A Comparaison of Beekeeping Sectors between Slovakia and Romania

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ABSTRACT

Beekeeping sector plays an essential role in agriculture for two main reasons: the process of pollination and the production of honey and other apicultural products. The aim of the paper was to analyse and compare beekeeping sectors between Slovakia and Romania in terms of honey production, market competitiveness and EU funding budget allocation. The secondary data used in the analysis were provided by European Commission reports, the Romanian Institute of Statistics, Slovak statistics, Central Register of Hives in Slovakia, Faostat and Trademap. The competitiveness in honey market was calculated using RCA indices and the Michaely index. Results show that the number of hives as well as honey production increased, while market competitiveness decreased. In conclusion, national beekeeping programmes provide financial support for beekeepers and foster the whole sector, therefore the European Union should continue implementing these programmes to stabilize this sector and increase production capacities in both countries.

Keywords: *Beekeeping sector, RCA indices, Romania, Slovakia*

INTRODUCTION

Beekeeping is defined as an agricultural sector, which ensures sustainability of ecosystems and rural development involving also the production of honey and other bee products (Levický and Gurčík, 2014). The main indicators for the beekeeping sector are the number of beehives, the proportion of professional beekeepers and honey yields (Chlebo, 2017). Furthermore, beekeeping sector plays an essential role in agriculture because of the pollination process and, in addition, ensures the production of honey and other apicultural products. Worldwide, *Apis mellifera* is the crucial pollinator for monoculture (Klein *et al.*, 2007) as honeybee can reach relatively long distance and possesses effective foraging behaviour (Künast *et al.*, 2011). Pollination depends on the population of bees and any decrease of the population in the

future may cause both ecological and economic problems in terms of ecosystems sustainability and food security (Opera Research, 2010). A significant reduce of the pollinators population can create a “pollination crisis” at a global level (Jacques *et al.*, 2016).

After a significant loss of the bee population in Europe, the European Union realized that this sector is confronted with an urgent crisis and decided to start the implementation of beekeeping programmes, which included several measures on beekeeping in order to foster honey production and improve bee products marketing strategies. These measures involve disease prevention and hive restocking. The primary support came from the Council Regulation (EC) no. 1221/1997, which describes all necessary steps and rules for providing 50% of co-financing from the EU. Each

member state had to create a national apiculture programme and plan budget allocation (Food and Agriculture Organization, 2011). The remaining 50% of funding is covered by the national budget of each member state (Pocol, 2011). As for the national beekeeping programme, the budget is allocated for these measures: varroasis control, technical assistance, rationalization of transhumance, hive restocking, applied research, honey analysis (European Commission, 2013). For 2017-2019, the European Union decided to extend these measures and include analyses of apiculture products and product quality (European Commission, 2017). Nowadays, product quality is more important than ever before (Nagyová *et al.*, 2014).

The national beekeeping programmes ensure competitiveness of the sector by increasing and restocking beehives, increasing the number professional beekeepers, developing consultancy service for beekeepers, providing modern equipment and technologies, enhancing honey quality, productivity and monitoring honey market (European Commission, 2016).

The aim of this paper is to analyse and compare beekeeping sectors between Slovakia and Romania in terms of sector structure, honey production, competitiveness in honey market, the EU funding and budget allocation from national beekeeping programmes.

MATERIALS AND METHODS

For analysing the beekeeping sectors, was used secondary data provided by European Commission reports, the National Institute of Statistics in Romania, the Statistical Office of the Slovak Republic, the Central Register of Hives in Slovakia, FAOSTAT and Trademap. The assessment of competitiveness in honey market was calculated through RCA indices and the Michaely index.

The procedure for indices calculation

Revealed comparative advantage index RCA (1):

$$RCA = \ln [(x : m) / (X : M)] \quad (1)$$

Where:

x – export of a commodity,
m – import of a commodity,
X – total country's export,
M – total country's import.

Result of quantification:

RCA > 0 – comparative advantage,

RCA < 0 – comparative disadvantage.

(Levický and Lajdová, 2011)

Index of Competitiveness Growth RCA 1 (2):

$$RCA\ 1 = [(X_{ij} : X_i) / (X_j : X)] \quad (2)$$

Where:

X_{ij} – export of country “i” in commodity group “j”

X_i – total export of country “i”

X_j – world's export in commodity group “j”

X – total world's export

Result of quantification:

RCA 1 > 1 – revealed comparative advantage,

RCA 1 < 1 – comparative disadvantage,

RCA 1 = 1 – neutral competitiveness, do not quantify comparative advantage or disadvantage

(Aiginger and Landesmann, 2002)

Index of net business performance RCA 2 (NEI) (3):

$$RCA\ 2 = [(X_{ij} - M_{ij}) / (X_{ij} + M_{ij})] \quad (3)$$

Where:

X_{ij} – export of country “i” in commodity group “j”,

M_{ij} – import of country “i” in commodity group “j”.

Result of quantification:

RCA II (0,1> – comparative advantage (reduced import)

RCA II < -1,0) – comparative disadvantage (reduced export)

RCA II = 0 – export = import (Balassa, 1965, p. 90- 124)

Michaely index (4):

$$Mi = X_{ij} / (\sum i X_{ij}) + M_{ij} / (\sum i M_{ij}) \quad (4)$$

Where:

X_{ij} – the export of commodity group “i” of country “j”

M_{ij} – the import of commodity group “i” of country “j”

$\sum i X_{ij}$ – total national export

$\sum i M_{ij}$ – total national import

Tab. 1. Structure of beekeeping sector in Slovakia and Romania in 2015

	Slovakia	Romania
Number of beekeepers	17 171	22 930
Number of hives	278 286	1 392 846
Number of beekeepers managing more than 150 hives	56	1 545
Total number of beehives managed by beekeepers with more than 150 beehives	11 457	299 243
Number of beekeepers organised in beekeepers' associations	16 607	22 930

Source: European Commission, 2016

Fig. 1. Number of hives

Source: Slovak Central Register of Hives, Romanian Institute of Statistics

Result of quantification:

$0 < M_i < 1$ – certain degree of specialization of a country, especially the commodity group

$-1 < M_i < 0$ – insufficient degree of specialization of a country, especially the commodity group (Michaely, 1962)

RESULTS AND DISCUSSION

The beekeeping sector's structure is primary characterized by the number of beehives, beekeepers and professional beekeepers (beekeepers with more than 150 hives). As shown in Table 1, in 2015, Slovakia had 17 171 beekeepers taking care of 278 286 hives. Only 56 of them were professional beekeepers, counting for a number of 11 457 hives. More than 90% of all beekeepers are organized in associations; mainly, in the Slovak Association of Beekeepers. The structure of this sector in Romania is slightly different. In 2015, the total number of beekeepers was 22 930 with 1 392 846 hives. Approximately 1 545 are professional beekeepers with 299 243 hives. All beekeepers are organized.

Another important aspect in evaluating the beekeeping sector is the development of bee population in time. According to figure 1, the number of beehives in Slovakia had been decreasing since 1990 till 2004 when a slight recovery can be observed. However, a gradual increase has been observed after 2007 till nowadays. The situation in Romania is quite similar, where a sharp decrease had been observed in the period 1991 – 1999. The number of bees started to increase since 2000. Nevertheless, the significant increase has been recorded since 2007 till nowadays. The increasing tendency in number of hives in both countries has been significantly influenced by EU subsidies through beekeeping programmes implementations, including restocking hives and supporting new beekeepers as well as through measures financed by the National Rural Development Programme.

The number of hives and beekeepers relates to honey production. Figure 2 illustrates honey production in both countries for 2007 – 2015.

Fig. 2. Total honey production

Source: Faostat, Slovak Central Register of Hives and Romanian Institute of Statistics

Tab. 2. Changes in honey production during 2013-2015 in Slovakia

Region	Total production in kg, 2013	Total production in kg, 2015	Δ%
Bratislava	150 797	170 334	+12.96%
Western Slovakia	1 552 386	1 699 542	+9.48%
Central Slovakia	1 085 209	1 258 802	+16.00%
Eastern Slovakia	1 091 057	1 167 419	+7.00%
Total	3 879 449	4 296 098	+10.74%

Source: Central Register of Hives

Tab. 3. Changes in honey production during 2013-2015 in Romania

Region	Total production in kg, 2013	Total production in kg, 2015	Δ%
North - West	3 117 000	3 568 000	+ 14.47%
Center	3 958 000	4 269 000	+ 7.86%
North - East	3 433 000	4 081 000	+ 18.88%
South - East	3 130 000	3 271 000	+ 4.50%
South - Muntenia	4 152 000	4 058 000	- 2.26%
Bucharest - Ilfov	379 000	277 000	- 26.91%
Southwest Oltenia	4 491 000	4 657 000	+ 3.70%
West	4 018 000	3 712 000	- 7.62%
Total	26 678 000	27 893 000	+ 4.55%

Source: National Institute of Statistics

Slovak beekeeping industry experiences a stable production with minor fluctuation from 3 304 tons to 4 326 tons, while in Romania honey production has been increasing continuously since 2007. However, a sharp decline was recorded in 2014 followed by a spectacular increase. One of the possible reasons for the massive decrease in 2014 could be the bad weather conditions or high bee mortality during winter.

For an even more insightful study, the next step was to analyse the percentage changes in honey production, by regions, between 2013

and 2015. Data show (see Tab. 2) that the total Slovakian honey production increased by 10.74%. The major increase was obtained in these regions: Central Slovakia (+16.00%) and Bratislava (+12.96%). The lowest increase was recorded in Eastern Slovakia (+7.00%).

A similar situation is observed in Romania (see Table 3), where the total honey production had increased by 4.55 % from 2013 to 2015. The highest increase was reached in North-East (+18.88%) and North-West (+14.47%) regions while lowest decrease was obtained in Bucharest

Tab. 4. Budget allocation for 2014-2016

Period	Slovakia	Romania
2013/2014	1 098 966 €	6 683 690 €
2014/2015	1 099 170 €	6 684 930 €
2015/2016	1 097 820 €	6 676 720 €
Total	3 295 956 €	20 045 340 €

Source: European Commission, 2017

Tab. 5. Future budget allocation in Slovakia

Measures/Years	2016/2017	2017/2018	2018/2019
Technical assistance	890 000 €	890 000 €	890 000 €
Combating beehive invaders and diseases	700 000 €	700 000 €	700 000 €
Rationalization of transhumance	100 000 €	100 000 €	100 000 €
Analysis of apicultural products	70 000 €	70 000 €	70 000 €
Restocking of hives	200 000 €	200 000 €	200 000 €
Applied research programmes	40 000 €	40 000 €	40 000 €
Market monitoring	5 000 €	5 000 €	5 000 €
Enhancement of product quality	5 000 €	5 000 €	5 000 €
Total	1 120 000 €	1 120 000 €	1 120 000 €

Source: European Commission 2016

- Ilfov (-26.91%), West (-7.62%) and South - Muntenia (-2.26%) regions.

Honey production significantly depends on the number of beehives, rationalization of transhumance and modernization of technologies in beekeeping. In both countries, the number of hives increased, impacting the overall honey production, which increased as well. In Slovakia, many new beekeepers appeared due to subsidies provided through national beekeeping programmes. According to table 4, EU allocated in 2015/2016 the sum of 1 097 820 €. A significant share was allocated to technical assistance, varroasis control, rationalization of transhumance and hive restocking. All these measures can influence bees' productivity. For example, Slovak beekeepers have moved their hives from one region to another to prolong the foraging period in order to increase their average production. For 2014-2016, both countries have been approved their national apiculture programmes. EU approved 3 295 956 € for Slovakia and 20 045 340 € for Romania (Tab. 4). The amount of approved fund depends on the number of beehives in country, therefore Romania got significantly higher funds than Slovakia.

Between 2017-2019, Slovakia is going to allocate approximately 1 120 000 € from the

national beekeeping program. Most of these funds will be spent on technical assistance (890 000 €) and measures to combat beehive invaders and diseases (700 000 €) as these issues still represent a major problem for beekeepers. Moreover, restocking of hives (200 000 €) and rationalization of transhumance (100 000 €) is going to have a significant share in the budget allocation structure (Tab. 5).

According to table 6, Romania is planning to allocate around 7 million €. In comparison to Slovakia, Romania's budget is going to cover only a few measures. The major amount will be spent on restocking hives, followed by rationalization of transhumance and combating beehive invaders and disease. A smaller amount is going to be allocated to technical assistance and analysis of apicultural products. The measures such as applied research, market monitoring and enhancement of product quality will not be funded at all.

The last aspect in the evaluation of both beekeeping sectors is competitiveness on honey market. For this reason, several indices had been applied. In the case of measuring the degree of specialization in the honey industry, the Michaely index was applied. Slovakia obtained a certain degree of specialization on the market during 2003-2009 (see Figure 3). The range of calculated values

Tab. 6. Future budget allocation in Romania

Measures/Years	2016/2017	2017/2018	2018/2019
Technical assistance	435 000 €	463 500 €	465 000 €
Combating beehive invaders and diseases	1 180 371 €	1 196 949.60 €	1 217 948.72 €
Rationalization of transhumance	2 042 440.32 €	2 093 280.28 €	2 137 488.95 €
Analysis of apicultural products	320 000 €	0.00 €	0.00 €
Restocking of hives	3 526 746.24 €	3 746 684.35 €	3 757 736.52 €
Applied research programmes	0.00 €	0.00 €	0.00 €
Market monitoring	0.00 €	0.00 €	0.00 €
Enhancement of product quality	0.00 €	0.00 €	0.00 €
Total	7 504 557.56 €	7 036 914.23 €	7 578 174.19 €

Source: European Commission 2016

Fig. 3. Michaely index

Source: Trademap, 2017

Tab. 7. RCA indices

Revealed Comparative Advantage (RCA)														
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Slovakia	1.19	1.68	0.48	0.74	0.21	0.30	0.78	-1.34	-1.16	-0.89	-0.60	-0.87	-1.54	-1.83
Romania	4.15	5.25	6.04	5.32	3.60	3.04	3.59	3.09	2.62	2.35	2.40	1.98	2.15	1.69
Index of Competitiveness Growth (RCA 1)														
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Slovakia	1.89	2.92	1.15	1.50	4.07	2.21	0.89	0.27	0.46	0.38	0.75	0.42	0.22	0.08
Romania	11.47	9.96	6.60	9.24	6.19	6.21	10.14	8.56	6.94	8.03	7.56	6.27	5.52	4.61
Index of Net Business Performance (RCA 2)														
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Slovakia	0.52	0.67	0.20	0.32	0.10	0.13	0.38	-0.59	-0.52	-0.40	-0.27	-0.38	-0.64	-0.72
Romania	0.96	0.99	0.99	0.98	0.91	0.85	0.93	0.89	0.84	0.79	0.82	0.73	0.76	0.64

Source: Trademap 2017

was from 0.0002243 to 0.0000299. However, since then, it reached an insufficient degree of specialization. The range was from -0.0000520 to -0.000111 in comparison with Romania that achieved, for all years analysed, a certain degree of specialization with data ranging from 0.00144

to 0.00039. Nevertheless, specialization has a decreasing trend as most products in Romania in terms of specialization (Ignjatijević *et al.*, 2015).

The next RCA indices shows competitiveness in terms of comparative advantage and according to table 7, Slovakia obtained the comparative

advantage between 2003-2008 in RCA and RCA 1 and 2003-2009 in RCA, which was influenced by suitable climate conditions and rich bee pasture (Levický and Lajdová, 2011). However, the situation has changed and after 2008 and 2009, Slovakia has lost this advantage until today. It can be explained by an overall decrease in competitiveness of the whole food industry in Slovakia (Qineti *et al.*, 2009) as well as due to increasing consumption of honey which cause higher demand and increase of imported honey as food market is influenced by the new trends connected with healthy lifestyle (Kubicová and Kádeková, 2016). The situation in Romania is different as, for the whole period and for all indices, Romania achieved comparative advantage in honey trade as it is net exporter of honey with good recognition worldwide (Pocol *et al.*, 2017). The maximum value was obtained in 2003 (11.47) and the lowest value in 2014 (1.98).

CONCLUSION

The paper analysed and compared beekeeping sectors in Slovakia and Romania and EU funding through national beekeeping programmes. Regarding the structure of beekeeping sectors, Romania has 5 000 more beekeepers than Slovakia and 5 times more hives. The number of professional beekeepers is higher in Romania. Since 2007, both countries have an increasing trend in number of hives. The Slovakian production of honey is stable, while the Romanian production has been continuously increasing since 2007. Both countries have positive percentage change in overall honey production in the period of 2013-2015. However, three Romanian regions: South – Muntenia, West and Southwest Oltenia obtained negative changes. In terms of EU funding, both countries are using this opportunity through national apiculture programmes. While Slovakia is going to allocate funds among all measures, Romania is going to allocate funds only for restocking hives, rationalisation of transhumance, combating beehive invaders and disease, technical assistance and analysis of apicultural products. As for market competitiveness, Romania obtained for all indices a comparative advantage, despite registering a decreasing tendency. Slovakia obtained a comparative advantage between 2003-2009, losing this advantage after 2009. This situation occurred due to the increasing honey

consumption, which lead to a growth of honey volumes imported from other countries.

RECOMMENDATIONS

The implementation of national beekeeping programmes provides financial support for beekeepers and foster the whole sector. For all these reasons, the European Union should continue to support beekeepers to stabilize this sector and increase production capacities in both countries.

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