

SUSTAINABLE DEVELOPMENT OF THE UKRAINIAN BEEKEEPING INDUSTRY

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Abstract. The results of an interdisciplinary systematic study of sustainable development of beekeeping in order to improve its institutional support are highlighted. The state documents (laws, concepts, strategies) concerning the development of agriculture and beekeeping are analyzed. It was found that the existing institutional support for the development of beekeeping is insufficient to fully realize the potential of the industry. The international criteria of sustainable development and their application to agriculture and beekeeping industry of Ukraine are generalized. The role of beekeeping in the implementation of the Sustainable Development Goals of Ukraine until 2030 is substantiated. The factors and conditions influencing the development of beekeeping and improvement of its production capacities are studied. It is proved that many problems can be overcome by improving the system of state regulation of the industry and creating sufficient institutional support. For the first time, criteria and a system of indicators for sustainable development of beekeeping have been developed, which are grouped into 7 blocks: state regulation / management; education, education and science; material, technical and financial support; primary production and processing of products; market and sales of products; food safety, veterinary support, epizootic welfare; environment and biodiversity. The formulated goals, criteria and indicators of sustainable regional development of beekeeping will improve the system of institutional support of the industry and develop a monitoring system to assess its progress and development.

Key words: economy, legislation, institutional framework, sustainable development criteria, agriculture.

JEL Classification: O13, O43, Q01, Q18

1. Introduction

Beekeeping is closely related to many industries, as it occupies a specific intersectoral position in agricultural production: as an agricultural sector, beekeeping is an integral part of animal husbandry, at the same time, bees are among the main pollinators of entomophilous crops, contributing to the solution of agro-economic and environmental problems. Moreover, it is one of the few industries that creates and multiplies the final product, both its own and related industries, with almost no negative impact on the environment (Lisohurska et al., 2022).

The beekeeping industry of Ukraine has several problematic issues: low competitiveness of domestic producers due to non-compliance with European quality standards, lack of harmonized legislation on

production, which also undermines the foundations of sustainable development of beekeeping, the problem of under-pollination of plants of natural and cultural flora of many regions of Ukraine due to a certain deficit in pollinating insects, including honey bees. As a result, the decrease in crop yields due to under-pollination. In addition, deterioration of the ecological state of the environment and violation of ecological requirements for growing crops leads to mass poisoning of bees by insecticides and pesticides.

Many scientists have studied the problems of beekeeping development in Ukraine (Karpenko et al., 2019; Dudar et al., 2021). In their works the main attention is paid to the issues of breeding, keeping and breeding of bees, control of major diseases and pests, improving the technology of keeping, wandering

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and wintering of bees, improving the production of bee products, developing drugs for apitherapy. However, the problems of choosing the most effective market-oriented institutions that would ensure sustainable regional development of beekeeping in Ukraine based on the optimal combination of economic, environmental and social aspects remain insufficiently researched.

Thus, the complex of problems that have accumulated in the industry does not allow it to develop effectively, and the existing mechanisms of industry management do not allow solving these problems. In this regard, it is of particular relevance to substantiate the main directions of improving the efficiency of beekeeping, ensuring the harmonization of legislation, the development of regulations governing social relations in the field of regional (and national) development of beekeeping and the formation of a mechanism for its development on the principles of sustainability (Shvorak, Filiuk, 2021).

2. Elaboration of strategies and goals for sustainable development of Ukraine

One of the priorities of the state regional policy, according to the Law of Ukraine "On the Basics of the State Regional Policy", is to stimulate and support local initiatives for the effective use of the internal potential of the regions to create and maintain a full-fledged living environment, improve the quality of life of people (Law of Ukraine "On the Basics of State Regional Policy", 2015).

Implementation of the state regional policy is carried out on the basis of a system of interrelated documents based on the Development Strategy of Ukraine, the General Scheme of Planning of the Territory of Ukraine, planning schemes of territories at the regional and local levels (State regional development strategy for 2021–2027; Materials of the General Planning Scheme of the Territory of Ukraine, 2002). The elaboration of regional development strategies is carried out taking into account the development strategies of cities, towns and villages, strategic priorities for the development of districts of the respective region. Implementation of regional development strategies and action plans for their implementation is carried out taking into account the strategic development goals of the region and provides for the incorporation of the Sustainable Development Goals (SDGs) and indicators for their measurement into regional strategies and plans for their implementation, as well as comprehensive measurement of the impact of planned activities, projects and programs on the achievement of the SDGs at the regional level. The State Strategy for Regional Development until 2027 envisages the implementation of tasks to ensure

the implementation of the SDGs at the regional and local levels, which should be integrated into the processes of forming relevant horizontal (sectoral programs and strategies) and vertical (at the basic, subregional, regional and macro-regional levels, as well as at the level of inter-municipal cooperation) policies (State regional development strategy for 2021–2027 and action plan for its implementation, 2020). On the way to ensuring sustainable development (SD) for the people of Ukraine, it is necessary to fulfill two important tasks: to create an institutional mechanism and to implement the SDGs at the level of regions and local hromadas (Kormych et al., 2022).

Ensuring sustainable development of all components of the socio-economic system is important for Ukraine today, especially in the context of European integration (Buriak et al., 2022). The issue of sustainable development has its history in the political life of the European Union. Significant progress in the implementation of the strategy is demonstrated by some EU members, in particular Estonia, Latvia and Lithuania (A handbook Localising sustainable development goals (SDGs) in the Baltic Sea Region, 2020). Taking into account the fact that Ukraine is a candidate for EU membership, studying the experience of these countries should be of great practical interest for Ukraine.

Consumer attitude to natural resources, attempts to achieve the highest economic effect today, despite the damage caused to the environment, have led to the depletion, degradation, violation of the quality of natural resources, especially soils, deterioration of health and living conditions of the population. One of the unique qualities of agriculture is that agricultural production is linked to renewable resources. It is clear that, like other resource-intensive sectors of the economy, agriculture faces a number of conflicts between economic, social and environmental aspects (Melnychuk, 2014; Pasemko et al., 2020). Therefore, the transition to the principles of sustainable development, taking into account international criteria, is a necessary requirement of today (Herasymiv, 2016; Fraier, 2018, Lipskyi et al., 2021).

3. Implementation of sustainable development goals in beekeeping

After analyzing the 17 goals of the SD, given in the Decree of the President of Ukraine, in order to determine in the implementation of which the beekeeping industry can participate, 5 such goals were found:

Goal 1 – Overcoming poverty: beekeeping provides food (primarily honey), and everyone can be engaged in beekeeping;

Goal 2 – Overcoming hunger, achieving food security, improving nutrition and promoting sustainable agriculture. Beekeeping contributes to the achievement of food security, honey bees pollinate entomophilous crops, orchards and berries. Therefore, it is impossible to achieve sustainable agricultural development without beekeeping;

Goal 3 – Ensuring a healthy lifestyle and promoting well-being for all at all ages. All bee products (honey, propolis, bee sting, feather, wax, royal jelly, etc.) have healing properties and are used to strengthen the body, increase overall resistance and treat and prevent many diseases. Bee products are used in the pharmaceutical and perfumery industries. Nowadays a separate scientific and practical direction of medicine – apitherapy – is successfully developing.

Goal 8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. To do this, it is necessary to establish training and retraining of the unemployed, giving them the necessary minimum knowledge and practical skills for beekeeping.

Table 1
Data of the register of apiaries of Ukraine by regions
(as of 01.10.2022)

Oblast	Number of apiaries registered	Number of apiaries eliminated	Number of apiaries in total	Number of bee colonies
Vinnitsia	3137	4	3141	204313
Volyn	969	0	969	29687
Dnipropetrovsk	3190	1	3191	138069
Donetsk	1352	0	1352	99769
Zhytomyr	806	0	806	36215
Zakarpattia	1054	0	1054	93283
Zaporizhzhia	3252	3	3255	130662
Ivano-Frankivsk	2228	1	2229	99094
Kyiv	1462	1	1463	56501
Kirovohrad	3916	7	3923	216118
Luhansk	1954	3	1957	103823
Lviv	2158	0	2158	84886
Mykolaiv	3101	9	3110	137204
Odesa	2788	0	2788	160321
Poltava	2047	0	2047	107067
Rivne	1052	1	1053	33082
Sumy	2418	1	2419	119803
Ternopil	1714	12	1726	69656
Kharkiv	2048	1	2049	104934
Kherson	1400	0	1400	50307
Khmelnitskyi	2186	7	2193	111438
Cherkasy	2443	0	2443	102666
Chernivtsi	1004	0	1004	77987
Chernihiv	1404	0	1404	56536
Kyiv (city)	16	0	16	848
Total	49083	51	49134	2423421

Source: Data of the State Statistics Service of Ukraine

Goal 15 – Protection and restoration of terrestrial ecosystems and promotion of their sustainable use, sustainable forest management, combating desertification, halting and reversing (reversing) land degradation and halting biodiversity loss. Bees pollinating entomophilous plants contribute to the conservation of biodiversity and sustainability of ecosystems. It should be noted that the role of honey bees in plant pollination in ecosystems is increasing due to the rapid decline of "wild" pollinators.

4. Problems of the Ukrainian beekeeping industry

Today, Ukrainian beekeeping has accumulated a lot of problems that can lead to a decline in the production of beekeeping products and export of honey to other countries, where Ukraine has made significant progress in recent years. This problem was understood not only by beekeepers and scientists. The authorities also began to talk about it (Green book on honey market regulation, 2018). Serious preparatory work was carried out for 2 years, as a result of which in January 2021 an order of the Ministry of Economic Development, Trade and Agriculture "On some issues in beekeeping" was published. Also, a working group of specialists and representatives of public organizations was created to prepare a new draft law on the development of beekeeping, which included scientists of the National Scientific Center "Institute of beekeeping named after P.I. Prokopovich". The working group formulated a list of the main problems of the Ukrainian beekeeping industry:

- lack of effective state financial support for the industry;
- low technological culture of production and processing of products, its packaging, lack of industrial technologies;
- reduction of entomophilic crops and insufficient use of bees for their pollination;
- deterioration of the ecological state of the environment and violation of technological requirements for the treatment of entomophilic agricultural plants with pesticides and pesticides and as a result – mass poisoning of bees;
- insufficient veterinary support, which leads to uncontrolled spread of bee diseases;
- lack of a harmonized legislative framework for the production and quality of the industry's products and, as a result, difficulties in realizing the export potential of the industry.

In connection with the introduction of state support for beekeeping – the provision of subsidies for bee colonies, beekeepers began to more actively register their apiaries. According to the register (Register of apiaries of Ukraine, 2021), which was compiled to provide subsidies for bee colonies, there are about 2.4 million bee families and 49 thousand apiaries

in Ukraine (Table 1). These data are approximate estimates of the number of bee colonies, as not all beekeepers applied for subsidies.

Currently, the main attention of the state is paid to the legislation in beekeeping, conducting nationwide registration of apiaries and beekeepers, preservation of native bees and involvement of science in breeding work.

According to the State Register of subjects of breeding in animal husbandry, 32 apiaries have the status of breeding farms in Ukraine: 21 of them are breeding apiaries, 9 – bee nurseries and 2 – breeding plants.

5. The essence of criteria and indicators of sustainable development of beekeeping

Assessment of Sustainable Development is multidimensional in nature, therefore, the assessment of the real state of the industry, factors of influence and their dynamics requires comprehensive measures to develop appropriate criteria and indicators – indicators of SD, reflecting the social, economic and environmental aspects of this development.

Among a large number of SD indicators that characterize the state of a certain sphere, it is necessary to choose those that can be used for quantitative and qualitative assessment of the state of the environmental, social and economic environment without using a large amount of statistical information. At the same time, the indicators must meet such criteria as validity, sensitivity to changes, reliability, quantitatively and qualitatively reflect all the main details of the state of the environment, social and economic spheres and ensure the promotion of the beekeeping industry to the SD.

Based on the results of the study of the problems and factors influencing the state of beekeeping in Ukraine, as well as the analysis of the collected information, a methodological framework and a system of criteria and indicators of the SR of beekeeping were developed on the basis of modifying the evaluation system (set of indicators); redistribution of indicators by areas (goals, objectives); assessment of the relevance of indicators; adjustment of the scale of measurement of variables.

The developed system of indicators and measures is grouped into 7 blocks (Figure 1), by environmental,

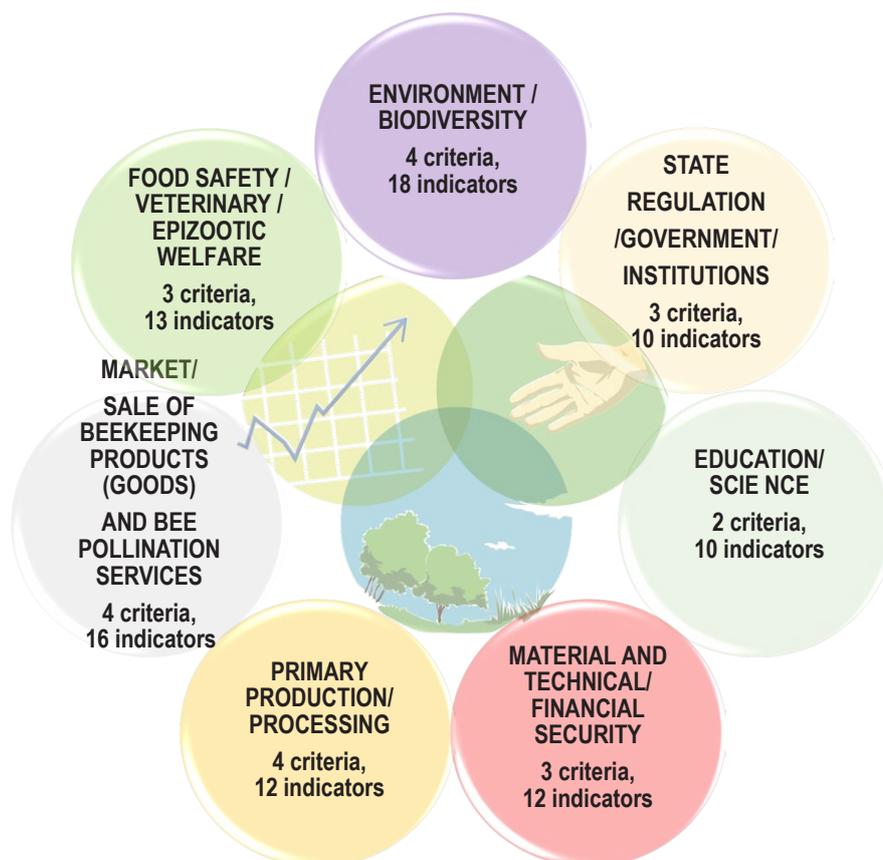


Figure 1. System of criteria and indicators for assessing the ecological, sociological and economic state of the SD beekeeping

Source: (Peliukhnia, 2022)

social and economic components, according to generally accepted international practices:

- 1) State regulation/management – to improve the management system of the beekeeping industry, to make the management system favorable for the development of the industry, to create an economically favorable environment and conditions for beekeeping, to provide guarantees for the observance of the rights and protection of the interests of individuals and legal entities engaged in beekeeping;
- 2) education, enlightenment and science – to form people's understanding of the role of bees in solving the food problem, providing raw materials for the pharmaceutical and cosmetic industry, and most importantly, awareness of the pollination role of bees to ensure the yield of entomophilic crops and conservation of wildlife biodiversity; to form a cohort of professionals for the beekeeping industry; to carry out scientific support of the beekeeping industry with the development and implementation of innovative technologies;
- 3) material, technical and financial support – to provide sufficient material, technical and financial support for the development of beekeeping to obtain the required volume of bee products and to achieve the number of bee colonies that will be sufficient for full pollination of agricultural and wild entomophiles;
- 4) primary production and processing of products – to create favorable conditions for the primary production and processing of bee products, the creation of cooperatives and other structures for this purpose;
- 5) market and sales of products – to create favorable conditions on the market for the sale of bee products for producers;
- 6) food safety, veterinary support, epizootic welfare – to create favorable conditions for the veterinary and epizootic welfare of bee families and ensure food safety of consumers of bee products;
- 7) Environment and biodiversity – protection of local (native) bee populations and their habitats.

The adopted system corresponds to the essence of environmental, social and economic assessment of the level of sustainable development as a dynamic structure that is consistently deployed. The sustainability of such a system is implemented on the principle of taking into account the weight and impact of each link.

To ensure the goals and objectives of sustainable development, the minimum and maximum quantitative values of the relevant basic indicators are statistical indicators, indicators calculated by direct or indirect methods using official public sources of information and data for which it is possible to determine such indicators, indicators determined on the basis of expert judgments

and sustainability benchmarks justified for the regional level.

For integral convolution there are additive and multiplicative forms of the integral index, each of which has its advantages and disadvantages. An important stage of the integral assessment is the normalization of indicators and their threshold values. The procedure of normalization of indicators and their thresholds is a necessary step in the calculation of the integral index, since different indicators have different dimensions. Moreover, they can be multidirectional: there are indicators whose increase is desirable, others whose decrease is desirable. The normalization procedure, firstly, transforms the indicators of different dimensions into dimensionless values in the range $[0, 1]$, and secondly, makes it possible to compare multidirectional indicators.

Obviously, each component and indicator has its own influence on the integral index, so it is necessary to take into account the weights. Moreover, the weights are not constant over time, so it is necessary to calculate dynamic weights.

Such an integrated assessment of sustainable development will reflect the degree to which the beekeeping industry is moving towards environmental, social and economic sustainability.

The defined set of criteria and indicators is not final and can be changed and supplemented in accordance with current priorities, challenges and opportunities.

6. Conclusions

It was found that the institutional support of the Ukrainian beekeeping industry is insufficient. In particular, there are no such strategically important documents as the nationally approved Sustainable Development Concept, the National Sustainable Development Strategy, and the National Action Plan. But there is the Concept of Sustainable Development of Human Settlements, approved by the Resolution of the Verkhovna Rada of Ukraine on December 24, 1999. Also, the Sustainable Development Goals of Ukraine for the period up to 2030, approved by the Decree of the President of Ukraine No. 722/2019 of 30.09.2019.

It is established that one of the most significant problems of the industry is the lack of perfect harmonized (coordinated) legislation, imperfection of by-laws, regulation of relations in the functioning of the beekeeping market system. The options for improving legislation and by-laws to eliminate existing problems are proposed, which can lead to more effective development of the beekeeping industry in Ukraine. Improving the legislative framework, taking into account international experience, is the first step towards creating proper institutional support for sustainable development of beekeeping in Ukraine.

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