzostup a pokles ich úrody, najvýraznejší nárast dosiahla ich produkcia v roku 2008, takmer 90 %, ale nedosiahla objem z roku 2003. Jablká tvoria 72,22 % z celkovej produkcie ovocia.

Druhým ovocím s najvyšším podielom produkcie z celkovej produkcie ovocia boli slivky (8,03 %) a broskyne (5,62 %). Vývoj produkcie jadrovín bol od roku 2003 (okrem roku 2006) klesajúci, v roku 2008 dosiahol nárast o 20,18 %. Z tejto skupiny ovocia tvoria slivky 39,19 % a broskyne (27,44 %).

Objem úrody bobulového ovocia mal počas rokov 2003 až 2007 klesajúci trend, v roku 2008 dosiahol ročný nárast 4,64 %. Najvýznamnejším ovocím z tejto skupiny sú jahody (40,32 %) a ríbezle (30,46 %).

Jedinou skupinou ovocia, ktorá v roku 2008 dosiahla v produkcii pokles (-6,84 %), sú orechy. Vlašské orechy tvoria 96,92 % podiel z tejto skupiny, ostatný podiel patrí lieskovým orechom.

Výrazný pokles domácej produkcie, ktorý sa prejavil i v produkčných sadoch je zrejmý z tabuľky 1, počas sledovaného obdobia bola najnižšia úroda v roku 2007. Aj v tomto prípade dominujúcou príčinou neúrody bolo nepriaznivé počasie. Neúroda bola kompenzovaná dovozom, čo vyvolalo 100 % nárast spotrebiteľských cien pri vybraných druhoch ovocia (jablák).

Pri analýze priemerných hektárových úrod sme zistili, že v produkčných sadoch hektárové úrody nedosahujú požadované hektárové úrody pri jednotlivých druhoch ovocia a ich kultivaroch. Výhody geneticky daných výkonnosti odrôd sú

v slovenských podmienkach využívané iba na 30 až 40 % (Porhajaš, 2002). Nové pestovateľské systémy zaručujú producentom vysoké úrody z jednotky plochy 30–45 t.ha<sup>-1</sup> pri výrobe jablák v závislosti od odrody. Na Slovensku v rokoch 2003 až 2008 boli dosahované úrody od 9,68 do 12,20 t na hektár. Tieto výsledky poukazujú na doteraz málo využívané rezervy zvyšovania technickej a ekonomickej efektívnosti pestovania ovocia.

Na celkovej spotrebe ovocia sa najväčšou mierou podieľa spotreba južného ovocia (57,71 %). Spotreba ovocia mierneho pásma predstavuje 36,65 % na celkovej spotrebe ovocia, spotreba hrozna a rovnako aj ostatného tropického a subtropického ovocia 5,64 %. Spotreba ovocia mierneho pásma v roku 2007 bola rovnaká ako v predošlý rok. Najvyššiu spotrebu z tohto druhu ovocia vykazujú jablká (57,92 %), broskyne (11,31 %, ostatné mäkké ovocie (8,14 %) a hrušky (5,43 %). Z južného ovocia majú najvyššiu spotrebu pomaranče (34,20 %), nasledujú banány (24,71 %) a mandarínky (18,10 %).

Najvyšší medziročný nárast spotreby ovocia bol zaznamenaný pri spotrebe višní (100 %), mandarínok (64,54 %), jahôd záhradných (37,50 %), ríbezlí a kivi (33,33 %) a banánov (26,47 %). Naopak, pokles v spotrebe sa prejavil pri marhuliach (-64,29 %), slivkách (-28,57 %) a ostatnom mäkkom ovocí (-21,74 %).

Spotreba ovocia veľmi výrazne zaostáva oproti bývalým krajinám Európskej únie a preto je žiaduce uvedený stav zmeniť. Odporúčaná dávka ovocia na obyvateľa Slovenska predstavuje 96,7 kg, pričom priemerná spotreba ovocia u nás dosahuje len 50,5 % z priemernej spotreby v EÚ (112,8 kg). Pri analýze spotreby ovocia na obyvateľa sme vychádzali zo súčasného stavu ovocných sádov, ktorých sa v roku 2008 na Slovensku pestovalo v celkovej výmere 9 602,4 hektárov. Z uvedenej celkovej výmery čistá pestovateľská plocha predstavuje 8 505,6 hektárov. Z čistej výmery na intenzívne sady pripadá 5 686,7 hektárov (68 %) a zvyšok tvoria extenzívne sady. Produkčná výmera sádov tvorí 6 712,7 hektárov, čo predstavuje 78,9 % z čistej výmery, ale vysokú agrotechnickú úroveň má iba 3 969,75 hektárov. Z uvedeného stavu vyplýva, že na Slovensku sa nevenuje dostatočná pozornosť ovocinárskej výrobe (Hričovský, 2004), čo sa prejavuje na celkovom objeme produkcie, ktorá sa pohybuje od 90 133 ton v roku 2003 do 74 572 ton v roku 2008. Ak vychádzame z odporúčanej dávky spotreby ovocia na obyvateľa, celková produkcia mala z domácej výroby dosiahnuť 478 286 ton pri výmere sádov 35 360 hek-

**Tabuľka 1** Bilancia výroby a použitia ovocia mierneho pásma na Slovensku v tonách

Ukazovateľ (1)	Skutočnosť (2)						Index 2008/2003
	2003	2004	2005	2006	2007	2008	
Domáca produkcia (3)	90 133	62 544	64 528	62 043	45 900	74 572	0,83
Z toho: produkčné sady (4)	41 131	38 394	41 289	38 171	22 316	48 762	1,19
Dovoz (5)	49 275	69 214	75 517	74 461	114 405	96 016	1,95
Celková ponuka (6)	139 408	11 758	140 045	136 504	160 305	170 588	1,22
Dodávky pre spracovanie priemyslu (7)	14 971	5 476	5 429	6 000	6 364	7 600	0,51
Priama spotreba (8)	110 177	106 919	102 634	100 000	101 397	125 600	1,14
Straty (9)	3 316	5 691	62 89	1 744	18 217	7 448	2,25
Vývoz (10)	10 944	13 672	22 756	28 760	39 327	29 940	2,74
Celkové použitie (11)	139 408	131 758	140 045	136 504	160 305	170 588	1,22

Zdroj: Štatistický úrad SR, VÚEPP

Source: Slovak Statistical Office, VUEPP

**Table 1** Mild climate fruit production and usage levels in Slovakia (tons)

(1) indicator, (2) real indicators, (3) domestic production, (4) out of this: production orchards, (5) import, (6) total supply, (7) raw fruit for processing industry, (8) primary consumption, (9) loss, (10) export, (11) total usage

tárov. Záhradkársky zväz vykazuje výmeru 5 300 hektárov ovocných sádov, ktoré sú súčasťou záhrad (79 tis.ha<sup>-1</sup>).

Výšky odbytových cien sú fundamentálnym faktorom zvyšovania spotreby ovocia na obyvateľa. Kúpna sila obyvateľstva v značnej miere ovplyvňuje spotrebu vybraných druhov ovocia z domácej produkcie. V súčasnom období sa spotrebiteľ začína orientovať na kvalitu a zdravotnú nezávadnosť ovocia. Ekologickejšia výroba ovocia na Slovensku dáva predpoklady a možnosti nášmu ovocinárstvu presadiť sa na náročnom európskom trhu a tiež exportovať vybrané druhy ovocia do iných štátov mimo EÚ. Uvedené tvrdenie môžeme podložiť množstvom chemických zásahov proti škodcom a chorobám, ktoré ak porovnáme s krajinami EÚ, Slovensko vykazuje podstatne nižšiu spotrebu uvedených prípravkov na ochranu a hnojenie.

Zakladanie intenzívnych sádov je fundamentálnou úlohou pestovateľov ovocia pre zabezpečenie konkurencieschopnosti v rámci nášho štátu a Európskej únie, ak sa chce Slovensko vrátiť na bývalé pozície v oblasti výroby, spotreby a exportu. Zabezpečenie uvedenej úlohy je možné iba budovaním intenzívnych sádov. V súčasnom období extenzívne sady nie je žiaduce z hľadiska efektívnosti výroby, kvality a návratnosti vynaložených prostriedkov budovať.

Pri zakladaní intenzívnych jablňových sádov sa takmer na 100 % využíva pestovateľský systém tzv. „štíhle vreteno“, ktoré sa odporúča vysádzať v sponě 3,0 až 3,5 x 0,8 a 1,5 m v závislosti od odrody a jej rajonizácie. Výber stanovišťa a jeho konfigurácia má vplyv na úrodu, dostupnosť v obrábaní a organizáciu práce. Odrodové zastúpenie v nových sadoch by malo zohľadňovať ponuku a dopyt po preferovaných odrodách a ich sfarbení (zelená, červená). Výber podpníkov je priamo závislý od výšky priamych nákladov na pestovanie sádov. Ak je nesprávne vybraný slaborastúci podpník, môže sa to prejavovať na výške, ale aj kvalite produkcie. V súčasnom období je najrozšírenejší slaborastúci podpník označený ako M9. Na Slovensku za posledných 5 rokov sa zvýšili výdavky na budovanie intenzívnych sádov zo 700 tisíc Sk na 950 tisíc Sk na hektár. Náklady na závlahy sa výrazne nezmenili a predstavujú 110 až 120 tisíc Sk na hektár. Náklady na výsadbu sadbového materiálu sa zvýšili o asi 50 %. Veľmi dôležitý intenzifikčný faktor predstavujú náklady na chemickú ochranu a hnojenie ktoré vzrástli približne o 40 %. Osobné náklady rástli len mierne. Celkové náklady na produkciu počas sledovaného obdobia v porovnaní s minimálnym rastom až stagnáciou realizačných cien rástli dynamickejšie. Dôsledkom tohto vývoja bola zvýšená návratnosť pôvodného investičného vkladu na založenie sadu

na 6 až 7 rokov rodivosti. Zníženie návratnosti je možné dosiahnuť výstavbou skladov ovocia, čím budú vytvorené predpoklady na zvýšenie ekonomického efektu z realizovanej produkcie.

Náklady sú rozhodujúcim faktorom ekonomickej efektívnosti a teda aj podnikovej úspešnosti (Bielik, 2001). Vývoj priemerných nákladov na kilogram ovocia za obdobie rokov 2003 až 2008 uvádzame v tabuľke 2.

Pri posudzovaní nákladov za sledované obdobie sme zistili, že vstupy mali plynulý nárast. Náklady na zahustené intenzívne sady sa pohybovali od 118 do 147 tis. Sk pri úrode 20–25 ton z hektára. Pri použití pestovateľského systému „štíhle vreteno“ vlastné náklady na hektár sadu oscilujú okolo 180 tisíc Sk pri úrode 35 ton a viac.

Analýzou kalkulácie vlastných nákladov sme zistili, že osobné náklady na výrobu 1 kilogramu jablák predstavujú 22,3 % z celkových vlastných nákladov (8,16 Sk.kg<sup>-1</sup>). Ak berieme do úvahy i osobné náklady vynaložené na zber jablák percentuálny podiel na vlastné náklady je až 29,1 %. Uvedený stav môžeme znížiť racionálnym využívaním pracovného času a zvýšením produktivity práce (Bielik, 2001). V súčasnosti v podniku jeden zamestnanec za smenu dokáže pozberať 800 až 1 200 kilogramov jablák, v zahraničí výkon za smenu a jedného zberača predstavuje 1 500 až 1 800 kilogramov. Spotreba chemických ochranných prostriedkov sa na celkových vlastných nákladoch podieľa 17,2 %.

Pri zakladaní nových intenzívnych sádov je možné zaraďovať do odrodovej štruktúry rezistentné kultivary jabloní. Pestovanie progresívnych rezistentných odrôd jabloní dáva predpoklad na radikálne zníženie nákladov na chemickú ochranu. Pri bežných kultivaroch je nutné chemickú ochranu vykonávať minimálne 12 až 15-krát. Zmenou odrodovej štruktúry v novozaložených sadoch je potrebné chemicky ošetrovať iba maximálne 3 až 5-krát (Porhajaš a Adamičková 2007). Z uvedeného vyplýva, že náklady na chemickú ochranu môžeme v budúcnosti znížiť o dve tretiny, čo v peňažnom vyjadrení činí 0,91 Sk na jeden kilogram. Znížením nákladov na chemickú ochranu sa zvýši zisk približne o 0,91 Sk na kilogram. V tabuľke 3 uvádzame vývoj realizačných cien v období rokov 2002 až 2008.

Z vývoja priemerných realizačných cien vyplýva ich pozitívny rast okrem roku 2008. Ak hodnotíme ekonomickú efektívnosť jablňových sádov, môžeme vysloviť názor, že pestovanie uvedeného ovocia je veľmi ziskové. Zisk z jedného hektára sa pohybuje od 70 do 120 tis.Sk, v závislosti od zvoleného systému pestovania odrody a výšky produkcie z jednotky plochy. Pri

**Tabuľka 2** Vývoj priemerných nákladov jablák na kilogram ovocia v rokoch 2002–2008

Roky (1)	Náklady v Sk.kg <sup>-1</sup> (3)							Index 2008/2002
	2002	2003	2004	2005	2006	2007	2008	
Ovocný druh (2)								
Jablá (4)	6,90	6,85	7,35	7,50	7,83	8,06	8,16	1,18

Zdroj: vlastné prepočty

Source: own calculations

**Table 2** Tendencies in development of average costs of apples per kilogram in the period 2002–2008  
(1) years, (2) fruit category, (3) costs in SKK.kg<sup>-1</sup>, (4) apples

**Tabuľka 3** Vývoj priemerných realizačných cien v rokoch 2002 až 2008

Roky (1)	Náklady v Sk.kg <sup>-1</sup> (3)							Index 2008/2002
	2002	2003	2004	2005	2006	2007	2008	
Ovocný druh (2)								
Jablá (4)	10,50	10,80	10,35	10,70	11,10	12,90	11,40	1,08

Zdroj: vlastné prepočty

Source: own calculations

**Table 3** Apple sale price tendencies in the period 2002–2008  
(1) years, (2) fruit category, (3) costs in SKK.kg<sup>-1</sup>, (4) apples

dodržaní technológie pestovania v uvedených systémoch pestovania vykazujeme od 80 do 85 % výberu z I. triedy, čomu zodpovedá i realizačná cena. Pri znížení nákladov hlavne v oblasti chemickej ochrany jablňových sádov sa môže zisk zvýšiť o  $0,91 \text{ Sk.kg}^{-1}$ . Pri priemernej úrode 30 ton na hektár sa zisk zvýši približne o 27 tis.Sk.

Uvedené zníženie nákladov zníži dobu návratnosti novovybudovaných produkčných sádov. Znížením vlastných nákladov a hlavne chemickej ochrany sa vytvoria predpoklady na zníženie vstupov a zvýšenie kvality jablák. Odbytové ceny pre výrobcov ovocia sú hlavným impulzom pre zakladanie intenzívnych sádov. V novozaložených sadoch by jablone mali mať dominantné zastúpenie a extenzívne sady by sa mali postupne likvidovať.

### **Ekonomická analýza drobného ovocia**

Pri analýze ekonomiky výroby ríbezlí na Slovensku sme vychádzali z celkovej produkcie a nákladov, ktoré boli vynaložené pri produkcii ríbezlí. Dôležitým atribútom pri technologicko-ekonomickom hodnotení ríbezlí boli agrotechnické a ďalšie pestovateľské požiadavky na založenie a prevádzkovanie ríbezlí. Ak chceme, aby výroba ríbezlí bola úspešná a efektívna je nutné akceptovať nasledovné požiadavky:

- červené ríbezle sú náročné na vlahu,
- čierne ríbezle znášajú suchšie oblasti,
- optimálny rast ríbezlí je zabezpečený pri pH 5,5–7,5,
- červeným ríbezlím vyhovujú polohy od 200 do 600 metrov nad morom čiernym ríbezlím vyhovujú polohy do 350 metrov nad morom.

Vzdialenosť radov závisí od intenzity rastu danej odrody a preto sa odporúča vzdialenosť medzi radmi 3 m, pri vzpriamene rastúcich odrodách až 3,5 m, pričom vzdialenosť medzi jedincami v radoch je od 0,6 do 0,8 m. Počet kríkov na hektár sa pohybuje od 3 570 do 5 550 ks, pritom cena jedného kríka bola vo výške od 45 do 50 Sk za kus. Celkové náklady na biologický materiál predstavovali  $178\,500 \text{ Sk}$  až  $277\,500 \text{ Sk.ha}^{-1}$ . Náklady na výsadbu a hnojenie sa pohybuje približne na úrovni 35 000 tisíc na hektár. Celkové náklady na založenie ríbezlíovej plantáže sú v intervale od 221 000 Sk do 319 000 Sk na hektár. Náklady na projektové a prieskumné práce predstavujú 5 525 až 7 975 Sk, čo je asi 2,5 % z celkových nákladov na založenie plantáže. Vybudovanie závlahy na jeden hektár predstavuje cca 110 tis.Sk, vrátane 7 % rozpočtovej rezervy.

Ekonomicky efektívne pestovanie ríbezlí je v značnej miere závislé od agrotechniky a výberu vhodnej, pre daný región rajonizovanej odrody. Veľkoplodé odrody typu Detvan, ktoré dosahujú priemernú úrodu 10 kg na ker, Tatra 17 kg na ker, Maraton 10–12 kg na ker a Hron 10 kg na ker. V čase kvitnutia sa odporúča rozmiestniť 6 včelstiev na hektár. Ide hlavne o čierne ríbezle, kde sa zvyšuje úroda o 30 a viac percent. Pri analýze priemernej produkcie ríbezlí na Slovensku sme zistili, že v sledovanom období úrody na jeden ker sa pohybovali od 0,5 kg v roku 2003 do 0,12 v roku 2008.

Veľmi dôležitým intenzifikačným faktorom je závlaha, ktorá rozhodujúcou mierou ovplyvňuje produkciu, kvalitu, a teda aj cenu hodnoteného drobného ovocia. Zavlažované plantáže vykazujú produkciu vyššiu o 30 až 60 %, a to v závislosti od klimatických podmienok. V našich podmienkach sa odporúča dodať  $1\,000\text{--}1\,500 \text{ m}^3.\text{ha}^{-1}$  v troch až piatich dávkach (25–40 mm).

Pri ručnom zbere možno vychádzať z nasledovných výkonností na jedného zamestnanca v závislosti od odrody:

- čierne ríbezle  $3\text{--}5 \text{ kg.h}^{-1}$ ,
- červené ríbezle typu Jonkheer van Tet's  $5\text{--}6 \text{ kg.h}^{-1}$ ,
- červené ríbezle typu Detvan, Tatra a.i.  $10\text{--}15 \text{ kg.h}^{-1}$ .

Pri dosahovaných priemerných úrodách je potrebné na 1 ha ríbezlí vynaložiť 2 200 odpracovaných hodín. Zavádzanie mechanizácie intenzifikuje pestovanie ríbezlí na plantážach čím môžeme niekoľkonásobne zvýšiť produktivitu práce a ušetriť 50 % nákladov vynaložených na živú prácu. Pri vhodnom odrodovom zastúpení a priemernej úrode červených odrôd 10–14 t môžeme v sezóne minimálne zozbierať 40 ha a tým ušetriť 250–300 pracovníkov. Osobné náklady na zber pri priemernej úrode 10 t a pracovnom výkone 80–120 kg za smenu sa pohybujú od 66 640 do 90 000 Sk na hektár v závislosti od výšky produkcie. Celkové náklady na produkciu ríbezlí sa pohybujú od 129 600 do 153 000 Sk na hektár. Priemerná realizačná cena červených ríbezlí je  $17 \text{ Sk.kg}^{-1}$  a tržby pri intenzívnych odrodách sa pohybujú od 170 000 po 204 000  $\text{Sk.ha}^{-1}$ , ak sú dodržané všetky technologické postupy pestovania. Zisk pre producenta je adekvátny k vynaloženým nákladom.

Pri hodnotení čiernych ríbezlí vychádzame z produkčnej schopnosti, ktorá sa pohybuje na úrovni 5 ton z hektára pre realizačnej cene 25–30 Sk za kilogram. Celkové náklady na výrobu predstavujú 85 600 na hektár, pritom tržby sa pohybujú od 125 000 do 150 000 Sk na hektár. Aj v tomto prípade sa využívaním modernej zberovej techniky môžu pracovné náklady znížiť až o 50 % a zisk, sa adekvátne zvýši.

### **Záver**

Pri hodnotení konkurencieschopnosti výroby ovocia na Slovensku sme zaznamenali relatívne straty na výnosoch plynúce z nedostatočne využívaných poznatkov o faktoroch, ktoré pozitívne determinujú technickú ako aj ekonomickú efektívnosť výroby ovocia. Ekonomicky efektívne pestovanie jablňových sádov je možné v súčasnosti iba intenzívnym spôsobom, ktorý pri dodržaných technologických postupoch výroby zabezpečí producentom vysokú úrodu 35–45 ton z hektára.

Pestovanie drobného ovocia patrí medzi intenzívne odvetvia ovocinárstva, na ktoré je potrebné vynakladať značný objem prostriedkov. Možnosti znižovania osobných nákladov predpokladáme zavádzaním špeciálnej mechanizácie na zber. Rozšírením pestovania výroby drobného ovocia na vidieku, ale aj jeho spracovania sa vytvoria nové, minimálne sezónne pracovné miesta. Drobné ovocie sa môže stať zaujímavým exportným artiklom.

Slovenské ovocinárstvo v konkurencii Európskej únie uspeje ak bude investovať do intenzívnych sádov a plantáží drobného ovocia.

### **Súhrn**

Príspevok je zameraný na aktuálne otázky najdôležitejších determinantov konkurencieschopnosti pri výrobe ovocia na Slovensku. Pri analýze ekonomiky výroby ovocia sme vychádzali z hektárových úrod, systémov pestovania, nákladov a realizačných cieľov. Podrobne sme analyzovali celkovú produkciu vybraných druhov ovocia a komparovali sme výsledné ukazovatele intenzity výroby u nás a v EÚ. Analýzou vlastných nákladov a výnosov poukazujeme na rentabilitu výroby jednotlivých druhov ovocia. Na zabezpečenie konkurencieschopnosti ovocinárstva má rozhodujúci vplyv budovanie moderných závlah a zavádzanie nových rezistentných odrôd ovocia do výroby. Rozvoj ovocinárstva má na Slovensku opodstatnenie z hľadiska produkčnej schopnosti a tradícií výroby ovocia.

**Kľúčové slová:** produkčná schopnosť, ceny, spotreba, náklady, konkurencieschopnosť



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## NEW ECONOMY AND SOCIAL RESPONSIBILITY IN ENTREPRENEURSHIP IN PROCESSES OF ECONOMIC GLOBALIZATION

### NOVÁ EKONOMIKA A SOCIÁLNA ZODPOVEDNOSŤ PODNIKANIA V PROCESOCH EKONOMICKEJ GLOBALIZÁCIE

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Globalization modifies a concrete way of creating New Economy which is the economy with modern communication networks, where competitiveness is determined by the ability to transform information into knowledge and intelligence. In times of economic globalization and foundation of so-called „New Economy“ it is expected that Man will have possibilities to spread freely, utilise and accept information and knowledge, use potential of information-communication technologies not only on behalf of economic growth but also for provision of sustainable development, improvement quality of life and protection of human rights. Except of the fact that New Economy brings new opportunities for satisfying human need, it also brings some risks and negative moments. Its task is to focus the attention not only economic growth but also on economic development and responsible replies to the questions for example, if it provides dignified conditions for citizens of modern world; what is the role of entrepreneurship in development of countries but also in the whole planet; and also to consider the ways by which entrepreneurial subjects try to satisfy human need, the ways by which the profit is divided, as well as the work and social product among particular participants in the market or among all the citizens of our planet. Social responsibility of entrepreneurship becomes the global challenge for all the entrepreneurial subjects. Their duty is to get adjusted to new conditions of the global market and try to profit by the socially responsible actions.

**Key words:** new Economy, economy globalization, social responsibility, entrepreneurial subjects, global market

Globalization as one of the most significant processes, characteristic for the recent development in the world, influences directly or indirectly all the spheres in life of the society and it is a dominating tendency in the development of the world economy as well. However, globalization means, first of all, the development of economic relations in the world-wide, global scale, great attention is paid to Economic globalization. Also the term 'globalization' was firstly used by Theodor Levitt, professor at Harvard University, who used it in 1983 in connection with economy. Even if it is connected with economy,

its extent is much broader, it influences social and cultural, technological, ecological and other conditions. And thus, today, we can consider not only new characteristics of world economy, so called 'new economy'<sup>1/</sup>, which is the product of globalization and is of a global character. We can consider development of

<sup>1/</sup> Or as Knowledge Economy. This English term has been used in Europe and it is translated differently as knowledge, knowledge-oriented or educational economy

economic relations in the whole world, global scale, innovative entrepreneurship, broadening the global trade, significant 'sharpening' of international competition, volume growth in international production or increasing flows of direct investments, growing integration of financial markets, etc. In connection with running processes on the global market, there is also the need for considering the societal responsibility, to take responsibility for running of these processes and definitely for consequences. Even as it seems, that the consequences of the current wave of globalization are more or less positive (saving of material, energy, work force and implementation of new technologies, products, quality innovation, price differentiation, etc.) and enable development of the global economy; economic, social, ecological and overall societal impacts of economic globalization do not bring only positives and more fears are connected with them.

Economic globalization is thus in ambivalent term. Its impact is, undoubtedly, the support of free market, which is generally accepted, because it causes increase in effectiveness and productivity. The ideology of a free market is nowadays in the world enthusiastically accepted and it plays an important role in the human life and life of societies; however, some questions arise: Which human needs and to such extent should be fulfilled; where and how to state the limits of consumption of limited natural sources or how to provide technical development, productivity; how to reasonably use energetic sources and many others. They point at the need to take responsibility for decisions, actions and behaviour exceeding legally-binding legally-binding sanctions. First of all, it focuses on the societal responsibility in relation with society and generally to the mankind as the whole, and thus also the responsibility to the nature. The new economy, which is characterized as "global economy", the economy developing in the world-wide level preferring non-material goods, i.e. first of all the intellectual production and information processing (knowledge economy); it must satisfactorily give answers to some questions. For example – if it is able to provide dignified conditions for citizens of the modern world; which role it plays in the societal development; how should the profit be divided, as well as work and societal product among participants of the market taking into consideration the fact that every one has the right for the dignified life and treatment. The globalizing market is not able to solve many problems of people in societies and "invisible hand of the market", which should provide meeting the needs of all, does not work reliably. For example, the market is managed by the prices which cannot adequately express social human values and similarly – the market can no answer the questions if in some cases, if it is not evoking his "pseudo-needs" rather than fulfilment of human needs. Similarly, there are questions if it is possible to judge the quality of life by economic indicators, or how we can "measure" welfare which can be reached for example also by inadequate exploitation of limited natural sources.

Considering societal responsibility of entrepreneurship<sup>2/</sup> is connected with the fact the entrepreneurship represents the

public concern, as well as the consequences of entrepreneurial actions are societal. Despite that, there are different opinions on the problem of socially responsible entrepreneurship and also with the understanding of that problem.<sup>3/</sup>

A significant progress in enforcement of the concept of societal responsibility of companies on European level was brought by EU Lisbon Summit. The delegates determined the strategic target for Europe – to become until 2010 the most dynamic and competitively the most effective knowledge economy in the world, which will ensure the permanent economic growth with better and more work places and with higher social solidarity. At the same time, they agreed on the fact that the concept of societal responsibility can become the significant instrument for reaching the strategic target.

World Business Council for **Sustainable Development** nowadays understands the societal responsibility in entrepreneurship as a "commitment to contribute to sustainable economic development, to the work with employees, their families, local community and society in general, in order to improve the quality of their lives" (Holme and Watts, 2000). An emphasis has not only been put on economic growth but mainly on economic development, increase of quality of life, whereby it requires to take into account the groups taking parts in entrepreneurship and also the groups, which are affected by the entrepreneurship. However, in so called "new economy",<sup>4/</sup> first of all, the economic growth is considered, which is also thought of the synonym of increasing the living standard. It is used in connection with new developments in the field of global information and communication systems where the economic growth and structural changes depend mainly on abilities of people to work with information. Information and knowledge have become the determination factors and also the competitiveness of economies is still more and more determined by the ability to transform information into knowledge and intelligence.

The main form of capital in New Economy; which is the product of globalization and sometime carries the attribute "soft"; are information, knowledge which are directly transformed into innovations. It represents the level of economic development, in which the values are created by knowledge and qualification and in which the Internet, databases and telecommunication represent the key commodities in mutual relations among the subjects and they have a big influence on transformation of current economy. New Economy is the economy with modern communication networks, built on strong regional groups and competitiveness is determined by the ability to transform information into knowledge and intelligence and that is based on versatile use of human creativity. There are no doubts that this type of economy represents turbulent competitive environment, as E. Luttwark states, so-called "turbo-capitalism", which is produced and offers extensive number of products in incredibly short time. (Šikula, 1999). The consequence of accelerating influence of information communication Technologies is the

<sup>2/</sup> Modern history of Corporate social responsibility – CSR - started to appear in the 1950s and the ideas of responsible entrepreneurship got in the Professional literature. In 1953 Howard R. Bowen who is generally thought to be the first theoretical of corporate social responsibility, mentioned in his book *Social Responsibilities of the Businessman*, that corporate responsibility represents efforts of businessmen to reach such strategies and decision or providing such activities, which are needed from the point of view of aims and values of our society.

<sup>3/</sup> For example the opinions of O. Sheldon, M. Friedman, H. Ford, P. Druckner, R.C. Solomon and others.

<sup>4/</sup> Theorists of new economy claim that it started in the period of the beginning of the seventies of 20th century and they connect it with the introduction of information society and thus also with reorganization of economic order. Among the main theorists of new economy belong Robert Atkinson, Don Tapscott, Lester Thurow, Robert Reich, Joel Kotkin, John Aic, Randolph Court, Joseph Ward, Stephen Herzenberg, Albert Gore, George Gilder and others

qualitative change of the character of society from the industrial into information one, whereby the transfer from the industrial society to the information one is of a global character.

The common vision of information society is the orientation on people, we expect that every man will have the opportunity to spread, use and accept information and knowledge, use the potential of information-communication technologies (IKT) not only on behalf of economic growth but mainly because of improvement of life quality, human right protection as well as provision of sustainable development.<sup>5/</sup>

New Economy searches for the models and approaches creating profit but at the same time they follow the social and ecological targets. There is the question if the economy comes out of the fact that the prosperity of society is based on three pillars – on economic prosperity, social capital and quality of environment. On behalf of life quality increase in the world, none of these pillars should be developed at the counter of the others. And thus, it is expected that New Economy will besides the economic prosperity, follow also other criteria (humanity, social responsibility, undisturbed environment), otherwise it will not serve to the common welfare in spite of the fact that it will fulfil the criteria of effectiveness and it will provide the economic growth. In terms of requirements for social responsibility of economic activities, which represents a commitment of businessmen to strive for such strategies, make such decisions or provide such activities, which are required from the point of view of the targets and values of our society; New Economy is supposed to search and reinforce innovation economic instruments with positive ethical and social impact, as well as to find also new possibilities for finding place for man in different fields of economy, even though new work place will probably more and more depend on information proceeding. The global market should not only be the economic agent, but it should provide every man with opportunities to fulfil different needs for the realization of personality. At the same time, we cannot forget the fact that such a market puts great demands on particular entrepreneurial subjects out of which not everyone can face them adequately. (Ibid, p. 27) All the entrepreneurial subjects on the market are not equally able to adjust to permanent changes and there are the differences among those which have an access to new technologies, to information and those which do not have it. We cannot forget the fact that except of new opportunities to fulfil human need, the globalization brings also some risks and negative moments regarding to which it is necessary to think of social responsibility of entrepreneurship on the global market. As for example: Rolný I. And Lacina L. state that: "The current state of economic growth, mainly a disproportion between developed countries and the countries of the third world and it has become the global ethical challenge" (Rólný and Lacina, 2004). Gradual Globalization is accompanied by hard-fisted competition and unlimited reinforcement of purposely oriented liberalization and it causes the total freedom of international capital movement. And it was expected that economic globalization will influence all the parts of the world and in all the countries it will try to create equal conditions and liberalization will improve the allocation of world capital in a way that it will lead the flow of financial means from the rich countries into the poor ones.

The efforts to create the global competitive environment thus face different problems. With the fact that globalization

supported the creation of new and more powerful multinational companies, the economic power was given into the hands of mega-corporations, which in the great extent, influences the economic competition. Big corporations are able to invest huge money into research of information, communication systems and technologies, with the help of which they control and influence processes on the global market and there is the question if it is possible to find, beyond these groups, also some efforts to help poorer countries. According to the critics of globalization, there is a bipolarization of the world, i.e. some division into the rich and powerful countries on the one hand, and to the poor and dependant countries, on the other hand, whereby so-called global outer-class – i.e. the global, socially excluded class is on its increase. The rich countries are those, which have become homes for the corporations appearing as multinational and they provide investments abroad, and the poor countries are those, which accept investments from abroad and their economy gradually becomes dependant on other countries (host countries).

Antiglobalists point at the fact, that short-term and partial interests of multinational corporations are in clash with the long-term and complex interests of the countries. The countries, where the foreign corporate dominate, they gradually become dependent on their economic strategy, by which their sovereignty is weakened and disrupted. They must often give up their sovereignty in the globalizing world or their sovereignty is limited by the power of other relevant agents.

The critics of globalization find it irresponsible when the economic growth makes the world dependent on economy and all the spheres of life become subordinated to economic principals. Meanwhile, some people admit, that the globalization help reach higher economic growth, but at the same time, they add that for many economic subjects and countries, the access to the world market is very difficult. Not all the countries, not all the economic and entrepreneurial subjects, as well as not all the people are able or will be able to feel the advantages of globalization. And some assume that globalization leads to the increase in unemployment, decrease of wages or the offer of such products and services, which are actively evoked or artificially made. According to them, unemployment arises, in the great extent, mainly with the help of implementation of new technologies with the decreasing work demand and also with the departure of capital from maternal developed countries into countries with the lower level of wages. Globalization thus brings not only economic growth, development of business but also the whole openness of economies, growing integration of international markets, which is accompanied by the growing volume of shifts of products, services and capital across the national borders, broadening of entrepreneurial investments, finance, production, sale or information across the national borders, growing international division of labour and some other advantages, but at the same time, it brings many inequalities. Because of the fact, that the new economy is the economy of high technologies, innovations and sophisticated services, knowledge jobs, which require new jobs and the higher education, one of the problems is that there are cases when highly qualified workers leave the country and the country counts with them as with the human capital.<sup>6/</sup> In connection with this, there is a problem

<sup>5/</sup> J. Stadtruckerová: Informačná spoločnosť – globálna výzva v novom miléniu. In: [www.blisty.cz/art/16601.html](http://www.blisty.cz/art/16601.html)

<sup>6/</sup> Human capital is understood as the result of investments into knowledge, abilities and skills, where these investments can be in the form of formal education or training or practical workshops



called the "brain drain." The countries of such experts deservedly expect that the costs for education and workshops will be given back. This event calls for the problem of social responsibility, in this case it relates to the social responsibility of particular individuals for commitments towards their country.

The sharpest critics of many antiglobalists implies to the whole-planetary social impacts, increasing gap between the richness and poverty, which doubts the vision that globalization will provide the equal opportunities to all the people. This type of responsibility emphasizes the responsibility towards the people outside our national environment; it reminds the responsibility of the man of this planet not only for the sake of the members of our community or the state but for the sake of the whole human society on this planet.

A. Rich states, that up till now, when the economy has grown and become to the global bindings, into non-transparent network of activities, relations; it is true that it is seen from the point of its basic purpose – to serve in order to fulfil the basic human and cultural human needs (Rich, 1994). Taking into consideration not only the basic role of the economy but also the human, social and ecological aim of economy; this philosopher remarks that ignoring or absolutization of some values, which are behind these aims, have the long-term effects. He also admits, that there can be doubting of economy as such. And thus, today, there is a challenge for all the entrepreneurial subjects – to adjust to new conditions of the global market and try to reach the profit by the socially responsible action. This challenge appeared in the second wave of globalization,<sup>7/</sup> which is connected with expansion of industrial capital and the growth of industrial production, as well as in the third wave, which has been in progress from the end of the 2<sup>nd</sup> world war and has been connected with the increase of multinational capital and global restructuralization.

The economic growth is becoming the organization principal of the global economy. There is mainly the growth of the shifts of production factors among the states, when also the past immobile factors become mobile, then the growth in production of labour, increase in technological progress. Economic progress is understood as a synonym of increase of living standard or the key to fulfilment of still broadening human needs, towards the solving of the problems of poverty and so on. Also some thinkers, who are trying to reveal the "true face" of globalization, do not really agree with that. For example L. Hohoš, referring to Marx, who in 19<sup>th</sup> century anticipated the process of globalization, in terms of penetrating and the rule of market; he says that "Base of a process called globalization, is created by the supreme of economic process and interests above everything else; maximization of utility is its finality" (Hohoš, 2008). It is connected with uncompromising enforcement of economic interests on the world level, it means with maximization of utility, or profit without any obstacles (Hohoš, 2008).

Even though the growth in the New Economy arises in the increase of knowledge and innovation and their general acquisition, producers and providers of services are forced to respect the social interests and whole-world problems. Productivity was and still has been the main component of economic growth, but sometimes it is not of the responding

quality. And thus, we assume that the word – "growth" – cannot be joined only with the increase of economic potential of the country, state and the world. It is not only the economic category without any regard to the consequences on the society and its members.

The economic growth does not automatically bring the higher quality of lives of the people in society, we can think of the internal conflict of economic globalization, which is on one hand significant with technological innovations and revolutionary changes in technological ways of production, by which the economic growth is achieved; their economic, social, ecological and overall social impacts are not only positive. It is not enough to only try only to reach economic growth but mainly the economic development. Understanding of the social responsibility of entrepreneurship in new economy should be related mainly on the reaching the economic development, however, the economic development and thus also the social development is the global challenge and also one of the basic principle of OSN activities. According to it, the economic development of all the countries of the world, it is the most stable guarantee of political, economic and social stability. In connection with it, removal of foreign liability of the states, provision of adequate living standard for all, sustainable development, a fair functioning of the market and so on; are required.

Service to live and provision of adequate living standard is the basic purpose of the economy. On the contrary, the quality of life cannot be judged only by the economic indicators and also, it is not easy to answer the question, where the human needs end and the human acquisitiveness starts. We expect that it is possible to win in the competitive fight in the globalizing market mainly by the production or provision of quality and healthy products and services and by permanent innovation on behalf of man to whom the economy should serve. The productivity and quality, as the aims of economic activities, are two sides of one coin, which should focus on the fulfilling of human needs and society. And eventually, they also bring the profit to entrepreneurial subjects, whereby it is still true that the higher profits of particular entrepreneurial subjects are, the higher is the social product of the whole economy and thus also the better is the general aim of economy – higher quality of citizens' life. The question of social responsibility relates to the moral aspects of creation and achievement of the profit. Businessmen when reaching the profit do not decide only on individual of economic aims, they do not decide only on how to reach the profit but also on the whole social and cultural level of the society. More specifically, there should be more work opportunities beyond the profit, which are the only source of their adequate living standard, the only source of their really human life. At the same time, the opportunities of the consumers to use quality products and services in the community should be connected with the profit of the businessman where he/she realizes his/her activities.

Some antiglobalists admit that the development of life quality in the current society is still more judged according to the economic determinants, whereby the cult of production increase is identified with the trend of increase of the need. In such a connection there is a demanding need – to differentiate the need of people, which should be fulfilled by the new economy and also to take responsibility for the way how they are fulfilled. Fulfilling of some needs does not enable to higher the quality of life, but they can have the opposite impact, damages on health, personalities,

<sup>7/</sup> The first wave of globalization is considered the period of exploratory trips and development of mercantilist capital in 16<sup>th</sup> century

disruption of social relations, etc. Today, the market does not react only on the needs of people but it offers the new products and services.

The requirement for economic growth to provide production of such good, which are not only useful but also valuable; is very close to the opinion of A. Rich, who warns about the fact that it is necessary to differ the human needs as well as to evaluate the ways, by which they are reached. And similarly, the question of a fair division of a social product can be seen from the different points of view. From the human point of view it is definitely clear, that the division of a social product cannot be totally in concordance with the "rules of the market", based on demand and offer but they must cooperate in making decisions for human and social moments. The other face of globalization appeals for the moral responsibility for itself, for the other people as well as for the nature, as the relation to the living condition is hidden behind the man's responsibility. Mainly antiglobalists assume that the distant threats and the distant spaces, as for example the growing consumption of limited natural sources, ozone holes, deforestation; still do not motivate enough the current businessmen as well as many other people. This is connected mainly with the question: how much to produce, how to produce; as well as where the borders of economic growth are regarding to the consumption of limited and non-renewable natural sources. This fact confirms that in connection with the progressing globalization, the individual conditions of our life are still in a great extent determined by the whole global, economic, natural, political and other conditions of the world.

### Conclusion

Thanks to modern technologies, globalization has changed the world economy into the system of mutually connected economic subjects, whereby it cannot be doubted that it equally enables the opportunities to influence processes on the global market. The important impact for globalization of the world economy has New Economy, which is a sophisticated economy, where inputs and outputs are based on knowledge. The key to the economic prosperity of competitiveness and consequently to the modern direction of the society has become the change in orientation of values towards the understanding of information and knowledge as the main source of economic development, as well as to the new and the main form of capital and new production factor. However, the bind between the quality of life of individuals and economic growth, which is reached mainly due to new technologies or creative abilities of man, is not the certainty and new economy can be connected with more risks regarding to the current and future citizens of our planet. There are no doubts for example on the fact, that this system cannot avoid some unequal levels, creation or deepening the existed social and economic inequalities and some other mistakes which point at the need of socially responsible action. The impact of socially responsible action in New Economy of developed countries is confirmed by the world experience, for example, through positive understanding of corporation from the side of employees, customers, business partners and other stakeholders. Responsible entrepreneurship on the globalizing markets requires the shift from the point of view of the level "profit only", which is reached by intellectual production and information processing from the broader point of view, which is considered to be so-called triple-bottom-line business, which characterizes

entrepreneurship as activities aimed at "profit, people, planet". This enables seeing business activities in a broader system of social and ecological relations. Eventually, also a new paradigm of economic thinking is based on the idea of complexity of the society as a system, on co-evolution of economic, ecologic and ethical dimension. Except of the social responsibility is New Economy confronted also with the call for sustainable development, which highlights the need to fulfil all the needs of a current generation without limitation of opportunities for the future generations. In the last decades, the environmental crisis has deepened in such an extent that the governments of western countries started to consider 'the economy of sustainable development'.<sup>B/</sup> Both requirements support the fact that the system of New Economy does not function in the globalizing market itself (isolated), but as a part of the outer world and thus, it cannot in the actions focus only on the economic growth but on social, environmental effects of its activities.

### Súhrn

Globalizácia modifikuje konkrétny spôsob utvárania novej ekonomiky, ktorá je ekonomikou s modernými komunikačnými sieťami, v ktorej konkurencieschopnosť je určovaná schopnosťou transformovať informácie na poznatky a inteligenciu. V období ekonomickej globalizácie a vzniku takzvanej „novej ekonomiky“ sa očakáva, že človek bude mať možnosť slobodne šíriť, využívať a prijímať informácie a vedomosti, využívať potenciál informačno-komunikačných technológií nielen v prospech ekonomického rastu ale najmä na zabezpečenie trvalo udržateľného rozvoja, zlepšovania kvality života a ochranu ľudských práv. Okrem toho, že nová ekonomika prináša nové príležitosti pre uspokojovanie ľudských potrieb, zároveň prináša aj viaceré riziká a negatívne momenty. Jej úlohou je kláď dôraz nielen na ekonomický rast ale i na ekonomický rozvoj a zodpovedne odpovedať na otázky typu – či zabezpečuje dôstojné podmienky pre obyvateľov súčasného sveta, akú úlohu zohráva podnikanie v rozvoji krajín ba celej planéty, a tiež zvažovať spôsoby, pomocou ktorých sa hospodárski aktéri usilujú uspokojovať ľudské potreby, spôsoby akými sa rozdeľuje zisk, ako i práca a spoločenský produkt medzi jednotlivých účastníkov trhu či medzi všetkých obyvateľov našej planéty. Spoločenská zodpovednosť podnikania sa stáva globálnou výzvou pre všetky podnikateľské subjekty. Ich povinnosťou je prispôbovať sa novým podmienkam globálneho trhu a usilovať sa o zisk spoločensky zodpovedným konaním.

**Kľúčové slová:** nová ekonomika, globalizácia, sociálna zodpovednosť, podnikateľské subjekty, globálny trh

<sup>B/</sup> Brundtland Commission defined the sustainable development as the development which fulfils today's needs without threatening the ability to fulfil the need of future generations. Sustainable development was also defined as the process for searching a balance between the economic and social development and the need to protect environment in a way that it could be possible not only nowadays, but in any time in the future. The field of sustainable development can be divided into four main components: environmental, economic, social and political.

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## STUPNE CYKLICKÉHO VÝVOJA AGRÁRNEHO TRHU V EURÓPSKYCH A ÁZIJSKÝCH KRAJINÁCH THE STAGES OF THE CYCLIC DEVELOPMENT OF THE AGRO-FOOD MARKET IN EUROPEAN AND ASIAN STATES

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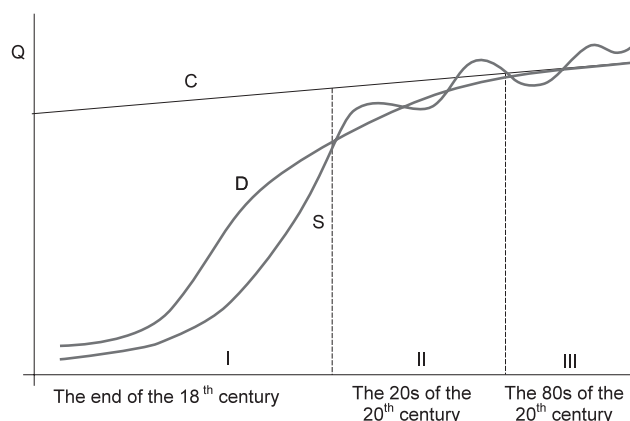
In the article three specific historical stages of the conjuncture in the agro-food market of the Western European countries are distinguished and analyzed. These stages are great waves of the conjuncture fluctuations in demand and supply levels, and long waves of conjuncture cycles in the agro-food market. The reasons causing long deviations of demand from supply, a steady increase and decrease in the alternative production cost are disclosed. As a result, trends in dynamics of the land rent in the course of the market development are discussed, the main reasons for changes in the parity of prices between agriculture and industry are revealed. The stages of the regulation mechanisms of the agro-food market are investigated in detail as well as the expediency of these mechanisms. Possible forecasts of the conjuncture development in the agro-food markets in Europe are provided. Agriculture and agrarian Russian market as well as markets in Asian countries are at the second stage of the cyclic development.

**Key words:** market, demand, supply, conjuncture, cycles, rent, agro-food

The food market at the industrial stage of the European states development (XVIII–XX centuries) underwent a number of the essential quality changes in the course of its evolution.

The analysis of development of the long-term agro-food market condition in the developed European states enables to distinguish three stages of the historical evolution of this market (Figure 1) (1; 2).

These stages differ in quantity and quality of the market condition and they are considered to be the great waves of the changes (fluctuations) in the level of demand and supply, the great waves of the cycles of condition in the agro-food market. The experience of the foreign countries points at the significant differences in these stages both in the regulation mechanisms of the agro-food sector of the economy and in the degree of the economy liberalization.



**Figure 1** The development stages of the agro-food market in the Western European countries:

I – the stage of the unsaturated market (the stage of the market self-regulation); II – the stage of the incomplete market saturation (the stage of the government market regulation); III – the stage of the complete market saturation (the stage of the market liberalism); C – the level of absolute demands; D and S – the demand and supply levels, correspondingly

**Graf 1** Štádiá vývoja agrárneho trhu v krajinách západnej Európy:  
I – štádium nesaturovaného trhu (štádium samoregulácie trhu); II – štádium neúplnej saturácie trhu (štádium vládnej regulácie trhu); III – štádium úplnej saturácie trhu (štádium trhového liberalizmu); C – úroveň agregátneho dopytu; D a S – úroveň dopytu a ponuky

### Results

#### The stage of the unsaturated food market, the stage of its growth

During the initial industrialization period under the conditions of the industrial revolution and the creation of large-scale machinery industry the increased number of factories raises the demand for farm raw materials. The demand for food greatly rises due to the growth of the urban population and the increase in its incomes. At this stage of the market development the specificity of the food demand is connected with its elasticity in relation to the population incomes. The high demand elasticity is due to the extremely low saturation level of food needs of the population, especially in such kinds of products as livestock products and fruit. The mentioned demand specificity can be clearly illustrated by Figure 1.

The demand level (D) and the consumption level at the beginning of the first stage of the food market evolution in the industrial society were considerably lower than absolute needs formed at the level of the rational norm of consumption (C). For example, if the rational norm of consumption of meat and meat products per head fluctuated according to the age and the sex within 80–90 kg per year, the real demand and the average consumption per head were not higher than 30–40 kg during this period. At such a low saturation of the needs the

dependence of the demand on the growth of the population incomes was very high. In contrast to the present situation in the food market the demand for it was elastic at the first historical stage of the market development.

The specificity of the first period was quick, steady growth of the elastic food demand for a long period of time. It resulted in the increase of volumes of sold agricultural products. If at the previous period, during the Middle Ages, a large share of food was spent on consumption, with the beginning of industrialization the share of food spent on consumption through a commodity-money exchange rose noticeably. It means the increase in the food supply at the market. Along with the growth of the market exchange, the increase in supply was caused by a certain growth of the production in the agro-food sector of the economy.

However, at the first evolution stage of the agro-food market there was a situation when the supply growth in the agro-food market remained behind the demand growth due to the lag in development rates of agriculture and disproportions appeared between the development of the material and technical bases of industry and agriculture. At the first stage social needs grew more rapidly than the production possibilities of agriculture (Figure 1).

The inter-branch competitive mechanism is not able to ensure the equilibrium of the demand and supply for the long time. It is connected with the perfect market mechanism infringement principles at the inter-branch level.

Barriers on the way of inter-branch transition of capitals, on a way of an input of firms on the branch market in conditions of high market terms in this branch are connected not to classical forms of market structures (a monopoly, an oligopoly, a monopolistic competition). The specific inter-branch barriers for a firm entering the agricultural market are caused by the monopoly ownership, management and use of a natural production factor – the land. The supply of land is scarcity and inelastic, the land cannot be reproduced artificially and it is immobile. At a given moment this production factor is being completely distributed between the owners and the land users. It is entirely occupied by them. As a result the possibilities to increase the number of firms in the branch by the numerical growth of such production factor as the land are extremely limited. The possibilities for the production growth and agricultural product supply increase by such extensive increase of the land resources are limited as well. It implies that the price inelasticity of the supply of agricultural output is connected directly with the inelasticity of supply of such production factor as the land.

The appearance of the barriers to the inter-branch flow of capitals and their flow into agriculture, under the conditions of favorable conjuncture for this branch at the first stage, are connected with artificial non-reproductively, the inelasticity of the land supply, and its monopolistic ownership. In its turn, it restricted the production growth possibilities on the basis of its intensification. The braking of the processes of the inter-branch resource redistribution causes the prolonged deviations of the social needs from production possibilities as well as demand and supply differentiation from each other (under the influence of non-price factors).

Only within a long period of time the mechanism of the inter-branch competitive equilibrium is able to overcome gradually the mentioned specific barriers and ensure a steady increase in the production by investing the attracted to the branch capitals into the used land areas and by increasing their efficiency. At the first stage a long and steady excess of

demand over supply predetermines the trend towards the formation of market prices for food at a higher level than prices of the competitive equilibrium. The state of the competitive equilibrium is upset. The market prices (marginal income) steadily exceed the level of marginal as well as the average production costs.

The obtained economic profit has the form of the economic rent (a quasi-rent) since its formation is connected with the stability of the price inelasticity of supply of the land. According to the classical economic theory this type of rent is known as an absolute rent of land. The amount and the dynamics of the economic land rent are determined by the steady excess of demand level in the agricultural products and land markets over the supply level as well as the changes in the degree of this excess. For this turn, it determines such specific characteristic of the examined stage as a long and steady infringement of the principles of the normal profit formation in the branch (the infringement of the law of the average profit rate). At the stage of the unsaturated market the elastic demand for food responds flexibly to the market changes and it is regulated by the market mechanism relatively well. Under these conditions the doctrine of the classical economic school – the concept of the market economy self-regulation – was the prevailing one. The infringement of the competitive equilibrium was considered to be an accidental, temporary phenomenon to be easily and flexibly removed by the market mechanism. The government interference in the agro-food economy was minimum and occasional. Only the protective measures were used towards some importing agricultural and food products.

### **The stage of incomplete market saturation.**

At the boundary of the 19–20th centuries the fundamental changes in agriculture and the agro-food market in the Western European states took place. In contrast to the previous stage this one was characterized by such a phenomenon as long, periodic excess of product supply over demand (Figure 1).

Historical evolution of the agro-food market showed that stability of economic profit obtained in agriculture is relative. This part of profit at the second stage, that is the stage of incomplete market saturation, disappears gradually. It happens due to the fact that the landownership monopoly does not remove entirely the inter-branch competitive mechanism, but it only causes difficulties and delays the balancing process of demand and supply in agricultural market. Moreover, the situation when demand exceeds supply and there exist higher cost and market prices for this produce may be relatively stable because of the landownership monopoly. As the agrarian sector of the economy develops the saturation degree of the society needs for food increases. As a result the demand elasticity for it greatly decreases and the demand growth slows down, that is, it becomes sluggish, inflexible, and unresponsive to the market mechanism signals. On the contrary, the supply growth for food facilitates. It is due to the fact that the inter-branch competition overcoming barriers steadily increases the capital inflow in agriculture and it ensures the land efficiency increases correspondingly. Finally, the inter-branch competitive mechanism leads to the balancing of the production possibilities (the supply level) of the society and the public needs (the demand level) in agriculture in course of time. In addition, transition of the agrarian market in the Western European states in the 20<sup>th</sup> century to the stages of the saturated market results in the formation of the unfavorable conjunction for agriculture, when a relatively stable excess of demand over supply is observed in the given branch.

The overproduction takes place, but it is relative in comparison with the demand, but not with absolute needs (C). On the whole, at this stage demand and supply are closer to the saturation level (to the level of the absolute needs). It results in the trend towards the decrease in the prices for agricultural products in relation to the industrial products prices. Market prices fall to the level of the competitive prices and lower. The disappearance of the additional (economic) profit under such conditions means the disappearance of the economic rent.

What makes up the basis for the price of land resources, the basis for the rent payment at the second and third development stages of the glutted agro-food market if the economic rent disappears at this stage? What share of income makes up this payment? This income must be obtained even from "worse" land sites (claimed by the society) at all the development stages of the agro-food market, including the stages of its saturation. Otherwise, there will be nothing to pay for these lands usage.

It is necessary to distinguish two types of the land rent – the economic and normal ones which are the components of the single land rent and differ in the formation conditions as well as in their functional and economic assignment. Both these rents will be united under the name of the absolute land rent. The main reason to refer them to the absolute land rent is the fact that they are the basis of the payment for the use of any land despite its quality and location. It form that these types of the rent are the basis of the payment for the use of worse land plots. One type of the absolute rent – the normal rent – is the normal amount of payment for land resources (the market equilibrium amount of the rent payment). This is the rent share which is formed even under the conditions of the macroeconomic competitive equilibrium when the demand level for products is balanced with the supply level of the ones. In this case, it is of stable character and it is obtained at the all examined stages of development of the agro-food sector of the economy on the condition that the land is the object of market relations.

The other share of the absolute rent is known as the economic rent and it is based on the relatively stable super-profit, that is, the economic profit obtained only at the growth stage of the agro-food market. Its function, assignment is to increase the food production up to the level of public requirements, to the demand level. It should be spent on the development of agriculture.

According to the neoclassical theory the land rent (the normal rent) in the form of the rent payment, as well as the payment for any other economic resource, is included in production costs. If an entrepreneur is a landowner, the normal rent, as imputed production costs, will be referred to the normal profit. The mechanism of the normal rent formation is the balancing mechanism in the land market. From the general economic point of view, the functional purpose of this share of the absolute rent is to ensure the economic realization of the land ownership as a payment for resources. Land is a limited resource. Limited economic resources are objects of isolated purchase, objects of the property in any of its forms. Therefore, in a market economy the land use will always be chargeable, as the isolation of its acquisition still exists due to the land scarcity (within any form of landownership). Unlike the differential rent, the normal rent is formed for all plots of land, so it is this rent that makes up the basis for the market prices for the land use.

The normal absolute rent as the market equilibrium price for the right to use the land is formed when land demand and supply are in balance. Some deviations from the land demand and supply equilibrium may lead to the increase or decrease in

the payment (the price) for the land use. If the land was not a limited natural resource with inelastic supply, under the conditions of the perfect competition the market mechanism would cause relatively short-term and uniform fluctuations of the absolute rent around its market equilibrium value, that is around the normal rent.

However, as it was shown above, there exist long and steady deviations from the competitive equilibrium state in the agricultural products and market of land. These deviations are caused by the long-term formation of a certain ratio between the society requirements in this produce and its production possibilities. Under all other equal conditions, at the first development stage of the agro-food market (at the growth stage) a steady excess of social needs over the production possibilities as well as the excess of production supply over demand, and the land correspondingly, lead to the formation of the market prices at a higher level in comparison with the price of the competitive equilibrium. Under these conditions there is a steady trend towards the increase in the deviation of the equilibrium value from the absolute rent. Along with the normal rent, the economic rent is formed as a part of the absolute rent.

On the contrary, at the stages of the glutted agro-food market, especially at present, there is a trend towards the formation of the market prices lower than the price level of the competitive equilibrium due to the stable low conjecture in the Western European countries. In this connection the economic absolute rent disappears, but there is also a reduction in the basis of the equilibrium value of the normal absolute rent. It is due to the steady trend towards the excess of the society production possibilities (the supply level) over the social needs (the demand level) for agricultural products at the second and third development stages of the agro-food market.

The indicated changes in the level and dynamics of the agricultural products price in the course of historical evolution of the agro-food market result in the fall of its cost in respect to the industry products. Owing to this, at the stage glutted of the agrarian market in industrialized Western states a marked trend towards the relative decrease in the price for agricultural products in comparison with industry was observed. It is a practical evidence for the fact that the absolute rent has no basis in the form of the super-profit at present. Moreover, the market prices for agricultural products do not often ensure even

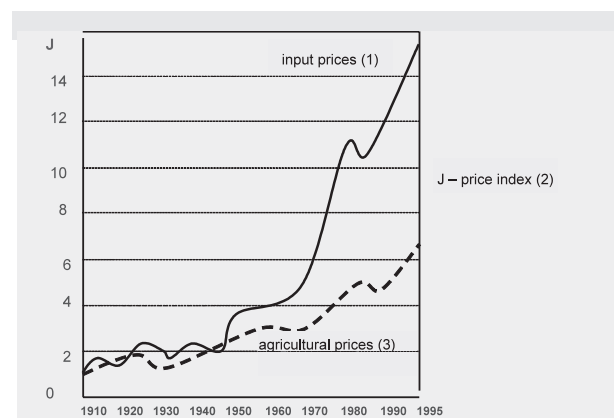


Figure 2 Price discrepancies. Dynamics of prices for agricultural products and resources that were sold to farmers of the USA in 1910–1995

Graf 2 Cenový nesúlád. Dynamika cien poľnohospodárskych produktov a zdrojov, ktoré boli predané farmárom v USA v rokoch 1910–1995  
(1) ceny vstupov, (2) cenový index, (3) poľnohospodárske ceny



the normal profit (the average profit) for farmers. Thus, there is a trend towards the steady deviation of the equilibrium value of the absolute rent (the normal rent) towards its reduction. The disturbance of the price parity for agricultural and industrial products takes place in favor of industry (Figure 2).

The present concept of the formation mechanism of the total economic and branch market conjuncture allows not only to disclose the contents and dynamics of the absolute rent in the process of the historical evolution of the agro-food market, but it serves as a methodological basis for revealing deep-laid reasons for the prices parity change between agriculture and industry.

At the second stage the main task of the government regulation of the agro-food market is to promote the effective aggregate demand for agricultural products and food. Such strategy in the agrarian policy was caused by the fact that at the second stage the demand due to its inelasticity was formed at a lower level in comparison with the aggregated food supply and the public requirements in it. The market was not able to ensure a rapid rising of the inelastic demand up to the supply level. In its turn, agricultural products supply grew at rapid rates, and it did not reduce during the crises, which means that it did not respond to the lag of demand and the corresponding price signals in the market. The supply of agricultural products is inelastic in relation to the decreasing prices. For example, during the Great Depression in 1929–1930 the production output of agricultural products in the USA decreased only by 6 percent, while the prices for it fell by 63 percent during the same period.

The sharpening of the overproduction problem became apparent for all main kinds of agricultural products. This problem was especially critical for the grain market.

The market mechanism is not able to overcome rapidly the overproduction in this branch of economy because of the resources immobility and the difficulty in their inter-branch flowing. It is proved by such specificity of the agrarian slump as their long character. When the agro-food market enters the second stage such crises become a typical phenomenon in the economy (Figure 1). The four world agrarian crises are known:

The first world crisis began in the beginning of 70<sup>s</sup> and lasted till the second half of the 90<sup>s</sup> of the 19<sup>th</sup> century; the second agrarian crisis lasted from the early 1920s till World War II; the third world agrarian crisis started at the end of the 1940<sup>s</sup> and lasted till the early 1970<sup>s</sup>; the fourth agrarian crisis began at the end of the 1970<sup>s</sup>.

The reasons for the long character of the agrarian crises are connected with the formation peculiarities of the agro-food market conjuncture at the stage of the incomplete saturation. On one hand, these peculiarities mean that the competitive mechanism cannot sharply increase the food consumption and demand owing to its inelasticity in relation to population incomes. On the other hand, this mechanism is not able to ensure a rapid reduction in the agricultural products production to the existing demand level due to the prices inelasticity of demand. The inelasticity of supply is concerned with the barriers against the inter-branch mechanism of the competitive equilibrium. However, at the second stage and especially at the third one the barriers are of the reverse character. These are not the barriers against entering agriculture, but against leaving the branch. These barriers are caused by immobility or low resources mobility involved in agriculture. Land as a specific agricultural production factor is practically immobile and cannot participate in the inter-branch transition of concerning excessive stocks of resources under the influence of the inter-branch mechanism of the competitive equilibrium. Labour in agriculture is also relatively inert and immobile.

The conducted analysis enables to make a conclusion that at the second stage, under the conditions of the glutted demand for food and approaching its level to the magnitude of the absolute needs, there is a lack of sufficient conditions for the effective inter-branch competition, for the normal “work” of the market mechanism. The given conclusion about the failure of the competitive mechanisms is of great importance, especially in case of the imperfect competition in non-agricultural branches while a free competition is maintained to a great extent in agriculture itself. All this, setting additional barriers to the inter-branch competition, makes the problem of the disparity of the price and incomes between agriculture and industry sharper.

As the inelastic demand for food responds slightly to the market signals, its government regulation is required. However, the role of the government in such situation does not mean the replacement of the market regulation mechanism, but it should create such conditions under which the mechanism would balance demand and supply by the increase in demand for the product, but not by the decrease in its supply. The problem of the increase in the aggregate demand for farm products and food can be solved only by implementing the certain government methods of the agro-food market regulation which will stimulate the demand. As a result the theory of the effective demand developed by J. Keynes is sure to have influenced the government policy in the agrarian sector. The methods of stirring up and increasing the aggregate demand were used as the basis for the government regulation of the agrarian market (Figure 3). For this purpose, the policy of the supported prices and farmers' incomes was widely used during the prewar and especially during the postwar periods.

As the inelastic demand responds slightly to the market signals, its government regulation is necessary. As it can be evident from the experience of the developed countries, there are two main ways of the government regulation of the demand.

1. Direct and indirect support of the population demand for food. In countries with a developed market economy measures aimed at the increase in the food demand by the low-income population are widely used.
2. Demand incensement for agricultural products from the side of the government. The given direction in the government regulation of the agrarian market is mainly aimed at the support of producers. At the second stage – at the stage of the incomplete saturation – the expansion government

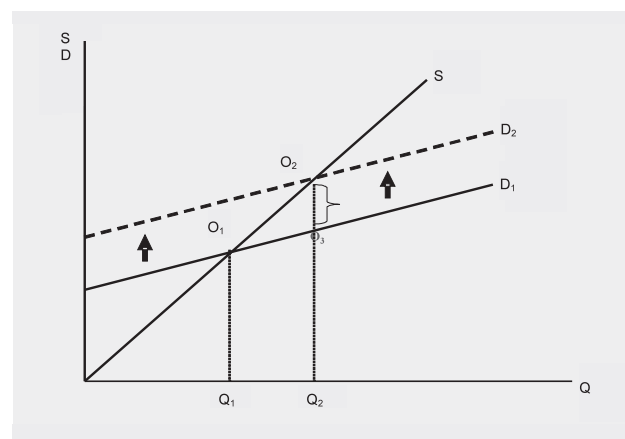


Figure 3 Keynesian model of macroeconomic equilibrium («Keynesian cross»)

Graf 3 Keynesiánský model makroekonomickej rovnováhy (Keynesiánsky kríž)

policy of increasing the demand for agricultural products, on the whole, agreed with the requirements of the balanced development of the agro-food market. The policy had to balance demand and supply without the production decline as well as to support the prices and producers' incomes.

This policy was applied in reality by the Western states in the 1930s, but it became widely spread during the postwar period. In the EU countries the policy was developed as the main directions of the Common Agricultural Policy in the 1950s–1960s when the level of food self-sufficiency production was not developed enough. For example, the grain production in the countries of the Common Market within the given period was much lower than the consumption level. The failing demand was covered by import. It can be proved by the constantly negative balance of the Western Europe in the world grain trade. The magnitude of the negative balance was increased till the 1970s. In 1970 the excess of grain import over export accounted for 30 million tons, but it decreased to 16 million tons in 1980.

Since the 1980s the grain production exceeded the level of its consumption and the balance was positive for the Western European countries in the world grain trade (Figure 4). The indicated trends which led to the changes in grain self-sufficiency were mainly due to the government policy aimed at the increase in demand for agricultural products and food as well as at the support of farmers' incomes.

The agrarian policy was aimed at the solution of the following problems which are typical of the second stage:

1. To remove the prices disparity
2. To support the incomes of agricultural output producers
3. To increase the demand for the products of the agro-food complex.

In order to solve the indicated tasks at the examined development stage of the agro-food economy, the main following methods of the government market regulation were used:

1. The supported prices were set for a large share of production.
2. Compensating payments, subsidies, beneficial crediting.
3. The government purchase interventions.
4. The financing of the programs of food support.
5. The market protectionism.

### **The stage of the complete market saturation (the stage of the market liberalization)**

By the end of the 1970<sup>s</sup> of the 20<sup>th</sup> century the essential changes in the quality and quantity of the agro-food conjuncture took place. They occurred both in the internal Western European markets and in the world markets. As it can be seen in Figure 1, the methods, which were widely used by the government for promoting food demand and supply at the previous stage, led to the saturation of the internal market (the demand in this market) by the main kinds of products at the level of the absolute needs (at the level of the rational consumption rates – C). Under such conditions the given policy began to fail. It made the problem of overproduction sharper, instead of removing or mitigating it, as it happened at the previous development stage of the food market. It can be explained by the fact that the EU food market at the border of the 1970<sup>s</sup>–1980<sup>s</sup> entered the qualitative new development stage – the stage of the complete saturation. The overproduction, which was relative and periodical at the previous stage (the stage of incomplete saturation), had become absolute and chronic by the beginning of the second stage, the supply

exceeding not only demand (D) but the absolute needs (C), as they coincided with each other now (Figure 1).

The demand became completely inelastic and its further growth was practically impossible. In such conditions the policy of supported prices and incomes stimulating the further production growth, while the population demand for food was decreasing, increased the gap between demand and supply to a greater extent and promoted the increase in the overproduction output. The further implementation this policy leads to the contradiction with the market mechanism. Instead of balancing demand and supply, such a policy results in their greater misbalancing as well as in the market and economic imbalance.

Scales of overproduction are increased at transition to the third stage. Production exceeds internal consumption in the countries of the European Union. At the end of the second stage in 1973–1974, for example, the consumption of only three kinds of food – pork, poultry and eggs – was provided by the domestic production. But for all that, the supply level did not practically exceed 100 per cent. By 1989–1990 the EU countries provided their internal consumption in eight kinds of food from twelve ones due to their domestic production.

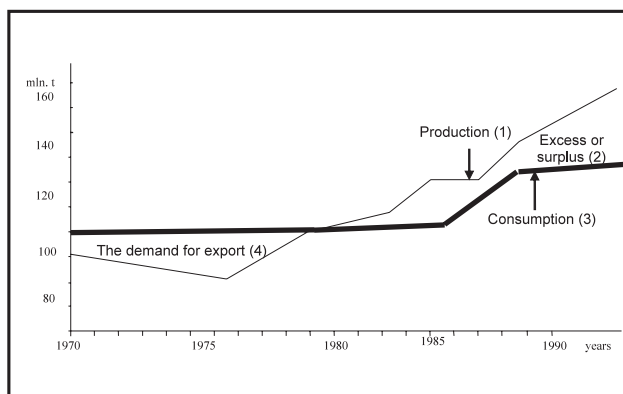
The conducted research of the patterns and characteristics of the agro-food market development enables to distinguish the borders of the qualitative transition of its conjuncture from one state into another and which, correspondingly, determine the change in the guiding lines and the directions of its government regulation. These borders can be clearly seen in Figure 1. Historical process of the conjuncture dynamics in the agrarian market is illustrated in the graphs by demand and supply curves, by their position towards each showing the stages of its development. The first stage is characterized by a long wave of the high conjuncture in the market. At this stage of the market mechanism, overcoming the barriers built by landownership and land tenure monopolies, decreases the conjuncture to the normal level by steady increasing the production within a long period of time.

The wave of the decreasing trend in the conjuncture was prevailing at the second and third saturation stages in the market. It is during this period of the historical evolution of the agro-food market, while the food market is saturated, that the conjuncture cyclic fluctuation are activated and the agrarian economic crises became deeper. In this connection active anticyclic policy of state regulation starts to be applied. Its directions and methods depend on what phase of a cycle of a conjuncture there is a market of the foodstuffs.

By the early 1980s the conjuncture in the world and domestic food markets was greatly changed. The transition from the second stage to the third one involved the radical turn in the quality and quantity conjuncture index activities is clearly illustrated by the facts of the grain market in the EEC (Figure 4).

When the agrarian markets of the Western European countries entered the third stage – the stage of the complete saturation – the increase in the agricultural products supply, considered as the positive result of the applied methods of the government regulation, turned to become a heavy burden in the form of the excess of the unsalable products. The rapidly growing supply ran against the limited demand both in the domestic and in the external markets. The accumulation of the huge product "surpluses" occurred.

The further promotion of the supply growth by the supported prices could be expedient only if there was a possibility for the effective export of the product excess. On the whole, the conjuncture of the agricultural products in the world market was not favorable for the exporters in the 1980<sup>s</sup>.



**Figure 4** The grain production and consumption in the EU countries  
Source: Data of EUROSTAT

**Graf 4** Produkcia a spotreba pšenice v krajinách EÚ  
(1) produkcia, (2) prebytok, (3) spotreba, (4) dopyt po exporte

First, there was a marked trend towards the decrease in the export prices for the agricultural products. For example, the world prices for wheat decreased from \$183 per ton in 1973–1975 to \$138 per ton in 1984–1986.

Second, the prices for many kinds of agricultural products, supported domestically at a high level in the EEC countries, were much higher than the world prices. As a result, the EU countries had to spend enormous subsidies in order to support the products competitiveness.

Third, in the 1980s both the traditional exporters and a number of other countries – former importers – sharply increased the supply of agricultural products. 30 countries, which imported food earlier, became its exporters in 1986. In that year 395 million tons of grain were accumulated as corruptible unsalable supplies of the non-socialist world.

The strategy and the tactics of regulation of the agrarian economy and the food market were radically reconsidered. In general, such change in the agrarian policy can be characterized as the transition from the policy of demand growth and the promotion of the supply growth to the policy of containment, and for some kinds of products it meant not only the containment, but the supply reduction. The new agrarian policy turns from the doctrines of the government regulation of the agrarian economy to the doctrines of the market liberalism.

The reforms started in the EU in the 1980s and they were insufficient for the entire solution of the problem of balancing food demand and supply. In the early 1990<sup>s</sup> the overproduction level of a number of products in the agrarian sector was significant. Owing to this, a new wide-scale reform of the agrarian policy was developed and implemented in the EU. It was aimed at a gradual transition from the policy of supported prices to the policy of compensatory payments. Among the measures of this reform one can distinguish such as freezing, decreasing the level of the guaranteed purchasing prices, and in the course of time their gradual abolition and transition to the market pricing. These measures should promote the containment of the supply growth and even its reduction.

The approach to the problem of the supported, guaranteed prices was changed fundamentally. The main strategy was to decrease the price level alongside with the compensations payments to farmers for the incomes reduction within a certain time period. The prices decreased and the transition to the market pricing was directed at the production reduction as a result of releasing the excess resources from agriculture.

It is necessary to have in view of that the market mechanism in agriculture is not capable to provide automatically curtailment of production due to liberation of excessive inefficiently used resources. There exist factors that prevent spontaneous flow of these resources into more profitable branches owing to the inter-branch competition. Therefore, the systems of government measures for “helping” the market in the inter-branch redistribution of resources and promoting the release of the excess resources from agriculture are required.

Unlike the policy of the supported prices, such agrarian EU policy was not aimed at the liquidation of the negative consequences of the low conjuncture in the food market, but at the elimination of their reasons (the excess of resources). A large variety of measures within the given policy is directed at the prevention of the excess production as well as the support of the excess produce export. The special place among these measures occupy the restriction or even reduction of areas under crops, introduction of quotas of volumes of production and realization of agricultural products, etc. The State agricultural policy has passed from extensive support of the prices and the income to programs of management of risk.

At the third stage the government regulation is realized by the market methods within the market system. The government interference into economy is aimed at the elimination of the barriers against the market mechanism which are connected with the peculiar actions of the demand and supply law in the food market. Thus, it is aimed at balancing the demand and supply levels as well as the public demands and production possibilities.

Summarizing the analysis of the third development stage of the agrarian economy, one can generally distinguish the following directions in the policy of the market liberalization in the agrarian economy:

1. The containment or even reduction of the production.
2. The decrease of the supported and preliminary prices.
3. The guide line towards the market regulation mechanism in order to increase the agricultural production efficiency.
4. The replacement of the compensation payments by the system of flexible production contracts.
5. The introduction of more perfect insurance programs for agricultural output producers.
6. The liberalization of the domestic and foreign trade. The orientation towards the requirements of the GATT-Uruguay Round (WTO).

### **The future trends in the development of the agro-food market in the European and Asian states in the stage growing conjuncture on the world market of the food**

Change of the conjuncture of the world market can significantly change the inter-state agro-food relations. In 2005–2007 there was the fifth enlargement of the EU. Twelve countries joined the Union. This historical event meant the beginning of the new development stage of the integration processes in Europe and it fundamentally changed the geopolitical situation on the continent. There are 27 country-members in the EU now. The latter has become the only powerful supranational organization on the continent. The joining of twelve new countries to the EU leads to a greater increase in the territorial, demographic and economic potential of the community. The European Union territory has increased by 28%, the population by 20%, the total wealth by 4.6%. All these changes are sure to affect the development processes of the agro-food market in the community.



The fifth enlargement of the EU may result in a great excess of supply over demand for agricultural products in the Union markets. The changing of the Common Agricultural Policy (CAP) of the EU towards liberalization means that if market prices and incomes of agricultural output producers fall under the worsening conditions of the overproduction crisis, one should not expect, as it happened before, any essential compensation of the decreased incomes in agriculture at the expense of the EU budget. In order to avoid economic, social, and political contradictions, and first of all the contradictions between the countries of the Old and New Europe, it is necessary for the EU to take measures for the re-orientation of the excess productions towards the external markets.

As agricultural raw materials and food produced in the new countries of the EU (CEECs) are uncompetitive in the Western European markets and inappropriate to the Common Agricultural Policy of the EU, it is necessary to promote the development of the competitive export production and agricultural products processing which are aimed at the external markets. The food market in the Union of the independent states (CIS) and developing states of Asia take a special place among them. Demand on many kinds of agricultural raw material and the foodstuffs will increase in these states in connection with economic growth and increasing incomes of the population.

The production potential of the agrarian sector economy of the Union of the independent states destroyed during the deep crisis of the 1990-s is not able to recover rapidly and saturate the growing demand for food in the nearest years. In comparison with 1990 the cattle stock in the Russia by more than two times, that is by 33 million heads. The physical depreciation of many kinds of the farm technique reached 70–80 percent. The return of farm lands is low, grains yield is more than two times lower than the average world one, and a large part of agricultural land is not cultivated.

The success of the project of the fifth EU enlargement depends to a great extent on how actively the Russian market and market of Asian states would be involved in the integration processes in Europe. A positive trade balance of the Russian Federation with the European Union exceeds 20 billion euro that is more than a half of the total foreign trade of Russia. By joining the CEECs to the EU the ratio of the Union in the Russian foreign trade circulation will exceed 55%, but it accounted for about 40% before the Union enlargement. The success of the EU

enlargement project will greatly depend on how the new system of the international labour division between the expanding EU, Russia and Asian states will be formed.

The European capital can flow into Russian agriculture attracted by enormous, rich agro-resources and cheap labour in Russia which are hardly half used at present. Agro-resource of Russia unlike mineral raw materials is an inexhaustible, renewed and increased resource. Nowadays less than 40% of its potential is used. Its use at a full capacity due to the active inflow of the Western European capital and intensive technologies can increase the production output of grain up to 190–200 million tons (instead of 60–80 million tons at present) and reduce the production costs to \$ 40–70 per ton.

However, in a short-term run and a medium-term one such increase in production is unreal. First, due to the existing conjuncture in the European and the world grain markets it disagrees with the CAP of the EU. A sharp increase in grain production will worsen the situation of overproduction both in the markets of the European Union and in the whole world market. Second, a relatively long period will be required in order to carry out the structural technological rebuilding of Russian agriculture and restore the resource potential of the agrarian country's sector degraded during the years of destroying economic crisis. As it was mentioned above, in case of a sharp transition to the liberal market model of the development, at the initial stage of the membership in the WTO, Russian uncompetitive agriculture will be involved in a new crisis characterized by stagnation, and even by the production recession.

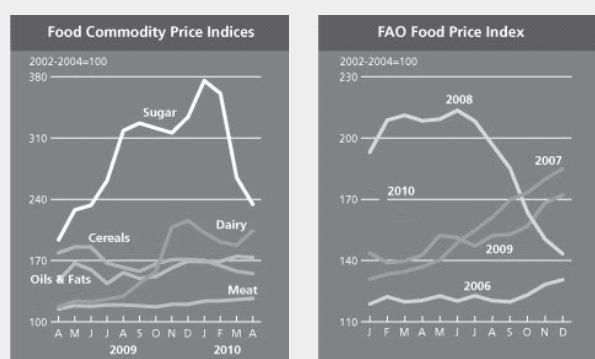
The direct imitation of the modern methods of the agrarian Western European policy and the USA policy by all the country-members of the WTO is impossible. It is necessary to take into account the characteristics of agriculture and the agrarian market existing in different countries. Firstly, the different characteristics of the formation and development of the food market should be considered. In contrast to the food market in the USA and the Western European, the food markets in the Union of the independent states and Asian states are unsaturated.

At the same time it is important to point out that there will be leveling in the saturation of food markets in different European countries. As a result the growth of food overproduction may take place not only in the domestic markets of the EU but in the markets of the Union of the independent states and Asian states with developed agriculture. However, by this time, according to the forecasts of a number of researchers, the problem of world food supply may worsen.

21<sup>st</sup> century can become the period of transition to the fourth stage of the cyclic development of the agro-food market – stage growing conditions on the external market. It is not reflected in Figure 1. The first signals we have received: growth on the world market demand and food prices in 2003–2008 and increase in the last seven months in 2009. Price index in 2010, in spite of certain decreases, was 162% in April (Figure 5 and Table 1).

New evidence identified the conclusions of this article on the development of world agro-food market, its entry to the fourth stage of the cycle of development, are given in the report of the FAO «The State of Agricultural Commodity Markets 2009», which was written by a team of staff from the Trade and Markets Division of FAO, led by David Hallam. The report with reductions and some changes are used in this article (3).

In June 2008, the prices of basic foods on international markets reached their highest levels for 30 years, threatening the food security of the poor worldwide. FAO estimates that



**Figure 5** Food Commodity Price Indices, FAO Food Price Index  
**Graf 5** Cenové indexy potravinářských komodit, FAO cenový index potravin  
sugar – cukor, cereals – obilniny, dairy – mléčné produkty, meat – maso, oils & fats – oleje a tuky

**Table 1** FAO food price index

	Food Price Index (1)	Meat (2)	Dairy (3)	Cereals (4)	Oils and Fats (5)	Sugar (6)
2000	90	94	95	85	68	116
2001	92	94	107	86	68	123
2002	90	90	82	95	87	98
2003	98	99	95	98	101	101
2004	111	111	123	107	112	102
2005	115	113	135	103	101	140
2006	122	107	128	121	112	210
2007	154	112	212	167	169	143
2008	191	128	220	239	225	182
2009	152	118	142	174	150	257
2009 April	143	115	117	179	147	194
2009 May	152	118	124	186	167	228
2009 June	151	118	123	185	160	233
2009 July	147	119	126	167	144	261
2009 August	152	119	129	162	156	318
2009 September	153	118	144	158	150	327
2009 October	157	117	158	166	152	321
2009 November	169	120	208	171	162	316
2009 December	172	120	216	171	169	334
2010 January	174	124	202	170	169	376
2010 February	170	124	191	164	169	361
2010 March	162	125	187	158	175	265
2010 April	162	127	204	155	174	234

Source: Data of FAO

**Table 1** FAO cenový index potravin

(1) cenový index potravin, (2) maso, (3) mléčné produkty, (4) obilniny, (5) oleje a tuky, (6) cukor

soaring food prices pushed another 115 million people into chronic hunger in 2007 and 2008.

Food prices were up as much as 40 percent from their 2007 level and 76 percent from 2006. The sharpness of the price increases and their persistence, which left many developing countries struggling to cope with the consequences, make this fourth stage different from past stages of the cyclic development of the agro-food market (3).

International food prices have fallen back towards their 2007 levels as the financial crisis and world recession have taken hold. However, prices are still significantly above the levels we have seen in recent years and are likely to remain high by historical standards.

Real prices have showed up to 2000 a steady long-run downward trend punctuated by typically short-lived price spikes. Up until 2006, the real cost of the global food basket had fallen by almost one-half in the previous 30 years, with prices of many foodstuffs falling on average by 2–3 percent per year in real terms. There is some suggestion of a flattening out since the late 1980s with a gradual recovery beginning in 2000 before the sharp increase in 2006 – the average annual growth rate of 1.3 percent for the period 2000–05 has jumped to 15 percent since 2006 (3).

Price growth factors are production shortfalls, low stock levels, oil prices, biofuel demand, growing incomes in emerging economies, depreciation of the US dollar and speculation. Popular explanation the reasons for rising prices is rapid economic growth in certain emerging economies, notably China and India, increasing demand for food, especially for livestock products, which generated increased cereal and oilseed demand for feed. While it is difficult to determine their individual contributions quantitatively, some of these factors

could have a persistent effect on the average level of prices. There are some features of the current situation, notably the historically low stock levels for cereals and strong demand for biofuels, that suggest that, in spite of the downward adjustments from the peak of early 2008, the recent high prices may well not be short-lived but could persist for some years. Prices for most agricultural commodities by mid – 2009 have fallen significantly from the peaks reached in the first half of 2008. World grain prices have fallen by 50 percent and prices for other basic foods have followed. However, prices remain high by historical standards and are still above their 2007 levels.

The importance of growth in demand from China and India as a shaper of world food markets and prices has been highlighted in a recent study by the International Food Policy Research Institute (IFPRI, 2008). This argues that rapid economic growth in certain developing economies has pushed up middle-class consumers' purchasing power and this has increased the demand for livestock products such as meat and milk and, hence, demands for feed grains. Emerging economies, particularly China and India, are certainly playing an important role in global agricultural commodity demand and supply. However, the high commodity prices of 2007 and 2008 do not seem to have originated in these emerging markets. Cereal use in China and India has in fact been growing more slowly than in the rest of the world. Cereal imports by China and India have been trending downwards since 1980, by about 4 percent per year, from an annual average of about 14 million tonnes in the early 1980s to roughly 6 million tonnes in the past three years. This means that the growth in cereal feed demand in these two countries, at least until recently, has been met mainly from domestic sources. Moreover, while China has

become a major importer of oilseeds, vegetable oils and livestock products, the country's overall agricultural trade balance has remained largely positive in most years since the mid – 1990<sup>s</sup>. The long-term development in the trade position of India also goes contrary to the belief that it is one of the drivers of increasing food prices in world markets. India has been a major exporter of food. In most years between 1995 and 2007, it exported more wheat, rice and meat than it imported. Even India's relatively large imports of vegetable oils need to be considered in the context of equally large exports of oilcakes. In fact, in the case of both China and India, there is no evidence of a sudden increase in imports of oilseeds, meals and oils to indicate that they have contributed to their price hike, which began in mid – 2007 after the spike in the prices of grains (maize in particular) a year earlier. China and India have not been the cause of the sudden price spike in the oils complex, but this does not downplay their role nor that of changing consumption patterns in general on developments in food markets both in the past and in the future (3).

The growth of agricultural production in India in recent years time marked increased use of fertilizers and pesticides. Thus, fertilizer consumption (nitrogen, phosphorus and potassium), which has stabilized in the period 1990–1991 and 1993–1994 at 12 million has increased in 1996–1997 to 14.3 million t (4).

The OECD–FAO Agriculture Outlook 2008–2017 (OECD–FAO, 2008) indicated that both nominal and real agriculture commodity prices would fall from the record levels reached in early 2008 but would remain higher over the next decade compared with the previous one. The Outlook argues that among the prime factors in the latest price spike – droughts in key grain-producing regions, increased biofuel feedstock demand, high oil prices, US dollar depreciation and a changing demand structure for commodities, all in the context of low stocks – some have permanent elements that are expected to sustain higher prices over the next ten years. In particular, the Outlook pointed to biofuel demand and oil prices. While globally, and in absolute terms, food and feed remain the largest sources of demand growth in agriculture, there is now a fastgrowing demand for feedstock by the bioenergy sector. Biofuel demand is the largest source of new demand in decades and is seen as a strong factor underpinning the upward shift in agricultural commodity prices. Biofuels have forged a new link between agricultural product prices and oil prices, which also has the potential to break the pattern of long-run decline in real agricultural commodity prices (5).

All of this is confirmed by new tendency of price growth on the food during August–September 2009. The FAO food price index, taking into account the price of cereals, oilseeds, dairy products, meat and sugar, in November was 168 points, the highest since September 2008 (6).

It is being broadcast that there will be a world population increase from 6 billion people at the beginning of the 21st century up to 8 billion by 2020, which may seriously change the conjuncture in the world food markets. If the world market conjuncture is high, the problem of balancing in the agro-food markets in Europe, including the Russian market, will be solved by the increase in the amount of food export (7). This failure, already dreadful, may soon get worse. None of the underlying agricultural problems which produced a spike in food prices in 2007–08 and increased the number of hungry people has gone away. Between now and 2050 the world's population will rise by a third, but demand for agricultural goods will rise by 70% and demand for meat will double. These increases are in a sense

good news in that they are a result of rising wealth in poor and middle-income countries. But they will have to happen without farmers clearing large amounts of new land (there is some scope for expansion, but not much) or using up lots more water (in parts of the world, water supplies are stretched to their limit or beyond). Moreover, farmers also wrestle with the consequences of climate change, which, on balance, will do more harm than good to farmland (7).

The need to protect consumers from higher food prices must be balanced against maintaining incentives for productivity-raising investment and supply response. Policy measures need to be targeted, non-distortionary and positive towards agricultural investment. Many developing countries need international support to overcome budgetary constraints and to identify and implement appropriate policies. Developed countries also need to consider the impacts of their agriculture, trade and energy policies on international food prices and availability.

## Súhrn

V príspevku sú rozlišované a analyzované tri špecifické historické štádiá konjunktúry agrárneho trhu v krajinách západnej Európy. Tieto štádiá sú výkyvmi konjunktúry v oblasti dopytu a ponuky a dlhodobými výkyvmi v konjunktúrnem cykle agrárneho trhu. Príčiny spôsobujúce dlhodobé odchýlky dopytu od ponuky, ustavičný rast a pokles nákladov alternatívnej produkcie sú predmetom výskumu. Výsledkom je sledovanie trendov v dynamike pôdnej renty v priebehu vývoja trhu, hlavné príčiny zmien v parite cien medzi poľnohospodárstvom a priemyslom. Sú skúmané štádiá regulačného mechanizmu agrárneho trhu a taktiež účelnosť týchto mechanizmov. Je vytvorená pravdepodobná prognóza vývoja konjunktúry agrárneho trhu v Európe. Poľnohospodárstvo a ruský agrárny trh ako aj trhy v ázijských krajinách sú v druhom štádiu cyklického vývoja.

**Kľúčové slová:** trh, dopyt, ponuka, konjunktúra, cyklus, renta, agrárny

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## VSTUP DO PROBLEMATIKY TECHNOLOGICKÉHO HODNOTENIA INTRODUCTION TO TECHNOLOGY ASSESSMENT

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The main objective of this study is to examine the key aspects of technology assessment issues, which have not been precisely defined yet. Identifying effects of the technology innovation or application always requires an interdisciplinary approach, which allows creating a more comprehensive picture/model of a particular technology. A picture of the existing technology or a model of the planned technology should be created on the basis of broader consensus within a scientific discussion. However, this process may be highly demanding, especially as far as the problem of bounded rationality is concerned. Technology assessment should be focused on systematic investigation of various real and expected effects of the technology application. This study deals with key characterization of the technology assessment methodology, and its most extensively applied methods. The research was carried out on the backgrounds of intensive study of resources, extensive analysis of the European foresight monitoring network, several discussions with experts, and last but not least several case studies.

**Key words:** technology assessment, technology foresight, technology forecasting, methodology, technology innovation

„Technologická zmena je jedna z najväčších hybných síl konkurencie a veľký determinant úspechu, ktorý môže narušiť konkurenčnú výhodu aj dobre etablovaným firmám a hnať slabšie firmy prudko dopredu.“

Michael Porter, 1985

Technológia ako sústava určitých vzájomne pôsobiacich procesov je často veľmi náročný systém, ktorého správne ohodnotenie má obsahovať identifikovanie prvkov, väzieb, ale aj aktuálnych či potenciálnych synergií i dis-synergií, ktoré sa môžu objaviť pri inovácii jednotlivých komponentov, alebo pri používaní celej technológie. Tieto väzby a vplyvy často presahujú vnútroorganizačné prostredie a zahŕňajú aj široké priame a nepriame dopady na prostredie, ale aj prostredia na technológiu, ako napr. zmena kvality výrobkov pre zákazníka, pozitívny alebo negatívny legislatívny vplyv, zmena infraštruktúry, zlepšená trhová či sociálna situácia alebo dopyt atď. Problematika TH je tiež veľmi úzko previazaná so spoločensko-ekonomickými vplyvmi technológií, hlavne pokiaľ ide o vplyv nových technológií na reálne ekonomické výsledky podnikov, regiónov a krajín, a tak aj nepriamo na sociálnu úroveň ľudí. Medzi súvisiace vplyvy používania technológie patrí problém vyčerpávania prírodných zdrojov, problém bezpečnosti potravín a produktov ľudskej spotreby, alebo problém znečisťovania životného prostredia. Technologický rozvoj je takto do veľkej miery podmienený účinnou podporou a kontrolou spoločnosti. Predovšetkým pokiaľ ide o spoločenské akceptovanie technológií, ktoré sa prejavuje hlavne prostredníctvom dopytu na trhu po konkrétnych produktoch či službách, ale aj o konkrétnu vládu, regionálne politiku a podporu, nakoľko technologický rozvoj je značne finančne i organizačne náročný. Vo vyspelých ekonomikách existujú silné obojstranné väzby, pokiaľ ide o celkový rozvoj spoločnosti a technologický rozvoj. Je preto na mieste, skúmať a komplexne hodnotiť tieto a súvisiace väzby technologického rozvoja, aby bolo možné primerane podporovať a využívať spoločensky a environmentálne akceptované technológie.

### Charakteristika technologického hodnotenia

„Technologické hodnotenie nie je primárne zamerané na technologické predpovedanie alebo plánovanie. Je to proces, v ktorom majú účastníci právo klásť otázky a hľadať odpovede na základe vecných informácií, ktoré je nutné získať prostredníctvom multidisciplinárnych analýz. Pokiaľ dôležité informácie nie sú k dispozícii, musí byť vykonaný ďalší výskum. Technologické hodnotenie je pomoc nie náhrada strategického rozhodovania“ (Emilio Q. Daddario, riaditeľ úradu pre TH, USA).

Počiatky systematického TH môžu byť nájdené približne v 70. rokoch 20. storočia, v súvislosti so založením Kancelárie pre TH (Office of technology assessment) pri Kongrese USA (1972–1995) (Schevitz, 1993). Táto kancelária vznikla z určitej spoločenskej objednávky s hlavnou požiadavkou ohodnotiť potenciál a vplyvy objavujúcich sa a plánovaných technológií. Od tohto času je TH stále viac previazané s V-V, verejnými otázkami i politikov a zamerané na technologický rozvoj a optimálne využívanie technológií v rôznych oblastiach. Od 90. rokov sa stávajú centrálnymi determinantmi celého procesu – optimálna participácia a efektívnosť (Grunwald, 2006). V súčasnosti sa do popredia TH dostávajú kritériá ako udržateľný rozvoj, bezpečnosť obyvateľstva, včasné varovanie voči technologickým a iným rizikám či etické otázky využívania technológií (hlavne nano-, biotechnológií).

Celkové rastúce sociálne uvedomenie ohľadom špecifických vplyvov vedy a techniky (V-T) spôsobuje rast záujmu hlavne o využívanie zdravotne i environmentálne prijateľných technológií, a takto vytvára prostredie pre sociálne formovanie technologického rozvoja. Do popredia sa dostávajú prevažne kvalitatívne kritériá TH (environmentálna prijateľnosť technológií, vyššia technologická bezpečnosť či interaktivita technologického vývoja a sociálneho rozvoja atď.) s možnosťou škálovania ich vplyvu a úžitku (Grunwald, 2006), ako aj potreba ich expertnej transformácie na lepšie merateľné kvantitatívne kritériá (náklady, úspory, PH, zisk atď.). Medzi **hlavné ciele TH** môžeme zaradiť:

- Identifikácia priamych a nepriamych prevažne strednodobých vplyvov technológie.

- Minimalizácia nevhodných investícií, nákladov a aktivít spojených s technologickým rozvojom.
- Identifikovanie širších alternatív pre rozvoj technológie.
- Odhadnutie predajných možností produktov/služieb, ako aj ekonomických výsledkov používania technológie.
- Rozpoznanie ekonomických, sociálnych, technologických a iných trendov v prostredí.
- Poskytovanie relevantných informácií pre strategické rozhodovanie podnikov, verejných inštitúcií.
- Zvýšenie povedomia o technológiách a ich vplyvoch a získanie vyššej akceptovateľnosti špecifickej technológie verejnou.
- Rozpoznanie potrieb a problémov podniku, regiónu, odvetvia atď. (Krüick a i., 2003)

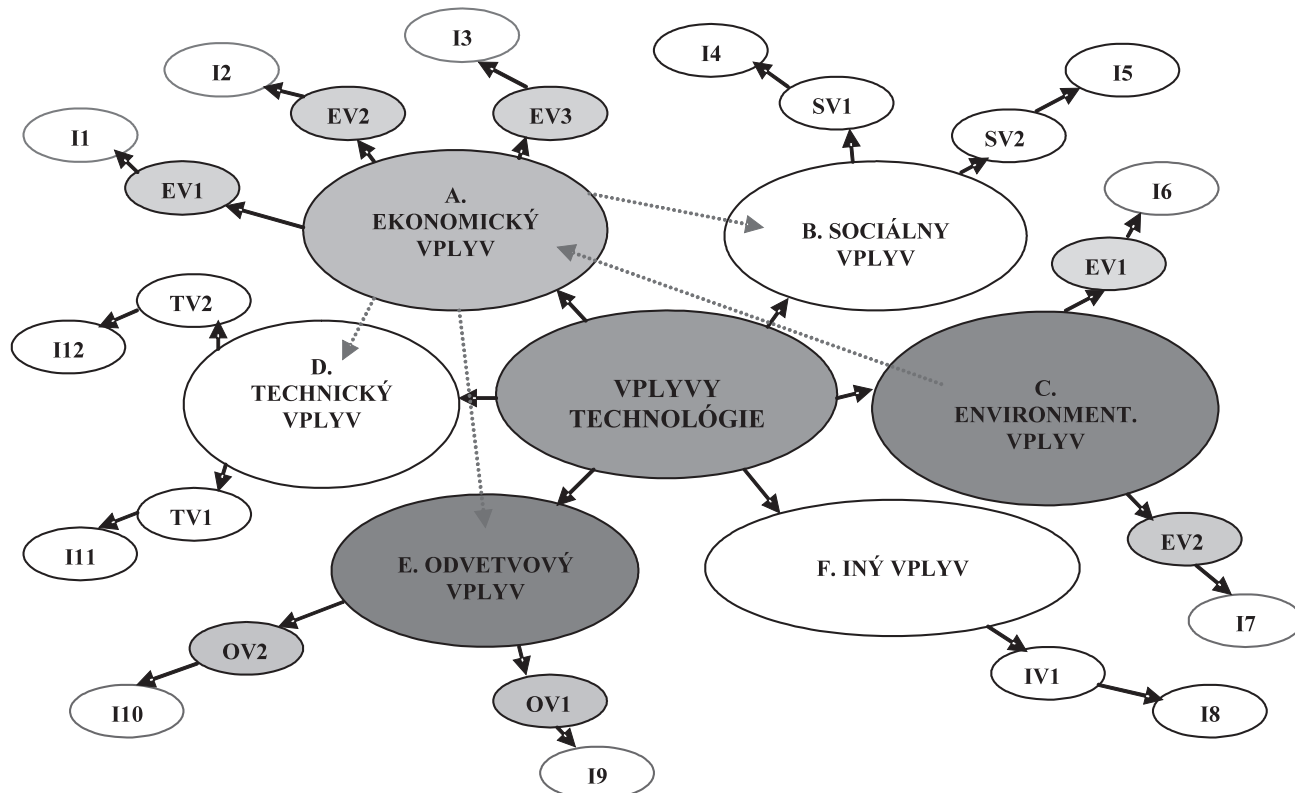
Medzi popredné inštitúcie v tejto oblasti patria: Európske zoskupenie pre TH (European Technology Assessment Group, ETAG), Európska sieť pre TH (European Technology Assessment network, ETAN), či Medzinárodná asociácia pre hodnotenie vplyvov (International association for impact assessment, IAIA). Všetky tieto organizácie predstavujú významné medzinárodné siete tzv. best practice, t. j. osvedčených postupov a know-how pre hodnotenie vplyvu technológií a inovácií pre podporu tvorby V-T politik, programov, plánov a projektov. Jednou zo špecifik týchto organizácií je široká participácia stakeholderov z rôznych profesií, ktorá poskytuje vynikajúce možnosti pre výmenu skúseností. Medzi hlavné aktivity zvyčajne patria: (1) rozvíjať prístupy a postupy pre komplexné a integrované hodnotenie vplyvu technológií, (2) zlepšiť hodnotenie

postupov a metód pre lepšie praktické aplikácie, (3) podporovať školenia zamerané na TH a šírenie verejného povedomia o TH, (4) poskytovať odborné rady na základe úzkej kooperácie s podnikmi/inštitúciami, (5) zdieľať informácie, vydávať odborné publikácie a realizovať odborné stretnutia (Cagnin a i., 2008).

Pozitívnym príkladom môže byť spomenutá (v súčasnosti už inovovaná) iniciatíva TH pri Kongrese USA, ktorá sa zameriava predovšetkým na sociálne, environmentálne a ekonomické aspekty využívania technológií, pričom každé schválenie technológie by malo nasledovať až po podrobnom zodpovedaní a pozitívnom vyhodnotení otázok ako:

- Aké môžu byť dôsledky používania špecifickej technológie na hospodársky vývoj podniku, odvetvia, regiónu atď.?
- Aký dosah môže mať technológia na kvalitu práce a zamestnanosť?
- Ako môže táto technológia napomôcť zlepšiť situáciu v životnom prostredí?
- Ako môže pokrok v oblasti technologickej inovácie ovplyvniť rozvoj spoločnosti?
- Aké problémy a vedľajšie vplyvy možno očakávať v prípade, že predpokladaná technologická inovácia bude/nebude realizovaná a využívaná.
- Ako budú produkty technológie po ich použití recyklované a zneškodnené? atď. (Vasanthi and Shekhar, 2004)

Takýto komplexnejší prístup by mal identifikovať aspoň šesť základných vplyvov každej technológie, pričom tieto môžu byť pozitívne a negatívne, priame a nepriame. Pokiaľ



Obrázok 1 Možné efekty aplikovanej technológie (tzv. Innovative Future Wheel)

Zdroj/source: Author

Figure 1 Possible effects of applied technology (so-called Innovative Future Wheel)

chceme komplexnejšie ohodnotiť a následne inovovať technológiu, je potrebné primerane identifikovať jej vplyvy a väzby medzi nimi (V1–VX), každý tento vplyv používania technológie či už na interné alebo externé prostredie podniku – ponúka potom možnosti pre parciálne inovácie technológie (I1–I12) (Obrazok 1).

- A. Ekonomický vplyv** zlepšenej technológie sa zvyčajne prejavuje hlavne cez efektívnejšiu výrobu, rýchlejší predaj, vyššie tržby a príjmy podniku, odvetvia a následne i štátneho rozpočtu, čo môže mať nepriamy vplyv na životnú úroveň ľudí, ale aj možné nové investície podniku, napr. na modernizáciu technického parku. V negatívnom zmysle, čím zložitejšia technológia, tým vyššie náklady na jej manažment, školenia zamestnancov, údržbu a opravy technických zariadení, likvidáciu odpadu atď.
- B. Sociálny vplyv** zlepšenej technológie môže byť napr. v ľahšom a bezpečnejšom používaní a lepšom využití technológie, alebo zlepšení sociálnych vzťahov prostredníctvom novej technológie (napr. Internet, mobilný telefón, bezpečnejšie auto atď.). Sekundárny vplyv môže byť v zlepšení kvality života ľudí, cez používanie lepších výrobkov a služieb.
- C. Environmentálny vplyv** v pozitívnom zmysle môže byť napríklad vo viac environmentálne prijateľnej výrobe, lepšej likvidácii odpadov či úprave životného prostredia. V negatívnom zmysle je to znečisťovanie prostredia, zvyšovanie hluku, alebo vyčerpávanie prírodných zdrojov. Sekundárny vplyv prináša dodatočné náklady na odstránenie týchto negatívnych javov, a tým zafažuje podnikový i verejný rozpočet.
- D. Technický vplyv** sa prejavuje napríklad prostredníctvom vyššej flexibility, modularity, účinnosti strojov a výrobných zariadení či nižšej prácnosti výrobného procesu. Toto umožňuje flexibilnejšie a lepšie sa prispôbovať potrebám zákazníkov, znižovať náklady, alebo menej zafažovať odpadmi životné prostredie, atď.

Ak by sme pri zjednodušení pozitívne ohodnotili technológiu Internetu, potom medzi ekonomické vplyvy Internetu môžeme zaradiť napríklad podstatné zrýchlenie bezhotovostných ekonomicko-finančných transakcií, vytvorenie viac dostupnejšej formy marketingu, alebo predaja. Sociálne vplyvy Internetu predstavujú širšiu, dostupnejšiu a kvalitnejšiu formu komunikácie v porovnaní s mobilným telefónom (email, chat, video konferencia), lepšiu možnosť získať potrebné informácie, novú formu trávenia voľného času. Environmentálne vplyvy znamenajú šetrenie prírodných zdrojov (dopravné emisie, papier, elektrina) či informovanie o environmentálne viac prijateľných formách výroby, spotreby, likvidácie odpadu. Medzi technické vplyvy Internetu môžeme zaradiť nové formy vyhľadávania informácií, spolupráce, alebo vzdelávania, atď.

Na základe rôznych vplyvov technológií môžeme povedať, že TH má byť systémová a aj systematická aktivita, ktorá skúma krátkodobé i dlhodobé technologické možnosti, vplyvy, relácie medzi nimi a ich dopady na interné prostredie (podnik, domácnosť, inštitúcia) a externé prostredie (spoločnosť, životné prostredie, kultúra atď.). Toto umožňuje získať lepšie informácie pre strategické rozhodovanie podniku/ inštitúcie o technologickom rozvoji, útlme či okamžitom vyradení príslušnej technológie. Aby bolo možné primerane ohodnotiť danú technológiu, je nevyhnutné zabezpečiť širšiu participáciu rôznych ľudí, primerané metódy, alebo objektívne kritériá tohto hodnotenia. Tento proces je organizačne i finančne náročný, preto zároveň vyžaduje širšiu formu spolupráce, napríklad

v rámci spoločného podnikania, odvetvovej, regionálnej či medzinárodnej spolupráce. Toto umožňuje spájať zdroje i capacity, aby tento proces bol objektívnejší a primerane finančne i organizačne zabezpečený. TH je z tohto dôvodu často politicky organizovaný proces zameraný aj na plánovanie V-T politik (Reuzel a i., 2001).

### Metódy technologického hodnotenia

TH vyžaduje stále viac holistický prístup, ktorý podporuje hodnotenie aj nepredvídateľných a nepriamo súvisiacich vplyvov danej technológie a zistenie určitej hodnotenia. TH by malo mať tzv. pasívny obsah, t. j. hodnotenie minulých a súčasných charakteristík technológie a tzv. aktívny obsah, t. j. hodnotenie budúcich vplyvov technológie a ich očakávaných determinantov. Hlavným problémom TH je potom správne ohodnotiť hlavne tzv. aktívne i pasívne komplexné agregované determinanty/väzby technológie nazývané aj entity. Entity sa prevažne vyznačujú náročnou identifikovateľnosťou a štruktúrovaním, nemožnosťou priamej kvantifikácie, a tak aj plánovania. Jedným z riešení ako zabezpečiť ohodnotenie entít technologického systému je použiť tzv. Fuzzy logic (Multikritériálna intuitívna logika). Podstatou tejto metódy je kombinácia využitia metód matematického modelovania a iných expertných metód TH (Expertné panely, PC simulácie, Think-tanks, atď.). Metóda je založená na predpoklade obmedzenej racionality, to znamená, že ľudská logika nie je schopná dokonale popísať realitu. Preto metóda využíva váhu reálneho hodnotenia v rozmedzí 0–1 (Waine, 2007). Následne „Fuzzy logic“ používa matematické modely na stanovenie určitosti/neurčitosti hodnotenia. Matematické hodnotenie procesov tu vyžaduje expertnú kvantifikáciu kvalitatívnych determinantov (Ludwig, 1998). Problém hodnotenia entít technológie do veľkej miery závisí od ostatných problémov TH. Problémy spojené s technologickým hodnotením:

- Nároky manažmentu na technológiu sú prehnané. Inovácia technológie má vyriešiť príliš veľa problémov podniku, alebo má zabezpečiť dosiahnutie príliš veľa nesúvisiacich cieľov.
- Nie sú definované jasné kritériá pre TH, alebo sú rozdielne kritériá používané rôznymi stakeholdermi (zúčastnenými stranami).
- Stakeholderi sú nesprávne vybraní a informovaní o technológiách, hodnotiacich kritériách, či procese hodnotenia.
- Celý proces je nesprávne organizovaný, neexistuje spätná väzba, alebo je príliš málo času na ohodnotenie technológie.
- Problémy a ciele sú časovo ohraničené a TH nezapadá do tohto časového intervalu.
- Zjednodušené príčinné závislosti (pokiaľ ide o účinky inovácie technológie v určitom období) nie sú už aktuálne (Ludwig, 1998).
- Príliš veľa nesprávnych ľudí participuje na konečnom rozhodnutí ohľadom technológie, atď.

Jednotlivé formy TH vyžadujú použitie individuálnej kombinácie metód, ktorá závisí od druhu technológie, jej zložitosti, rozsahu TH, časového intervalu TH, dostupnosti informácií, ako aj od individuálnych nárokov na TH (rozpočet, legislatívne pravidlá, spôsob obstarania, počet stakeholderov atď.). Aby bolo možné, čo najvhodnejšie ohodnotiť danú technológiu prostredníctvom výberu najvhodnejších metód TH, je potrebné rozčleniť tieto metódy na základe viacerých hľadísk (Tabuľka 1.). Toto delenie je podobné deleniu metód používaných v technologickom foresighte, nakoľko TH býva často súčasťou foresightu.



Tabuľka 1 Taxonómia najpoužívanejších metód technologického hodnotenia

Metódy TH (1)	Analytická (29)	Prognostická (30)	Hodnotiacia (31)	Formálna (32)	Neformálna (33)	Individuálna (34)	Kolektívna (35)	Kvantitatívna (36)	Kvalitatívna (37)	Expertná (38)	Neexpertná (39)
SWOT (2)	x		x	x		x			x	X	
Morfologická analýza (3)	x		x	x		x			x	X	
Strom významnosti (4)	X		x	x		X		x		X	
Benchmarking (5)	x		x	x		x			x	x	
Multi-kritériálna analýza (6)	x		x	X		X			x	x	
Analytický hierarchický proces (7)	x		x	x			x	x		X	
Analýza užitočnosti (8)	x	x	x	x			x		x	x	
Trendová extrapolácia (9)	x	X		X		X		X		X	
Brainstorming (10)	x	X	x		x		X		X		x
Delfy (11)	x	X	x	X			X		X	X	
Modeling a simulácie (12)	x	X	x	X		X		X		X	
Dynamická prognóza (13)	x	X		X		X		X		X	
Cross-impact analysis (14)	X	x	X	x			x		X	x	
Interview (15)	x		X		x	x			X	x	
Dotazník (16)	x		X	X		X			X	x	
Analýza indikátorov (17)	X		x	X		X	x			X	
Ekonometrický prístup (18)	x	X		X		X		X		X	
Synectics (19)	x	X	x	x			X		X	x	
Regresná analýza (20)	X	X		X		X		X		X	
Plánovacie bunky (21)	x	X	x	X			X		X	x	
Petri-Nets (22)	x	x		X		X		X		X	
Historická analógia (23)	x	X	x	x		X			X	X	
Prieskum problémov (24)	x				X	x			x		x
Písanie scenárov (25)	x	X			x		X		X	X	
Think tank (26)	x	X	X	X			X		X	X	
Volenie/Hlasovanie (27)	X		X	x			X	x			X
Workshop (28)		x	X		x		X		X	X	

Zdroj/source: Own compilation based on EFMN, 2010

Veľkosť písmena X v tabuľke reprezentuje preferenciu zaradenia do príslušnej skupiny (vzostupne)

Table 1 Taxonomy of most commonly applied methods in technology assessment

(1) methods of technology assessment, (2) SWOT analysis, (3) morphological analysis, (4) relevance tree, (5) benchmarking, (7) analytic hierarchy process, (8) analysis of usefulness, (9) trend extrapolation, (10) brainstorming, (11) delphi assessment, (12) modelling and simulations, (13) dynamical prognosis, (14) cross-impact analysis, (15) interview, (16) questionnaire, (17) analysis of indicators, (18) econometric approach, (19) synectics, (20) regression analysis, (21) planning cells, (22) petri-nets, (23) historical analogy, (24) survey of problems, (25) writing scenarios, (26) think tank, (27) voting, (28) workshop, (29) analytical, (30) prognostic, (31) evaluating, (32) formal, (33) informal, (34) individual, (35) collective, (36) quantitative, (37) qualitative, (38) expert, (39) non-expert

Tabuľka 1 bola zostavená na základe rozsiahleho prieskumu primárnych charakteristík a najčastejšieho použitia metód TH v rámci Európskej monitorovacej siete foresightu (EFMN, 2010). Nie je účelom tejto štúdie charakterizovať jednotlivé metódy a bližšie rozdiely medzi jednotlivými metódami, ktoré sú do veľkej miery vždy závislé od ich individuálnej aplikácie.

Na základe rozsiahleho výskumu aplikácií jednotlivých metód TH možno tieto primárne rozčleniť:

- a) Z hľadiska jednotlivých fáz/krokov TH – analytické, prognostické a hodnotiace metódy.
- b) Z hľadiska organizácie procesu TH – formálne a neformálne metódy.
- c) Z hľadiska spôsobu TH – individuálne a kolektívne metódy.
- d) Z hľadiska aplikovaných dát – kvalitatívne a kvantitatívne metódy
- e) Z hľadiska požadovaných znalostí – expertné a neexpertné metódy.

Na základe tabuľky 1 môžeme povedať, že najviac používané metódy TH sú analytické, formálne, individuálne, kvalitatívne a expertné metódy. Tejto charakteristike zodpovedá najviac uvedených metód, hlavne SWOT analýza, Morfológická analýza, Benchmarking, Multi-kriteriálna analýza, Modeling a simulácie, Dotazník, Analýza indikátorov, Ekonometrický prístup, Regresná analýza a Petri-nets. Prevalencia analytických metód, ako SWOT, Morfológická analýza či Multi-kriteriálna analýza, ktoré patria pôvodom do Strategického manažmentu, je podmienená potrebou aplikácie viacerých metód na rozbor a správnu identifikáciu jednotlivých charakteristík technológie. Tento prístup zabezpečuje komplexnejšie TH. Nakoľko TH zvyčajne vyžaduje presnú špecifikáciu prvkov a väzieb technologického systému, je nevyhnutné zabezpečiť viac formálny prístup, hlavne pre vykonanie expertných analýz. Formálny prístup je obvyčajne zabezpečený stanovením presného postupu a pravidiel TH. Najviac používané individuálne expertné formálne metódy sú regresná a korelačná analýza, vzťahová analýza a analýza užitočnosti. Tieto analýzy sú viac vykonávané v súvislosti so špecifickým hodnotením parciálnych častí technológie.

## Diskusia a záver

Technológia ako sústava určitých vzájomne pôsobiacich procesov je často veľmi náročný systém, ktorého správne ohodnotenie má obsahovať identifikovanie prvkov, väzieb, ale aj aktuálnych či potenciálnych synergií a dis-synergií, ktoré sa môžu objaviť pri inovácii jednotlivých komponentov, alebo používaní celej technológie. Tieto väzby a synergie často presahujú vnútroorganizačné prostredie a zahŕňajú aj široké priame a nepriame vplyvy na prostredie, ale aj prostredia na technológiu. Hlavným problémom širšej aplikácie TH predovšetkým v MSP je nedostatok potrebnej metodológie, aj keď existujú rôzne inštitucionálne odporúčania, postupy a smernice, ako realizovať TH. Medzi popredné inštitúcie v tejto oblasti patria: Európske zoskupenie pre TH, Európska sieť pre TH a Medzinárodná asociácia pre hodnotenie vplyvov.

TH môže byť považované za špecifický druh interinštitucionálneho a interdisciplinárneho technologického výskumu a podpory pre vedecko-technickú politiku (Grunwald, 2006). TH by malo mať tzv. pasívny obsah, t. j. hodnotenie minulých a súčasných charakteristík technológie a tzv. aktívny obsah, t. j. hodnotenie budúcich vplyvov technológie a ich očakávaných determinantov. Na základe analýzy účelu napoužívanejších metód TH môžeme zjednodušene povedať, že najviac používané metódy TH v rámci tejto štúdie sú analytické, formálne, individuálne, kvalitatívne a expertné metódy. Tejto charakteristike zodpovedá najviac uvedených metód, hlavne SWOT analýza, morfológická analýza, benchmarking, multi-kriteriálna analýza,

modeling a simulácie, dotazník, analýza indikátorov, ekonometrický prístup, regresná analýza a petri-nets.

Najväčším problémom TH zostáva nejednotná metodológia (Hansen, 2006) a hlavne identifikovanie a ohodnotenie dôsledkov komplexných a vysoko agregovaných systémových determinantov nazývaných aj entity. Správne ohodnotenie entít je prakticky nemožné s použitím klasických metód TH, ktoré zväčša zabezpečia len hodnotenie samostatných prvkov a väzieb technologického systému, bez identifikovania širších synergií a ich neurčitostí. Jedným z riešení ako zabezpečiť ohodnotenie entít technologického systému je použiť tzv. Fuzzy logic, čo je však veľmi náročný expertný proces, ktorý je často málo aplikovateľný v MSP. Medzi trend TH patrí nutnosť rozšíriť národné aktivity v oblasti TH na medzinárodnú úroveň, nielen pokiaľ ide o medzinárodnú spoluprácu, ktorá môže zabrániť duplicitám, ale aj stanovovanie spoločných štandardov a jednotnej legislatívy hlavne pre technologický V-V, ktorý má následný vplyv na zdravie ľudí i životné prostredie.

Hlavným cieľom tejto štúdie je preskúmať kľúčovú problematiku

## Súhrn

technologického hodnotenia (TH), ktorá vo všeobecnosti zatiaľ nie je presne definovaná. Účelom technologického hodnotenia je analyzovať technológiu a jej súčasné, ale aj budúce vplyvy na interné, ale hlavne externé prostredie podniku. Identifikovanie týchto vplyvov vyžaduje interdisciplinárny prístup, ktorý umožní vytvorenie komplexnejšieho obrazu/modelu o používaní danej technológie. Tento obraz pri existujúcej technológii, alebo model pri plánovanej technológii má byť určitým konsenzom širšej odbornej diskusie, čo môže byť veľmi náročný proces, hlavne pokiaľ ide o problém obmedzenej racionality. Technologické hodnotenie má byť zamerané na systematické skúmanie jednotlivých reálnych dôsledkov a špecifických podmienok využitia technológie. Táto štúdia sa zaoberá charakterizovaním podstaty technologického hodnotenia a najviac používaných metód v TH. Výskum bol robený na základe intenzívneho štúdia odbornej literatúry, rozsiahlej analýzy Európskej monitorovacej siete foresightu, niekoľkých odborných diskusií a prípadových štúdií.

**Kľúčové slová:** technologické hodnotenie, foresight, vplyv technológie, metódy technologického hodnotenia

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