

ДОСЛІДЖЕННЯ ПРОБЛЕМ РОЗВИТКУ ЕКОЛОГІЧНО-ОРІЄНТОВАНОЇ ЕКОНОМІКИ (НА ПРИКЛАДІ ПРОМИСЛОВИХ ПІДПРИЄМСТВ ЛЬВІВСЬКОЇ ОБЛАСТІ)

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У науковій роботі досліджено екологічні антропогенні проблеми, що наявні у Львівській області. Характеристику сталості розвитку Львівської області у 2009–2011 рр. наведено із використанням таких показників, як індекс сталого розвитку, який деталізовано за трьома індикаторами сталості розвитку – економічного, екологічного та соціально-інституціонального та ступеня гармонізації сталого розвитку. Охарактеризовано сучасний стан інвестиційної привабливості Львівської області з погляду впливу “м’яких” та “жорстких” факторів, на основі яких визначено переваги та проблеми щодо залучення інвестицій у розвиток Львівської області. На основі даних, що наведені в Статистичному щорічнику України за 2012 рік сформовано екологічний рейтинг Львівської області у 2012 році, що деталізований за відповідними показниками на основі яких визначено головні екологічні проблеми антропогенного походження. Особливу увагу звернено на питання утворення та утилізації відходів – як однієї з головних екологічних загроз Львівської області. Наведено характеристику основних підприємств-забруднювачів Львівської області, а також проведено порівняльний аналіз категоріальних змін щодо екологічної безпеки промислових об’єктів Львівської області у 2006 та 2011 рр. На основі результатів проведеного дослідження визначено актуальні напрями дослідження процесів розвитку екологічно-орієнтованої регіональної економіки та запропоновано низку заходів, спрямованих на зниження величини деструктивного впливу господарської діяльності на екологічний стан Львівської області.

Ключові слова: екологічний маркетинг, сталий розвиток, екологічна проблема, утворення та утилізація відходів, екологічний рейтинг, індикатори сталості розвитку.

О.В. Mnykh, Yu.R. Sokil
Lviv Polytechnic National University

ENVIRONMENTALLY-ORIENTED ECONOMY PROBLEMS RESEARCH (ON THE EXAMPLE OF INDUSTRIAL ENTERPRISES IN LVIV REGION)

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The anthropogenic environmental problems in the Lviv region studied in scientific paper. Sustainable development characteristics of the Lviv region in 2009–2011 are given using indicators such as the index of sustainable development, detailed by three indicators of sustainable development – economic, environmental and socio-institutional and the harmonization of sustainable development level. The current state of the investment attractiveness of the Lviv region characterized in terms of the impact of “soft” – the business climate, the efficiency of state authorities, administrative procedures, property rights, corruption, taxes and fees, openness of the authorities, business optimism and “hard” factors – natural resources (water and land), human resources: health, access to education, innovation potential, consumer segment, business segment, infrastructure – based on which benefits and problems of attracting investment in the development of Lviv region defined. The article presents data on the volume of investment in the Lviv region in 2005–2012 years, which are

detailed in such areas as protection and rational use of water resources, air protection, protection of natural resources and rational use of mineral resources, protection and rational use of land, utilization and neutralization of toxic industrial, household and other wastes – the dynamics of change are analyzed using a geometric mean values and through trend analysis for such variables as investment in the protection and rational use of water resources and the total environmental investment in the Lviv region in 2005–2012 years. The environmental rating of Lviv region in 2012, based on the data presented in the Statistical Yearbook of Ukraine for 2012 formed and detailed by the following indicators: the use of fresh water, the amount of reversibly used and reused water, the proportion of reused water in the total use of for production needs, wastewaters disposal into natural surface waters objects, emissions of pollutants into the atmosphere, emissions of pollutants into the atmosphere per square kilometer, emissions of pollutants and carbon dioxin emissions into the air from mobile sources of pollution, pollutant substances and carbon dioxin emissions into the atmosphere from stationary sources of pollution, I–IV hazard class waste generating, including I–III hazard classes, presence of wastes, including I–III hazard class – based on which the key environmental anthropogenic problems defined. Particular attention is paid to the formation and recycling of wastes as one of the major environmental threats in Lviv region. According to information provided by the Department of Environment and Natural Resources of the Lviv regional state administration the main characteristics of polluting enterprises in Lviv region characterized, as well as a comparative analysis of categorical changes in environmental safety of industrial objects in Lviv region in 2006 and 2011 Also examples of establishing communications between state and private, scientific and research cooperation in the field of rational waste management provided. Based on the results of the research main directions in the study of processes of eco-oriented regional economy defined and a range of activities aimed at reducing the level of the destructive impact of economic activities on the ecological situation of the Lviv region proposed.

Key words: ecological marketing, sustainable development, environmental problem, waste forming and utilization, ecological rating, indicators of sustainable development.

The setting of the problem and its relationship to important scientific and practical tasks. For Ukraine, European integration is not only the opportunity of joining the economic, political and legal space of European Union countries, but also the possibility of modifying the fundamental priorities of social development. Imperfect innovation and investment policy in Ukraine, together with the low capacity of national and regional institutions to build links in public-private partnerships to address critical challenges in the economic, social and environmental spheres, finds the reflection in aggravation the quality of life in society and the position of Ukraine in the international ratings. Therefore, the prospects for European integration should be seen as a vector aimed at the transformation of the functioning of all economic sectors in order to minimize barriers to their accession to the European sectoral policies and establishing communications intercluster cooperation.

Today's core European economic system is the sixth class of technology that is supported by an appropriate system of economic relations – “knowledge economy”, which are activated by new driving forces towards concentration of intellectual and creative resources during the innovative activities promotion at different stages of the life cycle investment projects. Enhancing the impact of negative environmental externalities not only on the environment but also on the productivity of the domestic real economy makes it impossible to increase the elasticity of production resources to adapt to the European standards.

Therefore, widely used by the domestic enterprises concepts of environmental marketing is a crucial necessity that will reduce the negative impact of economic activity on the environment and encourage innovative development of the economy, followed by the approval of a progressive model of economic relations – the “knowledge economy”.

Analysis of the recent research and publications. O. Sadchenko, A. Raschenko, S. Ilyashenko, E. Sadchenko [4] and others belong to the domestic researchers engaged in the issue of the introduction of the concepts of ecological marketing at enterprises and in certain sectors of the economy. The role of environmental innovation in providing the effective economic development is described in the works of A. Belyakov, V. Polovskoyi, O. Prokopenko and others.

According to data provided by the “World Data Center for Geoinformatics and Sustainable Development”, the indicators of sustainable development include, in particular: the index of sustainable development: sustainable development index (Isd) – a figure that is an integrated assessment that reflects the relationship between the three inseparable areas social development – economic, social and environmental, the degree of harmonization of sustainable development (G) – a figure that represents the degree of balance between economic, social, and economic indicators of institutional sustainability.

Quantitative values of these indicators calculated on empirical data for years 2009-2011 in the Lviv region, as follows:

$$\text{Isd2009} = 0,556 \text{ (4 position in the ranking of 27 areas)}$$

$$\text{G2009} = 0,713 \text{ (11 position in the ranking of 27 areas)}$$

In this case, the indicator of economic development (Ie) totaled 0,337, an indicator of ecological development (IEC) was equal to 0.733, and the indicator of social development (Is) was equal to 0.504.

$$\text{Isd2010} = 0,808 \text{ (4 position in the ranking of 27 areas)}$$

$$\text{G2010} = 0,772 \text{ (8 position in the ranking of 27 areas)}$$

Accordingly, in 2010, Ie = 0,313, IEC = 0.527 and Is = 0,527.

$$\text{Isd2011} = 0,982 \text{ (3 position in the ranking of 27 areas)}$$

$$\text{G2011} = 0,770 \text{ (9 position in the ranking of 27 areas)}$$

In 2011, Ie = 0,314, IEC = 0.532 and Is = 0,53 [1].

The data listed in [1] clearly highlight the tendency to increase the index of sustainable development, which is also reflected in the respective positions of the Lviv region in the overall ranking of areas in Ukraine in 2009-2011

According to the results of the indicators analysis of the sustainable development in the Lviv region one can draw the following conclusions:

1. Indicator of economic development annually on average is reduced by 0.0615, but this decrease is reduced annually by an average of 0.0125.

2. Environmental indicator of annual average is decreased by 0.5225, but this decrease is reduced annually by an average of 0.1055.

3. Indicator of institutional development of social and annual average is increased by 0,053, but this year increase is decreased by an average of 0.01.

4. Thus, the greatest negative impact on the index of sustainable development in the Lviv region is precisely the environmental indicator development, and the most positive – is an indicator of the social and institutional development.

World practice shows that one of the most effective ways of establishing communications business cooperation between the private and public sector and external counterparties is the investment activity in all its forms.

According to the “Rating of investment attractiveness of regions 2013” prepared by the Kiev International Institute of Sociology in partnership with the Institute for Economic Research and Policy Consulting in the overall ranking of the 27 regions of Ukraine, the Lviv region ranks 2nd with an index of investment attractiveness of the region – 1.482541. In his turn, the leader in Ukraine for this indicator is the Kharkiv region – 1.51927 [12].

Index of investment attractiveness of the region – is the integral index, which includes Investment Attractiveness Index on groups of “hard” (this group includes factors which impact is difficult or impossible to change within the short term, but they largely determine the regional potential and provides a platform for medium and long-term forecasts for the development environment implementing investment projects) and “soft” factors (this group includes factors that are subject to change over a relatively short period of time and may form barriers to the implementation of investment projects). Factors of that group

is usually related to how the investors are perceived in the economic environment, which, in turn, are detailed on the relevant parameters listed in Tables 1-2.

Table 1

Factors of “hard” impact on the investment potential in the Lviv region in 2013

Factor	Index value factor	Position in the overall ranking of regions
1. Natural Resources (water and land)	1,345942	17
2. Manpower	1,598937	2
2.1 Health	1,62872	5
2.2 Availability	1,543902	7
2.3 Education	1,625653	3
3. Innovation potential	1,427483	6
4. Consumer segment	1,219758	7
5. Business segment	1,290016	10
6. Infrastructure	1,632309	5

Source: authors formed from [12]

Thus, as reported in Table 1, the Lviv region occupies a leading position regarding the availability of effective workforce. There is a relatively high performance infrastructure development and innovation potential, however the business-segment engages not too high position. In terms of comprehensive index factors of “hard” influence in the Lviv region, it is equal to 1.47313 – a 5th place in the overall ranking of the regions of Ukraine [12].

Table 2

Factors of “soft” impact on the investment potential of the Lviv region in 2013

Factor	Index value factor	Position in the overall ranking of regions
1. Business climate	1,728391	2
2. The effectiveness of public bodies	1,347472	17
3. Administrative procedures	1,496153	12
4. Security of property rights	1,400349	14
5. Corruption	1,540257	5
6. Taxes and fees are	1,600601	6
7. Openness of government	1,824646	1
8. Business optimism	1,709064	2

Source: authors formed from [12]

Cumulative index factors of “soft” impact for Lviv is equal 1.492013 – this corresponds to the first place in the overall ranking of regions of Ukraine. It is clear that the basis of this result are the leading positions in Lviv region on indicators such as business environment, open government and business optimism that should be regarded as decisive competitive advantage in the Lviv region. However, the lowest position falls on the “efficiency of public bodies” indicator.

Statement of the problem. The purpose of this paper is to study contemporary environmental problems of anthropogenic origin in the Lviv region using the methods of mathematical modeling and time series, followed by the definition of current areas in the research processes of eco-oriented regional economy.

The main material. Effectiveness of public authorities is one of the key indicators of regional development, which is characterized not only by the ability of public authorities to take appropriate

management decisions about allocating resources to address current needs, but also their ability to stimulate business development in the region and establish communication public-private partnerships to implement strategic regional development plans. It is according to the setting up of new opportunities of this partnership after making the Law “On Public Private Partnership” in 2010 which potentially intensify the investment activity in the region. As noted above, the greatest negative impact on the sustainable development of the Lviv region is an indicator of the environmental development. In 2012 the Lviv region accounted for 3.8 % of Ukraine’s GDP

It should be underlined that only since 2009 in the Lviv region the including areas for investment in the environmental protection has been allocating individually rational use of mineral resources and mineral resources, but the volume of investment in this area is quite scarce: in 2009. – 57 thousand hrn., in 2010 – 459 thousand., in 2011 -547 thousand and in 2012 – 588 thousand hrn.

Similar phenomena are observed on environmental investments in Ukraine. Thus, in October 12, 2012 the meeting of the Board of the Ministry of Ecology and Natural Resources of Ukraine headed by Minister E. Stavisky [20] was held. It was stated there that as of 10.10.12 according to the Contract of sale of assigned amount units SEIA agreed with Japanese side 551 Project Environmental (Green) Investments in 24 regions of Ukraine worth 3 813.9 million. And as of 01.10.2012 it was conducted 30 % of the advance funding to overhaul the 323 social facilities. Unfortunately, the large industrial business entities where the significant emissions into the environment are accumulated did not get to such projects. After 20 years of building a socially oriented economy the highest echelons of government only began to discuss the draft Law of Ukraine “On the basic principles of state policy in the field of climate change mitigation and adaptation to change it “, about the steps towards ensuring the proper functioning of the national system for the estimation of anthropogenic emissions and removals greenhouse gas emissions.

The loss of valuable time in order to prevent the appearance of depressed regions in Ukraine – is one of the main reasons for the deterioration of the quality of life in society, loss of the worker’s health, the growing demand for pharmaceutical products, turnover of skilled personnel abroad in search of safe conditions of intellectual labor, and the accumulation of so-called “dead” capital industry, which does not work on improving the quality of economic growth.

Environmental investments were not a priority in the regional economy, as evidenced by their dynamics in 2005 – 2012 in the Lviv region (see Figure 1).

Using data sources [3], we calculate the geometric mean weighted value based on changes in the index for years 2005-2012 (with chain method):

$$\bar{I}_{\text{protec. and rac. use of nat. resources}} = \sqrt[7]{0.67 \times 1.43 \times 2.47 \times 1.60 \times 0.11 \times 1.27 \times 2.70} = 1,05 \quad (1)$$

$$\bar{I}_{\text{protec. of atm. air}} = \sqrt[7]{5.41 \times 1.19 \times 2.25 \times 0.75 \times 2.32 \times 2.05 \times 0.58} = 1,63 \quad (2)$$

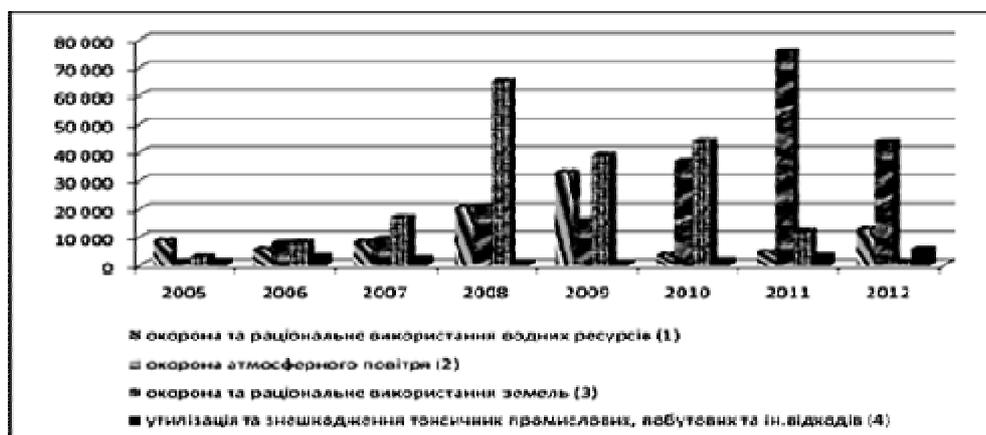
$$\bar{I}_{\text{protec and rac. use of mines. resources}} = \sqrt[3]{8.05 \times 1.19 \times 1.07} = 2,17 \text{ (for 2009-2012)} \quad (3)$$

$$\bar{I}_{\text{protec. and rac. use of land}} = \sqrt[7]{2.56 \times 2.16 \times 3.77 \times 0.60 \times 1.13 \times 0.27 \times 0.11} = 0,88 \quad (4)$$

$$\bar{I}_{\text{utilization and disposal}} = \sqrt[7]{2.25 \times 0.78 \times 0.37 \times 0.62 \times 3.10 \times 1.89 \times 1.79} = 1,23 \quad (5)$$

These calculations in formulas 1-5 suggest the following conclusions : Investing in the protection and rational use of natural resources in the Lviv region during the analyzed period increases annually by an average of 5 %, an annual average of investment in air protection increases by 63 %, investment in protection of mineral resources and the rational use of mineral resources annually (2009 – 2012) on average increased by 117 %, investment in the protection and sustainable use of land during the period annual average reduced by 12 %, investment in recycling and disposal of waste annually averaged increase by 23 %. So, during years 2005-2012 in the economy of the Lviv region the largest reduction in investment in the protection and sustainable use of land was being experienced and the fastest growing investment was in conservation of mineral resources and the rational use of mineral resources. However, we note that the growth rates depends strongly on the amount of the initial investment in 2005, which all areas in the Lviv region accounted for only 14.653 million hrn. But a source of investment depends on the rate reduction of the shadow economy in Ukraine: in 2012 the shadow economy in Ukraine on a “spending – retail sales” amounted to 45 % of official GDP. [21] Figure 2. shows trends that reflect the dynamics of

investment in the protection and rational use of water resources in all areas of the Lviv region 2005 – 2012 illustrating the dynamics of declining environmental investment after 2008 – the period of the deepening economic crisis in the country and the suspension of many investment projects in enterprises – the environmental pollutants.



- o-protection and rational use of water resources(1)
- o-protection of atmospheric air(2)
- o-protection and rational use of land(3)
- o-utilization and disposal of toxic industrial, household and other waste(4)

Fig. 1. investment in environmental protection in the Lviv region for 2005–2012. (in thous. грн)
Source: constructed by the authors based on [3]



red– all directions/ blue– protection and rational use of water resources (1)

Figure 2. Trends that reflect the dynamics of investments in the protection and rational use of water resources in all areas of Lviv region 2005 – 2012

The data presented in Table 3 show that the most negative impact on the ecological state of the Lviv region has an emission of pollutants and dioxin emissions into the atmosphere and the presence of waste, including IV class of danger.

According to the ecological passport of the Lviv region 2013 the major Lviv region polluters are six industrial units, which characteristics are presented in Table 4.

So in 2012 the emissions of pollutants into the air from stationary sources in Dobrotvir was equal to 48.3 tons [2] – 36,95 % of the total emissions of air pollution from stationary sources in 2012. Also according to the Department Environment and Natural Resources only during the third quarter of 2013 at LCP “Sbyranka” it was placed 67.2 tons of waste without a proper permit [6]. Such statistics confirms the relevance of implementing the principles of environmental marketing and ekologistics for such enterprises, and dictates the need for new metrology systems of quality investment projects evaluation in the context of their impact on the growth of the securities market value of environmentally – oriented businesses, their capitalization in the regional and international economy.

Table 3

Characterization of the ecological state of the Lviv region in 2012

№	Unit	Value index	Meaning	Position in the overall ranking of regions
1	The use of fresh water	million m ³	158	16
2	The amount recycled and consistently (re) used water	million m ³	440	14
2.1	Share of recycled water in the total use on production needs	%	90	6
3	Discharge of contaminated sewage waters in natural surface water objects	million m ³	44	7
4	Emissions to air	thousand tons	253,9	7
4.1	Emissions of air pollutants per km ²	tons	11,6	5
4.2	Emissions of dioxins and emissions of air pollutants from mobile sources	thousand tons	123,2	5
4.3	Emissions of dioxins and carbon into the atmosphere from stationary sources	thousand tons	130,7	7
5	Waste I-IV hazard class 8	thousand tons	3350,4	8
5.1	Including I-III hazard class	thousand tons	1,6	20
6	Availability waste	thousand tons	189765,6	5
6.1	Including I-III classes of danger	thousand tons	36,4	14

Source: [authoring from 2]

Table 4

Environmentally hazardous facilities in the Lviv region

№	Name of the object	Economic activities	Ownership (departmental affiliation)
1	Dobrotvir TPP	Electricity gas and water	
2	Management of municipal pipelines "Lvivtransgaz"	Transportation of Natural Gas	"Naftogaz Ukraine"
3	SE "Lvivugol"	Mining	State property
4	CME "Sbyranka" (Lviv landfill)	Other manufacturing (processing waste)	Municipal property
5	Rozdil Deposit "Sulfur"		State property
6	Lviv city utility "Lvivvodokanal"	Treatment of wastewater	Municipal property

Source: [5]

For several years the Department of Environment and Natural Resources of the Lviv regional state administration has implemented a pilot project "Eco-rating companies – Lviv pollutants". In accordance with the project by dividing the polluters of the environment into five categories from the best that adhere to all environmental requirements for the worst, each with a corresponding color: green, blue, yellow, red and black. Table 5 presents a comparative analysis of ratings of 2006 and 2011.

As the data in Table 5 show, in 2006, in the Lviv region it has been registered no one enterprise, economic activities which are fully corresponded to specified environmental norms and standards. Instead, the "black" category got half of the studied companies. In 2011, the category of "green" enterprises in Lviv region has consisted of 7 objects, however, and the number of companies which have entered the "black category" also increased by one object.

Table 5

Comparative analysis of polluting enterprises in the Lviv region in 2006 and 2011

Category	Number of companies in 2006	The number of enterprises in 2011	Rejection	
			Δ_{absolute}	Δ_{relative}
" Green"	0	7	7	-
" Blue"	8	1	-7	-87,5
" Yellow"	8	3	-5	-62,5
" Red"	7	9	2	28,57
" Black"	22	23	1	4,55
Total	45	43	-2	-4,44

Source: authors' elaboration based on [7,8]

To the Lviv region enterprises of "green category" in 2011 belong such enterprises: JSC "Lviv Brewery" Ltd." Leoni Wiring Systems, UMG "Lvovtransgaz", SE "Rava-Russkaya Slippersoak Plant", JSC "Zhidachev GIC", LPS "Skole" branch "Main Oil Pipelines" "Druzhba" JSC "UkrTransNafta", LPS "Brody" branch "Main Oil Pipeline "Druzhba" JSC "UkrTransNafta" [7].

Almost in 1999 JSC "Lviv Brewery" with Carlsberg Ukraine started their cooperation. This event marked a new stage in the development of the company, there were invested over 35 million U.S. dollars in its modernization. Simultaneously, a systematic improvement and evidence of compliance with the highest international standards of brewing technology and product quality have been hold. Company Carlsberg Ukraine much emphasis on environmental protection that is why the company prefers the use of "green" technologies. For many years, Carlsberg Ukraine uses reversible glassware. Thus, in 2010 got reuse 400 million bottles, and one of the last initiatives of the company in the field of environmental activity is the construction of sewage treatment plants for waste water, which made it possible to reduce the cost of natural gas consumption by 10-15 % and significantly reduce carbon emissions dioxide (CO₂) into the environment [9].

As environmentally oriented enterprise Ltd. "Leoni Wiring Systems" can be noted, which is an international manufacturer and supplier of wire, cable and cable networks to meet the needs of the automotive industry, as well as aviation, marine, consumer, and medical equipment. As of 2011 the concern was part of the 90 factories located in 35 countries with a total number of employees 56 000 people. LEONI Wiring Systems is a leading manufacturer and supplier of on-board cable networks in the European market for such world famous brands of cars, like the "Porsche", "Opel", "Audi", "BMW", "Reno", "Peugeot", "Volkswagen" "Mercedes-Benz", "Land Rover", etc. Ltd. "LEONI Wiring Systems UA GmbH" refers to the Wiring Systems Division and is the most powerful investment project in recent years. It is the shining example of establishing closer economic, scientific, technical and investment cooperation between Ukraine and Germany. Over 50 million Euro was allocated by Ltd. "LEONI Wiring Systems UA GmbH" for the environmental projects in Ukraine. The company uses a system of incentive awards for innovative ideas and suggestions for improving the manufacturing productivity. Carrying out a call for proposals to improve business management demonstrates openness to new ideas and the ability to learn from positive and negative experiences. [10]

PJSC "Ukrtransgas" is a good example of active Ecoproject introduction. There are laboratory facilities to determine the quality of atmospheric emissions from fixed and mobile sources of pollution and sewage disposal. In its activity the company is guided by environmental policy, every year there is held a bimonthly event on landscaping facilities of the company. According to the requirements of ISO 14001, the PSC "Ukrtransgas" certified environmental management system in the provision of engineering services in the supply and provision of pipeline transportation of natural gas. [11]

Also in the Lviv region there are other companies, which are aimed at reducing the destructive effects of economic activities on the environment. For example, the research-production enterprise "Ecology" provides services for environmental protection, labor safety, sanitary hygiene, job evaluation, industrial and technogenic security in the field of waste management [13]. Environmental activities of the

enterprise in the field of waste management is shown to provide the following services: defining hazard class waste analysis, identification, inventory, certification – a consistent accumulation, synthesis and storage of data for each specific type of waste that characterize their origin, technological, physical chemical, economic, health, environmental and other indicators and methods of measurement and control technology to collect, store, transport, processing, recycling, disposal, removal and disposal, development and preparation of registration forms object creation, processing and utilization waste (in accordance with the CMU № 1360 and instructions on how to prepare registration cards of such facilities, the development project limits, waste disposal – according to the Cabinet Decree № 1218) [13].

As for activities related to the release of pollutants into the atmosphere, it is a positive experience of Ltd. “NDVP “Ecology”, which has a whole set of permits to carry out work on an inventory of emissions of pollutants into the air instrumental method [13], and the LLC “Eco -Lviv”, which since its establishment in the territory of Ukraine performs the exclusive distributor of Czech producers as “MEVATEC” and “MEVA”. Ltd. “Eco-Lviv” has offered about 400 goods for organization improvement, environmental preservation, management of solid waste management and keeping in line with European standards. [14] The activity of the company started with the introduction European standards in the collection and removal of solid waste in the city of Lviv. In 2009 it was launched the first pilot project for the collection of solid waste in rural areas. The basis for this project performed Kamenka -Bug district, Lviv region, which experiences now extends to the entire territory of the region. Since its inception, LLC “Eco-Lviv” has established the partnerships with the leading utilities and public enterprises throughout Ukraine, among them there are “Borispol Airport”, “Kraft Foods Ukraine”, “Metro Cash & Carry Ukraine”, “Obolon”, “Roshen”, “Nemiroff”, “Procter & Gamble” and others. In 2007, the LLC “Eco-Lviv” began production in Western technology containers for collection of solid waste, which comply with the established European standards and norms. Production is carried out on its own production capacity, allowing them to significantly reduce costs for domestic consumers, to provide short term production and delivery, and further tailored to the individual needs of customers, such as applying lohotypnyh pictures, coloring, etc. Production capacity LLC “Eco-Lviv” gives it a chance to produce about 40 containers every day. [14]

In accordance with the program of energy efficiency, the Government of Ukraine approved assume that its implementation will enable to reduce the energy intensity of GDP by 20 % and provide favorable conditions for attracting financial resources to be directed to the renovation and modernization of production facilities. At present in Ukraine, there are three basic sources of “green” energy, namely hydropower, solar power engineering and wind energy resources [15]. The identified relevant areas of research processes of eco-oriented regional economy are shown in Fig. 3.

In order to ensure proper collection and management of spent chemical energy sources, such as batteries, Department of Environment and Natural Resources of the Lviv regional state administration initiated in the Lviv region the implementation of a pilot project “Recycle correctly”. The Lviv region is one of the first regions of Ukraine, where the pilot project is implemented [16]. In addition, in June 2013 retail network of stores Health and Beauty Watsons launched the National Social project of the used batteries disposing. Quarterly Watsons collectes all batteries for recycling and passes the state enterprise “Argentum” which is located in the city of Lviv. State Enterprise “Argentum” is the only plant in Ukraine, specializing in the processing of the waste materials and secondary origin, containing the precious metals or their alloys. The main goal is to provide every Ukrainian with possibilities to place rationally the used batteries (containers are located in 89 cities of Ukraine, 285 stores are located at Watsons) [17], and the degree of obtaining recycled gold and silver is 99.5 %, for platinum group metals – 99.2 %. Obtained in the enterprise metals are suitable for making more than 100 items of industrial products [18]. In SE “Argentum” cooperates with the Institute of Inorganic Chemistry in “Lviv Polytechnic” [19].

Research practice implementation of environmental projects in industrial enterprises in the Lviv region indicates their choice of innovative solutions to protect the environment from production and business activities. However, consideration of defining environmental problems in the Lviv region the industrial enterprises would be appropriate to apply the concept of ecomarketing and ecologistics network because it allows not only to reduce the time of development and innovation, but also to reduce the time reversibility of waste as secondary raw material or energy source. However, to achieve this goal it is

necessary to create regional industrial clusters for the production of products based on recycled materials, which act as the core research center (university, research institute, technology parks, business incubators, etc.) They will include utilities and private companies.

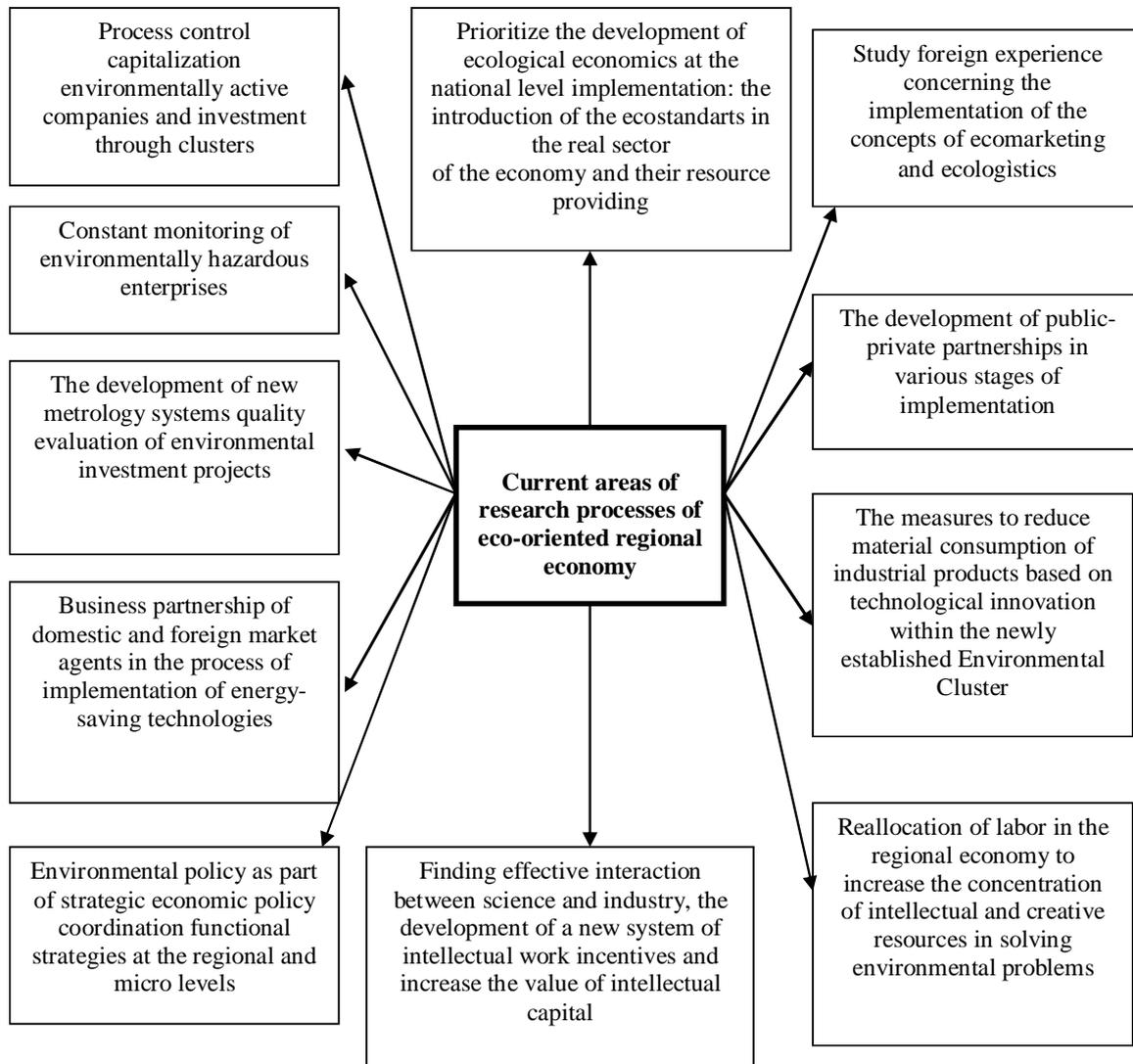


Fig. 3. Current areas of research processes of eco-oriented regional economy (authoring)

Conclusions and recommendations for further research. The study showed that the crucial environmental issues in the Lviv region is the large amount of waste and the emission of pollutants into the air from both mobile and stationary sources. Environmental indicator development has the most negative impact on the overall assessment of the sustainability of the Lviv region and its attractiveness.

Although the Lviv region has a very high position on the availability of skilled labor, infrastructure development and innovation potential, but development of environmental business is in need of system resources in the form of effective interaction of industrial, financial, human intellectual capital, cooperation of public and private institutions, the introduction of ecomarketing and ecologistics concepts by studying the foreign progressive experience. Construction of the democratic society in Ukraine and an active preparing for the European integration processes will need to define the new vectors of the industrial sector development, new criteria for the selection of investment projects of long-term environmental nature.

There the environmental standards will have an important role and strict control of quality performance on the part of both investors and public organizations and all stakeholders.

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