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DESTINATIONS OF ENVIRONMENTAL RESTRUCTURING OF UKRAINIAN FOOD INDUSTRY ENTERPRISES

ABSTRACT

This article explores the main ecological problems of Ukraine, food industry enterprises for example sugar industry enterprises. The main economic problems which affect the greening of production are researched. The main problems of sugar industry enterprises which influence the deterioration of ecological situation are formed. The main of them are: high material expenditure of production, use of physically and morally outdated equipment and technologies, and the absence of cleaning equipment.

The factors which affect production of ecologically clean products of sugar industry have been researched, and the main directions and trends of ecological restructuring of sugar industry enterprises have been formed.

Keywords: food industry, sugar industry, restructuring, ecology

Introduction

The growing anthropogenic influence upon the environment, its pollution with various production wastes, along with the excessive use of natural resources, have

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become the subject of wide discussion and all-round study. The research of various aspects of this problem has been performed by numerous national and foreign scientists, namely: O.I. Alimov, O.I. Balatsky, P.P. Borschevsky, I.N. Buzdalov, K. Bystryakov, P.V. Vedenichev, S.A. Gensiruk, KL. Gerenchuk, S.I. Doroguntsov, B.M. Danylyshyn, M.I. Dolishny, P.A. Ivanukh, P.G. Kazmir, P.S. Kovalenko, Ya.V. Koval, V.I. Kutsenko, Y.P. Lebedynsky, A.S. Lysetsky, E.M. Libanova, L.G. Melnyk, V.S. Mischenko, I.R. Mykhasyuk, L.Ya. Novakovsky, V.V. Onikienko, M.N. Palamarchuk, O.M. Palamarchuk, V.O. Palamarchuk, P.P. Rusnak, V.G. Sakhaev, V.F. Semenov, A.V. Stepanenko, V.M. Stepanov, V.M. Tregobchuk, Yu. Tunytsya, A.M. Fedoryscheva, M.F. Fedorenko, S.K. Kharichkov, M.A. Khveysyk, L.G. Chernyuk, M.G. Chumachenko, M.F. Reymers, T.S. Khachaturov, A. Endres and many others.

Currently, the ecological situation in Ukraine is critical, and the main reasons for this are: low ecological compatibility of technologies, absence of economical interest of companies in making their production ecologically friendly and reducing emissions, low level of ecological education and culture, absence of state support in hosting events of greening the production and growing ecologically clean products.

1. Development of law environmental protection in Ukraine

The main ecological problems of Ukraine are:

- reduction of natural resources and deterioration of their quality,
- reduction of water volumes and pollution of surface waters by human activity,
- pollution of atmospheric air by excessive emissions,
- change of land resources structure,
- reduction of soils fertility as a result of pollution,
- deterioration of geo-hygienic and sanitary and epidemiological conditions of human vital activity and existence of live organisms¹.

In the last couple of years, more than 20 environmental protection laws, 40 bilateral international treaties have entered into force in Ukraine, regulating relations in the sphere of nature use. The main laws are:

¹ A.K. Zapolzkiy, A.I. Ukraynets, *Greening Food Production: A Textbook*, K.: High School, 2005, s. 423.

1. Law of Ukraine „On the Main Principles of State Ecological Policy for the Period up to Year 2020”.
2. Water Code of Ukraine, which regulates the relations on protection and use of water resources, binding enterprises the activities of which is related to the use of water resources to build cleaning assemblies, determining permissible norms of concentration of harmful substances in the water reservoirs.
3. Land Code of Ukraine, which regulates protection and use of land resources and soils, stipulating obligations of land users.
4. Forest Code of Ukraine. Regulates relations of rational forest resources use.
5. The law of Ukraine „On environmental protection” pays much attention to the economic side of ecological relations, which is an important step forward. It scientifically proves the interdependence of ecological, economic and social interests of man, society and the state to ensure sustainable development and environmental protection. However, in Ukraine the economic mechanism of natural management, regulations and standards related to adjusting environmental protection and natural management have not been worked out well enough yet.
6. Law of Ukraine „On Ecological Network”. Regulates management in the sphere of use and preservation of ecological network.
7. Law of Ukraine „On Protection of Atmospheric Air”. Determines legal and ecological requirements in the sphere of protection and use of atmospheric air.

2. Determinants of ecological restructuring of enterprises in Ukraine

The analysis of literary sources² enabled us to draw to a conclusion that the main economic problems which affect the increase of environmental friendliness of production are:

- a) correct use of expenses to overcome harmful consequences of irrational nature use (elimination of caused losses and prevention of cleaning gaseous and smoke emissions and sewage waters, restoration of flora and fauna and human capability);
- b) complex processing of raw materials;
- c) introduction of small waste and waste-free technologies;

² *Ibidem.*

- d) organization of closed-loop water circulation circles;
- e) introduction of an energy saving system with the simultaneous use of non-traditional energy sources (sun radiation, wind energy, geothermal energy, bioenergy, water energy etc.);
- f) determination of optimal expenses for the protection of the environment and increase of their efficiency;
- g) expedient choice of methods of economic stimulation of environmental protection activities, which facilitate performance of this activity by the enterprises³.

The notion of ecological restructuring which requires further determination is widely used in literature.

V.M. Boronos determines ecological restructuring as a complex optimization of the system of ecological functioning of enterprises according to the requirements of external environment and tried-and-true strategy of its development, which is able to principally improve the administration and enhancement of efficiency and competitiveness of production and produced goods on the basis of modern approaches to administration, including methodology of quality management, management of informational technologies and systems of ecological administration⁴.

It is expedient to research the ecological restructuring of food industry enterprises from two points of view: first, as a process aimed at reduction of emissions or prevention of their occurrence; second, as a process aimed at production of ecologically clean products to ensure food safety of the country.

The modern development of the food industry proves that the matter of production, consumption and quality of products are related to the matters of environmental friendliness of production and ecological safety of products. The efficient development of food production is impossible without resolving a complex of ecological and economic problems.

³ V. Boronos, *Ecological and Economic Effectiveness of Waste Recycling Industrial Enterprises*, V.M. Boronos, I.V. Mamchuk, „Bulletin of the SSU. Line-economy”, 2007 No. 2, s. 5–17; N.A. Husyatyn, *To the Question of the Ecologisation of Sugar*, N.A. Husyatyn, T.N. Black, L.M. Cooper, I.M. Kasian, Collection of scientific articles Third Ukrainian Congress ecologists with international participation, Kiev, 2011, Tom.2, s. 548–551, <http://eco.com.ua/> (19.02.2013); A.K. Zapolzkiy, A.I. Ukraynets, *Greening Food Production: A Textbook*, K.: High School, 2005, s. 423.

⁴ V. Vitvitskiy, *Food Industry: Status and Prospects valuation work*, V.V., Vitvitskiy, A.L. Soloshonok, Economy APC, 2001, No. 7, s. 22–25.

For the purpose of overcoming the ecological and economic crisis in the country, it is necessary to fulfill the greening of industry in whole and food production in particular. Greening of production means gradual expansion of coverage of ecological priorities in the production activities, increase of ecological awareness and knowledge of the administrative personnel, gradual introduction of ecological innovations into production and ecological modernization of production processes.

During the research of this problem, it has been determined that food industry enterprises create a bad ecological situation by emissions of harmful substances into the air and pollution of drain waters and soils, which makes growing ecologically clean raw materials for production of food products impossible.

Pollution of water, air and soils obstruct growing and procurement of food raw materials of vegetative and animal origin for the production of high quality food products. Harmful substances in excess are accumulated in the soils and then spread around, accumulating in the soil-plant-animal-man trophic chain in hazardous quantities. The pollutants, especially such as heavy metals, radioactive nuclides, chlorine-organic and phosphorous organic compounds, polycyclic aromatic carbohydrates, nitrosamines etc., affect human health negatively and lead to undesirable consequences.

By the stage of negative effect of food industry objects upon the environment, the first place is taken by water resource pollution. Also, the enterprises of this branch cause damage to soils and atmosphere by emissions of solid, liquid and gaseous compounds.

The largest negative effect upon the environment is caused by meat, sugar, alcohol and yeast branches of food industry.

3. Ecological problems of sugar industry

Sugar industry is included in the list of activities which are ecologically hazardous⁵.

This is connected with the following:

- a) first, high material consumption rate of the production as the rate of raw material amount and materials exceeds the release of finished product several times: to produce 1 ton of sugar, 6 to 8 tons of sugar beets are used, about 60

⁵ V. Boronos, *Ecological...*, s. 5–17.

m³ of water, 0.6 tons of calciferous stone, 0.24 m² of filtering fabric and 0.53 tons of oil equivalent;

- b) second, the majority of sugar branch enterprises use physically and morally outdated equipment and technologies, which leads to pollution of the environment by solid, liquid and gaseous emissions;
- c) third, imperfection of water cleaning assemblies, which leads to dumping of polluted waters without the necessary cleaning;
- d) fourth, absence of economic levers of regulation of ensuring environmental safety.

Besides, one of the main ecological problems of sugar plants is significant water consumption⁶ and absence of water cleaning assemblies or their imperfection.

In the process of sugar production, water is used to transport beetroots to the root-washing section of the sugar plant, to transport production wastes to the places of their storage, to wash beetroots, extract saccharose from beet chips, washing of filtration sediments and sugar in centrifugal machines.

The sewage waters from the sugar industry are characterized by high content of weighted substances the amount of which depends on the pollution of raw materials incoming for processing, the level of beet pollution is 40%, at normative value of 1.5%. The soil after washing turns into depositions which accumulate in the settling tanks and at the filtration fields, which leads to the loss of fertile layer of soils, pollution of underground waters at the place of cleaning assemblies allocation (filtration fields and biological ponds) and at the places of storage of production wastes, as well as exhaustion of water sources and degradation of fish resources.

The sewage waters from the sugar production enterprises contain a large amount of organic substances: saccharose and products of its dissolution, albumens and other nitrous substances, pectin, saponin, pentose, salts of sodium, magnesium, phosphorous and hydrochloric acids etc., which causes fast development of fermentation and rotting processes. In the fermentation process of sugar contained in the sewage waters, acetic acid, lactic acid, oleic acid and propionic acid are formed. These pollutions distribute within the air basin irregularly, their concentration in the air in individual regions can reach levels threatening for the health of the population.

⁶ N.A. Husyatyn, *To the Question...*

That's why it is necessary to introduce technologies which enable rational use of water in the sugar production, which will lead to reduction of water wastes in the production process and reduce the amount of sewage waters, which will facilitate the improvement of the ecological situation in Ukraine. Also, it is expedient to develop modern methods of sewage waters cleaning, which will provide for its quality, high level of safety, minimal level of occurrence of secondary wastes and will also facilitate saving the resources and energy.

Besides, the sugar industry enterprises emit wastes into the atmospheric air in the form of heat and power plant fuel combustion products, carbon oxides, ammonium, iron oxides, oleic and acetic acids, hydrogen sulphide and carboxylic acids which lead to air pollution.

Carbon oxide is formed as a result of incomplete combustion of carbonic substances and leads to increase of temperature across the planet and establishment of greenhouse effect. The concentration of carbon oxide which exceeds the permissible limits leads to physiological changes in the human body, and extremely high concentration leads to death.

Hydrogen sulphide and carbon bisulphide emitted by sugar industry enterprises into the atmosphere are subject to slow oxidation to sulfuric anhydride at interaction with other pollutants.

Flue gases emitted by boiler houses available at many enterprises of sugar industry contain products of incomplete fuel combustion. Flue gases also contain ash particles.

Technological emissions contain dust, solvent vapour, hydrogen and excessive heat.

All these emissions precipitate on the fields and affect the growing of raw materials for food product manufacturing.

Nevertheless, it is not expedient to consider the ecological restructuring of sugar industry enterprises only as a process of introduction of modern cleaning assemblies. The greening of production shall be aimed not only at reduction of emissions but also at prevention of appearance of production wastes, reduction of primary raw materials which is used for production, and increase of raw material quality.

Also, the problem of establishing an efficient economic mechanism of stimulation of sugar industry enterprises for resource-saving mode of production is still open. Development and introduction of innovative resource-saving technologies requires significant investments, which leads to reduction of profitability of production and decrease of enterprise profits.

Besides the above-mentioned ecological problems related to sugar plant activities, there is also the problem of growing ecologically clean raw materials, which depends on ecological aspects of industry activities.

In the last years, there has been the trend to deterioration of technological characteristics of sugar beets, which affects the production, technical and economic indices of sugar plants which depend on quality and quantity of raw materials. Reduction of sugar beet quality affects the quality of beet juice, terms of beet storage, the level of losses, which reduces the efficiency of production funds use.

A sheer number of factors influences the formation of technological qualities of sugar beets, first of all, the following: agricultural technique of growing, sugar beet seeds, use of fertilizers and plant protection means, means of collection, weather and climatic conditions etc.

The use of foreign hybrids (70%) which are not suitable for the fluctuation of the weather conditions in Ukraine is a great problem, they are not immune to illnesses and are less suitable for storage, compared to the domestic seeds. In 2011, sugar beet seeds were grown by only 5 farms in Ukraine.

The main index of sugar beet quality is the sugar content. Sugar content of beets in the harvest of 2010 was reduced by 1.55% as a result of failure to keep to the agricultural technique of beet growing in many economies, besides, the introduction of sorts and hybrids of sugar beets with low sugar content into production, which are not immune to illnesses, taking cultures after improper previous crops, use of means of weed fighting measures not suitable by quality or quantity, insufficient use of organic fertilizers and violation of recommended doses, non-conformity of nutrient substances at their input and soils erosion. In 2011, this index was better, which was caused by the use of organic fertilizers of better quality.

The problem of increasing raw material quality for the sugar industry requires introduction of a complex of measures.

The most important of them are:

- a) improvement of seed selection works;
- b) use of high sprouting seeds of single-sprout sorts and hybrids;
- c) introduction of substantiated technologies of farming, correct placement of beets in crop rotation;
- d) provision of high-quality seeds of region-specialized sorts and hybrids of sugar beets to beet-sowing farms;

e) provision of chemical and natural fertilizers, herbicides and pesticides⁷.

So, the greening of production of sugar industry shall begin with growing of ecologically clean beet seeds, growing of beets with adherence to all norms of use of fertilizers and mineral compounds, and end with the introduction of innovative technologies of sugar production, emission cleaning, reduction of emissions, reduction of expenditure of raw materials and additional materials in the process of production.

Nevertheless, the greening of production in sugar industry is complicated by insufficiency or absence of financial resources necessary to perform ecological measures. So, consideration of the matters of improvement of ecological condition of the environment and issue of ecologically-friendly and clean products to ensure the food safety of the country should be done at the government level by creating a system of privileges and grants to companies which use technologies enabling to enhance the level of greening of the country.

Performance of ecological restructuring of sugar industry enterprises will provide a number of advantages:

- a) reduction of expenditures for production at the expense of introducing resource- and energy-saving technologies;
- b) utilization of by-products and wastes of production;
- c) reduction of payment for pollution of the environment;
- d) preservation of soils fertility;
- e) increase of profits at the expense of increase of price for ecologically clean products;
- f) increase of production rates at the expense of reduction of sugar content in the pulp and increase of sugar content in the roots;
- g) opportunities of sugar export.

Conclusion

The importance of ecological audit and ecological expertise needs to grow. The latter is mandatory in the process of legislative, investment, administrative, economic and other types of activity which influence the condition of the environment. The final goal of ecological expertise shall be composition of opinions on the effect

⁷ Modern circuits and equipment for processing sugar beets. Transportation, cleaning, getting shavings and diffusion juice: Manual, K.: IPDO NUFT, 2006, s. 240.

upon the environment. One of the main tasks of ecological audit is to make the analysis of the environment condition an integral part of technical and economic substantiation of projects. To build new enterprises and modernize the existing ones, one of the essential measures of greening of food enterprises is the introduction of ecological education and training of production personnel. This will give the opportunity to prepare ecologically aware and technically literate executors of the program of food industry greening.

Further formation of national ecological strategy shall be fulfilled with the consideration of priority level of ecological problems of the country by criteria of risk of influences and effects upon all the spheres of vital activity of the society, health of the population and interests of future generations.

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KIERUNKI EKOLOGICZNEJ RESTRUKTURYZACJI UKRAIŃSKICH PRZEDSIĘBIORSTW PRZEMYSŁU SPOŻYWCZEGO

Streszczenie

W artykule poruszono główne problemy ekologiczne Ukrainy, w tym przemysłu spożywczego, na przykładzie przedsiębiorstw przemysłu cukrowniczego. Przeanalizowano problemy gospodarcze, które wpływają na produkcję przyjazną dla środowiska. Na tym tle określono problemy przedsiębiorstw przemysłu cukrowniczego, które powodują pogorszenie sytuacji ekologicznej. Jednymi z najważniejszych są: wysokie koszty materiałowe produkcji, stosowanie fizycznie i etycznie wątpliwych sprzętów i technologii oraz brak urządzeń do oczyszczania. Zbadano czynniki oddziałujące na produkcję ekologicznie czystych wyrobów przemysłu cukrowniczego oraz określono kluczowe kierunki i trendy ekologicznej restrukturyzacji przedsiębiorstw przemysłu cukrowniczego.

Słowa kluczowe: przemysł spożywczy, przemysł cukrowniczy, restrukturyzacja, ekologia

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