Agrifood Economics and Sustainable Development in Contemporary Society

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Chapter 4
The Social, Economic, and Environmental Impact of Ecological Beekeeping in Romania

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ABSTRACT

The beekeeping activity in Romania benefits from an exceptional melliferous base and favorable climatic conditions, especially for Apis Melifera Carpatica species adapted for millennia to the specific Romanian conditions. Beekeeping is a beneficial activity for beekeepers who either supplement their income, whether it is the main or sole source of income, as well as for agriculture, society, and the environment. After 1989, during the transition period to the market economy, beekeeping experienced a severe decline, but the good organization experience in the Association of Beekeepers in Romania dating from 1958 and the relatively large share of the private sector before 1989 made the transition period much diminished compared to other sectors of the economy, and to experience continuous development. The quantitative and qualitative indicators that have been analyzed highlight the main economic, social, and environmental effects of apiculture practices in Romania.

INTRODUCTION

This chapter focuses mainly on the authors' active vision concerning the social, economic and environmental impact of ecological beekeeping on both the environment and human life, with a particular interest on Romania's situation, making however numerous comparisons with international trends and evolutions in terms of beekeeping business and activity, as well as bee honey consumption. First of all, it should be mentioned that the work is structured as follows: the background section emphasizes the

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role and the importance of beekeeping worldwide as well as the main literature review studies which are related to the authors' filed of interest; in addition, the research contains methods of evaluation and measurement of the economic, environmental and social performances of apiculture in the context of sustainable development, which in turn stress aspects, such as the importance of the harmonious development – a desideratum of the present age, the necessity of presenting and focusing on the indicators of sustainable development for Romania with impact on beekeeping, and also the necessity of discovering and strengthening all the relevant indicators for measuring social, economic and environmental impacts in beekeeping; moreover, the work is keen on analyzing and discovering the aspects related to Romania's apiculture sector, with its present and perspectives, having in mind the Romanian beekeeping – opportunities and threats; furthermore, the study aims to reflect upon the indicators which show the economic impact of beekeeping in Romania, with a direct reference on both the indicators reflecting the environmental impact of apiculture activity in Romania and the synergistically impact on economic, social and environmental of attraction and use of grants; at the end of this work the authors present some important and relevant future research directions as well as numerous important conclusion which come to strengthen the importance of this subject as well as the economic, environmental and social that the beekeeping business and activity, as well as bee honey consumption opportunities and advantages.

The paper has specific objectives that come to emphasize the beekeeping business and activity, as well as bee honey consumption opportunities and advantages and to stress the necessity of understanding and encouraging the beekeeping business and activity, as well as bee honey consumption, in terms of financial, economic, social, demographical, and ecological benefits for both the humanity and environment. In this context, the first objective is to show the historical, archaeological, folkloric data revealed by the works of many authors that come to attest the fact that the Romanian territory has offered favorable conditions for bee breeding since ancient times as well as the millenary continuity of this occupation and also the significant honey resources of the Romanian territory, as well as favorable natural conditions, are essential factors for the development of apiculture regardless of the period. In addition, the second objective is to present the methods of evaluation and measurement of the economic, environmental and social performances of apiculture in the context of sustainable development, which come to stress the importance of harmonious development - a desideratum of the present age, the indicators of sustainable development for Romania with impact on beekeeping, and the relevant indicators for measuring social, economic and environmental impacts in beekeeping. Moreover, the third objective is to show the apiculture from Romania in terms of its present and perspectives, focusing on aspects such as the Romanian beekeeping - opportunities and threats, the indicators which reflect the economic impact of beekeeping in Romania. Furthermore, in terms of the indicators which reflect the economic impact of beekeeping in Romania, the fourth objective of the paper is to discover and present the indicators reflecting the social impact of apiculture in Romania, and the indicators reflecting the environmental impact of apiculture activity in Romania.

In this complex and new context, the study considers several questions as being extremely relevant for the authors' research process, such as:

- When the beekeeping activity was first mentioned and in what way does this particular line of work makes itself remarked at an international level?
- Is the social, economic and environmental impact of the beekeeping activity as well as the honey bee consumption notable and relevant for the human life and for the environment, and are the researchers able to measure with the aid of specific indicators both the impact and the consumption?

- Can the beekeeping activity and business be regarded, on the long term, as a profitable line of work and is the beekeeping activity and business able to bring new social, economic and environmental trends capable to ensure ecological development, sustainable growth and care for the planet's future generations?
- Will the younger generations find themselves capable to see new perspectives and seek new development opportunities in the beekeeping activity and business, and are the younger generations interested in offering the beekeeping activity and business the chance to show its grate potential in terms of the social, economic and environmental impact?

The life of bees is so closely related to people's lives that Albert Einstein estimated that within 4 years of the disappearance of bees on our planet, man will also disappear (Fetea, 2015). It is estimated that the production increases and the qualitative increase by bee pollination exceed at least 20 times the value of the direct beekeeping products obtained through the valorization of specific products of honey, wax, pollen, royal jelly, venom, and many others. Bees capitalize the nectar and pollen of the plants that would lose anyway, the results being found, on the one hand, in apiculture products of great economic and nutritional value, with energetic, revitalizing properties and, on the other hand, in beneficial dietary supplements for human health. Honey is the main product of beekeeping, appreciated for both its nutritional qualities and its therapeutic effects. The level of honey consumption is considered an indicator of the health of the population and a barometer of welfare. In addition, bees have an extremely important role in maintaining ecological balance and perpetuating many species in the plant kingdom. Worldwide, specialized bodies of the World Organization for Agriculture and Food (FAO) have placed the bees on the 4th place in a classification of environmental pollution sensors, since beekeepers are the main pollutants: chemical; industrial and biological noxes; radioactive substances; powders loaded with heavy metals; toxic gases; noise pollution; and so on. With favorable natural conditions, Romania has a long tradition of bee growing and beekeeping products. Beekeeping, as a branch of agricultural production, has since ancient times constituted an activity appreciated by the society. Romania through: the abundance and variety of honey resources from the spontaneous and cultivated flora that provides bees, early spring, until late autumn; the number of bee families it has; the amount of honey obtained; the diversity of bee products; the results of scientific research and specialist training - is among the countries with a well-developed beekeeping.

The world beekeeping market has been marked by the major changes in recent decades. Both changes in the structure of food consumption and developments in the intensity and extent of trade between producers' beekeeping and consumers of honey products contributed to this. Honey with other bee products consumed worldwide developments recorded average consumption of which are different from one country to another, from one area to another, from one period to another. Some countries, such as China or Argentina, are large producers of honey, although they have a low domestic consumption and consequently take advantage of surplus, exporting a significant part of their production. High consumption of bee products shall also be recorded in the USA, but also in European Union countries. Although the average honey consumption in Romania is below the European level, our country is recognized not only by the quantity of honey exported but also by its special quality. Nowadays, honey production is on the rise worldwide due not only to the concern to increase the number of hives, increase average honey production, but also to better know the benefits not only of honey, but also of derived products, used not only in the food industry but also in the pharmaceutical and cosmetic industry, in various forms of therapy.

According to FAO statistics, world honey production has evolved as shown in Table 1.

Table 1. Evolution of honey production worldwide during 1961-2015

Specification	1961	1970	1980	1990	2000	2005	2010	2015
Production of honey (thousand tons)	670	803	975	1,180	1,252	1,414	1,542	1,826

Source: (http://www.fao.org/faostat/en/#data/QL)

These changes, as can be seen from international literature (Gu & Zhang, 2002), are also reflected in the honey production of the top ten producing countries in the world as shown in Table 2, between 1970 and 2000.

BACKGROUND

Numerous historical, archaeological, folkloric data revealed by the works of many authors (Antonescu, 1979; Avetisian, 1978; Hristea, 1943) attests the fact that the Romanian territory has offered favorable conditions for bee breeding since ancient times as well as the millenary continuity of this occupation. The significant honey resources of the Romanian territory, as well as favorable natural conditions, are essential factors for the development of apiculture regardless of the period (Cîrnu & Roman, 1986). Romanian beekeeping in the past 200 years has experienced both momentums, such as the 1870s when the production of honey not only covered domestic consumption but also generated surpluses that could be used for export as well as highlights such as the end of the Second World War, during which time the number of bee families in our country was only 460,000, the average annual production reaching about 3-5 Kg for a family. In socialism, apiculture enjoyed support, and individual beekeepers carried on their activity almost unhindered, even in the difficult period of a super-centralized economy. Romania had 1,418,000 families of bees in 1989 and honey production per bee family was 8.5 kg, according to the Romanian Statistical Yearbook of 1990. A decisive role for the organization and evolution of the Romanian beekeeping activity (Giogia, 2001) was: the reorganization of the Beekeepers Association in 1957,

Table 2. Honey production of top ten producing countries in the world

Rank	1970		1980		1990		2000	
	Country	Yield	Country	Yield	Country	Yield	Country	Yield
1	USSR	210,000	USSR	189,000	USSR	270,000	China	253,691
2	USA	106,499	China	96,300	China	193,000	USA	101,000
3	Mexico	38,984	USA	90,530	USA	84,000	Argentina	91,000
4	China	37,000	Mexico	65,245	Mexico	71,114	Turkey	63,500
5	India	35,000	India	45,000	India	50,500	Mexico	56,844
6	Argentina	25,000	Argentina	37,600	Turkey	40,000	Ukraine	52,000
7	Germany	23,829	Canada	29,235	Argentina	39,000	India	51,000
8	Canada	23,152	Turkey	25,170	Canada	33,000	Russia	50,000
9	Australia	22,258	Australia	2,4954	Germany	32,000	Canada	32,000
10	Turkey	14,889	Germany	14,907	Australia	28,200	Spain	32,000

Source: (FAO Production yearbook, www.fao.org)

which, besides the technical guidance, training and apicultural propaganda activity, was also directed towards the production of economic activities through the Beekeeping Association, which facilitated the endowment and supply of beekeepers and the valorization of the products obtained by them; the establishment in 1971 of the Centre for Beekeeping Studies, Design and Education, subordinated to the Association of Beekeepers Association in Romania; the establishment in 1974 of the Research Institute for Beekeeping, within the Association of Beekeepers Association in Romania.

In 1958, the Beekeepers Association of Romania became a member of the International Federation of Beekeeping Associations - APIMONDIA.

The most resounding event for Romanian beekeepers for that period was the organization in Bucharest, in 1965, of the 20th International Jubilee Congress on Apiculture. Thanks to the international recognition of the results of the beekeeping activity in Romania, Prof. Ph. Veceslav Harnaj, president of the International Federation of Beekeeping Associations - APIMONDIA was elected as President. She held this position for 20 years. In the same time, as a result of the confidence he had in the forces and capacity of the Romanian association, the Romanian government approved, at the request of the International Federation of Beekeeping Associations, the authorization to establish in Romania the International Institute of Apiculture, Technology and Apiculture and the APIMONDIA Publishing House.

In 1965, according to FAO statistics, Romania, with a honey production of 7,718 tons, produced over 1.08% of world honey production and ranks fourth in Europe, located after the USSR, Germany and Spain. In 2015 with a production of 27,893 tons of honey, Romania held over 1.52% of world production, ranking fifth place in Europe after the Russian Federation, Ukraine, Spain and Hungary.

The transition to a post-December 1989 market economy has affected beekeeping in a significant way, but fortunately, the impasse has been overtaken in a short while, covering step by step, the differences.

The apiculture sector (state, about 20 beekeeping and cooperative farms, 15% of the national beekeeping patrimony), similar to all sectors of economic activity, has disorganized, which has resulted in the abolition of many apicultural farms and the reduction and loss of flocks. In addition, the mirage of making immediate profits from other activities has led in many cases small beekeepers to abandon the practice of beekeeping. These are the main causes that have led to a fall in the number of bee families, as shown in Table 3.

The evolution of the beekeeping patrimony of Romania recorded, during 1990-2003, three distinct stages (Chirilă & Patruică, 2005), namely:

- **Stage 1990-1993:** When the apicultural heritage almost halved, with 638 thousand bee families disappearing, especially from the former state and cooperative beekeeping units;
- **Stage 1993-2000:** When more than 166,000 bee families entirely disappeared from the apicultural heritage, entirely from the private sector. Summarized, the total losses in the two stages amounted to 804 thousand bee families;
- **Stage 2000-2003:** When there was an increase in beekeeping stock with 225 thousand families of bees, with an average annual growth rate of 75 thousand families.

In the difficult period of transition, the Association of Beef Breeders in Romania, already reorganized into a territorial structure on counties, incorporating the vast majority of bee breeders from all over the country, played a decisive role. At the level of each county branch a commercial company operates, which takes the apiculture products made by the producers into its own apiaries and ensures the supply

Table 3. Evolution of bee herds and honey production during the transition period

Years	Families of bees (thousands)	Honey production (tons)	Average production for a family (Kg)
1989	1,418	12,124	8.50
1990	1,201	10,579	8.80
1991	1,091	8,279	7.60
1992	1,207	10,410	8.60
1993	780	9,936	12.70
1994	759	9,820	12.90
1995	747	10,434	13.90
1996	696	11,157	16.00
1997	656	10,543	16.10
1998	626	10,199	16.30
1999	620	11,153	18.00
2000	614	11,746	19.10
2001	745	12,598	17.00
2002	781	13,434	17.20
2003	849	19,007	22,40

Source: (Association of Beekeepers)

of the beekeepers with equipment, plants and apiculture materials made by S.C. Beekeeping complex S.A. and S.C. Institute for Development of Beekeeping S.A.

Romania's accession to the grand family of the European Union (EU) was a test of success for the apiculture sector in Romania (European Union (EU): Council Regulation (EC) No. 834/2007, 28 June 2007). The entrepreneurial spirit (Popescu, Popescu, & Popescu, 2014; Popescu, Popescu, & Popescu, 2017) of beekeepers, cultivated and transmitted from generations, has allowed the appropriation and capitalization of the opportunities offered by the Common Agricultural Policy (CAP) of the European Union. EU directly supports the beekeeping sector since 1997 (Regulation (EC), 1997). The successive rules for supporting beekeeping have allowed Member States to develop their own national programs. In this favorable context, they sought to capitalize on the national beekeeping potential for the production and marketing of apiculture products. Programs co-financed by the European Union in a percentage of 50% for successive three-year periods have also allowed the diversification of apiculture products. Besides honey production, they have increased significantly the quantities of royal jelly, pollen, propolis, venom or beeswax. The three-year plans of the EU have imposed a greater transparency on the financing, production and marketing of apiculture products. According to the 2016 Report (COM, 2016) with a production of around 250,000 tons / year, the EU is the second largest producer of honey after China. However, the EU does not produce enough honey to cover its own consumption. In 2015, the percentage of self-supply was around 60%. In this context, through its policies, the European Union imposed an almost continuous increase of its production of honey, with small deviations of the very unfavorable crop years. However, for beekeepers, maintaining this level of production can not only become much more difficult, but even impossible. The explanation is found in the new challenges that the beekeepers have to face, both in terms of the health of bees and the loss of their habitat due to agricultural intensification,

which does not always comply with environmental standards. The immediate consequences are found primarily in higher production costs, which favor imports of cheaper honey from third countries, but often much weaker in terms of quality. This process inevitably leads to increased competition, otherwise positively, if it is not detrimental to the quality of apiculture products.

In Romania the beekeepers acceded to the quality requirements imposed by the European Union producing quality organic honey. Regarding the quality of honey, the European Commission adopted a series of measures to control severe content of antibiotics, pesticide, insecticide and fungicides, heavy metals, residues of veterinary medicines and generally full range of residues which can really put in danger the consumer health (Bura, 2010). With the 2013 CAP reform, the legal basis for supporting beekeeping has improved. The eligible measures have been adapted to the changing needs of the sector and the methods of allocating EU funds to the Member States, based on the number of hives, have been optimized. Out of the eight eligible beekeeping measures of the reformed Common Agricultural Policy, five of them directly or indirectly fund the quality and the attestation of quality in the production and marketing of apiculture products. These programs concern: technical assistance to beekeepers and beekeepers' organizations; combat aggressors and hive-related diseases, especially varroosis by ecological methods; measures to assist beekeepers' analysis laboratories to help beekeepers to harness and to market their products; extensive measures to include analysis of other bee products, such as royal jelly, pollen, propolis or beeswax ; cooperation with specialized bodies for the implementation of applied research programs in the beekeeping and bee products for conservation and the best use of bee products; improving the quality of products in order to better market their products. A segment currently insufficiently exploited in the European market is the production and marketing of organic honey. "Eco-friendly" honey must comply with Regulation (EC) no. 834/2007. In accordance with the requirements of this Regulation, organic honey must be obtained strictly under environmental conditions, both from the point of view of the environment and production. The requirements of that Regulation provide for the following rules: bees must be treated exclusively with veterinary medicinal products containing only approved organic substances; hives must be placed exclusively in a clean area where, within a radius of 3 km, there is no contamination with chemicals from industrial complexes, airports or high-traffic roads; hives must be built only from natural materials; the chemical treatment of agricultural holdings in the area is strictly forbidden; the artificial feed provided to bees must be certified as ecologically organic.

Some unethical trade mechanisms, including honey washing or re-labeling, have imposed new labeling rules on honey marketed in the European Union. For more certainty regarding compliance with the European Commission Regulation, European buyers set up a working group within the International Federation of Apiculture Associations (Apimondia, 2016) to monitor and prevent unfair trade.

It should be noted that apiculture, as an economic sub-branch of agriculture (Bradbear, 2009), represents on one hand a very practical and extremely useful occupation for the rural population, and on the other hand a form of increasing people's income or even of generating a constant profit if transform in some sort of business (Hall, & Vredenburg, 2003; Hall, Daneke, & Lenox, 2010).

Moreover, in this particular context, the strategy of combining several types of interests, such as the economic and environmental ones, prove to be extremely important (Cohen, & Winn, 2007): first of all, by improving beekeepers' strategies by helping them to find new ways to sell their healthy products on different markets their income will grow (Dean, & McMullen, 2007), and, second of all, by encouraging this type of entrepreneurial behavior sustainable (Gibb, 1996) and ecological development will be generated on the long run (Brugmann, & Prahalad, 2007).

Furthermore, weather the focus is on bee honey production in Romania (Antonie, 2016; International Federation of Beekeepers' Associations (Apimondia): Apimondia, 2016) or somewhere else in the world (Ene, 2015), in order to develop an entrepreneurial behavior in the beekeeping sector by taking into consideration elements such as international prosperity, sustainable development and ecological growth by meeting human development goals, the managerial aspects should be taken into account as well (Regulamentul (CE) nr. 1221/97 al Consiliului, 1997). In this context, sustainable development, regarded as a universal concept, which has currently become the primary goal of all individuals worldwide as well as the fundamental issue on the agenda of all governments on the planet, implicates at its managerial level the following key aspects which are interrelated: first of all, sustainable development relies today on the countries' economic development, and second of all, the process of economic development can be considered as an advantage for the human race in terms of sustainable development only if it implicates also social development, emphasized in its turn by the constant concern for environmental protection, cultural development, planet's preservation and biodiversity, national, regional and international good quality in terms of security development and assurance (Raport COM(2016) 776 al Comisiei către Parlamentul European și Consiliu cu privire la punerea în aplicare a măsurilor privind sectorul apicol prevăzute de Regulamentul (UE) nr. 1308/2013, 2013).

However, the struggle for sustainable development needs to be seen far more than the simple transition process from the industrial society to the new economy, focused on cultural and ecological development as well as on information as part of the knowledge-based society. The managerial implications generated by the struggle for sustainable development refer to finding solutions in order to eliminate financial, economic, social and demographic crisis, poverty, pollution, migration and work-uncertainty, with a clear aim of returning to traditional values, which in this particular context are related to apiculture, bee honey production, beekeepers' strategies.

METHODS OF EVALUATION AND MEASUREMENT OF THE ECONOMIC, ENVIRONMENTAL AND SOCIAL PERFORMANCES OF APICULTURE IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

Harmonious Development: A Desideratum of the Present Age

About the need for harmonious development there have been many concerns over the last decades. These were in various forms and were meant to shoot more or less alarmed signals. Thus: In 1962 in the "Silent Spring" work, the author Rachel Carson, biologist, describes, in an imaginary way, a possible ecological catastrophe of massive proportions. (Carson, 1962)

The "Limits to Growth" report, published by the Club of Rome in 1972, predicts an apocalyptic decline as a result of the depletion of non-renewable resources; the first non-governmental ecological organizations such as the Earth Friends (1971) and Greenpeace (1971) appear to be involved in the fight for environmental protection; There is a visible similarity between the concept of Eco development, a term widely used during and especially after the 1972 United Nations Conference on Environment held in Stockholm and those of Sustainable Development; Although the United Nations Environment Program in 1975, which debated the report - What to do - another way of development - had a weak echo, The United Nations has given a mission to the World Commission on Environment and Development, led by Mrs. Harlem Brundtland, to conceives a "global change program". In 1987 was discussed and

published the Brundtland Report, "Our Common Future", during which the concept of "zero growth" was replaced with "sustainable development". Although there are currently more than 1,000 definitions of this concept, the one that enjoys the widest international acceptance is the one in the Brundtland Report, which defines sustainable development as the development that ... *meets the needs of the present without compromising the ability of the next generation to meet their own needs*. Sustainable development includes at least two important ideas: Development has an economic dimension, a social dimension and an environmental dimension; the current generation has an obligation for the next generation to leave enough "stocks" of economic, social and environmental resources to enjoy levels of welfare at least as high as they are today.

Development will be sustainable only if there is a balance between these factors, which contribute to the overall quality of life, in the sense of changing the quality of economic growth in order to make it more bearable for both man and the environment.

In the Tokyo Final Statement of the United Nations Commission on the Environment and Development of 27 February 1987, all the nations of the world were invited to integrate sustainable development into their objectives by: revitalizing economic growth; conserving and improving the resource base; ensuring a sustainable population level; strengthening international cooperation. After 1987, progress in the development of sustainable development concepts was visible, continuous and rapid.

Indicators of Sustainable Development for Romania With Impact on Beekeeping

Defined, available and capitalized to assess the achievement of the targets set by the National Sustainable Development Strategy for the years 2013, 2020, 2030, the 103 Sustainable Development Indicators are structured on the Strategy's objectives and are hosted in: 19 level 1 indicators, as indicators main (basic); 37 Level 2 indicators, as complementary indicators for monitoring and reviewing sustainable development programs and 47 level 3 indicators, as progress indicators.

Among them, we have presented and analyzed those whom we considered to be able to directly or indirectly influence apicultural act in general and ecological beekeeping in particular. The dynamics of these indicators is presented in Table 4.

A brief presentation of the impact of these indicators on beekeeping activity:

Table 4. Indicators of sustainable development of Romania with impact on beekeeping activity

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
O1-1	9.00	4.80	8.70	8.50	10.30	-6.30	-0.20	1.60	1.10	3.90	3.50
O2-1	132,803.51	129,128.11	130,839.92	130,322.44	125,297.14	107,085.23	100,559.05	105,358.64	104,611.40	93,604.31	93,249.00
O3-9		4.29	4.23	3.79	4.07	3.95	3.73	3.87	4.20	3.78	3.50
O4-10			0.80	1.00	1.00	1.20	1.40	1.70	2.20	2.30	2.20
O4-14		4.29	4.23	3.79	4.07	3.95	3.73	3.87	4.20	3.78	3.50
O5-3	4.38	4.40	4.46	4.51	4.54	4.59	4.69	4.77	4.78	4.82	4.82
O6-10				34.50	31.30	34.90	31.50	28.00	27.10	26.50	

Source: (National Institute of Statistics on-line: http://www.insse.ro/cms/ro/content/indicatori-de-dezvoltare-durabila -22.09.2017)

- **O1_1. GDP Growth Rate per Capita:** Growth may favor honey consumption;
- **O2_1. Total Greenhouse Gas Emissions:** Growth can favor unfavorable climate change;
- **O3_9. Emissions of Suspended Particulate Matter from Shipment:** Growth is not favorable to bees;
- **O4_10. Share of the Area Grown Ecologically in the Agricultural Area Used:** Growth can help increase organic honey production;
- **O4_14. Total Emissions of Particulate Matter:** Growth is not favorable to bees;
- **O5_3. Surface of Artificial Space as% of Total Area:** Growth is not favorable to bees;
- **O6_10. Proportion of the Population that Believes that Households Suffer from Noise:** Growth is not favorable to bees.

Analyzing the dynamics of these indicators over the last decade, we find that their evolution generally favors the growth of bees, with the exception of the unfavorable increase in the share of artificial space (O5-3 indicator).

Relevant Indicators for Measuring Social, Economic, and Environmental Impacts in Beekeeping

In order to assess the social economic and environmental impacts, it is necessary to use a system of characteristic indicators. Defining and using this indicator system is not an easy operation, as it is a complex and lasting process involving efforts from several interested parties: businesses or civil society organizations, expert groups, research centers, international financial institutions, etc.

Although at the 1992 World Summit of the Earth Summit in Rio de Janeiro, it has come to the conclusion that the development of unitary means of measuring the level of sustainable development is vital to the success of its implementation. The most difficult issue was the establishment of a set of indicators of sustainable development, with general applicability.

A meeting of experts was set up in Bellagio, Italy in November 1996, in order to develop and solve this problem, which set out a set of principles on the selection, integration and interpretation of sustainable development indicators. These principles, guidelines, which apply uniformly, and represent a pragmatic expression of the most important features of the concept of sustainable development, refer to: Vision and guiding objectives; Holistic approach; Essential elements; Pragmatic orientation; Efficient communication; Continuous evaluation.

The purpose of these indicators is that through representativeness and replicability it allows to monitor and evaluate the different aspects of sustainable (ecological, social and economic) development and to provide concrete information from which economic policies can be used to self-check and correct.

In connection with the above principles to identify specific and relevant indicators that reflect the social, economic and environmental impact of bee activity in Romania we study several sources. The most important ones are:

- **Romania's Sustainable Development Indicators:** Managed by the National Institute of Statistics: we did not identify any indicators containing analytical data on the economic, social or environmental impact of beekeeping activity and its results; but many indicators have been identified that can dynamically influence them for good or bad beekeeping activity; they were previously presented in the material;

- **In the Literature (Daly, 1990; Rennings & Wiggering, 1997):** It is appreciated that the rules linking economic and environmental concepts in the context of sustainable development refer to: the rate of exploitation of renewable resources should be equal to that of their regeneration; the waste generation rate must not exceed the absorption capacity of the ecosystem in which the waste is stored; non-renewable resources must be exploited in a sustainable way, i.e. their consumption rate must not exceed their substitution rate through renewable resources. And the social dimension of sustainable development requires a fair distribution of opportunities between generations, which can be reflected both by GDP and employment, as primary macroeconomic indicators but also by the population health status index;
- **From the Performance Report List, Developed by the Global Reporting Initiative (GRI) in the G4 Sustainability Reporting Guidelines:** (https://www.globalreporting.org/information/g4/Pages/default.aspx; https://www.globalreporting.org/standards), which although has a somewhat different approach to corporate social responsibility, these issues are reflected by economic, legal, ethical and philanthropic indicators, relevant indicators can be identified for the economic, social and environmental impacts, even if they are presented as indicators reflecting legal, ethical or philanthropic aspects according to GRI classification.

In line with the above, we have identified as relevant for reflecting the economic, social and environmental impacts the following indicators:

1. Economic impact, reflected by:
    a. Generated and distributed direct economic value, including revenue;
    b. Significant financial assistance received from the Government;
2. The social impact, reflected by:
    a. Education, counseling training;
    b. Addressing public policies and participating in their development (lobbying);
    c. Lifecycle stages in which they are being evaluated to improve the impact of products and services on the health and safety of citizens;
    d. Significant financial assistance received from the Government;
3. Environmental impact, reflected by:
    a. Land owned, leased or administered;
    b. Describe the significant impact of activities, products or services on protected areas or other biodiversity rich areas;
    c. Programs for adhering to laws, standards and voluntary codes;
    d. Significant financial assistance received from the Government;

These indicators will be presented and further analyzed.

APICULTURE FROM ROMANIA: PREZENT AND PERSPECTIVES

Romanian Beekeeping: Opportunities and Threats

Beekeeping as a branch of animal husbandry in terms of absolute value has small compared to other sub-branches of livestock production in the national economy. However, the economic importance of bee products is much higher if we consider increasing their value through industrialization, use as a raw material in the manufacture of many food products, medicines, energetic vitalizing, cosmetics, and many others. Let's not forget that one-third of the food we eat is obtained from bee pollinating. It's about vegetables, fruits, field crops, with which we feed ourselves (Mateescu, 2015).

Since apiculture is far from reaching the maximum level of development, we will continue to analyze the types of beekeeping holdings and then make a SWOT assessment to identify sustainable development mechanisms.

If the small beekeepers who practice a degree of pleasure as mentioned in the literature (Bura & Patruică, 2005), the types of apicultural holdings and their characteristics in Romania are presented in Table 5.

The SWOT analysis method (Strengths, Weaknesses, Opportunities and Threats) is designed to determine the current situation of beekeeping in Romania. The aim is to identify the strengths and disadvantages of Romanian beekeeping, in order to determine the actions that should be taken and the measures to support the development that can be taken, taking advantage of the opportunities.

The results of the SWOT analysis are presented below.

- **Strong Points:**
  - Variety of natural conditions, with relief, which is part of three different categories: plain, hill and mountain, with micro-zones specific to the Danube Delta and meadows;
  - Substantial, insufficiently capitalized apical potential;
  - The existence of a long tradition;
  - Attracting young people to beekeeping;
  - Increase honey production on the bee family and reduce costs per unit of product;

Table 5. Types of beekeeping holdings in Romania

The type of the apiary	Small	Middle	Large
Category of beekeeper	Amateur	Semi-professional	Professional
Type of holding	Family management.	Farm.	Farm or commercial company.
Families of bees in maintenance	Minimum 50.	51-150 in Romania.	Over 600.
How to ensure reproductive material	Through own growth or acquisition activities.	By purchase from specialized units.	By purchase from specialized units.
Workforce	Its own.	Its own / Employed.	Employed.
Hours of work	Usually on weekends.	Under 2000.	Between 2000-2400.
The purpose of production	Completing the family budget, occasional spare time.	Profit, services (pollination).	Subsistence, services, profit.
The legal regime	Physical person.	Natural or legal person.	Legal person.

Source: (Processing after Bura & Patruică, 2005*)*

- Switching from amateur to professional apiculture;
- Combining tradition with elements of modernity.

- **Weaknesses:**
  - Existence of a high percentage of the aging population;
  - Reducing the employment of the population and shifting the population to other countries, especially to get jobs;
  - Using an insufficient number of modern technologies both in terms of increased production and recovery of by-products;
  - Generating a low-value production in general through the disappearance of honey-producing factories, which is exported in a natural state even to large honey producing countries that mix it with their own to increase quality;
  - The low economic power of the rural population, which also has low mobility and low productivity of work;
  - Dependence on manual labor and the whims of weather.
- **Opportunities:**
  - Access to the internal market of the European Union;
  - Increasing the use of computer communication technologies (ICT);
  - Transfer of technology and know-how;
  - Developing entrepreneurship;
  - Orientation of educational programs, training and training to specializations in the fields of beekeeping, especially in terms of preparing mature persons;
  - Developing civil society and civic spirit to protect the environment;
  - The development of organic farming, based on the existence of favorable land in our country, for which no chemical fertilizers were generally used;
  - Regeneration of rural communities;
  - Facilities for agricultural associations;
  - Increasing the number of environmental protection investments;
  - High potential for tourism development in the conditions of increased demand in the field of mountain, ecological, cultural and balneoclimat tourism;
  - Increasing interest in the concept of sustainable development that assures development at all three levels: economic, social and environmental;
  - Accessing non-reimbursable funds;
  - Apply new methods of growing and maintaining bee families;
  - Rational widespread practice of pastoral graduation;
  - Genetic improvement of Romanian bees;
  - Intensification and diversification of production;
  - Ensuring the quality of production and harmonization of the local legislation with the
  - European Union regulations;
  - Acceleration of the process of concentrating bee-breeding activities and capitalizing on apiculture products.
- **Threats:**
  - Number of population is decreasing;
  - Migration of young people to urban areas;

- Increasing the imbalance between supply and demand on the labor market and the unequal distribution of income by category and gender;
- Insufficient use of existing potential;
- Lack of entrepreneurial culture;
- Lack of capital to support investments in the economy;
- Slowing the development and diversification of the rural economy;
- The low process of modernization and restructuring of agriculture;
- Fragmentation of agricultural holdings;
- Import of unsuitable bees for the conditions in our country and the loss or weakening of the Romanian bee;
- The emergence of new diseases and pests of bees brought from other areas;
- The import of surrogate surplus honey, which is incorrectly labeled, which is used by hypermarkets.

As it emerges from the SWOT analysis, the melliferous base of Romania is unique and as such the growth and developmental strengths of the beekeeping activity will allow its sustainable development in the future.

Moreover, by being able to manage the sustainable development impact approach of beekeeping in Romania, certain elements will prove to be of extreme necessity in order to ensure this type of business' success on the long run, especially because this type of business should be regarded from this point on as extremely innovative, timely and with a simple and practical style:

- First of all, the sustainable development impact approach of beekeeping in Romania should be regarded and treated as an integrated management approach, which can be used across a wide range of sectors and domains, in a variety of contexts, such as in the medical field, food industry, and biomass technology production;
- Secondly, the sustainable development impact approach of beekeeping in Romania should be regarded and treated as a results-oriented management approach due to the fact that it addresses most pressing concerns such as pollution, poverty, and resources' scarcity;
- Thirdly, the sustainable development impact approach of beekeeping in Romania should be regarded and treated as a possible mean to contribute towards the sustainable development goals due to the fact that it has a people-oriented approach which is capable to integrate and interconnect specific managerial processes such as planning, strategizing, monitoring, and evaluating.

INDICATORS WHICH REFLECTS THE ECONOMIC IMPACT OF BEEKEEPING IN ROMANIA

As mentioned above, the main indicators reflecting the economic impact of beekeeping activity are:

- **MexT: Honey Extracted in Tons:** The dynamics of this indicator is reflected in Table 6.
- **VpaM: Income Obtained by Beekeepers at Purchase Price Thousand Lei:** The dynamics of this indicator is reflected in Table 7.

Table 6. Honey extracted in tons

Years	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
MexT	17,409	19,150	17,704	12,576	15,106	16,250	15,202	15,184	11,593	13,443	14,861

Source: Processing by the National Institute of Statistics: Statistical Yearbook of Romania 2009 and 2014

Table 7. Income from the sale of honey (thousand)

Years	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
VpaM	130.219,3	128.496,5	72.586,4	54.076,8	68.732,3	99.937,5	117.359,4	133.467,4	115.814,10	134.967,7	170.307,1

Source: Processing by the National Institute of Statistics: Statistical Yearbook of Romania 2009 and 2014

INDICATORS REFLECTING THE SOCIAL IMPACT OF APICULTURE IN ROMANIA

The main indicators reflecting the social impact of apiculture activity are:

- **AlMf: Bees (Thou Families):** The dynamics of this indicator is reflected in Table 8.
- **Education, Training:** Beekeepers who are part of professional associations have beekeepers certificate and participate in continuous professional training.
- **Approaching Public Policies and Participation in Their Development (Lobbying):** Out of about 40,000 beekeepers over 50% are registered with the Association of Romanian Beef Breeders (ACA) founded in 1958, they own over 75% of the bee families. The other members belong to several hundreds of beekeepers' associations; this division makes it difficult to define coherent policies for the common interest of beekeepers, as decisions are not made according to the number of bee-keepers or bee families (Fetea, 2015).
- **Life Cycle Stages Where they are Evaluated to Improve the Impact of Products and Services on the Health and Safety of Citizens:** Products derived from honey but also from propolis by-products, bee venom, pollen, royal jelly, and many others, carried out by the Institute for Research and Development for Beekeeping have the necessary attestations obtained, as the case may be, from the National Medicines Agency or the National Technical Committee for Medicinal, Aromatic and Stupin Products (Mateescu, 2015).

Indicators Reflecting the Environmental Impact of Apiculture Activity in Romania

- **EaHa: Agricultural Holdings in Hectares**: The dynamics of this indicator is reflected in Table 9.

Table 8. Bees (thousands of families)

Years	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
AlMf	840	888	888	891	892	998	1,057	1,275	1,250	1,254	1,354

Source: Processing by the National Institute of Statistics: Statistical Yearbook of Romania 2009 and 2014

Table 9. Size class of agricultural area in use (hectares)

Size class of agricultural area in use (hectares)	Bees		
	2005	2007	2010
under 0.1	9,368	4,547	6,296
0.1-0.3	4,081	3,566	5,452
0.3-0.5	1,850	1,328	2,605
0.5-1	5,267	3,840	4,420
1-2	7,157	6,985	6,456
2-5	14,208	10,809	10,677
5-10	7,081	6,036	4,640
10-20	2,504	1,804	1,490
20-30	374	348	315
30-50	224	287	228
50-100	189	108	156
over 100	94	82	129

Source: Processing by the National Institute of Statistics: Statistical Yearbook of Romania 2009 and 2014

- **Adherence to Laws, Voluntary Standards and Codes:** The vast majority of beekeepers voluntarily accepted the quality control of honey delivered to the association. They have also aligned themselves with the voluntary requirements of EU environmental standards in the field. Romanian honey enjoys a high appreciation in the EU.
- **The Description of the Significant Impact of Activities, Products or Services on Protected Areas or Other Areas Rich in Biodiversity:** Bees by pollination contribute to the maintenance and development of biodiversity. Nectar that is picking bees would be lost. So the bees do not affect the environment in which they act.
- **Education, Training:** Beekeepers who are part of professional associations have beekeepers certificate and participate in continuous professional training.

The Synergistically Impact on Economic, Social and Environmental of Attraction and Use of Grants

Beekeepers in their professional associations have attracted and capitalized over 99% of European funds allocated from their grant to date. They have been used according to the eligibility requirements for: increasing the number of bee families, verifying and improving quality; procurement of equipment.

The social, economic and environmental impact of ecological beekeeping in Romania represents an innovative as well as a timely activity, which is seen both as a people-centered approach due to the fact that it has a profound impact in the sustainable development era and as a simple and practical business due to the fact that it has the potential to attract the younger generation support and involvement. In addition, only by being able to understand the social, economic and environmental impact of ecological beekeeping in Romania, the sustainable development practitioners will be helped to address the complexity of planning, strategizing, monitoring, and evaluating the development initiatives that this business requires. Moreover, the synergistically impact on economic, social and environmental of attraction and use of

grants has the power to enrich the management process as well as the management process approach in order to increase in time the importance of this dynamic process. Furthermore, the synergistically impact on economic, social and environmental of attraction and use of grants has the power to guide and improve practice as well as build learning tools and strategies for the near future, which could prove to be the basic steps to manage the need for the sustainable impact in a correct manner.

However, the synergistically impact on economic, social and environmental of attraction and use of grants should inspire every person interested in how to manage a business in a practical, useful and effective way to think and work differently, by taking into consideration key aspects, such as: good and efficient management mainly oriented on the development impact and on the effective practice; independent international business based on ecological principals, focused on attracting wise investments, capable to generate effective practice flows which are founded on a solid ground of constructive use of information and knowledge; adaptability from understanding and engaging in complex line of businesses in more dynamic and competitive international economic, financial and social systems; integration elements, which are part of a comprehensive framework, having a complex strategic design, delivering not only profit but also respect and genuine concern to nature itself and people worldwide.

FUTURE RESEARCH DIRECTIONS

By analyzing the distribution of beekeepers and bee families on the eight development areas of the country, it is possible to identify an inverse correlation between employment and apiculture development in those areas. Beekeeping can be a real lifeline for those who cannot find a job. Although specialists estimate that beekeeping is only profitable after 3-5 years, it does not involve very large investments, and who is attracted to this activity can learn relatively quickly. In addition, there is a very good training infrastructure and the lack of workforce allows for an effective apprentice. It is also preferable that the proportion of bee families and beekeepers be lower in highly industrialized and polluted areas.

But, perhaps the most important aspect is represented by capitalizing on new sustainable energy resources, even finding new energy resources. We can think of fuel obtained in the form of peat, wood or non woody biomass, water from rivers, lakes, and groundwater (Xiangzheng, Zhihui, Jikun, Qingling, & Yanfei, 2013). Biofuels must be in the future very useful for food, energy, and, generally speaking for entire environment. This is a pressing necessity for a global review, influencing subsequently, of the impact of so called ”Land Use Changes” on a series of biodiversity and ecosystem services, that will help avoid environmental harm, maintaining with a lot of care the biodiversity, referring especially to the impacts of the wellbeing human, major changes who alter already the entire ecosystem by his effects of negative effects in climate, human population, land use, water use, and who must be managed with a lot of attention by researches. It is why they have to create and implemented a set of thorough based on normative method, in order to estimate ecosystem services values and improve the accuracy of assessment results. On the other hand they need to begin an in-depth process-based analysis of the relationship between human activities and ecosystem services function. And, in the same time, they have to consider as an urgent requirement the promoted and the application of ecosystem services values in various aspects of production, livelihood, and government decision-making all of these measures serving eventually the human wellbeing (Euliss, Jr., Smith, Liu, Feng, Mushet, Auch, & Loveland, 2010; Jordan & Warner, 2010).

In addition, in terms of future research directions, other numerous elements need to be taken into account and should be mentioned in the lines below: first of all, one focus could be on the entrepreneurial methods concerning beekeeping activity and bee honey production business that should be analyzed in terms of profit growing by focusing on today's the new trends based on the increasing compliance with the requirements of ecology, sustainable growth, and sustainable development by enhancing with priority bio-diversity and bio-productivity; second of all, the beekeeping activity and business could be analyzed by focusing on its natural resources, means and current solutions able to generate economic efficiency and social equality in turbulent times such as the ones that humanity are facing nowadays; third of all, the beekeeping activity and bee honey production business could be analyzed by focusing on facilitating individuals' access to beekeeping education in terms of becoming more and more aware of the benefits of this line of work as well as of this type of business, by attracting in this way people interested in investing in this type of process which can offer, in time, effective means capable to generate money in a sustainable way, focusing on the young generation's participation as well as on the social, ecological and cultural aspects of life (Popescu, 2017).

Therefore, the specialists from all fields of activity should join their forces in order to further analyze, develop and improve the research on the social, economic and environmental impact of ecological beekeeping in Romania as well as at an international level. As a general idea, it should be mentioned that by emphasizing the social, economic and environmental impact of ecological beekeeping in Romania as well as at an international level in other works, new trends and new ways of managing the sustainable development impact approaches will be born as well as new and improved integrated, results-oriented approaches will emerge. So, it should clearly be stressed the fact that the research on the social, economic and environmental impact of ecological beekeeping in Romania as well as at an international level should represent the specialists' collaborative and participatory engagement to useful means of generating new information and knowledge capable to bring the latest research and insides concerning the subject of sustainable and ecological growth and development, focusing on bringing benefits to both people and nature as a whole.

CONCLUSION

The beekeeping activity in Romania, which has continued for millennia, has experienced both moments of glory when it was able to satisfy its internal requirements but also to capitalize on its export products, as well as the turning points such as those at the end of the Second World War as well as the end of the current transition. There have always been the resources to overcome these more difficult moments.

Being recognized as a safe and healthy food, having a very long history of consumption worldwide, due to its excellent conservation quality, honey can certainly be considered as a regular and necessary food for families, as well as a household drug. In addition, a real advantage is that beekeepers do not require their own land, so even a landless farmer can practice it, thus benefiting from its multiple properties and uses. Since apiculture exploits the available resources of any area cultivated a few kilometers of hives, the most important aspect for a beekeeper is to have access to a space large enough to place its own hives. Even in ours days, both traditional and modern approaches to beekeeping are used everywhere is possible in our country. Being crucial to the conservation and sustainability of the ecosystem, beekeeping offers natural pollination, future food security, high income generation, medicinal products, and many valuable new research opportunities. Due to pollination by bees, the increase and improvement of the

quality of Romanian agricultural products, as well as the essential effects generated by the pollination process in ecosystems, are constantly increased, aiming not only at preserving them but also searching for new ways of expanding them. Honey is a product easy to sell as long as it has a very good and stable reputation along the years. If its reputation become doubtful due to an irresponsible way of being produced or even preserved, selling and capitalizing on them will generate great difficulties, which will be very hard to be hard to overcome by their producers and even harder to forget in time by their buyers. In order to avoid such possibility, it is very important that the participant farmers to be informed and educated to be aware such that the signification and the importance of their product's quality.

Today the Romanian beekeeping by the quality of the honey and the by-products obtained has a good reputation in Europe and the world and is fully adapted to market requirements and conditions. The activity of bees and beekeepers is beneficial to agriculture, the environment and society. The economic, social and environmental impact was highlighted by the set of financial and non-financial indicators that were presented and analyzed. The socio-economic restructuring known by Romania over the past 27 years has created particularly favorable conditions for the development of ecological beekeeping, unfortunately not enough exploited on the European Union market.

Moreover, the beekeeping activity and bee honey production business represent the key to develop new socio-economic strategies, with the aid of effective consumption and effective means of transportation, which could lead to saving people from the following problems: first of all, hunger and poverty due to the process of implementing undeniable methods to increase the importance of this business especially with the young generation's participation; second of all, certain illnesses due to the undeniable properties of honey discovered a long time ago by specialists in the medical field, which strongly recommend the use of honey for the health services; third of all, pollution due to the undeniable methods of honey production which first and foremost do not harm the environment and second support natural improvement, biotechnology, sustainable growth and development.

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KEY TERMS AND DEFINITIONS

Bee Families: Represent number of bee families for honey production.

Beekeeper: Is the amateur or professional who is involved in raising and nurturing bees. Beekeepers enrolled in the professional associations of beekeepers must be certified by graduating courses organized by professional associations and carrying out a practical apprenticeship in an apiary under the guidance of an experienced beekeeper.

Beekeeping: It is a branch of animal breeding that cares for raising and nurturing bees.

Economic Welfare: Aims to generate a maximum revenue stream through maintaining in time the capital that has produced these benefits.

Environmental Protection: From the point of view of sustainable development, it aims to preserve the biological and physical stability of natural systems.

Honey: Is the main product obtained from the growth of bees. Its quality is dependent on the quality of the environment from which it was harvested and the health of the bees. Honey can be classified into multiple varieties depending on the single or predominant plant from which it originates.

Honey Base: Is the total number of honey plants within the useful activity range (3 km or 2,800 hectares) of bees and provides the raw material necessary for their survival and development.

Self-Supply: Is the ratio of domestic honey production to total consumption.