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THE FINANCIAL CRISIS – CATASTROPHE OR RENEWAL? FINANČNÁ KRÍZA – KATASTROFA ALEBO OBNOVA?

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The article presents a chronicle and causes of the global financial crisis. It contains an analysis of the influence of the crisis on Poland and a trend of Polish business cycle. The article presents a theory of Kondratiev large business cycles. Based on the calculations and opinions of economists, authors attempted to predict the global cycle in the context of globalization. The paper contains also the cycles by the year 2060, which were described by the economists after Kondratiev's death. The relation between the Kondratiev cycles and technological systems in the historical perspective is also presented there. The article ends with the conclusion that authors predict, for next few years, a slower activity of investing funds, bankruptcy of big companies and higher development of new technologies after 2015.

Key words: global financial crisis, business cycle in Poland, Kondratiev long cycles, phases of cycle, forecasting

Once we are frightened that the crisis would last for a long time, the other time, on the contrary, we expect that in 3–5 years we will reach the same level of GDP per capita as we had before the crisis. But ordinary citizens want to know what they can expect from this crisis in the future. Should we look for a new job or country of residence, should we buy some currency, collect tea, salt, matches, or maybe calmly and confidently look to the future? We will try to talk about this problem.

(private and federal sectors) amounted to \$ 5.7 trillion, but in March 2008 it exceeded \$ 13.8 trillion. In this way, a system of debt obligations began to resemble a classic financial pyramid: own money is no longer enough to cover debt obligations, and we need to look for a way to restore the payment, or, at least, the percentage of old debts. It was understood that in the end there would be a situation where we wouldn't get loans, and then the whole pyramid would crumble.

Material and methods

The problems of America – the problems of the World

In the late 80's, globalization, that is, creating common financial institutions of independent countries and their common „production line“, had reached its maximum. The opening of the huge markets of the former Soviet Union, Eastern Europe and China for new business partners willing to take loans and buy goods stimulated a rapid growth of economics of developed countries. For example, from 1993 to 2001, the United States – the largest international borrower – were developed with a fantastic result: in 1998 the U.S. has even beaten a long-term budget deficit. And that was a signal to investors that the U.S. securities were reliable and profitable. Therefore, money flowed to the U.S. from Europe, Japan and from the developing countries.

The first problems arose in early 2001, when some of the most advanced countries of Asia and South America survived severe currency and financial shocks. The Americans, who literally bathed in money, started to lose more and more on social programs and to expand their military presence in the world. On the other hand, globalization stimulated the migration of production capacity to developing countries, which have almost unlimited amount of cheap labor. As a result, China became a leader in economic growth, while the U.S. became its largest debtor. The Americans at the cost of debt and investments (and this is a type of debt) acquired a huge debt. In January 2001, the foreign national debt of the United States

The chronicle of the crisis

In 2006, there was a remarkable boom in the housing market in the United States. As the demand for real estates was very high, the prices were growing very fast. The reason did not lie in the rapid growth of Americans' income, but in the availability of mortgages for almost everyone. First of all – mortgage loans in the United States are at least three times cheaper than e.g. the Russian loans. Secondly, the mortgaged property, in accordance with U.S. law, can be sold without restriction – and thus, money could be made on it. And thirdly, mortgage programs have very flexible terms of loan repayment. The first few years, loans installments are very small, so that even poor family can afford such installments. And only after some time the amount of repayments becomes inaccessible to those families. In such a way, the illusions of easy housing availability are created.

Most of real estates were proved to be the property of borrowers who did not have the financial capacity to repay, or even had no intention to pay off the loans completely. This phenomenon became particularly visible in early 2007. It is possible that this situation was not sufficiently proved to be disastrous if not the presence of the U.S. bonds on the mortgage market. For example, two thirds of mortgage documents in the U.S. were converted into mortgage bonds and sold as securities to the largest financial institutions. As a result, banks could quickly recover the money (to provide re-mortgage), and the bonds were bought in the capital markets by various companies and corporations. When the mortgage market in the U.S. was flooded by the non-refundable mortgage loans, the price of mortgage bonds was strongly decreased and their holders have suffered huge losses.

The list of financial machinations victims started with an American company „Bear Stern”, the banking group Commerzbank and Allianz Holding International, the world-famous Deutsche Bank and the largest U.S. investment banks – Lehman Brothers and Morgan Stanley and others.

August 2007 is linked with the beginning of the global crisis of securities liquidity. Until September 2007, fifty mortgage institutions had become bankrupts in the U.S. The bankruptcy of these companies has led to an increase of unemployment, especially in the construction sector. At the same time, the first mass panic of the owners of savings took place in Europe. The economic crisis was continuing to deepen and moved to other sectors of the economy.

September 15, 2008 was a shock: Lehman Brothers bankrupt, Bank of America Corp. was absorbed by Merrill Lynch, declined credit rating of American International Group (AIG) – the largest insurer in the world who felt the lack of cash for the reason of the mortgage losses. These events caused a domino effect, or wave of bankruptcies, mergers and takeovers in the U.S., as well as in Europe.

Results and discussion

How does the global crisis affect Poland?

Leading Polish economists say: „The crisis will not hit us as hard as in the euro-zone and the U.S., but we are not completely safe.” In their opinion, the crisis is likely to affect the Polish economy through an increase of credit costs, investment risks and weaker export. The circumstances in the world financial markets will certainly also have impacts on the Polish economic development. In the economic exchange a mean of payment is needed but business will have a limited access to credit. The essential question is whether the crisis in the U.S. will affect a situation of the Polish financial sector.

International Monetary Fund predicted that financial crisis would affect Poland in a very small extent. In 2009, the Polish economy was driven by internal consumption demand, investment demand and export. Salaries, in real terms, are forecasted to rise up to 16 percent over the next two years. The financial situation of companies operating in Poland is good. Exports in Poland increased in 2007 by 8.7 percent, in 2008 it was 9.2 percent, in 2009 it was 8 percent and in 2010 it was 10 percent. Poland’s adoption of the euro currency will increase the credibility of the credit in the EU and the world.

Is Poland threatened by the economic crisis?

Until recently, there was optimism about further economic growth in Poland among Polish politicians and economists. The current turmoil in global markets begins to cause the revision of these opinions. Increasingly, there are statements about a possible economic slowdown or even recession. The state income tax is clearly marked by a downward trend. Certainly, the best years are behind us. Global economic cycle is relentless and the current economic problems in the United States must find their reflections in our country. Inflation and the inevitable increase of interest rates may slightly cool our economy. Polish Zloty is also getting stronger and it does not serve the exporters. It requires looking with some concern into the future, but the crisis is still far away.

Recently, we have heard statements about a possible crisis that awaits us in the coming years. There are signals to support

the contention about the impending economic crisis. First of all, few people are aware of the fact that economies around the world develop in cycles. Secondly, the economy of our country has been lucky so far – we used the global economic situation, combined with the effect of accession to the EU and the stream of money for subsidies has been reflected in the economic growth. Thirdly, currently, there is almost certain slowdown in the growth of economies around the world – so is in Poland.

A crisis similar to that occurring in the U.S. in general is not the question. First of all, the Poles firmly repay home loans, secondly, securitization of receivables, as developed in the U.S. market, is still in its infancy in Poland. There are no fundamental cells, which in the U.S. caused the problems in the mortgage market and brought the financial institutions’ losses.

In our opinion, there is no reason to anticipate the recession in Poland in the near future. Decline in the growth rate of economic growth is obvious, but not the recession. The economic growth will be supported by Polish accession to the EU and resources for infrastructure development. Rapidly rising incomes of the Poles lead to the increased consumption and economic growth. It is also worth noting that during the rapid economic growth, Poland reduced the budget deficit and unemployment. The increase in real wages in recent times was quite big, but it may be that it will not have much significance for inflation. Firstly, because in previous years the increase in production and productivity was not accompanied by the increase of wages, so that part of labor costs fell in total costs. Secondly, the economic slowdown in the U.S. and some EU countries may cause the return of some of our compatriots to Poland encouraged by better prospects in the country than abroad, which increases the supply of qualified workers.

Kondratiev cycles

Today, economists break down the hand: the crisis could not be foreseen and nobody could have been prepared for it, economists were forced to make decisions very quickly and intuitively. But this is not true. Current crisis was predicted almost a century ago and an excellent Russian economist Nikolai Kondratiev did it. He was born in 1892 and graduated at the University of St. Petersburg.

Kondratiev developed the theory of large business cycles. Of course, there are different economic cycles: the Joseph Kitchin cycle – 3–4 years, the Clement Juglar cycle – 7–11 years, the Simon Kuznets cycle – 15–25. But for us the most important application is represented by the cycles of global crises that arise once in 50 years and have a minimum of prosperity. During the study, Kondratiev examined some economic indicators of countries in Western Europe and the U.S. from 1790 to 1920. Economic indicators used for the analysis are: price indices, government securities, the nominal wage, the turnover of foreign trade, coal mining, gold, production of lead, iron, etc. Kondratiev noticed that these indicators vary cyclically over time. In capitalism, economic growth and its decline are cyclical, which does not depend on the degree of development of production and the quantities of countries involved in the economic relations. Kondratiev indicated time periods of the first three cycles in the history of the capitalist economy:

1. First: from 1779–80 to 1841–44
 - prosperity from 1780 to 1814
 - recession of economy from 1814 to 1841
2. Second: from 1841–44 to 1891–96
 - prosperity from 1843 do 1870

– recession of economy from 1875 to 1891

3. Third: from 1891–96 to 1929–33

- prosperity from 1896 to 1914
- recession of economy from 1914 to 1929

The maximum was achieved in the years 1814, 1873 and 1914, while the minimum in the years 1779, 1841 and 1894. The length of the cycle consists of an average of 50 years. Based on his observations, the long-term prognoses to year 2010 were made by Kondratiev. And based on the Kondratiev calculations, after his death, economists have described, in greater details, the following cycles (figure 1):

4. Fourth: from 1929–1933 to 1973–75

- prosperity from 1933 to 1951–53
- recession of economy from 1951–53 to 1973 (possible to 1981)

5. Fifth: from 1973–75 to 2010–15

- prosperity from 1975 to ~1995
- recession of economy from ~1995 to 2010

6. Sixth: from 2010–15 to 2060

- prosperity from 2015
- recession of economy to 2060

Until now, nobody knows why, regardless of the development of modern economics, the rhythm and mode of Kondratiev cycles are immutable.

Phase of growth

It mostly begins with the war or other reason causing increasing loss of the state, increases the demand, production, number of credits. Rising rate of inflation and implementation of the inventions actively develop new industries and branches, followed by the development of competitiveness, increasing the scope of international trade. Marketing loans exceed demand,

the financial situation is stable. Economists, politicians and voters are focused on long-term economic growth.

Phase of peak

Almost always it means an increase of military activity: the surge in prices, the change of state policy – from support of the demand to financial stability – the increase of exchange rate fluctuations due to different levels of inflation in different countries. Patents are not implemented; there is overproduction of means of production. Society turns to solving international problems.

Phase of decline

In the first half after the war phase the economic growth begins. Inflation is reduced; the production is developing intensively due to the reduction of costs. The fiscal policy is in the center of public attention. The second half of the decline phase is the transfer of a substantial part of the credit to the hopeless category of debt. Polarization of society. The reduction in demand. Strengthening of protectionism and nationalism, building customs barriers. Strengthening the degree of regulation of financial markets. Declining interest in public policy in favor of economy. Course to depression.

Phase of depression

Low inflation, bank rate is almost zero, very low demand and sales of loans. Overproduction in the old industries. There are major inventions in the field of technique and the management, which will be implemented in the next phase of growth cycle, causing that new media energy, types of transport and communications will be created. The gradual reduction of debt, high unemployment, getting out of raw materials.

While analyzing this situation, a forecast for the next few

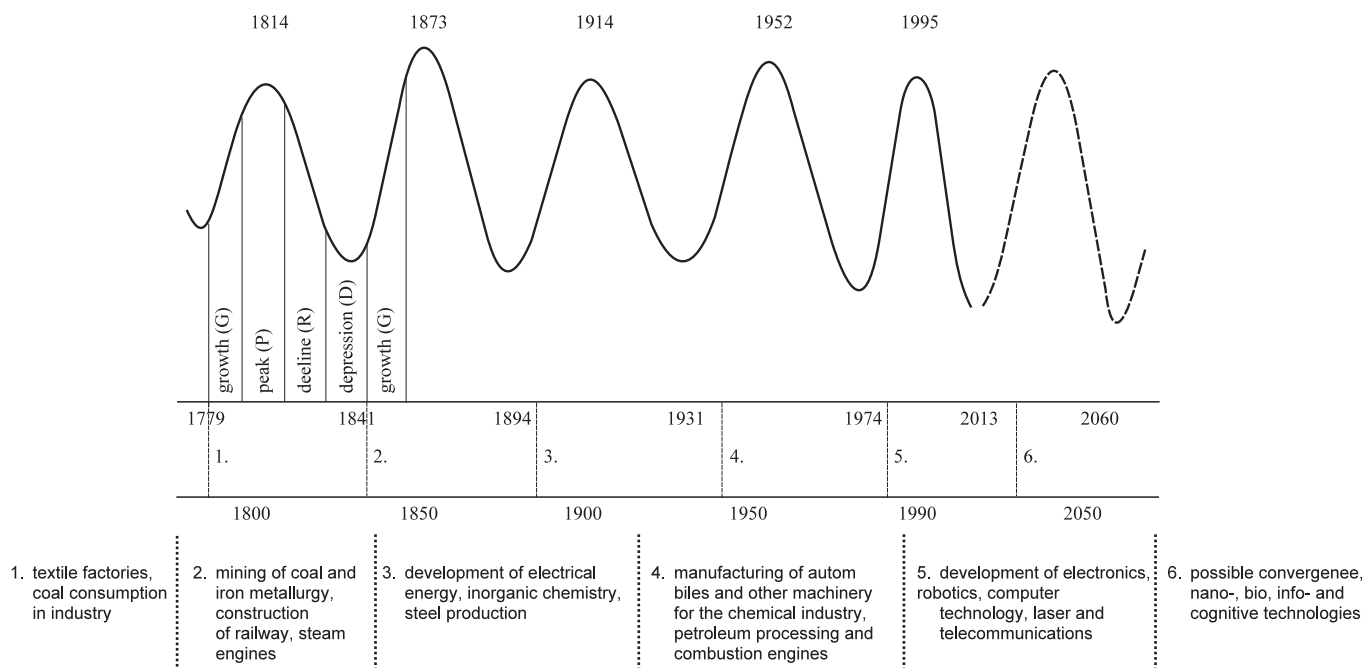


Figure 1 Kondratiev cycles

Obrázok 1 Kondratievove cykly

(1) textilné továrne, spotreba uhlia v priemysle, (2) ťažba uhlia a železa, stavba železníc, parné stroje, (3) vynájdenie elektrickej energie, anorganická chémia, produkcia ocele, (4) výroba automobilov a strojov pre chemický priemysel, spracovanie ropy, spaľovacie motory, (5) rozvoj elektroniky, robotiky, počítačových technológií; laser a telekomunikácie, (6) nanotechnológie, biotechnológie, informačné technológie, poznávacie technológie, konvergencia; (G) rast, (P) vrchol, (R) pokles, (D) kríza

years can be made: maintenance and strengthening of the present situation, the release of activity funds, the bankruptcy of large companies, development of new technologies after 2015 (rather in the field of genetics and medicine), advantage for small companies, able to adapt to the market downturn.

We can also see the relationship between the Kondratiev cycles phases of growth and peak and technological systems:

- 1 cycle – textile factories, coal consumption in industry,
- 2 cycle – mining of coal and iron metallurgy, construction of railway, steam engines,
- 3 cycle – development of electrical energy, inorganic chemistry, steel production and electric engines,
- 4 cycle – manufacturing of automobiles and other machinery for the chemical industry, petroleum processing and combustion engines,
- 5 cycle – development of electronics, robotics, computer technology, laser and telecommunications,
- 6 cycle – possible convergence, nano-, bio-, info- and cognitive technologies.

During the economic decline, the years of crisis are mostly coming. Considering that the previous crisis began in 1973, it can be concluded that for the moment we are in a „declining“ phase of the cycle, bringing economic prosperity to a minimum. To start a „booster“ phase, a few more years will pass; the strong growth is expected around the year 2015. But that does not mean that until then we will be hungry and poor, and after that period everything will bloom! This process is much more complex. The same Kondratiev indicated that at the very beginning of the „booster“ phase, changes occur throughout the whole life of the capitalist society, which precede significant scientific and technical inventions, and scientific and technical progress.

Conclusion

Current crisis seems to be a result of cyclic fluctuations and is deeper because of financial bubbles in real estate market. Economists say that today we are in the bottom of the crisis, despite some positive symptoms of growth. From autumn 2010 the world economy should be in late phase of depression and slowly come over the crisis. The strong growth is expected around the year 2015. For next few years, we can predict slower activity of investing funds, bankruptcy of big companies, higher development of new technologies after 2015. Small and midsized business, as more flexible and adaptable to current situation, takes market advantages over.

Súhrn

Článok predstavuje priebeh a príčiny svetovej finančnej krízy. Obsahuje analýzu vplyvu krízy na Poľsko a trend v poľskom ekonomickom cykle. Článok popisuje Kondratievovu teóriu veľkých ekonomických cyklov. Autori sa na základe výpočtov a názorov ekonómov pokúsili predpovedať globálny cyklus v kontexte globalizácie. Práca tiež obsahuje popis cyklov do roku 2060 ako ich popísali ekonómovia po Kondratievovej smrti. Je v nej tiež predstavený vzťah medzi Kondratievovými cyklami a technologickými systémami v historickej perspektíve. Príspevok končí záverom, v ktorom autori na niekoľko najbližších rokov predpovedajú nižšiu aktivitu investičných fondov, bankrot veľkých spoločností a intenzívnejší rozvoj nových technológií po roku 2015.

Kľúčové slová: svetová finančná kríza, ekonomický cyklus v Poľsku, Kondratievové veľké cykly, fázy cyklu, prognózovanie

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FOOD SECURITY IN CENTRAL ASIA AND EASTERN EUROPE AND POSSIBLE SOLUTIONS FOR HUNGER AND MALNUTRITION IN THESE REGIONS

POTRAVINOVÁ BEZPEČNOSŤ VO VÝCHODNEJ EURÓPE A STREDNEJ ÁZII A MOŽNOSTI RIEŠENIA HLADU A PODVÝŽIVY V TÝCHTO REGIÓNOCH

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Even at the beginning of the 21st century, hunger and malnutrition are still serious problems for many countries in the world. It is estimated that every three and a half seconds a person dies because of insufficient amount of food. There are as much as 925 million undernourished people on our planet. Hunger and malnutrition present in fact a great risk to the health worldwide, even greater than AIDS, malaria and tuberculosis altogether. Eastern Europe and Central Asia are both regions with specific conditions and issues related to the poorer part of the population. The goal of this paper is to point out possible solutions for eradication of extreme poverty with specific focus on these two regions and to highlight the most important factors that have had an influence on the development of the agricultural sector in these regions.

Key words: food security, soaring food price crisis, global economic crisis, climate changes, investments in agriculture

The world is facing three global crises. They are related to the environment, economic crisis and food insecurity. The sharpest of them is the current economic collapse. The most frightening is the looming food crisis and world hunger which has recently registered 925 million starving people. The main causes of the unstable, unequal and unsustainable development in the world are population growth, globalization and urbanization as well as the growing energy demand and climate change.

In 2050, 9.2 billion people are expected to live in the world. The Earth has enough natural and human-based capacity to feed this number of the world population, however, in the first decade of the third millennium the hunger is the most serious issue and the agricultural experts are forced to admit that the environmentally friendly use of the natural resources in the field of agriculture and food security is significantly lagging behind the Earth potential, especially in the European and Central Asian region.

The number of undernourished people in the world increased by 75 million in 2007 and 40 million in 2008, largely due to higher food prices; the number of starving people further increased by 100 million in 2009, due to the economic crisis. 907 million people in developing countries alone are hungry. 33 countries currently face a food security crisis, 14 of which have been in this situation for more than a decade. When emergencies continue for such extended periods of time, traditional humanitarian and development paradigms are not suitable for providing effective responses.

Material and methods

The objective of this paper is to analyse different approaches for eradication of extreme poverty with specific focus on Eastern Europe and Central Asia. The other important processes which have had the significant impact on the development trends in the agricultural sector are taken into consideration, e.g. the transition process, the EU enlargement, the impact of the food soaring prices on the food security, the global economic crisis and the

effects of the climate change on the poverty and food security in the Eastern Europe and Central Asian.

The data are downloaded from FAOSTAT and from a special questionnaire survey which was carried out by FAO Regional Office for Europe and Central Asia in Armenia, Hungary, Kyrgyzstan and Ukraine in order to evaluate the recent trends in Eastern European and Central Asian region caused by the global economic crisis.

Results and discussion

Current trends in the food and agriculture security in Central and Eastern Europe and in Central Asia

The current situation in the food and agriculture security in Central and Eastern Europe and in Central Asia is affected by several recent trends:

- the transition processes in Eastern European and Central Asian Countries,
- the EU Enlargement,
- the soaring-volatile food price crisis,
- the global economic crisis,
- the impact of the climate change.

It is well understood that the Central and Eastern European and Central Asian Regions, due to the transition, went through significant changes in the agricultural sector. These changes have had a strong impact on the development of food security in these regions. It is also important to underline that the transition caused a great deal of diversity among the countries of these regions. At its initial stage, the food security in Central and Eastern Europe and in Central Asia was characteristic with negative development trends. The number of hungry population was consistently increasing up to 2000 especially in CIS countries and in Southern and Eastern Balkan. Afterwards, these negative trends were reversed due to the revitalization of the agricultural sector. However, as the consequence of the soaring food prices and the global

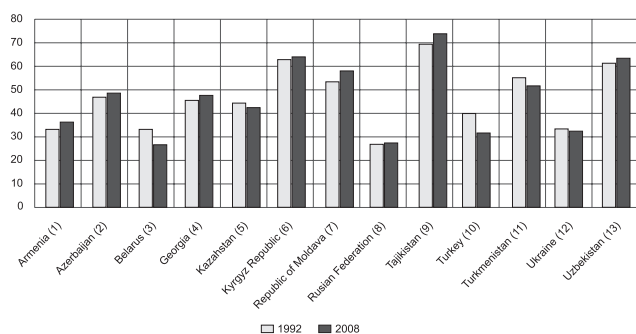


Figure 1 Share of rural population to the total, an average of 1992 compared to 2008 in %

Source: World Development Indicators, World Bank

Obrázok 1 Podiel vidieckeho obyvateľstva na celkovej populácii, priemer roku 1992 porovnaný s rokom 2008 v %

Zdroj: Svetové rozvojové indikátory, Svetová banka

(1) Arménsko, (2) Azerbajdžan, (3) Bielorusko, (4) Gruzínsko, (5) Kazachstan, (6) Kirgizsko, (7) Moldavsko, (8) Ruská federácia, (9) Tadžikistan, (10) Turecko, (11) Turkménsko, (12) Ukrajina, (13) Uzbekistan

economic crisis, the number of poor and hungry people is remarkable increasing, especially in South Caucasus States and in Central Asian region. In many of these countries, especially in those with lower incomes, the share of population in rural areas remains rather large (figure 1).

The second most important process in the agriculture sector of Central and Eastern Europe was the EU Enlargement. As the consequence of this process, the greatest progress and degree of commonality have been achieved in these new EU states, because all of them have adopted a common set of policies and regulations of the EU. The diversity in the development of the agricultural sector has been documented in numerous studies of the region. In general, the accession had a positive impact on the sector. It has resulted in a consolidation of production, higher current prices, higher export and import quantities and much higher farmers' income (Csaki and Jambor, 2009). However, besides the overall positive picture, there is the diversity stemming from initial conditions, pre-accession policies and the way of implementing the CAP as well as from macro-policy and institutional environment.

The new EU members are facing significantly increased competition in their domestic markets and there are also new market conditions with the quick emergence of vertically coordinated food chains including supermarkets, supermarkets and multinational agro-processing companies. In general, the EU enlargement has had a positive impact on the agricultural development and on the food security of the new EU states. But in this part of Europe there are also population segments facing poverty, especially those who live in the marginalized areas or in the suburbs of the large cities.

The soaring food prices crisis have had a significant but contradictory impact on farmers and on consumers (on the one side on the poorer urban households and on the other side on the farmers – net food producers). From the end of 2006 this crisis has brought to hunger more than 75 million people including those from Eastern Europe and Central Asia. This crisis has been appearing as the confluence of different forces:

- weather – related production shortfalls (agricultural production has been affected by climate change: floods, harsher winters, earthquakes),
- gradual reduction in the stock levels (cereal stocks stand at their lowest level since 1980 dropping down by 3.4% per year, this refers also to the new EU states),

- increasing fuel cost (raised not only costs of production of agricultural commodities but also the transportation costs),
- investments in the agricultural sector fell from more than 17 billion USD per year in the early 1980s to less than 5 billion USD in the late 1990s.

The Food Price Crisis was followed by the Financial and Global Economic Crisis. Both crises have had a differing effect but both have led to social unrest in scores of countries, including some in these regions, and have added more than 140 million people to the number of hungry and undernourished people in the world. The economic crisis, which hit hardest in 2009, has depressed economic growth and the purchasing power of consumers, while impacting food and agricultural markets through depressed demand, declining exports, declining credit availability and increasing food insecurity. All of these shocks have been more severe for low income population, especially in food deficit areas, and for smaller farmers, too.

In Eastern Europe and Central Asia, among the most vulnerable countries belong Albania, Armenia, Bosnia-Herzegovina, Georgia, Kyrgyzstan, Moldova, Turkmenistan and Tajikistan. However, regarding this, it is important to mention that farm land is under stress. According to the World Earth Institute, the main reasons for world food supply decreasing are the population growth and accelerated urbanization, changes in the life-styles, falling water tables and diversion of water for irrigation towards the cities. There is a good potential for new land cultivation, notably in Eastern Europe and Central Asia. Regardless of this, new land is insufficient or difficult to use for food production due to property rights and insufficient infrastructure. Important for world demand of food production is scaling – up the global agricultural production. In this connection, Europe and Central Asia has to take the responsibility to mitigate the global warming negative impact and contribute to the environmentally friendly utilization of the global production potential.

Another phenomenon contributing to recent changes and future prospects is the climate change. Many of the countries in these regions are already experiencing effects of the climate change which are accompanied by a legacy of environmental mismanagement that increases vulnerability towards the effects of global warming. Such effects also vary greatly from country to country but can add local production instabilities to those arising from global market effects and put even more pressure on land and water constraints in coming decades.

Trends in world hunger and the food consumption share

World Summit on Food Security was convened by FAO in November 2009 in Rome in order to accelerate steps to reverse the alarming situation with the starving people and to collectively accelerate steps to set a path for achievement of progressive realization of the right to adequate food in context of national food security. The High Level Expert Meeting had been convened before the mentioned summit. The best experts of the world were asked to give effective solutions for feeding of 9.02 billion people equitably, healthily, safely and sustainably in the year 2050. 60 heads of states and governments, 191 ministers from 182 states and the European Union participated on the summit altogether. The summit adopted the official Declaration; however it is crucial to note that this document contains neither measurable targets nor specific deadlines, which would make it easier to monitor the implementation.

It should be noted, that there was a slow, but steady decrease in the number of hungry until the 1995–1997 period. But the fact that hunger was increasing even before the food

and economic crisis suggests that present solutions are insufficient.

The region of Europe and Central Asia is not considered to be an emergency region in terms of food security. However, it should be noted that about 30 percent of the population (about 145 million) are still considered either poor or vulnerable. Now, the number is expected to rise by about 5 million people for every 1 % decline in GDP. That is why there are additional 13 million poor people in Eastern Europe and Central Asia in 2009 instead of the decrease foreseen for this group before the crises (from 145 to 130 million). 60 % of the 145 million poor people (87 million) could be hungry or malnourished.

Factors of the food crisis

The FAO food price index rose 52 percent on average, from mid – 2007 to mid – 2008. Then, in July 2008, food price began to decline. The downward trend should not be interpreted as the end of the food crisis. Global cereal prices are still more than 63 percent higher as they were in 2005 according to the International Monetary Fund. The same factors which caused the food crisis are still present:

- agricultural productivity is low,
- the population growth rate is still high in many of the most food insecure states,
- water availability and land tenure are significant problems,
- the frequency of floods and droughts is above long-term averages – most likely as a result of the climate change,
- investments into agricultural research and development are much lower than recommended and they are not directed towards the crops most important for the poor.

Investments would play a crucial role in improving the hunger situation especially in the developing states. In spite of the fact that the number of the hungry has been increasing since the mid 1990s, the share of Official Development Aid (ODA) for agriculture declined substantially in 2007. After adjusting for inflation, the level of ODA was 37 % lower than in 1980. There is no hope for an increase of investments in agriculture sector and we also cannot claim that the investments into agriculture reached the lowest level.

Conclusion

The countries of the regions of Europe and Central Asia have faced many challenges in the last two decades, and most of them have experienced massive changes in social and economic institutions and policies. The structural changes in the national agro-food sectors have been challenged by cyclical factors of the agricultural production, such as the fall in production, decrease of stocks, liberalization of the world trade, volatile food price crisis and the global economic crisis.

During the transition period, the EU enlargement, volatile food price crisis and the global economic crisis, some policies and some countries have been clearly more successful than the others and much can be learned from their successes and failures. However, the lessons learned from dealing with adversity in these regions during the previous years can be valuable for effective steps in favour of the resolution that challenges multiple recent crises. In order to stimulate the economic growth in the agricultural and food sector across the regions, it is important to introduce and effectively implement the short and long run policies and priorities. The most important principle is that the policy makers have to avoid a situation when the short run policies conflict the long run development. For Europe and Central Asia, it is important:

- to improve the efficiency of the early warning systems, including farms/farmers and government levels,
- to promote the food production programme by implementing the FAO Twin-Track approach,
- to accelerate the local adaptation and dispersion of currently existing improved technology,
- to continue with acceleration of the reforms,
- to enhance the transfer of ownership and full ownership rights for land and other productive agricultural and rural assets.

In the frame of the long run policies, it is important to stimulate the economic growth through:

- the enhanced investment,
- improved market functioning
- introduction of the risk management tools for farmers which can mitigate important elements of a farm income, such as yield and price variability,
- enhancement of the rural development and rural infrastructure with emphasis on new opportunities in green technology due to climate change mitigation policies, agriculture and food security, transition of the agro-food sector, soaring food price crisis, volatile prices, global economic crisis, climate change, short and long run policies, investments in agriculture, food index, early warning system and bioenergy.

Súhrn

Na začiatku 21. storočia sú hlad a podvýživa stále vážnym problémom pre mnoho krajín sveta. Počet podvyživených sa odhaduje celosvetovo na viac ako 925 miliónov a situácia sa nezlepšuje. V globálnom meradle sú hlad a podvýživa závažnejším ohrozením zdravia ako AIDS, malária a tuberkulóza dohromady. Východná Európa a stredná Ázia sú regióny so špecifickými podmienkami a problémami týkajúcimi sa chudobnejšej časti ich populácie. Cieľom príspevku je poukázať na možné riešenia extrémnej chudoby z pohľadom na tieto dve zemepisné oblasti a tiež na faktory ovplyvňujúce vývoj poľnohospodárstva v tomto regióne.

Kľúčové slová: potravinová bezpečnosť, potravinová kríza, svetová ekonomická kríza, klimatické zmeny, investície do poľnohospodárstva

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PARTICIPATION OF DEVELOPING COUNTRIES' PRODUCERS IN GLOBAL NETWORKS – THE CASE OF COFFEE

ZAPOJENÍ PRODUCENTŮ Z ROZVOJOVÝCH ZEMÍ DO GLOBÁLNÍCH SÍTÍ – PŘÍKLAD KÁVY

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One of the indisputable consequences of globalization is the world-wide linking of market agents and creation of global networks. The possible impacts of these processes are apparent also in the agro-food sector, especially within the networks of commodity chains. Coffee, the second most heavily traded commodity in the world, is a typical example, featuring as a global commodity chain. It means that its individual production stages are miles distant. The first stage of analyzed value chain, coffee growing, is situated in developing countries of Latin America, Asia and Africa, while the processing and consumption are carried out mostly in developed countries such as the US or the EU. This paper is focused on the analysis of the individual production stages within the coffee commodity chain. Furthermore, the position of developing countries producing the raw commodity, interrelationships along the whole value chain and market concentration on the individual stages are subjects of the analysis as well. The results have been obtained within the frame of the research project MSM 6215648904 "The Czech Economy in the Process of Integration and Globalisation, and the Development of Agricultural Sector and the Sector of Services under the New Conditions of the Integrated European Market" of Mendel University in Brno, Faculty of Regional Development and International Studies.

Key words: global commodity chain, coffee, developing countries, agro-food sector

After implementation of important economic reforms resulting in market liberalisation in developing countries in the 1980s, there has been an intensive discussion about the nature of the changes caused by market liberalisation and de-regulation, and over the results of these processes.

In the early 1990s, problems such as 'setting the right prices' and 'appropriate incentives' went aside and the main interest was focused on the role of globalisation in economic restructuring, and on the issues of institution building and good governance. These issues were analysed at the international, regional as well as national and sectoral levels. However, relatively small attention has been paid to the development of commodity markets and to the possibilities (and restrictions) of their economic upgrading in favour of developing countries. International trade is supposed to be an important source of income for the countries; however, they are still poor. A lot of low-income countries have been producing and trading tropical commodities. Coffee belongs to the most traded (not only

agricultural commodities. Despite the fact, a "coffee boom" has emerged in the consuming countries, international coffee prices have fallen dramatically down and their primary producers have been caught in the "coffee crisis".

Significant spatial separation of raw commodity production and consumption of coffee products with significantly increased added value accordingly challenges for an establishment of constituent entities involved in the commodity chain, including an assessment of the possible uneven distribution of economic forces.

According to Swinnen (2009), the rapid globalization of the agro – food network integrating consumers, food companies and agricultural producers led to a significant restructuring of production, sale and marketing systems worldwide, some already well advanced in developing and transition countries. Although the transaction cost theory deduced (and empirical literature often confirmed) higher possibilities for large farms in the vertical connection, empirical works indicate a much

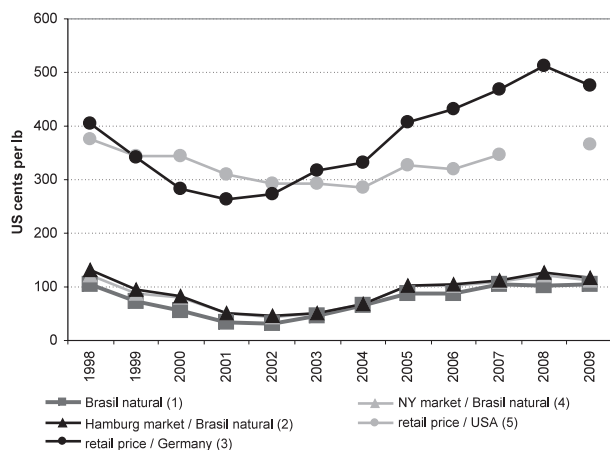


Figure 1 Price levels – value added distribution among individual stages of coffee commodity chain
Source: USDA, own processing

Obrázek 1 Cenové úrovně – rozdělení přidané hodnoty mezi jednotlivými úrovněmi komoditní vertikály kávy
Zdroj: USDA, vlastní zpracování
(1) Brazílská káva, (2) trh v Hamburku – Brazílská káva, (3) maloobchodní cena v Německu, (4) trh v New Yorku – Brazílská káva, (5) maloobchodní cena v USA

greater diversity than is often reported, including the proportion of small farms linked to the global network. This is a clear implication for the welfare of farm households in producer countries, where these small farms could be vertically integrated as well, or family members can be employed on large farms. Coffee producers from developing countries have the possibility to participate in global networks by creating value, but deeper examination is needed and must be based on individual cases.

Materials and methods

Framework of the commodity chain

Flows of commodities between locations of production, processing and consumption in a particular sector, may be analyzed by means of Global Commodity Chain (GCC) analysis. Global Commodity Chain analysis was developed by Gary Gereffi et al. within a political economy of development (and underdevelopment) perspective, derived from World Systems Theory. The roots of GCC analysis indeed lay in the “dependency theory” of the 1970s, but more in terms of questions posed than in terms of concepts or methodology. Like the dependency theory, GCC analysis addresses the issue of who controls global trade and industry, and how agents locked into lower-value segments of trade and industry can break out of this situation. But unlike dependency theory, “control” is not assumed to be located in multi-national companies (MNCs) with their own production facilities spread around the world, and the world is not thought to fall into neat “core” and “peripheral” geographical compartments. Furthermore, the relation between the state and MNCs, both in Northern and in Southern countries, is no longer seen as the key link standing between development and underdevelopment. GCC analysis embodies a political as well as a theoretical acknowledgement that the repertoire of industrial policy tools recommended by dependency economists has nowadays only limited relevance.

The focus on “global commodity chains” as units of analysis primarily reflects the importance assigned to the emergence of

manufacturing systems which are dispersed and integrated on a world-wide basis, but in which at the same time power is mainly associated with system coordination rather than with a concentration of ownership of productive resources. Chain coordination reinforces or enhances barriers to entry, but more importantly, allows “driving” agents to institute measures which reduce costs and risks while increasing the speed and reliability of supply, or which increase sales. It thus offers a way out of the apparent circularity of dependency theory, where power within the global economy was measured in terms of profits, while profits were explained in terms of monopoly power. Since chain coordination leads to genuine increases in efficiency and cost reduction, it also offers a means of avoiding a zero-sum approach, in which profits are derived solely at the expense of all subordinate agents in a chain. On the other hand, it is stressed that chain coordination is still typically directed from northern countries, since it is usually associated with those links in a chain which have particularly high barriers to entry, and because international income distribution remains extremely uneven.

Results and discussion

Description of coffee commodity chain

Coffee is the second most traded commodity (after crude petroleum), produced in more than 60 developing countries and consumed mainly in developed countries with over US\$ 70 billion of retail sales each year. It is estimated that coffee growing provides a livelihood for 25 million people and that in total 100 million people are involved in the sector from agriculture to processing and sale. Number of subjects operating on the individual levels of coffee chain is schematically depicted in figure 2.

In terms of international trade, coffee is the most valuable tropical agricultural product. Historically, the largest world coffee producers were Brazil and Columbia, however, the situation changed in the 1990s with rapid growth of coffee production in Vietnam. International coffee trade mainly consists of green coffee in 60 kg bags. Coffee is also traded in instant and roasted form.

The systematic study of commodity chains seeks to explain the spatial organization of production, trade and consumption

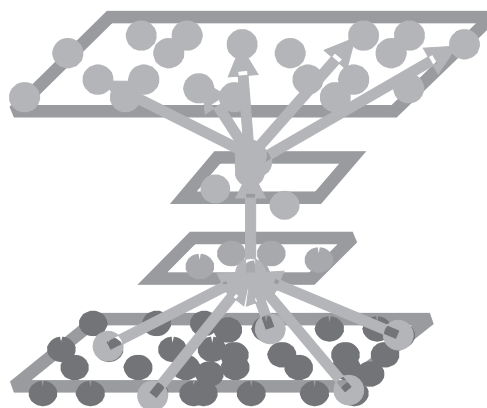


Figure 2 Number of subjects involved in the coffee commodity chain
Source: USDA, Coffee Barometer, own processing

Obrázek 2 Počet subjektů zapojených do komoditní vertikály kávy
Zdroj: USDA, Coffee Barometer, vlastní zpracování

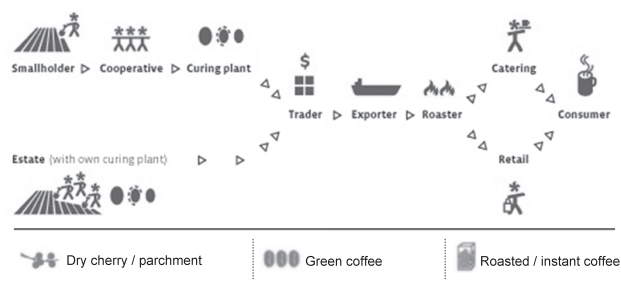


Figure 3 Individual stages of coffee commodity chain
Source: Coffee Barometr 2009

Obrázek 3 Dílčí úrovně komoditní vertikály kávy
Zdroj: MZe, vlastní zpracování
Rolník → družstvo → ošetření → obchodník → vývozce → pražírny → catering/obchod → spotřebitel
Farma (vlastní ošetření) → obchodník → vývozce → pražírny → catering/obchod → spotřebitel
Suché bobule kávy — zelená káva — pražená/instantní káva

of the globalized world. A commodity chain in this context is seen as a network of labour and production processes resulting in a finished product (Smělková, 2007). Individual processes involved in coffee commodity chain are represented as “nodes” linked together in a network depicted in figure 3.

Coffee goes a long way along the whole value chain from its growing, through processing and retail outlet to the final consumer. We can distinguish following levels of the production process: growing, preliminary processing, secondary processing (hulling), export / import, roasting, wholesale and retail (see figure 3).

Growing

Once planted, it takes coffee about 3–5 years to reach full yield, but then it continues yielding coffee cherries for at least 20 years. It means that supply of coffee is price inelastic in the short-term period. Frost, drought and coffee berry disease belong to factors that significantly affect coffee supply. The quality of coffee is derived from manner and form of picking (the extent to which unripe berries are picked). However, the main factors affecting the final quality and hence the growers' price are the choice of species (whether Arabica or Robusta^{1/}) and the altitude at which the coffee is grown (higher altitude usually results in higher quality). The majority of coffee farmers are smallholders farming less than 10 hectares; however, some 70% of the coffee supply is produced by small coffee farms, 1–5 hectares in extent. The farms are usually run by family members but also hired workers might be required for harvesting.

In countries like Guatemala, Kenya, Brazil, India and Vietnam, there are also large coffee plantations that cover hundreds of hectares. Generally, further concentrations of land, mechanization, and broader use of agrochemicals have led to lower demand of labour in the plantations. Nonetheless, these plantations offer a high amount of employment, especially temporary work, during the harvest period.

Workers in coffee farms and plantations can be categorized as follows:

- **Family producers (mainly family members).** It is a common practice for family farmers to help each other out by pooling their labour, especially at harvest time. Also,

^{1/} Only two of many (more than 60) botanical varieties of coffee trees are cultivated and utilized commercially to any large extent worldwide. One is Arabica (in excess of 60% of world production) and the other one is Robusta.

many family workers take to harvesting in the plantations after harvesting their own fields.

- **Fixed salary labourers (monthly paid workers),** who live on or near the plantation.
- **Temporary/harvest labourers (mostly migrant workers),** who specialise in harvesting crops such as coffee, tomatoes, fruits, etc.
- **Casual labourers:** workers employed when agricultural work is available.

Coffee producers are hampered by serious problems like inadequate access to infrastructure, financial resources and market information. This directly impacts the social well-being of farmers, plantation labourers and their communities. Typically, coffee is the primary source of cash income for coffee farmers. Therefore, volatile and declining coffee prices have a direct impact on access to education, housing, food, medical services, and the other basic necessities. In fact, incomes and working conditions, on plantations as well as on family farms, are under constant pressure. Coffee producers are facing considerable sustainability challenges on social, economic and environmental fronts. The coffee market continues to be a showcase of the need to address producers' problems, on a global scale (Coffee Barometr 2009).

Preliminary processing

This normally takes place on the farm or estate, but occasionally, farmers sell unprocessed cherries to local traders. There exist two main types of on-farm processing methods: dry and wet^{2/}. In the wet method the beans are separated from the cherries by consecutive operations involving considerable quantities of water, consisting of pulping, fermentation to remove mucilage, drying and hulling. In the dry method, the harvested berries are placed on racks to dry in the sun for about three weeks. After that, hulling can take place. Coffee produced by the wet method is usually regarded as being of better quality and therefore commands higher prices.

Secondary processing

Coffee is grown in tropical and subtropical regions around the equator. Ripe coffee cherries are harvested manually and then undergo primary processing in the producing country before they are exported. Primary processing is carried out to separate the coffee bean from the skin and pulp of the cherry, and there are two methods of doing this. In the wet method, the harvested ripe cherries are pulped, fermented and washed, dried, peeled and polished. In the dry method the ripe cherries are dried and hulled. The end products of both methods are coffee beans, referred to as “Green” coffee in the trade. Wet processing produces “Mild” coffee, usually of the Arabica type, and the dry method produces “Hard” coffee, either Hard Arabica or Hard Robusta. The distinction is important as Mild Arabica, Hard Arabica and Hard Robusta coffees are traded separately.

Export / Import

From the mill the coffee goes to a trading company. International traders get access to green coffee either directly from its origin or via the spot markets in US and Europe. This branch went through substantial changes in the last two

^{2/} The dry method is used for 95% of Arabica coffee in Brazil, most Arabica from Ethiopia, Haiti and Paraguay and almost all Robustas. The wet method is used for most of other Arabica and rarely for Robustas.

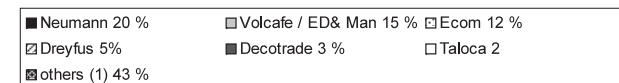
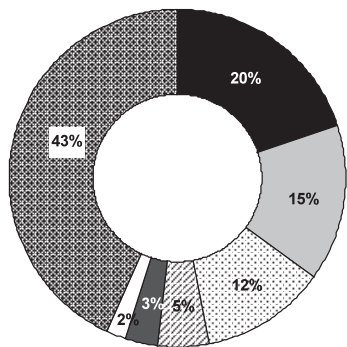


Figure 4 Green coffee market shares of international trading companies

Source: Coffee Barometer 2009, own processing

Obrázek 4 Tržní podíl obchodních společností na trhu se zelenou kávou
Zdroj: Coffee Barometer 2009, vlastní zpracování
(1) ostatní

decades. Midsized traders with unstable positions suffered losses and found themselves too small to face the competition from larger companies. A large share of the profits in the coffee supply chain goes to the middlemen and the large roasters. As a result, smaller traders either went bankrupt, merged with the others, or were taken over by their competitors. Therefore, the market has been becoming more concentrated. International coffee trading companies operate in the coffee-producing countries via joint ventures with local middlemen. In 2000 five companies, Dreyfus (France), ED & F Man/Mercon (UK), Esteve (Brazil), Neumann (Germany) and Volcafe (Switzerland) covered about 40 % of the total volume of green coffee traded worldwide. In 2005, as a result of two mergers (i) Volcafé and ED & F Man and (ii) Esteve and Cargill into Ecom, the three top groups controlled about 47 % of the market. The largest trading company, Neumann Group, controlled about 20 % of the market. The other large companies are as follows: Decotrade (trading arm of Sara Lee/Douwe Egberts) and Taloca (owned by Philip Morris/Kraft), both based in Switzerland. International traders are likely to continue investing in operations in origin countries to meet the needs of major roasters.

Roasting

Roasting of coffee beans usually takes place in the consuming country or close to the point of final sale. An important activity of the roaster is blending of different types of coffees to achieve a desired taste. Roast analysis and cup testing are carried out to check the evenness of the roast and to look for any defects like over-drying or over-fermentation. Once the consignment arrives in the port of destination the coffee is cleaned again before it is sold. The international trader might sell it directly to a roaster, or to a broker. Roasters blend together different coffees, roast the blend, and grind it. Arabica is used for high quality coffee blends with a mild flavour. Robusta is used mostly for instant coffee and in blends with a medium-strong flavour. Instant coffee is manufactured in a separate process.

Almost 50 % of the green coffee imports are purchased by the five largest roaster companies which sell their processed coffees in the European, American and Japanese markets mainly (see figure 5). Nestlé processes 25 % of the total

amount, Philip Morris controls 24 % and Sara Lee (operating mainly in the European and Brazilian market) roasts about 15 %. Procter & Gamble has a share of 10 % (operating especially in US) and Tchibo processes approximately 7 % (focused on German market). Nestlé also dominates the soluble coffee market with a market share of over 50%. Profit margins of roasting companies are considerable thanks to a combination of low-priced green coffee, innovative product development and a strong brand strategy (Daviron, Ponte, 2005).

There has been a very little vertical integration between roasters and international traders, with a few exceptions – e.g. Tchibo which has vertically integrated all the way into estate production in Tanzania.

Wholesale and retail

Roasted beans and/or ground coffee is then sold to retailers or to commercial catering outlets or coffee houses either directly or via a wholesaler. Coffee roasters process green coffee beans into a variety of final products, including filter coffee, instant coffee, and the new 'coffee pods'.

Most of the coffee produced is consumed in high-income countries. Globally, coffee for home consumption is mostly purchased in supermarkets. The food retail sector is highly concentrated in the US, UK and Northern Europe and plays a dominant role in the food marketing chain. Depending on the brand or outlet, the price of conventional coffee varies considerably. All supermarkets use conventional coffee as a loss leader and offer it at a very low price to attract consumers into their stores.

Consumer

The world's biggest consumer of coffee is the US, which traditionally buys its largest proportion of coffee from Central America (Mexico and Peru). Scandinavian countries and Germany have the highest consumption per capita in the world. In the international coffee trade, historical trading relationships remain still apparent. Large part of East African coffee goes to Germany and UK, coffee produced in Côte d'Ivoire or other Francophone countries finds its way to France as well as Dutch trading links with Indonesia are still important (Ponte, 2002).

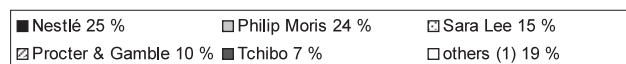
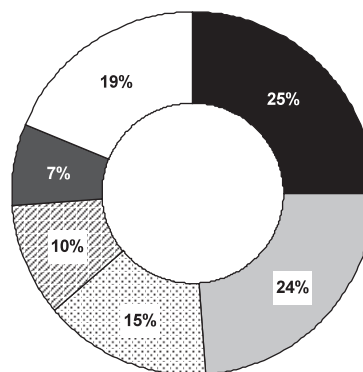


Figure 5 Market share of roasting and instant manufacturing companies

Source: Coffee Barometr 2009, own processing

Obrázek 5 Tržní podíl pražírén a zpracovatelských podniků
Zdroj: Coffee Barometr 2009, vlastní zpracování
(1) ostatní

Europe, the biggest market for coffee, accounts for 40 % of world demand, the United States 25 % and Japan 10 %. But coffee consumption in these countries is stagnant. Brazil has the fastest-growing domestic coffee market; the better quality coffee enjoying a rapidly increasing demand. Coffee for home consumption is bought in supermarkets. Brand loyalty is high among consumers, who tend to prefer the well-known roasters and own-brands.

Conclusions

One of the typical characteristics of contemporary development of (not only) global commodity chains is the fact that farmer, as a producer of essential agricultural inputs, is more and more determined by the economic surroundings, especially by successive levels of agro-food chain. Concentrating wholesale and retail sector as well as processing companies have the increasing market power. As a consequence of this behaviour, farmers are caught in the "scissors" of market power of finalizing sectors of commodity chains and they are not always successful in trying to get out of them by mutual cooperation or by founding sales or marketing organization.

The aim of this paper is to analyse the individual production stages within the coffee commodity chain, the position of developing countries and interrelationships along the whole value chain as well as the market concentration on the individual stages.

Wanting to describe the position of the individual links within the coffee commodity chain, the analysis of value added distribution was done, proving that there is an uneven distribution of economic forces in this sector. Despite the fact, a "coffee boom" has emerged in consuming countries and coffee has become the second most heavily traded commodity in the world, international coffee prices have fallen dramatically down and farmers and coffee producers have faced the crisis. In this sector, a substantial proportion of total income has been transferred from farmers to agents in consuming countries.

A large share of the profits in the coffee supply chain goes to the middlemen and the large roasters. As a result, smaller traders either went bankrupt, merged with the others, or were taken over by their competitors. Therefore, the market is becoming more concentrated. Roasting of coffee beans usually takes place in the consuming countries and this stage of the commodity chain is also highly concentrated.

According to the transaction cost theory, the welfare of farm households in developing countries could be improved by means of the vertical coordination towards subsequent links. However, empirical works indicate a much greater diversity, including the proportion of small farms linked to the global network, than is often reported. Coffee producers from developing countries have the possibility to participate in global networks by creating value, but deeper examination is needed and must be based on individual cases.

Súhrn

Jedním z nesporných důsledků globalizace je propojování subjektů trhu v celosvětovém měřítku a vytváření globálních sítí.

Možné dopady těchto procesů do zemědělsko-potravinářského sektoru je možné demonstrovat na fungování komoditních vertikál. Typickým příkladem je káva, druhá nejvíce obchodovaná komodita na světě, která nese znaky tzv. globální komoditní vertikály, tj. při jejíž produkci jsou jednotlivé fáze hodnotového řetězce územně velmi vzdáleny. Prvotní fáze zemědělské prvovýroby, tedy pěstování kávy, se odehrává v rozvojových zemích Latinské Ameriky, Asie a Afriky, zatímco její zpracování i následná spotřeba se uskutečňuje v zemích vyspělých, jako jsou Spojené státy nebo EU. Příspěvek si klade za cíl provést analýzu jednotlivých výrobních stádií komoditní vertikály kávy, se zaměřením na pozici rozvojových zemí, jako poskytovatelů primární suroviny, na vazby mezi jednotlivými úrovněmi a míru koncentrace producentů na jednotlivých stupních. Tento příspěvek vznikl v rámci řešení výzkumného záměru MSM 6215648904, „Česká ekonomika v procesu integrace a globalizace, a vývoj agrárního sektoru a sektoru služeb v nových podmínkách integrovaného evropského trhu“, Mendelovy univerzity v Brně, Fakulty regionálního rozvoje a mezinárodních studií.

Klíčová slova: globální komoditní vertikála, káva, rozvojové země, zemědělsko-potravinářský sektor

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METODOLOGICKÉ PRÍSTUPY K ANALÝZE EFEKTÍVNOSTI ZA PREDPOKLADU NEPRESNÝCH DÁT: HODNOTENIE VPLYVU IKT NA EFEKTÍVNOSŤ PODNIKOV

METHODOLOGICAL APPROACHES TO EFFICIENCY ANALYSIS WHEN IMPRECISE DATA ARE PRESENT: ANALYSIS OF ICT IMPACT ON FIRM EFFICIENCY

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The paper presents a survey of the most effective procedures for efficiency measures calculation using data envelopment analysis when imprecise data are present (IDEA). It pays special attention to envelopment version of IDEA model (EIDEA), proposes modification of the Zhu (2003a) procedure for converting ordinal data to exact data and applies the procedure in efficiency analysis of 193 agro-food firms when impact of ICT use is taken as an efficiency factor. Analysis results by EIDEA are compared with standard CCR DEA results. The comparison shows that the standard model underestimates efficiency what seems to be a consequence of incorrect consideration of ordinal data.

Key words: Data Envelopment Analysis (DEA), Ordinal data, Interval data, Imprecise DEA (IDEA), Envelopment IDEA model (EIDEA)

V štandardnej metóde analýzy obalov dát (DEA) sa predpokladá, že hodnoty inputov a outputov hodnotených rozhodovacích jednotiek (podnikov) sú vyjadrené ako exaktné kvantitatívne dáta. V mnohých reálnych situáciách sa však stretávame so situáciami, keď takéto dáta z rôznych dôvodov nie sú k dispozícii. Sú však dostupné v menej presnej podobe a to buď ako kvalitatívne dáta, intervalovo vyjadrené dáta, alebo dáta charakterizované poradím. Cook, Kress a Seiford (1993) boli prví, ktorí modifikovali štandardný DEA model vytvorený Charnesom, Cooperom a Rhodonom (1978) (CCR) tak, aby bolo možné použiť inputy a outputy vyjadrené namiesto kardinálnymi veličinami, veličinami ordinálnymi. Model DEA, v ktorom sú popri presných dátach prípustné aj dáta nepresné Cooper, Park a Yu vo svojej práci z roku 1999 nazvali **DEA s nepresnými dátami** (v origináli DEA with imprecise data, v kompaktnejšej forme Imprecise DEA, resp. IDEA). V uvedenej práci prezentujú postupy ako priamo do štandardného lineárneho modelu CCR DEA inkorporovať slabo ordinálne a intervalovo vyjadrené dáta. V podobnej práci Kim, Park a Park (1999) sa zaoberajú problémom ako použiť nielen intervalovo zadané dáta a slabo a silne ordinálne dáta, ale aj dáta vyjadrené intervalom pomerových veličín.

Všetky vyššie uvedené práce vedú k nelineárnym a nekonvexným úlohám. Zhu (2003a; 2004) ukázal, že nelineárne úlohy IDEA možno riešiť pomocou štandardného lineárneho CCR DEA modelu a to tak, že sa z nepresných dát inputových a outputových premenných identifikujú exaktné dáta. Tento postup potom umožňuje využívať všetky dostupné DEA techniky na získanie dodatočných informácií, ako je napr. klasifikácia hodnotených jednotiek podľa výnosov z rozsahu, identifikácia zdrojov neefektívnosti, identifikácia referenčných, resp. benchmarkových jednotiek a pod.

Existujúce IDEA postupy sú založené buď na multiplikátorovom DEA modeli, alebo na k nemu duálne združenom obalovom DEA modeli. Chen, Seiford a Zhu (2000) a Chen (2006) tieto postupy nazývajú multiplikátorová IDEA (MIDEA), resp. obalová (envelopment) IDEA (EIDEA).

Predkladaný príspevok prezentuje najefektívnejšie postupy hodnotenia efektívnosti podnikov za predpokladu nepresných

dát metódami IDEA a tieto ilustruje na empirickom príklade hodnotenia efektívnosti podnikov z hľadiska využívania IKT.

Metódy

Hlavným cieľom príspevku je podať stručný výklad metód IDEA za predpokladu nepresných dát a to tak slabo ordinálnych, ako aj intervalovo zadaných. Z rôznych publikovaných postupov uvádzame postupy, ktoré sú z pohľadu výpočtov ako aj aplikácie najefektívnejšie. Čiastočným cieľom je posúdenie aplikovateľnosti všeobecných postupov IDEA pre rôzne definované ordinálne škály.

Sekundárnym cieľom je aplikovať vybrané metódy IDEA pri hodnotení efektívnosti podnikov agro-potravinárskeho rezortu z hľadiska vplyvu faktorov spadajúcich pod kategóriu informačné a komunikačné technológie.

Pri výklade princípov IDEA vychádzame z predpokladu, že analyzujeme množinu n navzájom porovnávaných rozhodovacích jednotiek $DMU \{DMU_j; j = 1, 2, \dots, n\}$, ktoré produkujú outputy y_{rj} ($r = 1, 2, \dots, s$) využívajúc inputy x_{ij} ($i = 1, 2, \dots, m$). Ak na hodnotenie efektívnosti rozhodovacej jednotky DMU_o použijeme CCR DEA model, potom riešime nasledovný multiplikátorový DEA model:

$$\max \pi_o = \sum_{r=1}^s u_r y_{ro}$$

za podmienok:

$$\sum_{r=1}^s u_r y_{rj} - \sum_{i=1}^m v_i x_{ij} \leq 0 \quad \forall j$$

$$\sum_{r=1}^s v_i x_{io} = 1$$

$$v_i, u_r \geq 0 \quad \forall r, i$$

(1)

Duálnu úlohu k modelu (1) – tzv. obalový model DEA môžeme zapísať nasledovne:

$$\theta_o^* = \min \theta_o$$

za podmienok:

$$\begin{aligned} \sum_j^n y_{rj} \lambda_j &\geq y_{ro}, \quad r = 1, 2, \dots, s \\ -\theta x_{io} + \sum_j^n x_{ij} \lambda_j &\leq 0, \quad i = 1, 2, \dots, m \\ \lambda_j &\geq 0, \quad j = 1, 2, \dots, n \end{aligned} \quad (2)$$

kde:

- x_{ij} – i -tý input j -tej DMU
- y_{rj} – r -tý output, j -tej DMU
- x_{io} – i -tý input hodnotenej DMU
- y_{ro} – r -tý output hodnotenej DMU
- u_r – váha (multiplikátor) r -tého outputu
- v_i – váha (multiplikátor) i -tého inputu
- λ_j – intenzitné premenné j -tej DMU
- θ_o^* – koeficient redukcie inputov – miera efektívnosti hodnotenej DMU_o

Keď y_{rj} (pre niektoré r) a x_{ij} (pre niektoré i) majú charakter nepresných dát, buď vo forme ordinálnych dát alebo intervalovo zadaných dát, model (1) sa stáva nelineárnou a nekonvexnou úlohou a v súlade s terminológiou zavedenou v práci Cooper et al. (1999) úlohou DEA s nepresnými dátami (IDEA).

Nepresné dáta môžu nadobudnúť nasledovnú formu:

a) **Intervalovo zadané dáta:**

$$\underline{y}_{rj} \leq y_{rj} \leq \bar{y}_{rj} \quad \text{a} \quad \underline{x}_{ij} \leq x_{ij} \leq \bar{x}_{ij} \quad \text{pre } r \in BO, i \in BI \quad (3)$$

kde:

- \underline{y}_{rj} a \underline{x}_{ij} – dolné hranice intervalu
- \bar{y}_{rj} a \bar{x}_{ij} – horné hranice intervalu
- BO a BI – reprezentujú množiny intervalovo zadaných outputov resp. inputov

b) **Slabo ordinálne dáta:**

$$y_{rj} \leq y_{rk} \quad \text{a} \quad x_{ij} \leq x_{ik} \quad \text{pre } j \neq k, r \in DO, i \in DI$$

alebo v jednoduchšej notácii:

$$y_{r1} \leq y_{r2} \leq \dots \leq y_{rk} \leq \dots \leq y_{rn} \quad (r \in DO) \quad (4)$$

$$x_{i1} \leq x_{i2} \leq \dots \leq x_{ik} \leq \dots \leq x_{in} \quad (i \in DI) \quad (5)$$

kde:

- DO a DI – reprezentujú množiny slabo ordinálnych outputov, resp. inputov

c) **Silne ordinálne dáta:**

$$y_{r1} < y_{r2} < \dots < y_{rk} < \dots < y_{rn}, \quad (r \in SO) \quad (6)$$

$$x_{i1} < x_{i2} < \dots < x_{ik} < \dots < x_{in}, \quad (i \in SI) \quad (7)$$

kde:

- SO a SI – reprezentujú množiny silne ordinálnych outputov, resp. inputov

d) **Dáta vyjadrené intervalom pomerových veličín:**

$$L_{rj} \leq \frac{y_{rj}}{y_{rj_o}} \leq U_{rj}, \quad (j \neq j_o)(r \in RO) \quad (8)$$

$$G_{ij} \leq \frac{x_{ij}}{x_{ij_o}} \leq H_{ij}, \quad (j \neq j_o)(ir \in RI) \quad (9)$$

kde:

- L_{rj} a G_{ij} – reprezentujú dolné hranice intervalu a U_{rj} a H_{ij} horné hranice intervalu

- RO a RI – reprezentujú množiny outputov a inputov viazaných na intervaly pomerových veličín

Ak (3) až (9) pripojíme k modelu (1), dostaneme multiplikátorový IDEA model (MIDEA podľa Chen, Seiford a Zhu, 2000 a Chen, 2006)

$$\max \pi_o = \sum_{r=1}^s u_r y_{ro}$$

za podmienok:

$$\sum_{r=1}^s u_r y_{rj} - \sum_{i=1}^m v_i x_{ij} \leq 0 \quad \forall j \quad (10)$$

$$\sum_{r=1}^s v_i x_{io} = 1$$

$$(x_{ij}) \in \Theta_j^-$$

$$(y_{rj}) \in \Theta_r^+$$

$$u_r, v_i \geq 0$$

kde:

- $(x_{ij}) \in \Theta_j^-$ a $(y_{rj}) \in \Theta_r^+$ – reprezentujú ktorúkoľvek alebo všetky možnosti vyjadrené v (3) až (9)

Ak (3) až (9) pripojíme k modelu (2), dostaneme obalový IDEA model (EIDEA podľa Chen, Seiford a Zhu, 2000 a Chen, 2006). Model (10) je zjavne nelineárny a nekonvexný model, pretože niektoré outputy a inputy sa stali neznámymi rozhodovacími premennými. Viaceré práce, ako napr. Cooper, Park a Yu (1999) a Kim, Park a Park (1999) tento problém riešia transformáciou nelineárneho modelu na lineárny model transformáciou škály a konverziou premenných. V našom príspevku uvádzame postup Zhu (2003a), ktorý vyžaduje iba konverziu premenných. Vzhľadom na potreby našej aplikácie sa sústredíme iba na konverziu slabo ordinálnych a intervalovo zadaných dát.

a) **Konverzia intervalovo zadaných dát na exaktné dáta**

Zhu (2003a) dokázal, že za predpokladu hodnotenia rozhodovacej jednotky DMU_o exaktné dáta môžeme získať tak, že položíme $y_{ro} = \bar{y}_{ro}$ a $x_{io} = \underline{x}_{io}$ pre hodnotenú DMU_o a $y_{rj} = \underline{y}_{rj}$ a $x_{ij} = \bar{x}_{ij}$ pre DMU_j ($j \neq o$) a pritom model (10) zachováva mieru efektívnosti DMU_o. Po takejto konverzii dát model (10) už nie je nelineárny. Obalový model s intervalovo zadanými dátami má nasledovný tvar:

$$\theta_o^* = \min \theta_o$$

za podmienok:

$$-\theta_o x_{io} + \sum_{j=0}^n \lambda_j \bar{x}_{ij} + \lambda_o x_{io} \leq 0, \quad i \in BI$$

$$-\theta_o x_{io} + \sum_{j=1}^n \lambda_j x_{ij} \leq 0, \quad i \notin BI$$

$$\sum_{j=0}^n \lambda_j \underline{y}_{rj} + \lambda_o \bar{y}_{ro} \geq \bar{y}_{ro}, \quad r \in BO \quad (11)$$

$$\sum_{j=1}^n \lambda_j Y_{ij} \geq y_{ro}, \quad r \notin BO$$

$$\lambda_j \geq 0, \quad j = 1, 2, \dots, n$$

b) Konverzia slabo ordinálnych dát na exaktné dáta:

V metóde konverzie slabo ordinálnych dát Zhu (2003) vychádza z predpokladu, že riešením modelu (10) pre DMU_k , keď Θ_j^- a Θ_j^+ sú vo forme (4) a (5), získame optimálne riešenie y_{ij}^* a x_{ij}^* s optimálnou hodnotou π_k^* , pre ktoré platí:

$$y_{r1}^* \leq y_{r2}^* \leq \dots \leq y_{rk-1}^* \leq y_{rk}^* \leq y_{rk+1}^* \leq \dots \leq y_{rm}^*, \quad (r \in DO) \quad (12)$$

$$x_{i1}^* \leq x_{i2}^* \leq \dots \leq x_{ik-1}^* \leq x_{ik}^* \leq x_{ik+1}^* \leq \dots \leq x_{in}^*, \quad (i \in DI) \quad (13)$$

Ak uvedené optimálne hodnoty prenásobíme kladnou konštantou ρ , potom ρy_{ij}^* ($r \in DO$) a ρx_{ij}^* ($i \in DI$) sú tiež optimálne hodnoty, pretože v DEA platí vlastnosť nemennosti riešenia pri zmene jednotiek premenných inputov a outputov. Preto je vždy možné položiť $y_{rk}^* = x_{ik}^* = 1$. Potom dostaneme množinu optimálnych riešení na slabo ordinálnych outputoch a inputoch tak, že (12) a (13) možno vyjadriť nasledovne:

$$0 \leq y_{r1}^* \leq y_{r2}^* \leq \dots \leq y_{rk-1}^* \leq y_{rk}^* (= 1) \leq y_{rk+1}^* \leq \dots \leq y_{rm}^* \leq M, \quad (r \in DO) \quad (14)$$

$$0 \leq x_{i1}^* \leq x_{i2}^* \leq \dots \leq x_{ik-1}^* \leq x_{ik}^* (= 1) \leq x_{ik+1}^* \leq \dots \leq x_{in}^* \leq M, \quad (i \in DI) \quad (15)$$

kde:

M – číslo blízke $+\infty$ (alebo iné vhodne zvolené číslo)

Pre outputy a inputy takto upravené na slabo ordinálne množiny definujeme nasledovné intervaly:

$$y_{ij} \in [0, 1] \text{ a } x_{ij} \in [0, 1] \text{ pre } DMU_j \text{ (} j = 1, \dots, k-1 \text{)} \quad (16)$$

$$y_{ij} \in [1, M] \text{ a } x_{ij} \in [1, M] \text{ pre } DMU_j \text{ (} j = k+1, \dots, n \text{)} \quad (17)$$

Vychádzajúc z teoretických záverov práce Zhu (2003a) vieme, že pre ($r \in DO$) a ($i \in DI$), π_k^* zostáva nezmenené a (16) a (17) sú splnené ak:

$$y_{rk} = x_{ik} = 1 \text{ pre } DMU_k \quad (18)$$

$$y_{ij} = 0 \text{ (dolnej hranici } y_{ij}^- \text{)}, x_{ij} = 1 \text{ (hornej hranici } \bar{x}_{ij} \text{)} \quad (19)$$

pre DMU_j ($j = 1, \dots, k-1$)

$$y_{ij} = 1 \text{ (dolnej hranici } y_{ij}^- \text{)}, x_{ij} = M \text{ (hornej hranici } \bar{x}_{ij} \text{)} \quad (20)$$

pre DMU_j ($j = k+1, \dots, n$)

Tabuľka 1 Základné štatistické charakteristiky premenných

	Outputová premenná (1)		Inputové premenné (2)	
	Hosp_sit (3)	PC_celkom (4)	%_zam_s_PC (5)	Inv_IKT (6)
	ordinálna (7)	kardinálna (8)	intervalová (9)	intervalová (9)
Minimum	1	1	–	–
Maximum	5	160	–	–
Priemer (10)	3,68	10,33	30,62	56735,75
Medián	4	6	21,43 ~ (20–40]	47,38 ~ (20–50]
Modus	4	3	13,53 ~ (0–20]	47600 ~ (20–50]

Table 1 Descriptive statistics of variables (1) output variable, (2) input variables, (3) firm prosperity, (4) number of PCs, (5) percentage of employees working with PC, (6) ICT investments, (7) ordinal, (8) cardinal, (9) bounded, (10) mean

Výsledky a diskusia

V príspevku aplikujeme postupy IDEA v analýze vplyvu využitia informačných a komunikačných technológií na efektívnosť 193 agro-potravinárskych podnikov Slovenska. V analýze skúmame, aký má vplyv počet používaných počítačov, podiel pracovníkov využívajúcich počítače, a vynaložené investície na IKT na hospodársku situáciu v podniku. Zdrojom dát je dotazníkový prieskum Katedry informatiky (VEGA 1/4636/07 „Informačná stratégia podniku v agropotravinárskom sektore), v ktorom boli použité štandardné dotazníkové postupy. Odpovede na otázky formulované v dotazníku sú v závislosti od typu otázky požadované buď ako kardinálne dáta, nominálne dáta, dichotomické dáta, intervalové dáta, alebo ordinálne dáta Likertovej škály s prevahou posledne troch menovaných. V tomto príspevku uvádzame iba základné výsledky analýzy, v ktorej sme použili štyri premenné.

Ako outputová premenná bola použitá premenná *Hospodárska situácia v podniku (Hosp_sit)*. Vzhľadom na neochotu podnikov poskytovať konkrétne informácie vo forme kardinálnych veličín, pre hodnotenie hospodárskej situácie bola zvolená nasledovná ordinálna Likertova škála: (1) Veľmi dobrá, (2) Dobrá, (3) Ani dobrá, ani zlá, (4) Skôr zlá, (5) Zlá.

V analýze boli použité tri inputové premenné: *Celkový počet PC v podniku (PC_celkom)*, *Percento zamestnancov využívajúcich PC (%_zam_s_PC)* a *Investície do IKT (Inv_IKT)*.

Premenná *PC_celkom* je premenná s kardinálnymi hodnotami. Premenné *%_zam_s_PC* ako aj premenná *Inv_IKT* patria medzi nepresné premenné, nakoľko ich hodnoty sú vyjadrené intervalovo. Použité intervaly, ako aj početnosť podnikov v jednotlivých intervaloch uvádza tabuľka 2, základné charakteristiky premenných sú vyjadrené v tabuľke 1.

Tabuľka 2 Intervalové inputové premenné – použité intervaly a početnosť podnikov v intervaloch

%_zam_s_PC (1)		Inv_IKT v tis. Sk/rok (2)	
Interval	<i>n</i>	Interval	<i>n</i>
(0–20]	94	(0–20]	40
(20–40]	49	(20–50]	63
(40–70]	25	(50–100]	61
(70–100]	25	(100–]	29
Spolu (3)	193	Spolu (3)	193

Table 2 Input variables with bounded data – bounds and firm distribution (1) percentage of employees working with PC, (2) ICT investments in 1 000 SKK per year, (3) total

Ak by sa outputová premenná *Hosp_sit* použila v DEA analýze štandardne, znamenalo by to, že poradové číslo 4 vyjadruje dvojnásobne horšiu hospodársku situáciu ako je situácia vyjadrená ordinálnou hodnotou 2. Z Likertovej škály toto však nevyplýva a preto je potrebné ordinálne hodnoty prekonvertovať na exaktné veličiny. V ďalšom texte ukážeme konverziu slabo ordinálnych dát outputovej premennej *Hosp_sit* podľa pravidiel (18), (19) a (20). Tieto pravidlá schematicky možno vyjadriť pre k -tú rozhodovaciu jednotku DMU_k nasledovne:

Tabuľka 3 Schéma pre konverziu slabo ordinálnych dát na exaktné dáta pre DMU_k podľa (18)–(20)

Ordinálna škála (j) (1)	Outputy y_{ij} (2)	Inputy x_{ij} (3)
1	0	1
2	0	1
...
$k-1$	0	1
k	1	1
$k+1$	1	M
...
n	1	M

Table 3 Scheme for conversion of weak ordinal data to exact data for DMU_k following (18)–(20)
(1) ordinal scale, (2) outputs, (3) inputs

Pri aplikácii pravidiel (18)–(20) si treba uvedomiť, že i po konverzii ordinálnych dát na exaktné tieto musia byť v súlade so základnými preferenčnými pravidlami DEA, t. j. že outputy mu-

Tabuľka 4 Upravená schéma pre konverziu slabo ordinálnych dát na exaktné dáta pre DMU_k

Ordinálna škála (j) (1)	Exaktné outputy y_{ij} (2)	Ordinálna škála (j) (1)	Exaktné inputy x_{ij} (3)
n (najlepší output) (4)	0	1 (najlepší input) (5)	1
$n-1$	0	2	1
...
$k+1$	0	$k-1$	1
k	1	k	1
$k-1$	1	$k+1$	M
...
2	1	$n-1$	M
1 (najhorší output) (6)	1	n (najhorší input) (7)	M

Table 4 Adapted scheme for conversion of weak ordinal data to exact data for DMU_k
(1) ordinal scale, (2) exact outputs, (3) exact inputs, (4) best output, (5) best input, (6) worst output, (7) worst input

Tabuľka 5 Vybrané dáta pre IDEA model

Podnik (1)	<i>Hosp_sit</i> (2)	<i>PC_celkom</i> (3)	%_zam_s_PC (4)		<i>Inv_IKT</i> (5)	
			dolná hranica (6)	horná hranica (7)	dolná hranica (6)	horná hranica (7)
1	5	4	0	20	20	50
6	3	4	0	20	20	50
70	4	49	20	40	50	100
143	2	10	0	20	0	20
193	1	6	0	20	20	50

Pozn.: Ordinálne dáta v stĺpci *Hosp_sit* sú teraz zo škály: 5 – veľmi dobrá hospodárska situácia až 1 – zlá hospodárska situácia
Note: Ordinal data in column *Hosp_sit* are now within the scale: from 5 – very good prosperity to 1 – very low prosperity

Table 5 Selected data for IDEA model
(1) firm, (2) firm prosperity, (3) number of PCs, (4) percentage of employees working with PC, (5) ICT investments, (6) lower bound, (7) upper bound

Tabuľka 6 Konvertované ordinálne dáta *Hosp_sit* na exaktné dáta

<i>Hosp_sit</i> (1)	Hodnotený podnik (DMU_k) (2)				
	1	6	70	143	193
$y_{1,2}$	200	200	200	200	200
$y_{1,6}$	0	200	0	200	200
$y_{1,70}$	0	200	200	200	200
$y_{1,143}$	0	0	0	200	200
$y_{1,145}$	0	0	0	0	200

Pozn.: V súlade s (16) a (17) konvertujeme ordinálne hodnoty na dve exaktné hodnoty: M a 0. M = 200 bolo zvolené približne vo veľkosti počtu hodnotených podnikov

Note: Following (16) a (17) we convert ordinal values to two exact values: M and 0. M was put equal to 200, what is approximately the number of DMUs

Table 6 *Hosp_sit* ordinal data converted to exact data
(1) firm prosperity, (2) firm under evaluation

sia byť v súlade s pravidlom rastúcej preferencie (čím viac, tým lepšie), a naopak inputy v súlade s pravidlom klesajúcej preferencie (čím menej tým lepšie). Pravidlá (18)–(20) Zhu (2003a) formuloval bez zohľadnenia uvedených pravidiel. Takže ak vychádzame z predpokladu, že poradie $j = 1$ je priradené najlepšiemu, t. j. najvyššiemu outputu a najlepšiemu, t. j. najnižšiemu inputu, a naopak poradie $j = n$ najhoršiemu (najnižšiemu) outputu a najhoršiemu (najvyššiemu) inputu, potom preferenčné pravidlo je splnené v tabuľke 3 iba pre inputy. Konvertované hodnoty inputov s lepším ako k -tým poradím dominujú konvertované hodnoty s poradím $k+1, \dots, n$. Pravidlo preferencie však neplatí pre outputy, pretože konvertované exaktné outputy

s poradím lepším ako $j = k$ sú dominované outputmi z horších poradí. Tento nesúlad možno napraviť tým, že definujeme najlepšie a najhoršie poradie osobitne pre outputy a osobitne pre inputy. Najlepšie poradie pre inputy musí byť $j = 1$ (najhoršie pre outputy) a najlepšie poradie pre outputy musí byť $j = n$ (najhoršie pre inputy). Toto pravidlo je ad hoc naznačené v Chen a Zhu (in Zhu a Cook eds., 2007) v referencii na staršiu prácu Kim, Park a Park (1999).

S ohľadom na uvedené navrhujeme nasledovnú schému pre konverziu slaboo ordinálnych dát (tabuľka 4).

Konverziu ilustrujeme na piatich podnikoch vybraných z databázy 193 podnikov. Pôvodné dáta sú uvedené v tabuľke 5. Konvertované dáta uvádza tabuľka 6.

Aplikáciou vyššie uvedeného postupu konverzie ordinálnych dát a konverziou intervalovo zadaných dát podľa (11) úloha pre výpočet miery technickej efektívnosti pre podnik č. 70 má nasledovný tvar:

$$\theta_{70}^* = \min \theta_{70}$$

za podmienok:

PC_celkom:

$$-49\theta_{70} + 4\lambda_1 + \dots + 4\lambda_6 + \dots + 49\lambda_{70} + \dots + 10\lambda_{143} + \dots + 6\lambda_{193} \leq 0$$

%_zam_s_PC:

$$-0\theta_{70} + 20\lambda_1 + \dots + 20\lambda_6 + \dots + 40\lambda_{70} + \dots + 20\lambda_{143} + \dots + 20\lambda_{193} \leq 0$$

Inv_IKT:

$$-20\theta_{70} + 50\lambda_1 + \dots + 50\lambda_6 + \dots + 100\lambda_{70} + \dots + 20\lambda_{143} + \dots + 50\lambda_{193} \leq 0$$

Hosp_sit:

$$200\lambda_1 + \dots + 0\lambda_6 + \dots + 200\lambda_{70} + \dots + 0\lambda_{143} + \dots + 0\lambda_{193} \geq 200$$

$$\lambda_1, \lambda_2, \dots, \lambda_{193} \geq 0$$

Pre obmedzený rozsah príspevku uvidíme výsledky iba za vybrané podniky. V tabuľke 7 uvádzame porovnanie mier technickej efektívnosti získaných aplikáciou modelu EIDEA s mierami získanými aplikáciou štandardného CCR DEA modelu. V oboch modeloch sa predpokladajú konštantné výnosy z rozsahu. Súčasťou tabuľky sú aj základné štatistické charakteristiky za celý súbor $n = 193$ podnikov.

Tabuľka 7 Porovnanie mier technickej efektívnosti EIDEA a CCR DEA

Podnik (1)	Miere technickej efektívnosti (2)	
	EIDEA	CCR DEA
1	1	1
6	1	0,6
70	1	0,29
143	1	0,5
193	1	0,2
Priemer ($n = 193$) 3	0,95	0,56
Minimum ($n = 193$)	0,29	0,12
Maximum ($n = 193$)	1,00	1,00
Štand. odchýlka ($n = 193$) (4)	0,14	0,28
Podiel efektívnych podnikov v % (5)	88,60 %	8,81 %

Table 7 Comparison of EIDEA and CCR DEA technical efficiency scores (1) firm, (2) technical efficiency scores, (3) mean, (4) standard deviation, (5) share of efficient firms

Ako je zrejme z porovnania, EIDEA model dáva vyššie miery efektívnosti, ako aj vyšší podiel efektívnych podnikov ako CCR DEA model. Toto vyplýva predovšetkým z korektného zohľadnenia ordinality outputových dát. Rozdiely naznačujú k akým skresleným výsledkom môže dôjsť aplikovaním štandardného DEA modelu pri prítomnosti ordinálnych, ako aj ostatných typov nepresných dát.

Záver

V ostatných tridsiatich rokoch sa DEA stala jednou z najrýchlejších sa rozvíjajúcich vedných disciplín operačného výskumu. Jej aplikačné možnosti sa značne rozšírili hlavne po vyvinutí množstva modifikácií, ktoré umožňujú analyzovať problémy so špecifickými vlastnosťami. Osobitnou triedou modifikácií modelov DEA sú modely umožňujúce pracovať s nepresnými dátami. Väčšina modelov tejto triedy je založená na formulácii nelineárnych modelov. Aplikácie atraktívnejšie sú však modely lineárne, ktoré umožňujú využívať väčšinu doteraz vyvinutých analytických techník štandardných modelov DEA. V predkladanom príspevku sú prezentované najefektívnejšie lineárne postupy pre hodnotenie efektívnosti rozhodovacích jednotiek za prítomnosti nepresných dát a to vo forme ordinálnych a intervalovo zadaných dát. V práci je navrhnutá modifikácia metódy Zhu (2003a) konverzie ordinálnych dát na exaktné dáta. Model EIDEA s modifikovanou procedúrou je aplikovaný v analýze efektívnosti 193 agro-potravinárskych podnikov z hľadiska vplyvu informačných a komunikačných technológií. Komparácia výsledkov modelu EIDEA s výsledkami modelu CCR DEA v závere práce ukazuje na významné rozdiely v mierach efektívnosti, čo je argumentom pre aplikáciu špecifického modelu v záujme vyvarovania sa skreslených výsledkov.

Súhrn

Príspevok prezentuje výber najefektívnejších postupov pre výpočet mier efektívnosti podnikov metódou analýzy dátových obalov za predpokladu nepresných dát (IDEA). Podrobnejšie sa venuje aplikácii obalovej verzie modelu IDEA (EIDEA), navrhuje úpravu postupu konverzie ordinálnych dát na exaktné dáta navrhnutého v Zhu (2003a) a model EIDEA spolu s navrhnutým postupom aplikuje na hodnotenie efektívnosti 193 agropotravinárskych podnikov z hľadiska využívania IKT. Výsledky analýzy modelom EIDEA sú komparované so štandardným modelom CCR DEA. Porovnanie ukazuje, že štandardný model podhodnocuje miery efektívnosti, čo je zrejme dôsledkom nekorektného zohľadnenia ordinálnych dát.

Kľúčové slová: analýza dátových obalov, ordinálne dáta, intervalové dáta, DEA s nepresnými dátami (IDEA), obalový model IDEA (EIDEA)

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ANALÝZA ŠKOLSKÉHO MLIEČNEHO PROGRAMU THE ANALYSIS OF SCHOOL MILK PROGRAMME

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The main objective of the paper is to evaluate the contribution of School Milk Programme (SMP) in the Slovak Republic and find out the reasons of low participation of preschool and school facilities in the Nitra Self-governing Region. Lately, the number of preschool and school facilities involved in the SMP has been increasing. However, reported consumption quantities reached only 30% of the total amount which could have been consumed by children and youth under the program. In the research, four sub-objectives were defined. The first sub-objective identifies changes in SMP legislation and their impact on preschool and school educational facilities. The role of the other sub-objectives is to determine the reasons for the low consumption of milk and dairy products under SMP, to assess the assortment of offered milk and dairy products, issues of communication and organization and to propose measures leading to the elimination of problems and improvement of the current situation.

Key words: school milk programme, consumption of milk and dairy products, European support, eating habits of children and youth

Spotreba mlieka a mliečnych výrobkov zaznamenala v deväťdesiatych rokoch 20. storočia v členských štátoch EÚ priemerne 20% pokles na osobu a rok. Rovnakú tendenciu mala spotreba mlieka a mliečnych výrobkov aj v Slovenskej republike, pričom kritická je spotreba mlieka a mliečnych výrobkov u detí navštevujúcich predškolské a školské zariadenia. Medzi primárne faktory, ktoré pravdepodobne výrazným spôsobom ovplyvnili klesajúcu spotrebu mlieka a mliečnych výrobkov

v SR možno zaradiť pokles detskej populácie, zmenu v spotrebiteľských návykoch, cenu mlieka a mliečnych výrobkov ako aj nedostatočnú podporu spotreby na národnej úrovni. Tieto dôvody viedli predstaviteľov EÚ k zavedeniu nového trhového opatrenia jednotnej spoločnej organizácie trhu o poskytovaní pomoci na podporu spotreby mlieka a mliečnych výrobkov, ktoré vyplýva z nariadenia Rady (ES) č. 657/2008.

Materiál a metódy

Počet školských zariadení zapojených do školského mliečného programu (ŠMP) v súčasnosti rastie, avšak vykazované spotrebované množstvo predstavuje iba 30% z celkového množstva, ktoré by deti mohli v rámci programu skonzumovať. Hlavným cieľom vedeckého príspevku je zhodnotiť ŠMP v Slovenskej republike a spoznať príčiny nízkeho zapojenia predškolských a školských zariadení v Nitrianskom samosprávnom územnom celku. Po uskutočnení analýzy trhového prostredia boli stanovené nasledovné hypotézy:

- zapojenie škôl do ŠMP závisí od počtu žiakov navštevujúcich dané školské zariadenie,
- zapojenie škôl do ŠMP závisí od toho, či je škola v obci alebo v meste,
- počet druhov mliečnych výrobkov stúpa s počtom žiakov zaradených do ŠMP v rámci školského zariadenia,
- počet druhov mliečnych výrobkov závisí od sídla školy.

Pri skúmaní vzťahov a závislostí medzi kvalitatívnymi znakmi bola využitá asociačná a kontingenčná analýza. Existencia závislosti medzi znakmi bola overená pomocou χ^2 -testu (Chí-kvadrát – testu) nezávislosti, pričom predpoklady hypotéz sú nasledovné:

H_0 : medzi danými kvalitatívnymi znakmi neexistuje závislosť,
 H_1 : závislosť medzi kvalitatívnymi znakmi existuje.

Test je založený na porovnávaní empirických a teoretických početností pre každú kategóriu sledovaných znakov. Testovacie kritérium pre overovanie nulovej hypotézy H_0 sa vypočíta podľa nasledovného vzťahu:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(E_{ij} - T_{ij})^2}{T_{ij}}$$

kde:

r, c – počet kategórií prvého a druhého znaku

E_{ij} – zistená početnosť

T_{ij} – teoretická početnosť

Vzťah pre výpočet teoretickej početnosti T_{ij} :

$$T_{ij} = \frac{R_i \times C_j}{n}$$

kde:

R_i – suma početností v i -tom riadku

C_j – suma početností v j -tom stĺpci

n – celková početnosť

Výsledné hodnoty hypotéz sú porovnané s kritickou (tabulkovou) hodnotou:

$$\chi_{tab}^2 = (\alpha(c-1) \times (r-1))$$

kde:

α – hladina významnosti

Hypotézu H_0 nezamietame, ak je vypočítaná hodnota testovacieho kritéria $\chi^2 < \chi_{tab}^2$, kde χ_{tab}^2 je tabulková hodnota nájdená pri $(c-1) \times (r-1)$ stupňoch voľnosti. Ak $\chi^2 > \chi_{tab}^2$, zamietame hypotézu H_0 , teda považujeme znaky na zvolenej hladine významnosti za závislé. Všetky výpočty sú realizované s 5% teoretickou hladinou významnosti.

Pre výpočet sily závislosti bol použitý Pearsonov koeficient:

$$X = \sqrt{\frac{\chi^2}{n + \chi^2}}$$

kde:

χ^2 – vypočítané testovacie kritérium

n – celkový počet meraní

Čím viac sa blíži (absolútna hodnota) k hodnote 1, tým je závislosť silnejšia.

Základnou technikou prieskumu bol dotazník. Cieľovou skupinou výskumu boli predškolské a školské zariadenia. Dotazník bol rozposlaný v dvoch etapách. Prvá etapa rozposielania dotazníkov sa uskutočnila v mesiaci január 2010. Nakoľko bola nízka návratnosť dotazníkov, boli opätovne oslovené ďalšie školské zariadenia v mesiaci marec 2010. Celkovo bolo oslovených 70 základných a materských škôl v Nitrianskom samosprávnom územnom celku. Celková návratnosť dotazníkov bola 54%, pričom jeden dotazník nebol vyplnený kompletné, preto nebol zaradený do ďalšieho spracovania.

Výskum bol realizovaný z finančných prostriedkov Grantovej agentúry Slovenskej poľnohospodárskej univerzity v Nitre č. 759/01310.

Charakteristika skúmanej vzorky respondentov

Do prieskumu bolo zapojených 22 (58%) školských zariadení, ktoré sa nachádzajú v mestách a 16 (42%) školských zariadení, ktoré sa nachádzajú v obciach.

Z miest malo najväčšie zastúpenie mesto Nitra (32%, sedem školských zariadení) a Nové Zámky (18%, 4 školské zariadenia). Z miest Hurbanovo, Komárno, Šaľa, Štúrovo, Veľký Ďur a Zlaté Moravce sa zapojilo iba jedno školské zariadenie, pričom spolu tvoria až 27% podiel škôl, ktoré boli do prieskumu zapojené (podiel predškolských a školských zariadení zapojených do prieskumu pochádza z okresu Nitra (34%) potom z okresu Levice (18%) a najmenší počet z okresu Topoľčany (3%) (tabuľka1).

Tabuľka 1 Zastúpenie jednotlivých okresov v prieskume

Okres (1)	Počet škôl (2)	Percentuálny podiel (3)
Nitra	13	34%
Zlaté Moravce	2	5%
Levice	7	18%
Šaľa	3	8%
Komárno	4	11%
Dunajská Streda	2	5%
Topoľčany	1	3%
Nové Zámky	6	16%
Spolu (4)	38	100%

Zdroj: Vlastný výskum Source: Own research
Table 1 Representation of districts in the survey
 (1) district, (2) number of schools, (3) percentage share, (4) total

Výsledky a diskusia

Školský mliečny program v SR

Podľa Svetovej zdravotníckej organizácie (2006) je obezita jednou z najväčších výziev verejného zdravotníctva v 21. storočí.

Tabuľka 2 Realizácia Školského mliečného programu v SR v rokoch 2004–2008

Školský rok (1)	Počet zapojených školských zariadení (2)	Množstvo spotrebovaného mlieka a ml. výrobkov v kg (3)	Výška národnej dotácie v € (4)	Výška dotácie z EÚ v € (5)
2004/2005	100	141 000	26 887	32 530
2005/2006	650	1 137 000	265 551	258 913
2006/2007	820	1 343 215	285 468	248 954
2007/2008	920	–	–	–
Index 2006/2007–2004/2005 v %	820%	953%	1 062%	765%

Zdroj: PPA SR Source: PPA SR

Table 2 Implementation of School Milk Programme in the Slovak Republic in the years 2004–2008

(1) school year, (2) Number of facilities involved in the SMP, (3) Amount of consumed milk and dairy products in kg, (4) Level of national subsidy in Eur, (5) Level of EU subsidy in Eur

Od roku 1980 sa prevalencia obezity strojnásobila v mnohých krajinách európskeho regiónu a počet tých, ktorí sú postihnutí, kontinuálne narastá do alarmujúcich rozmerov, najmä u detí. Obezita je taktiež zodpovedná za 2–8 % všetkých výdavkov na zdravotníctvo a 10–13 % úmrtí v rôznych častiach európskeho regiónu. V súčasnosti má nadváhu 30–80 % dospeléj populácie európskeho regiónu, ktorá je sledovaná prostredníctvom indexu BMI. Priemerné hodnoty BMI sa v regióne blížia k hodnote 26,5. Obezitou (BMI viac ako 30) je postihnutých viac ako tretina dospeléj populácie v regióne. Odhaduje sa, že takmer 400 miliónov dospelých trpí nadmotnosťou a asi 130 miliónov je obéznych. Detská obezita predstavuje akútnu zdravotnú krízu. Asi 20% detí trpí nadmotnosťou a asi tretina z nich je obézna.

Od roku 1992 je v SR zaznamenaný sústavný pokles spotreby mlieka a mliečnych výrobkov. Medzi primárne faktory, ktoré pravdepodobne výrazným spôsobom ovplyvnili a ovplyvňujú klesajúcu spotrebu mlieka a mliečnych výrobkov v SR, možno zaradiť pokles detskej populácie, zmenu v spotrebiteľských návykoch, cenu mlieka a mliečnych výrobkov, ako aj nedostatočnú podporu spotreby na národnej úrovni. Deti patria do najohrozenejšej vekovej skupiny z hľadiska príjmu množstva vápnika a aj z tohto hľadiska EÚ kladie veľký dôraz na konzumáciu mlieka a mliečnych výrobkov a zároveň návyky z detstva vytvoria predpoklad pre jeho konzumáciu aj v dospelom veku. V SR dosahuje príjem vápnika u detí približne 60% odporúčaného množstva. Alarmujúce sú štúdie, ktoré tvrdia, že iba 43% detí pije mlieko každý deň, 45% pije mlieko nepravidelne a 12% detí nepije mlieko vôbec. Podľa svetovej zdravotníckej organizácie je minimálna odporúčaná dávka spotreby mlieka na obyvateľa a deň 603 gramov. Spotreba mlieka a mliečnych výrobkov sa na Slovensku za posledných 15 rokov znížila o 100 kg na osobu a rok. Zatiaľ čo v roku 1989 pripadalo na jedného obyvateľa SR v priemere 253 kg mlieka a mliečnych výrobkov, v roku 2007 to bolo len 153 kg. Odporúčaná výživová dávka je 220 kg na osobu za rok. Extrémne nízkou spotrebou mlieka sa Slovensko zaraďuje nielen na posledné priečky v Európe, ale aj vo svete. V súvislosti s nízkou spotrebou mlieka a mliečnych výrobkov sa v SR začal realizovať Školský mliečny program. Hlavným cieľom ŠMP je zvýšenie spotreby mlieka, kyslomliečnych výrobkov, tvarohu a syrov v školách, čím sa zvýši aj príjem vápnika u školopovinných detí, domnieva sa Hamade (2008). Školský mliečny program sa realizoval na území SR do roku 1989 a jeho obnovenie nastalo až v roku 2004. Podľa tabuľky 2 bolo v školskom roku 2004/2005 do programu zapojených 100 škôl a vyplatilo sa celkovo 1,79 mil. Sk za 141 tisíc kg skonzumovaného mlieka a mliečnych výrobkov, z čoho 0,81 mil. Sk bolo vyplatených zo štátneho rozpočtu. V roku 2005/2006 bolo zapojených už cca 650 škôl a vyplatili sa prostriedky celkovo vo výške 15,8 mil. Sk za

1 137 tisíc kg výrobkov, pričom zo štátneho rozpočtu sa vyplatilo 8,0 mil. Sk. Postupne narastá počet zapojených škôl a aj finančné prostriedky sa zvyšujú, v školskom roku 2006/2007 bolo zapojených 820 škôl a za 1 343 tisíc kg výrobkov sa vyplatili prostriedky celkovo vo výške 16,2 mil. Sk, z čoho 8,6 mil. Sk bolo zo štátneho rozpočtu. Podľa predbežných údajov sa v školskom roku 2007/2008 zapojilo 900 škôl a celková výška prostriedkov sa predpokladá na 29 mil. Sk. Počet materských, základných a stredných škôl predstavuje 45% účasť na programe.

Základné legislatívne predpisy upravujúce organizáciu školského mliečného programu v SR vyplývajú z Nariadenia Rady (ES) č. 1234/2007 z 22. októbra 2007 o vytvorení spoločnej organizácie poľnohospodárskych trhov a o osobitných ustanoveniach pre určité poľnohospodárske výrobky (nariadenie o jednotnej spoločnej organizácii trhov), z Nariadenia Komisie (ES) č. 657/2008 z 10. júla 2008, ktorým sa ustanovujú podrobné pravidlá uplatňovania Nariadenia Rady (ES) č. 1234/2007, pokiaľ ide o pomoc Spoločenstva pri poskytovaní mlieka a určitých mliečnych výrobkov žiakom vo vzdelávacích inštitúciách a z Nariadenia vlády SR č. 339/2008 z 20. augusta 2008 o poskytovaní pomoci na podporu spotreby mlieka a mliečnych výrobkov pre deti v materských školách, pre žiakov na základných školách a pre žiakov na stredných školách a z Nariadenia Komisie (ES) č. 966/2009 z 15. októbra 2009, ktorým sa mení a dopĺňa nariadenie (ES) č. 657/2008, ktoré stanovuje pravidlá na uplatňovanie nariadenia Rady (ES) č. 1234/2007 o pomoci Spoločenstva pri poskytovaní mlieka a mliečnych výrobkov žiakom vo vzdelávacích inštitúciách. Nové Nariadenie Rady (ES) č. 657/2008 a Nariadenie Komisie (ES) č. 966/2009 prinieslo niekoľko pozitívnych zmien, ktoré sa týkajú:

a) Rozšírenia cieľovej skupiny:

Uchádzačom o zabezpečenie mlieka a mliečnych výrobkov podľa nového Nariadenia Komisie (ES) č. 657/2008 môže byť:

- vzdelávacia inštitúcia,
- orgán školstva, pokiaľ ide o výrobky distribuované žiakom v rámci jeho pôsobnosti,
- dodávateľ výrobkov,
- organizácia pôsobiaca v mene jednej alebo viacerých vzdelávacích inštitúcií alebo jedného či viacerých orgánov školstva a osobitne zriadená na tento účel.

b) Propagácie programu

Nakoľko nebola dostatočná informovanosť žiakov a rodičov, ale aj ostatných návštevníkov školy o tomto programe, zaviedla sa povinnosť označovať miesto distribúcie mliečnych výrobkov financovaných z prostriedkov EÚ plagátom, ktorý musí spĺňať minimálne požiadavky podľa prílohy III nariadenia

(ES) č. 657/2008, napríklad veľkosť plagátu, veľkosť písma, názov školy, prípadne informáciu o význame mlieka. Plagát musí byť umiestnený na viditeľnom mieste pri vstupe do školy.

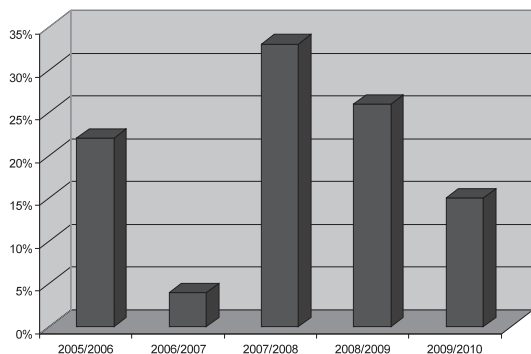
c) Kategorizácie a rozšírenie sortimentu

– je členený do piatich kategórií a ku každej kategórii je určená výška pomoci: Nariadenie Komisie (ES) č. 657/2008 člení sortiment do 5 kategórií. Nakoľko skúsenosti poukázali, že určité výrobky z nariadenia Komisie (ES) č. 657/2008 neboli a ani nie sú v súčasnosti dostupné na trhu vo viacerých členských štátoch, bolo navrhnuté rozšíriť zoznam výrobkov s cieľom zabezpečiť v členských štátoch možnosť použitia širšieho spektra výrobkov oprávnených na pomoc. Rovnako boli presnejšie vymedzené pojmy syr a sladidlá. Touto problematikou sa zaoberá Nariadenie Komisie č. 966/2009, ktoré naďalej člení sortiment do 5 kategórií a upravuje Prílohu I nasledovne: Do I kategórie boli začlenené výrobky tepelne upravené mlieko alebo tepelne upravené mlieko s čokoládou, ovocnou šťavou alebo ochutené, obsahujúce minimálne 90 % hmotnostných mlieka a obsahujúce najviac 7 % pridaného cukru a/alebo medu; fermentované mliečne výrobky obsahujúce alebo neobsahujúce ovocnú šťavu, ochutené alebo neochutené, obsahujúce minimálne 90 % hmotnostných mlieka uvedeného a obsahujúce najviac 7 % pridaného cukru a/alebo medu. Kategória II. obsahuje ochutené a neochutené mliečne výrobky s ovocím, fermentované alebo nefermentované obsahujúce minimálne 75 % hmotnostných mlieka a obsahujúce najviac 7 % pridaného cukru a/alebo medu. Do kategórie III. boli zaradené čerstvé a spracované syry s obsahom nemliečnych zložiek maximálne 10 %. Kategória IV. zahŕňa Syry Grana Padano a Parmigiano Reggiano. Posledná V. kategória obsahuje syry obsahujúce maximálne 10 % nemliečnych zložiek, na ktoré sa nevzťahujú kategórie III. a IV.

Výška pomoci z finančných zdrojov EÚ je stanovená v nariadení Komisie (ES) č. 657/2008 z 10. júla 2008. Ku každej kategórii bola navrhnutá miera pomoci, ktorá sa novým nariadením nezmenila a je platná nasledovne:

- 18,15 € . 100⁻¹ kg na výrobky kategórie I.,
- 16,34 € . 100⁻¹ kg na výrobky kategórie II.,
- 54,45 € . 100⁻¹ kg na výrobky kategórie III.,
- 163,14 € . 100⁻¹ kg na výrobky kategórie IV.,
- 138,85 € . 100⁻¹ kg na výrobky kategórie V.

Pomoc je školským zariadeniam vyplácaná v národnej mene, pričom na prepočet sa v zmysle nariadenia Komisie (ES) 873/2007 v znení neskorších predpisov používa kurz vyhlásený



Obrázok 1 Podiel školských zariadení, ktoré zahájili účasť v ŠMP, v jednotlivých školských rokoch

Zdroj: Vlastný výskum

Figure 1 Share of schools participating in the School Milk Programme in respective academic years
Source: Own research

Európskou centrálnou bankou (ECB), platný v prvý deň zúčtovacieho obdobia, ku ktorému sa žiadosť o pomoc vzťahuje. Výška pomoci z finančných zdrojov SR je stanovená v nariadení vlády Slovenskej republiky z 20. augusta 2008 č. 339/2008 o poskytovaní pomoci na podporu spotreby mlieka a mliečnych výrobkov pre deti v materských školách, pre žiakov na základných školách a pre žiakov na stredných školách. Finančná pomoc z európskych a národných prostriedkov sa uplatňuje iba na podporované mliečne výrobky uvedené v nariadení vlády SR č. 339/2008 Z. z. Pomoc sa poskytuje maximálne na 0,25 litra spracovateľsky ošetrovaného mlieka (alebo mliečného výrobku prepočítaného na ekvivalentný objem mlieka) na jedného žiaka a jeden vyučovací deň.

Financovanie programu je v SR čiastočne dotované a je tvorené tromi zložkami:

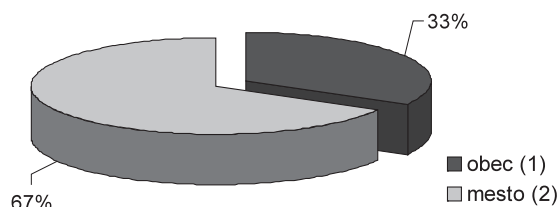
- prostriedky z EÚ,
- prostriedky zo štátneho rozpočtu,
- doplatok žiaka.

Týmto spôsobom dostávajú deti a žiaci mlieko alebo mliečny výrobok za cenovo výhodnejších podmienok. Výška prostriedkov z EÚ je daná nariadením a je stanovená podľa už spomínaných jednotlivých kategórií výrobkov. Pre všetky druhy mlieka je určená vo výške 18,15 € na 100 kg mlieka. Pre žiaka je stanovená maximálna denná dávka v množstve 0,25 l mlieka alebo mliečného výrobku prepočítaný na ekvivalent mlieka. Prostriedky zo štátneho rozpočtu sú k prostriedkom z EÚ v pomere približne 2,5 : 1. Zvyšnú čiastku dopláca žiak.

ŠMP v Nitrianskom samosprávnom územnom celku

Na základe uskutočneného prieskumu možno tvrdiť, že vývoj zapojenia školských zariadení v Nitrianskom samosprávnom územnom celku (NSÚC) v Školskom mliečnom programe má výrazne kolísavý charakter. Napriek uvedenej skutočnosti je pozitívne, že záujem o ŠMP zo strany školských zariadení z roka na rok narastá, čo dokumentuje aj obrázok 2. Do Školského mliečného programu sa školské zariadenia v NSÚC prvýkrát zapojili v školskom roku 2005/2006. V tomto roku sa z opýtaných zapojilo 22% škôl. Najväčší prepad záujmu o školský mliečny program bol v roku 2006/2007, kedy sa pripojili len 4% škôl z celkového počtu nezapojených škôl v NSÚC. Výrazný nárast zapojenia školských zariadení do programu Školské mlieko nastal o rok neskôr, v školskom roku 2007/2008 a to až o 33% (obrázok 1).

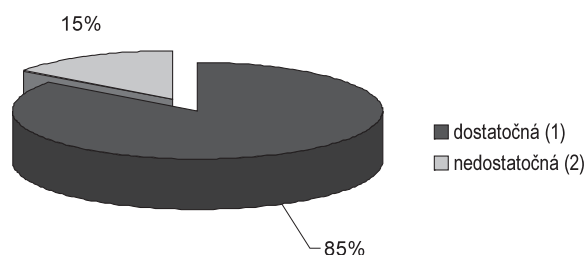
Z oslovených 38 materských a základných škôl potvrdilo svoju účasť v ŠMP až 71% predškolských a školských zariadení. Výrazne vyšší podiel zapojenia do mliečného programu majú mestské školské zariadenia 18 (64%) (obrázok 2). Obecné školy tvoria 36% podiel zapojenia, čo potvrdilo 9 škôl.



Obrázok 2 Podiel zapojených školských zariadení v ŠMP podľa miest a obcí

Zdroj: Vlastný výskum

Figure 2 Share of preschool and school facilities involved in School Milk Programme by cities and villages
Source: Own research
(1) village, (2) town



Obrázok 3 Spokojnosť so sortimentom mliečnych výrobkov podľa respondentov
Zdroj: Vlastný výskum

Figure 3 Satisfaction of responders with the assortment of dairy products
Source: Own research

Z Nitrianskeho samosprávneho kraja do školského mliečného programu nie je zapojených 29% opýtaných. Sedem školských zariadení, ktoré nie sú zapojené v ŠMP pochádza z obcí (67%) a 4 školy z miest (33%). Medzi dôvody, prečo školské zariadenia nie sú zapojené do mliečného programu respondenti uvádzali nasledovné dôvody:

- nezáujem o mliečne výrobky zo strany žiakov (2),
- nízky počet žiakov navštevujúci školské zariadenie (2),
- neskoré informovanie o ŠMP (1),
- problematické skladovanie, manipulácia a vydávanie potravín počas prestávok, ktoré nie sú školy technicky a ani personálne schopné zabezpečiť (3).

Sortiment mlieka a mliečnych výrobkov

V rámci školského mliečného programu môže byť deťom a žiakom podávané mlieko najviac v množstve 0,25 l na dieťa alebo žiaka a deň alebo mliečny výrobok, prepočítaný na ekvivalentný objem mlieka. Každým rokom sa zvyšuje počet schválených výrobkov, ktoré sú následne počas školského roka žiakom ponúkané. Sortiment mliečnych výrobkov schvaľuje PPA. V školskom roku 2009/2010 bola v SR ponuka tvorená 26 mliečnymi výrobkami. V sortimente výrobkov sú v súčasnosti schválené prevažne biele jogurty, ochutené a neochutené mlieko, smotanové jogurty, acidofilné mlieko, kyslomliečny výrobok s probiotickou kultúrou biely.

Ponuku sortimentu v rámci ŠMP hodnotí až 85% opýtaných za dostatočnú. 15% respondentov považuje sortiment výrobkov za nedostatočný a ocenili by jeho rozšírenie (obrázok 3). Uvítali by viac druhov jogurtov, a to najmä ovocné, ďalej rôzne druhy syrov a piškótové rezy s mliečnou náplňou.

Tabuľka 3 Štruktúra objednávaných výrobkov od jednotlivých mliekarní

Druhy mlieka a mliečnych výrobkov (1)	Danone		Rajo		Tatranská mliekareň		Spolu školy (3)
	počet škôl (2)	%	počet škôl (2)	%	počet škôl (2)	%	
Neochutené mlieko (4)	1	50	3	60	20	100	24 (89%)
Ochutené mlieko (5)	1	50	4	80	9	45	14 (52%)
Ochutený jogurt (6)	2	100	0	0	1	5	3 (11%)
Mliečne nápoje (7)	2	100	0	0	4	20	6 (22%)
Biely jogurt (8)	1	50	0	0	5	25	6 (22%)
Syry (9)	0	0	0	0	2	10	2 (7%)
Iné (10)	1	50	1	20	1	5	3 (11%)

Zdroj: Vlastný výskum Source: Own research

Table 3 The structure of products ordered from individual dairies

(1) types of milk and dairy products, (2) number of schools, (3) total for the schools, (4) unflavoured milk, (5) flavoured milk, (6) flavoured yoghurts, (7) milk drinks, (8) white yoghurt, (9) cheese, (10) other

Zo skúmanej vzorky až 20 škôl (74%) spolupracuje s Tatranskou mliekarnou, a.s., so sídlom v Kežmarku, 5 škôl (19%) s mliekarenskou spoločnosťou Rajo, a.s. a iba dve školy (7%) so spoločnosťou Danone.

Tabuľka 3 zachytáva podiel škôl na odoberaní jednotlivých druhov mliečnych výrobkov. Najväčší záujem prejavujú žiaci o neochutené mlieko (89%). Neochutené mlieko odoberajú školské zariadenia najčastejšie od Tatranskej mliekarene, a. s., (20), 3 školské zariadenia od spoločnosti Rajo, a.s. a iba 1 školské zariadenie nakupuje neochutené mlieko od Danone. Ochutené mlieko odoberajú školy v prevažnej miere od spoločnosti Rajo, a.s. a ochutený jogurt a mliečne nápoje od spoločnosti Danone. Na druhej strane, najmenší záujem je o syry (7%) a to je z dôvodu ich nedostatočnej ponuky.

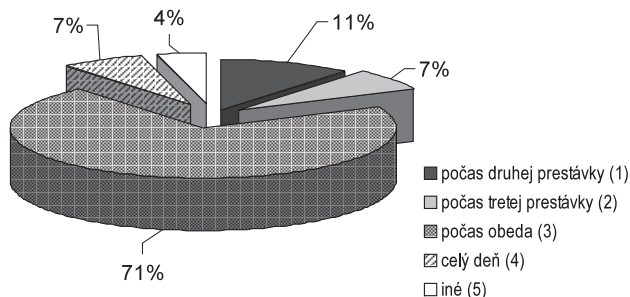
Nová forma predaja mlieka a mliečnych výrobkov v rámci programu Školské mlieko sa realizuje od školského roku 2008/2009 a to prostredníctvom chladených mliečnych automatov. Predaj sa uskutočňuje cez čipovú kartu, za ktorú si majú možnosť žiaci zakúpiť 20 kusov mliečnych výrobkov podľa vlastného výberu. V ponuke sú zatiaľ 4 druhy mliečnych výrobkov: dvojdecilitrové mlieko s príchutou vanilky, kaka, jahody a neochutené acidko s 1 % obsahom tuku. Pre školský rok 2009/2010 bola určená cena jedného výrobku na 0,25 eur (7,53 Sk). Školské mliečne automaty na Slovensku zatiaľ ponúka a prevádzkuje iba spoločnosť Rajo, a.s. Zo skúmaných školských zariadení v NSÚC mliečny automat prevádzkuje iba 5 (19 %) z oslovených škôl.

Výhody realizácie školského mliečného programu prostredníctvom mliečnych automatov sú nasledovné:

- žiak si vyberie mliečnu desiatu v deň a v čase kedy jemu vyhovuje,
- nižšie administratívne náklady pre školské zariadenie,
- evidencia žiakov sa realizuje prostredníctvom čipovej karty,
- skladovanie, prevádzkovanie, hygienickú údržbu zabezpečuje prevádzkovateľ chladiaceho mliečného automatu,
- pravidelné týždenné dokladanie výrobkov uskutočňuje prevádzkovateľ automatu.

Nevýhody realizácie školského mliečného programu prostredníctvom predaja z mliečného automatu:

- v prípade, že si žiak nevyberie mliečnu desiatu do konca školského roka, t. j. k 30. 6., zostávajúce body mu prepadnú a nemôže si ich preniesť do nového školského roka,
- forma predaja nie je vhodná pre deti v predškolských zariadeniach,
- je určený iba pre školské zariadenia s vyšším počtom žiakov.



Obrázok 4 Konzumácia mliečnych výrobkov počas dňa
Zdroj: Vlastný výskum
Figure 4 Consumption of dairy products during a day
Source: Own research
(1) during the second break, (2) during the third break (3) during the lunch, (4) the whole day, (5) other

Konzumácia mlieka a mliečnych výrobkov v rámci Školského mliečného programu by sa mala v školách realizovať počas prestávok v rámci výchovno-vzdelávacieho procesu alebo v rámci mimoškolskej činnosti. Školy zároveň nemôžu použiť mliečne výrobky pri príprave jedál v zariadení školského stravovania, čo je uvedené v čl. 4 nariadenia Komisie (ES) č. 657/2008 z 10. júla 2008, avšak mlieko môžu v školskej jedálni zohrievať prípadne ochutiť. Prieskum poukazuje na skutočnosť, že vo väčšine školských zariadení (70%) konzumujú žiaci mliečne výrobky počas obeda, z čoho vyplýva, že do školského mliečného programu sú zapojení iba žiaci, ktorí navštevujú školskú jedáleň. Celodenný prístup k mlieku a mliečnym výrobkom má iba 7% žiakov a to v školských zariadeniach, ktoré prevádzkujú mliečny automat.

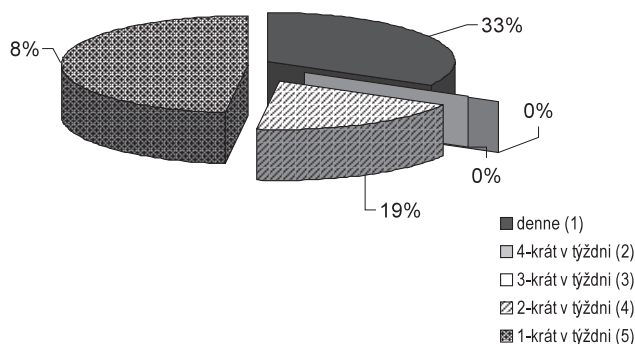
Obrázok 4 zachytáva konzumáciu počas jednotlivých prestávok. 23% žiakov konzumuje mliečnu desiatu po druhej a tretej vyučovacej hodine. Najčastejšie žiaci konzumujú mlieko a mliečne výrobky počas obeda, kde výrobok dostávajú ako prídavok k obedu. 70% podiel konzumácie mlieka a mliečnych výrobkov počas obeda poukazuje aj na problém, ktorý súvisí s distribúciou a zabezpečením chladiacich a hygienických požiadaviek na výrobky.

Žiaci vo väčšine školských zariadení konzumujú výrobky ŠMP 1-krát v týždni, čo uviedlo až 48% opýtaných (obrázok 5). Niektoré školské zariadenia ponúkajú mliečne výrobky 3-krát týždenne, čo uviedlo 33% opýtaných. Denne mliečnu desiatu neposkytujú žiadne školské zariadenia, čo možno považovať za jednu z príčin nižšej spotreby mlieka a mliečnych výrobkov v rámci ŠMP.

Medzi problémy súvisiace s ŠMP dopytované školské zariadenia uviedli:

- administratívna náročnosť,
- nedostatok personálnych a peňažných zdrojov na ohodnotenie poverenej osoby za administrovanie ŠMP,
- absencia žiaka,
- nedostatočná komunikácia,
- nevhodné alebo nedostatočné skladovacie podmienky,
- materiálno-technické podmienky, problematické prenášanie a manipulovanie s výrobkami z dôvodu pavilónového typu budovy.

Na **administratívnu náročnosť** sa poukazuje ako na jeden z najväčších problémov školského mlieka. Avšak z prieskumu vyplýva, že až 37% ju nepokladá za náročnú, 26% opýtaných ju považuje za náročnú a 37% sa k danej otázke nevyjadrilo. K zlepšeniu administratívnej náročnosti by prispelo napr. zaslanie výkazov jedenkrát polročne a v niektorých prípadoch ročne, čo však súčasná legislatíva neumožňuje.



Obrázok 5 Konzumácia mliečnych výrobkov
Zdroj: Vlastný výskum
Figure 5 Consumption of dairy products
Source: Own research
(1) daily, (2) 4 times a week, (3) 3 times a week, (4) twice a week, (5) once a week

Ďalší problém v rámci ŠMP vidia školy v **nedoriešenom zabezpečení a ohodnotení personálu**. V minulosti bol za organizovanie ŠMP poverený pedagogický pracovník. Nakoľko v súčasnosti došlo k výraznému poklesu pedagogických pracovníkov a ich počet je presne vypočítaný na počet žiakov, nie je z časového hľadiska možné poveriť týchto pracovníkov. Vo väčšine školských zariadeniach je preto poverená vedúca/i jedálne. Riaditeľ školy väčšinou zohľadňuje poverenému zamestnancovi prácu súvisiacu s výkonom ŠMP iba v osobnom príplatku. Tento nedostatok mnohé školské zariadenia riešia realizovaním mliečného programu počas obeda, takže sa v mnohých prípadoch nedotýka všetkých žiakov školy.

Jedným z organizačných problémov je **skladovanie výrobku počas absencií žiaka**. Absentujúcim deťom alebo žiakom je potrebné mliečnu desiatu dodať. Ak však rodičia neprídu po výrobok, škola musí zabezpečiť skladovanie výrobku. Platné nariadenia sa tejto problematike nevenujú, ale problém nastane, ak dieťa alebo žiak príde do školy/ materskej škôlky po dlhšej chorobe, resp. neprítomnosti a mlieko alebo mliečny výrobok je po dobe spotreby. Školy riešia tento problém rôzne. Väčšina škôl realizuje vydávanie mliečnych výrobkov počas obeda, takže keď žiak chýba, tak je odhlásený aj z obeda a tým pádom aj z ŠMP v daný deň. Ostatné školy používajú mliečny automat, pričom žiaci vlastnia čipové karty, to zn. že mlieko si vyberajú počas prítomnosti v škole. V prípade, že z organizačného hľadiska zlyhá dodávanie mlieka a mliečnych výrobkov, školské zariadenie rodičom poukáže šek na nákup výrobkov platný vo vybranej obchodnej sieti.

Návrhy na **zlepšenie komunikácie** v rámci ŠMP uviedlo iba 6 školských zariadení. Väčšina z nich odporúča väčšiu propagáciu ŠMP a zlepšenie informovanosti škôl i rodičov, poskytnúť školským zariadeniam od dodávateľa viac propagačných materiálov na spotrebu mlieka a mliečnych výrobkov. Ďalšie návrhy sú prispôbiť ponuku požiadavkám a podmienkam škôl, presnejšie definovanie a rozšírenie výberu výrobkov o také, ktoré deti obľubujú.

Vyhodnotenie hypotéz prieskumu

Nezapojenie sa školských zariadení do ŠMP je determinované viacerými faktormi, pričom niektoré dôvody boli zistené samotným dotazníkom. Stanovením hypotéz sme chceli potvrdiť súvislosť medzi počtom žiakov, resp. sídlom školy a zapojenosťou do ŠMP. Obdobné hypotézy boli overované aj ohľadne počtu druhov mliečnych výrobkov.

V prípade prvej hypotézy: zapojenie škôl do ŠMP závisí od počtu žiakov navštevujúcich dané školské zariadenie, bola potvrdená závislosť medzi zapojením škôl do ŠMP a počtom žiakov navštevujúcich školské zariadenie. Vypočítaná testovacia charakteristika je väčšia ako tabuľková hodnota.

Na základe Pearsonovho koeficienta (0,43) možno konštatovať iba stredne slabú závislosť. Na druhej strane predpoklad, že sa viac zapájajú školské zariadenia v mestách ako v dedinách, nebol potvrdený, to znamená, že medzi zapojenosťou a sídlom školského zariadenia nie je závislosť, čím bola vyvrátená druhá hypotéza.

Z χ^2 -testu nezávislosti vyplýva, že počet žiakov zaradených do ŠMP nemá vplyv na počet druhov mliečnych výrobkov odobraných daným školským zariadením. Štatisticky významná závislosť sa nepreukázala ani v prípade sídla školského zariadenia. V oboch prípadoch je vypočítaná testovacia charakteristika menšia ako tabuľková hodnota.

Zo stanovených hypotéz sa potvrdila iba jedna hypotéza a to, že zapojenie škôl do ŠMP závisí od počtu žiakov navštevujúcich školské zariadenie. Pomocou Pearsonovho koeficienta bola však odhalená iba stredne slabá závislosť.

Dôvody zníženej konzumácie mlieka a mliečnych výrobkov prostredníctvom programu ŠMP:

- **Nie je zabezpečená celodenná konzumácia mlieka a mliečnych výrobkov.** Konzumácia mlieka a mliečnych výrobkov v rámci Školského mliečného programu by sa mala v školách realizovať počas prestávok v rámci výchovno-vzdelávacieho procesu alebo v rámci mimoškolskej činnosti. Vo väčšine školských zariadení (70%) konzumujú žiaci mliečne výrobky počas obeda, z čoho vyplýva, že do školského mliečného programu sú zapojení iba žiaci, ktorí navštevujú školskú jedáleň. Celodenný prístup k mlieku a mliečnym výrobkom má iba 7% žiakov a to v školských zariadeniach, ktoré prevádzkujú mliečny automat.
- **Nie je zabezpečená každodenná konzumácia.** Vo väčšine školských zariadení konzumujú žiaci mlieko a mliečne výrobky 1-krát v týždni, čo uviedlo až 48 % opýtaných, pričom nárok na ich konzumáciu majú denne. Podľa výsledkov prieskumu denne mliečnu desiatu neposkytuje žiadne školské zariadenie, čo možno považovať za jednu z príčin nižšej spotreby mlieka a mliečnych výrobkov v rámci ŠMP.
- **Pestřejší sortiment výrobkov.** V školskom roku 2009/2010 bola v SR ponuka sortimentu tvorená 26 mliečnymi výrobkami. V sortimente výrobkov sú v súčasnosti schválené prevažne biele jogurty, ochutené a neochutené mlieko, smotanové jogurty, acidofilné mlieko, kyslomliečny výrobok s probiotickou kultúrou. Aby sa ŠMP mohol realizovať denne, je potrebné zabezpečiť pestrú ponuku mlieka a mliečnych výrobkov.

Súhrn

Hlavným cieľom vedeckého príspevku je zhodnotiť školský mliečny program (ŠMP) v Slovenskej republike a spoznať príčiny nízkeho zapojenia predškolských a školských zariadení v Nitrianskom samosprávnom územnom celku. V poslednom období rastie počet predškolských a školských zariadení zapojených do ŠMP, avšak vykazované spotrebované množstvo defni a mládežou predstavuje iba 30% spotreby z celkového množstva, ktoré by deti mohli v rámci programu skonzumovať. Za týmto účelom boli určené štyri čiastkové ciele výskumu. Prvý čiastkový cieľ identifikoval zmeny legislatívy ŠMP a ich dopad na predškolské a školské zariadenia. Úlohou ďalších cieľov bolo zistiť príčiny nízkej spotreby mlieka a mliečnych výrobkov v rámci ŠMP, zhodnotiť sortiment mlieka a mliečnych výrobkov, komunikačnú, organizačnú, náročnosť programu a navrhnúť opatrenia, ktoré by viedli k odstráneniu problémov a k zlepšeniu súčasnej situácie.

Kľúčové slová: program školské mlieko, spotreba mlieka a mliečnych výrobkov, európska podpora, stravovacie návyky detí a mládeže

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FOOD QUALITY AND FOOD QUALITY MARKS FROM THE CONSUMERS POINT OF VIEW IN THE CONDITION OF SLOVAKIA AND THE CZECH REPUBLIC

VNÍMANIE KVALITY POTRAVIN A ZNAČIEK KVALITY SPOTREBITEĽOM V PODMIENKACH SLOVENSKEHO A ČESKÉHO TRHU

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Food quality is the subject of interest in many countries. Slovakia and Czech Republic implemented the national programs promoting domestic agricultural commodities and food in order to increase the quality and safety of domestic products and support their competitiveness on the domestic and foreign markets. Food products in Slovakia and Czech Republic are labeled by the quality marks that represent the guarantee of their high quality, safety and domestic origin. Promotion of these quality products is ensured through various media campaigns and exhibitions that take place in different countries across Europe. The paper focuses on food quality and Food Quality Policy in Slovakia and Czech Republic and consumer's attitudes towards the food quality and products bearing food quality marks in their home country.

Key words: food, agricultural commodities, national programme, Food Quality Policy, Quality mark

Product quality is one of the marketer's major positioning tools. Quality has a direct impact on product or service performance, thus it is closely linked to the customer value and satisfaction. The product quality means the quality performance – the ability of the product to perform its functions (Armstrong et al., 2009).

It includes the overall durability, reliability, accuracy, ease of use and repair and other valued properties. Even though some of them can be measured objectively, from a marketing point of view, customer's perception of quality should be taken into account. That is why the companies today use customer's perception of quality as an effective strategic weapon. Quality has now become a competitive necessity, in the 21st century will thrive only companies offering the highest quality (Kotler et al., 2007).

EU applies so-called Quality Policy, which represents the protection of agricultural and food products with the fact that these foods meet certain quality parameters, which distinguish them from other products with their well-defined requirements for their raw material composition and manufacturing process technology (Čo je to politika kvality?, 2010).

Today, for European companies, product quality has its place among major strategic issues. Much of the discussion on quality in the food industry is related to product and process-oriented quality and quality control. But consumers subjectively evaluate quality. Hence, an important element of a marketing strategy based on quality is consumer's perception. It has become increasingly important to optimally align the quality of food with consumer demands, expectations and desires (Greibitus, 2008).

All member states of European Union respect the Quality Policy of EU and also use the chance to support domestic agricultural products and foodstuffs. This is the way to harmonize the Quality Policy at both European and national levels (Nagyová et al., 2010).

The common feature of the consumers is their uniqueness and individuality. Requirements for quality, origin, properties

and other attributes of the products are different from consumer to consumer and individually assessed. Quality is one of the major factors of success of any enterprise. In a time of economic crisis, businesses are increasingly focusing their attention towards customers whose purchasing power determines, affects the direction of the economy and prosperity of individual businesses.

The paper identifies the issue of national programs promoting domestic agricultural products in Slovakia and the Czech Republic and analyzes the consumer's views towards the quality of domestic foods and the quality food brands on the domestic market.

Material and methods

Our research paper is based both on primary and secondary data. As a source of secondary data were used materials dealing with national programs promoting domestic food in Slovakia and the Czech Republic, materials and publications dealing with quality marks in Slovakia and the Czech Republic and analyzed issue.

In order to obtain primary data, a marketing survey through a questionnaire method was carried out in the period of 2009–2010 with the purpose to obtain data about consumer attitude towards quality and quality brands in their home country.

Questionnaire was divided into two sections. The first section surveyed consumer's attitudes towards the food quality, factors that influence consumer's purchase decisions as well as areas relating to quality food brands in Slovakia and the Czech Republic. The second section consisted of respondent's data concerning their gender, education, employment, average family income per month, number of family members and place of residence.

Acquired data were processed by the MS Excel. We examined the relationships and dependencies between qualitative characteristics. Obtained and classified data were organized into so-called contingency tables. The existence of dependency between the characters was verified through the Pearson's chi square test.

Results and discussion

Food quality is perceived differently in many ways. Perception of food quality gets a new dimension, its goals, holders, as well as tools for its security are constantly changing. Preferences and consumer needs are not static, they are constantly changing, that is why the methods of manufacture and composition of products are permanently evolving and improving in order to improve overall product quality.

In order to protect and support domestic producers of agricultural products, the sales and domestic product's competitiveness on the domestic market, Slovakia and the Czech Republic developed for this purpose through authorized institutions various activities. These activities are carried out with the purpose of protection and promotion of domestic products in order to increase consumer interest and convince them about the quality and safety of domestic agricultural and food products. Both Slovakia and the Czech Republic implemented a national programmes promoting domestic agriculture and food products and the quality label placed on each product confirms their uniqueness and exceptionality. The aim of this label is to promote the sale of domestic products and convince consumers that the brand holders are only products meeting the strict criteria of quality, their manufacturing process is subject of strict control, which ensures their health safety. National program promoting domestic agriculture and food products in both countries is unique. There are no uniform conditions for its implementation, the programme operates under the national standards and regulations issued by the home country and specifically designated institutions are responsible for its control and realization.

National program promoting domestic agricultural and food products in Slovakia – “Quality Label SK”

National Program promoting domestic agricultural products was established in 2004 under the auspices of the Ministry of Agriculture, where the intervention agency and its marketing department was responsible for implementing of all activities related to the implementation of the National Program. Subsequently section of coordination of foreign relations and trade policy of ministry was temporarily responsible for marketing and organization of “Quality Label SK” program because the Intervention agency was repealed on 31st December 2006.

Currently, Food Research Institute is responsible for all activities related to the national programme. Institute is also responsible for granting of quality brand, its promotion, marketing, organizational, information and promotional activities in the media, exhibition work, information and education activities.

Logo of “Quality Label SK” is placed on the product's packaging representing the guarantee of the high quality of traditional product made in Slovakia. Products bearing this logo are easily distinguishable from other similar products.

Domestic high-quality products are promoted via media campaigns with the aim to raise awareness of Slovak consumers that the production of domestic food is controlled and this fact guarantee their quality and health safety. Other important opportunities to promote quality products are various food exhibitions held in different countries across Europe.

Quality mark logo is granted upon fulfillment of certain criteria and its compliance is controlled by state authorities. In case of default conditions the right to use the logo of a quality label can be removed. National quality mark logo “Quality Label SK” can be granted only to producers of agricultural products whose products meet all set conditions, meet all the criteria for the award and raw materials for production are processed in the Slovak Republic. Quality mark logo may be awarded for the period of three years with the possibility of additional extensions.

Since the national programme came into existence, total of 106 producers received the right to use the quality mark logo “Quality Label SK” for nearly 500 different food products.

National program promoting the domestic food in Czech Republic – “KlasA”

The program of national quality “KlasA” came into existence in 2003. The “KlasA” quality mark is awarded to the suggested products by the Minister of Agriculture in cooperation with the State Agriculture and Food Inspection that controls and assess the quality and composition of the foodproducts. The rules for granting national quality mark “KlasA” include conditions which have to be fulfilled. These conditions are designed by marketing department of the State Agricultural Intervention Fund (SZIF) and Scientific Council and subsequently approved by the Minister of Agriculture of the Czech Republic. National Agriculture and Food Inspection in cooperation with the State Veterinary Administration are responsible for control of compliance with these conditions. The quality mark logo “KlasA” is awarded for the period of three years with the possibility of additional extensions.

The promotion of quality domestic products is ensured through various media campaign and exhibitions that take place in various countries across Europe.

The quality mark “KlasA” represents the assurance for the consumers that the product they are buying is really of high quality. In order to obtain to right to use the logo “KlasA”, it is essential to produce product in the Czech Republic.

A total of 227 producers of food products and 1,323 food products acquired the right to use quality mark logo “KlasA” since the beginning of this program.

Questionnaire survey

The amount of 300 respondents answered the questionnaire, 150 respondents from Slovakia and 150 respondents from the Czech Republic. In Slovakia the sample consisted of 75 men and 75 women, in case of the Czech Republic 71 men and 79 women were involved.

In the first question consumer's attitudes towards the quality of domestic products compared to quality of foreign products has been investigated. Results are presented at Fig.1. Respondents were asked to compare the level of quality of domestic and foreign product. For the vast majority of respondents in Slovakia (51 %) and the Czech Republic (69 %) the quality level of these products is comparable, the same. 20 % of Slovak respondents and 15 % of Czech respondents evaluate the quality as higher and 8 % of Slovak respondents

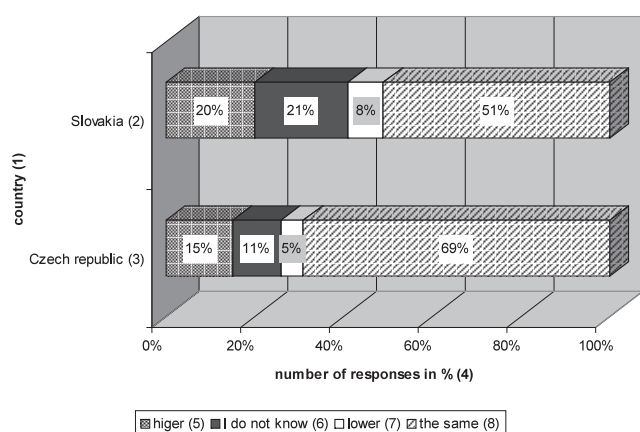


Figure 1 Percentage evaluation of responses to the question "According to you, is the food in your home country of higher quality compared to the foreign one?"
Source: own research and processing

Obrázok 1 Percentuálne vyhodnotenie odpovedí respondentov na otázku „Sú podľa vášho názoru potraviny vo vašej krajine vyššej kvality v porovnaní so zahraničnými?“
Zdroj: vlastný výskum a spracovanie
(1) krajina, (2) Slovensko, (3) Česká republika, (4) počet respondentov, (5) vyššia, (6) neviem, (7) nižšia, (8) rovnaká

and 5 % of Czech respondents as lower compared to quality of domestically produced foods.

Slovakia and the Czech Republic via their home national programs protect domestically produced foods. Respondents in each country were asked whether they recognize the national program promoting domestic food in their home country. Knowledge of the national programs is different depending on the age structure of the respondents in particular countries. Knowledge of respondents about the national program in their home country is shown in the Fig. 2 and in Tab. 1 there are compiled responses to the question about the awareness of the national program at home country in relation to the age.

National program "Quality Label SK" is realized under the auspices of the Ministry of Agriculture of Slovak Republic in order to promote high quality domestic products. 61 % of respondents (91 respondents) know this program, 39 % of respondents (59 respondents) do not know this program. In

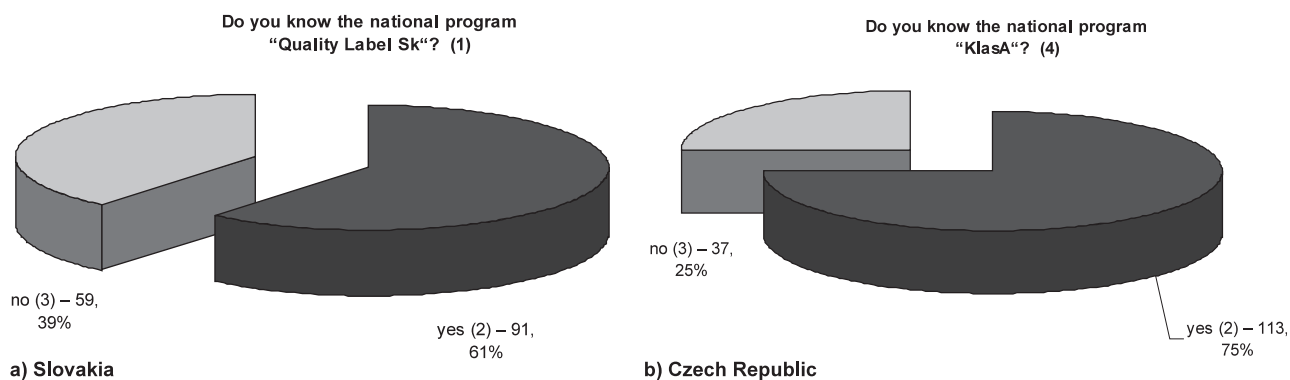


Figure 2 Percentage evaluation of responses to the question, whether the respondents recognize the national programs in Slovakia (a), Czech Republic (b)
Source: own research and processing

Obrázok 2 Percentuálne vyhodnotenie odpovedí respondentov na otázku, či respondenti poznajú národné programy Slovensku a) a v Českej republike b)
Zdroj: vlastný výskum a spracovanie
(1) Poznáte národný program „Značka kvality SK“? (2) áno, (3) nie, (4) Poznáte národný program KlasA ?“

Table 1 Percentage evaluations of responses to the question about the awareness of the national program in Slovakia and the Czech Republic by the age group in %

Age group (1)	Slovakia (2)		Czech Republic (5)	
	no (3)	yes (4)	no (3)	yes (4)
to 25 years (6)	15.25	23.08	27.03	22.12
26–35 years	25.42	19.78	8.11	23.89
36–45 years	16.95	23.08	18.92	23.89
46–55 years	27.12	14.29	16.22	19.47
Over 56 years	15.25	19.78	29.73	10.62
Total (7)	100.00	100.00	100.00	100.00

Source: own research and processing
Zdroj: vlastný výskum a spracovanie

Tabuľka 1 Percentuálne vyhodnotenie odpovedí respondentov na otázku týkajúcu sa vnímania národného programu na Slovensku a Českej republike podľa vekových skupín v %
(1) veková skupina, (2) Slovensko, (3) áno, (4) nie, (5) Česká republika, (6) roky, (7) celkom

Slovakia knowledge of the national program for all age categories is approximately the same. The lowest knowledge of the national program has 16 of respondents in the age category 46–55 years.

In the Czech Republic the quality of domestic products is supported through the national program "KlasA". 75 % of respondents (113 respondents) are aware of this program, 25 % of respondents (37 respondents) are not aware. National program is known mainly by the respondents in the 26–45 age group. Respondents over 56 years (11 respondents) have the lowest awareness of the national program. Other results are presented in Tab. 1.

From the results it can be concluded that the level of knowledge of national programmes is quite high, in the Czech Republic is slightly higher compared to Slovakia. In order to increase the awareness it is appropriate to carry out various actions, activities via the media that serves as a source of information about the activities and mission of these programs.

Respondents from Czech republic (65 %) are better informed compared to respondents from Slovakia (28 %). Vast majority of Slovak respondents (72 %) and 35 % of Czech respondents do not know products bearing these quality marks.

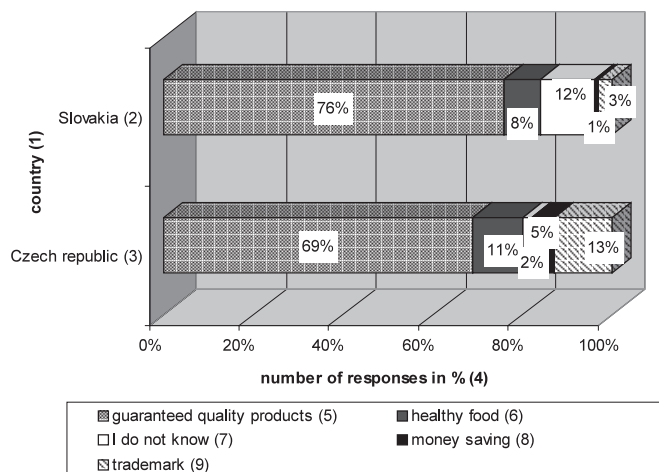


Figure 3 Percentage evaluation of responses to the question "What do you understand by the concept of quality mark?"
Source: own research and processing

Obrázok 3 Percentuálne vyhodnotenie odpovedí respondentov na otázku „Čo rozumiete pod pojmom značka kvality?“
Zdroj: vlastný výskum a spracovanie
(1) krajina, (2) Slovensko, (3) Česká republika, (4) počet respondentov, (5) garantované kvalitné výrobky, (6) zdraviu prospešné výrobky, (7) neviem, (8) úspora peňazí, (9) obchodná značka

Vast majority of respondents answered positively the question: Do you trust the quality of food bearing the quality mark logo? Greater confidence towards these product can be seen in Slovakia (79 %) and in case of Czech Republic it is 72 % of respondents. The rest of respondents do not trust to the quality of products labeled by the quality mark.

In Slovakia, vast majority of respondents (74 %) do not search for the products labeled by the quality mark at point of purchase. 23 % of respondents sometimes and 3 % of respondents are always looking for these products. Another situation is in Czech Republic where these products are not interesting for 47 % of respondents. 50 % of Czech respondents are searching for these products sometimes and only 3 % of them always.

The aim of national programs realized in Slovakia and the Czech republic is to promote quality domestic products and foodstuffs in order to increase customer satisfaction and customer awareness about high quality, safe and domestically produced products. Respondents were asked what they understand by the concept the quality mark. In case of Slovakia, 76 % of respondents consider the products bearing the quality mark logo as quaranteed quality products. As it was previously written, Czech respondents (65 %) have high knowledge of products labeled by the quality mark. From the responses of respondents may be indicated that vast majority of Czech respondents (69 %) know the meaning of quality mark. 13 % of respondents assumed this mark to be trademark. Other results are presented at Fig. 3.

85 % of Slovak respondents and 78 % of Czech respondents agree that the national program promoting domestic quality products represent the contribution to the domestic market and domestic producers. In case of respondents who thought that this program has a positive effect, the responses and explanations were as following:

- support of domestic market, domestic producers and domestic economy,
- greater confidence towards domestic products,
- greater incentives to buy domestic products,

- increase in sales of domestic products,
- increase in employment and job creation by increasing the production and sales of domestic quality products.

Answers of respondents who did not think that this program has a positive impact on domestic market and producers were the following:

- increase in quality causes the increase in prices of domestic products,
- lack of confidence of respondents – mark may be awarded to the low-quality products,
- quality control may not be sufficient and may results in lower quality products,
- brand is just a marketing tool, the quality does not correspond to the price.

Important part of our research is to determine whether there is a relationship between knowledge of national programs promoting domestic quality food and gender in both Slovakia and the Czech Republic. For this purpose, Pearson's chi-square test was used. Its aim was to confirm or disprove the hypothesis that knowledge of national programmes in these countries is dependent on the gender of respondents. The data acquired via questionnaire survey were processed through the pivot tables, where we obtained empirical frequency, which served as the basis for the calculation of test characteristics. The data were compared to the values in the table. Based on the data set, we evaluated the hypothesis.

Rated hypothesis:

H_0 : Knowledge of national programs does not depend on gender.

H_1 : Knowledge of national programs depends on gender.

We calculated the table value according to the function $CHIINV \chi^2 (0.05; 1*1)$ and its value was 3.841459149. Subsequently we compared this value with the test characteristics for both countries and we obtained these results:

In Slovakia and the Czech Republic the hypothesis H_0 is accepted ($1.411029 \wedge 0.530469 < 3.841459149$). In these countries, the dependence between knowledge of national programs and gender is not confirmed.

Then we tried to determine whether there is a correlation between educational attainment and knowledge of national programmes in each country. For this purpose, the following hypothesis were formulated:

H_0 : Knowledge of national program does not depend on education.

H_1 : Knowledge of national programs depends on education.

For the calculation we used the function $CHIINV \chi^2 (0.05; 1*3)$, where the table value = 7.81472776. H_0 hypothesis is rejected in case of both countries ($10.18891 \wedge 29.72262 > 7.81472776$). In this case, we accept the hypothesis H_1 . In Slovakia and the Czech Republic knowledge of national programs is dependent on the level of education of respondents.

Conclusion

Currently Slovakia and the Czech Republic implement the national programs promoting quality domestic agricultural products in order to increase consumer awareness of quality domestic products. Results obtained through the marketing survey demonstrate a high level of consumer's knowledge about the products bearing the quality mark together with high level of confidence towards these products.