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INVESTMENT ACTIVITY OF SERBIAN FARMS COMPARING TO NEIGHBOURING COUNTRIES: APPLICATION OF FADN INDICATORS[4]

Abstract

Investments are precondition for profitable, efficient and sustainable agricultural production. As a consequence of market liberalization Serbian farmers are competing with EU and neighbouring farmers, therefore it is important to compare investments in Serbian farms with investments in farms in neighbouring countries which have already became EU members (Croatia, Hungary, Romania and Bulgaria). The goal of this research was to analyse investments in the most important farm types in Serbia (mixed type of farms and farms specialized in crop production) and to compare it with appropriate investments in above mentioned countries. To achieve this goal authors used FADN methodology and relevant EU and Serbian databases and publications. The research results revealed that investments in Serbian farms are similar or even higher comparing to investments in observed countries, although level of investment's subsidies in Serbia is modest. Net investments are especially high for mixed Serbian farms, allowing development of even less present livestock production types. Future research should be directed towards evidence and comparison of subsidies on investments according to FADN methodology in Serbia and EU countries.

Key words: *Gross investments, Net investments, Subsidies, FADN.*

JEL classification: Q12.

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ИНВЕСТИЦИОНА АКТИВНОСТ СРПСКИХ ФАРМИ У ОДНОСУ НА СУСЕДНЕ ДРЖАВЕ: ПРИМЕНА FADN ИНДИКАТОРА

Апстракт

Инвестиције су предуслов профитабилне, ефикасне и одрживе пољопривредне производње. Као последица либерализације тржишта, српски пољопривредници се такмиче са пољопривредницима из ЕУ и суседних земаља, стога је веома важно извршити поређење улагања у српске фарме са улагањима у фарме у суседним земљама које су већ постале чланице ЕУ (Хрватска, Мађарска, Румунија и Бугарска). Циљ истраживања био је да се анализирају инвестиције у најважније типове фарми у Србији (мешовити тип фарми и фарме специјализоване за ратарску производњу) и упореде са одговарајућим улагањима извршеним у претходно поменутим државама. За постизање овог циља коришћени су FADN методологија и релевантне ЕУ и српске базе података и публикације. Резултати истраживања су показали да су инвестиције у српске фарме сличне или чак веће у поређењу са инвестицијама у посматраним државама, иако је ниво субвенција за инвестиције у Србији доста скромнији. Ниво нето инвестиција је посебно висок на мешовитим фармама у Србији, што омогућава развој мање присутних типова сточарске производње. Будућа истраживања би требало да буду усмерена на евидентирање и поређење субвенција за инвестиције према FADN методологији у Србији и чланицама ЕУ.

__Кључне речи:__ Бруто инвестиције, Нето инвестиције, Субвенције, FADN.

Introduction

This paper is researching characteristics of mixed and specialized crop farms in countries surrounding Serbia, which have similar background - former socialist countries such as Croatia, Hungary, Romania and Bulgaria. All these countries are now EU member states and can give an insight in possible future development path of Serbian agriculture. Analyse in this paper will be focused on mixed and specialized crop farms (field-crops), as this farms are dominant in structure of Serbian agriculture (according to latest Farm Structure Survey in Serbia), (SORS, 2019).

Farm Accountancy Data Network (FADN) was launched in European Union in 1965. It considers annual survey (collection of production, economic and financial dataset) at previously determined (representative) farm sample, classified into certain groups in line to their economic size, type of production, etc. (Očić et al., 2018). FADN represents the instrument of the European Commission in order to estimate real producer's income, production performance, etc., as well as to determine the CAP impact on the agricultural sector (Crnčan et al., 2017). Currently, FADN analyses the sample that represents more than 5 million of EU farms and over the 90% of EUs' agri-production (Pitulice, Gorgan, 2012). Development of FADN indicators is important for farmers as they are receiving feedback FADN information (Kovacevic et al., 2017)

Analysis is based on data collected and assorted through the FADN database according to EU regulation 1242/2008 (EC, 2008) using TF8 grouping (such approach is also used in Serbian FADN dataset), which means that mixed farms include following principle type of

faming (with appropriate particular type of farming and its subdivisions), (Tapiador, 2008; EC, 2018):

- Mixed livestock, primarily grazing livestock (Mixed livestock, primarily dairying, Mixed livestock, primarily non-dairying grazing livestock),
- Mixed livestock, primarily granivores (Mixed livestock: granivores and dairying combined, Mixed livestock: granivores and non-dairying grazing livestock),
- Field crops - grazing livestock combined (Field crops combined with dairying, Dairying combined with field crops, Field crops combined with non-dairying grazing livestock, Non-dairying grazing livestock combined with field crops),
- Various crops and livestock combined (Field crops and granivores combined, Permanent crops and grazing livestock combined, Apiculture, Various mixed crops and livestock).

Within FADN database (Špička, 2014) there could also be found reports which apply TF14 grouping (according above mentioned EU regulation), allowing division of mixed farms in following principle types - Mixed crop farms, Mixed livestock farms and Mixed crop and livestock farms. Nevertheless, such grouping was not used in previous Serbian Farm Return, because Serbia is not EU member. Therefore, it could be expected that in close future Serbia FADN will not publish data concerning TF14 grouping, at least until Serbia officially joins the EU.

Specialized crop farms classified in TF8 grouping in the EU include following types of faming (EC, 2015):

- Specialist cereals, oilseeds and protein crops (Specialist cereals (other than rice) oilseeds and protein crops, Specialist rice, Cereals, oilseeds, protein crops and rice combined),
- General field cropping (Specialist root crops, Cereals, oilseeds, protein crops and root crops combined, Specialist field vegetables, Specialist tobacco, Specialist cotton, Various field crops combined),
- Mixed cropping (Horticulture and permanent crops combined, Field crops and horticulture combined, Field crops and vineyards combined, Field crops and permanent crops combined, Mixed cropping, mainly field crops, Other mixed cropping).

It is obvious that some of above mentioned particular types of farming cannot be applied in Serbia (such as rice production or cotton production). Nevertheless, the general principles of farms' classification are the same in Serbia and in the EU. It is also possible to apply following TF14 grouping for specialized crop farms (but their particular types and further subdivisions will not be discussed) - Specialist COP (cereals, oilseeds and protein crops) and Specialist other field-crops (general field cropping).

Research was based on hypothesis that even the Serbian mixed and specialized crop farms are limited in production resources, available assets and subsidies on investments, they could compete with the same type of farms from the neighbouring countries which are EU members. According to that key goal of paper is to define the most important investment features of mixed type of farms and farms specialized in crop production in observed countries, and to compare the data with Serbian farms.

Material and methods

The analysis of mixed and specialized crop farms in observed EU countries will be made on the basis of FADN data for years 2015 and 2017 (which is the latest available year in the appropriate EU database (EC, 2020). On the other hand, there are no publically available FADN data for Serbia after year 2015. Therefore, authors used Serbian Farm Return for 2015 to collect data on chosen farm types (MAFWM, 2016). Methodological framework implies the use of comparative analysis of the selected FADN indicators. Internationality to analysis is given through the indicators comparison among the primarily agricultural countries from the Serbian surrounding.

In the analysis are used FADN indicators such as SE080, SE025, SE436, SE516, SE521, SE406, and SE409. Some of them are not presented in Serbia Farm Return, but can be calculated on the basis of existing information (such as indicator SE521 – net investments) while others cannot be calculated (indicator SE409 – subsidies on agricultural investments). On the other hand, some indicators are not presented, neither in the EU FADN database nor in Serbian Farm Return, so they were calculated by the authors (such are the values of total farm assets per annual work unit and net investments per annual work unit). New FADN indicators and calculation methods introduced in this paper can be valuable for Serbian FADN.

Results and Discussion

At the beginning, it is necessary to take into account the size of similar farm types among different states. The size of the farms could be measured using physical and financial indicators (Hanson et al., 1989). In this research the size of the farms is established based on the number of livestock units (LU) and hectares of total utilized agricultural area (UAA). The model, duration and successfulness of post-communist transformation of agriculture in Eastern parts of Europe, i.e. liberalisation and establishment of market economy has been led to certain level of agricultural development. But, after the several countries from that region accessed to EU, there still lefts the characteristic common to majority of farms – their relatively small size (Baležentis et al., 2019). Typically, farms from observed countries (Serbia, Croatia, Bulgaria, Romania, and Hungary) are facing almost similar issues, lagging far behind to EU averages related to farm's production, investment, market and other elements. Serbian farms are mostly characterized by small and fragmented property, low level of agrochemicals and irrigation use, agro-technical, technological and practical backwardness, economic weakness and powerless financing conditions, etc. (Božić, Munćan, 2015; Jeločnik, 2017).

By size of farm estate Romanian farmer is managing almost 10 times smaller land complex and by their value several times lower size of other fixed assets such are mechanisation, equipment, facilities, etc. than EU average. Besides, value of available current assets at the farm level is for eight times lower than EU average, while farmers are meeting significant deficit in financing sources (Burja, Burja, 2010).

Bulgarian farms are also characterized by limited agricultural area, small number of livestock, small scale production and reduced farms' net incomes. Besides, they are more present within the less favoured areas (LFA), (Galluzzo, 2015). Besides, certain degree of shifting from traditional to newer production models, technological and

knowledge transfer, impact of EU funds, rapid specialization, etc. have been affecting the positive trends in overall farm's sustainability (Bachev, 2017). Although average farm size in Hungary was doubled during the land reform in last decade of XX century, it is still unfavourable. Average farm is extremely fragmented, and in sum of all farms dominate small individual farms that mostly cultivate up to 2 ha. There is constant fall in number of almost all livestock species (Tóth, 2013). According to economic power of average farm, although small farms play important role in Hungarian agriculture, unfortunately almost 85% of total sum of farms generate standard output lower than 4,000 EUR, or 65% of them generate even less than 2,000 EUR (Süveg, 2015). It could be mentioned that within the EU-28, there were around 12 million registered farms in 2010, where at 60% of them standard output did not approach to 4,000 EUR (Kemény et al., 2017).

Similar situation occurs in Croatia. It has unfavourable farms' structure dominating by the small family farms. In average, one farm has almost 3 times smaller agricultural land (5.6 ha) compared to EU, where atomized and dispersed parcels generally initiate inefficient production, leading to the certain level of deficit in the agri-food sector (self-sufficiency is secured in few production lines, such are potatoes, poultry products, cereals, wine and sugar), (Civello, Alvir, 2015; Lončarić et al., 2016).

Regarding number of LU per farm (SE080) and UAA per farm (SE025) Serbian mixed farms are bigger than farms in Croatia, Bulgaria and Romania (Table 1. and Table 2.). Generally, mixed farms are the biggest in Hungary, while they are the smallest in Romania. Some similar situation had been recorded before couple decades (WB, 1995). On the contrary, the biggest farms specialized in crop production are in Bulgaria. They cultivate almost three times more UAA comparing to Serbia. The size of Serbian crop farms is similar to farms in Hungary, while they are bigger comparing to farms in Romania and Croatia. Although farms specialized in crop farming have very small number of LU, this livestock production is probably used only to satisfy needs of household members. In the observed period (2015-2017) in all analysed countries (except in Romania) mixed farms continue to grow, while it was not the case regarding farms specialized in crop production.

Table 1: Number of livestock units (LU) per farm

Country	Mixed farms	Farms specialized in crop production	Mixed farms	Farms specialized in crop production
	2015		2017	
Croatia	6.09	1.91	7.93	1.72
Hungary	22.01	1.88	29.74	2.36
Romania	2.99	0.36	2.75	0.39
Bulgaria	4.78	1.35	8.61	1.52
Serbia	14.26	1.55	-	-

Source: According to MAFWM, 2016; EC, 2020.

Table 2: Utilized agricultural area (UAA) per farm (in ha)

Country	Mixed farms	Farms specialized in crop production	Mixed farms	Farms specialized in crop production
	2015		2017	
Croatia	8.79	26.38	10.17	24.75
Hungary	39.36	59.12	38.81	62.59
Romania	3.61	21.49	4.1	27.89
Bulgaria	8.38	199.86	16.7	151.89
Serbia	18.91	55.22	-	-

Source: According to MAFWM, 2016; EC, 2020.

The other way to evaluate size of various farm types is to use financial indicators, such as total assets (SE436) or some other indicator. If total assets of mixed farms are compared (Table 3.), they are the highest in Hungary and Serbia, which is in accordance with extent of previously mentioned indicators SE080 (number of LU) and SE025 (total UAA) per farm. When specialized crop farms are analysed it could be noticed that value of total assets is the highest in Serbia, although Bulgarian farms have the highest UAA. This fact could be related to prices of land in various countries (which are by rule estimated by individual farmers involved in FADN sample) and estimated value of agricultural mechanization. Within the observed period at all mixed farms in countries that border with Serbia it comes to increase in value of their assets, while value of assets for crop farms decreased only in Croatia.

Table 3: Total assets (in EUR)

Country	Mixed farms	Farms specialized in crop production	Mixed farms	Farms specialized in crop production
	2015		2017	
Croatia	79,431.00	116,888.00	81,383.00	105,748.00
Hungary	140,966.00	176,403.00	178,410.00	217,531.00
Romania	23,885.00	51,938.00	28,536.00	64,556.00
Bulgaria	33,227.00	191,676.00	48,763.00	235,948.00
Serbia	150,246.00	272,803.00	-	-

Source: According to MAFWM, 2016; EC, 2020.

Although in Serbia value of total assets is high, their value per annual work unit (AWU) is rather small (Table 4.). For mixed farms it is almost twice as low as in Hungary, while the situation is much better for specialized crop farms. Generally, it could be concluded that value of assets per AWU is the highest in Hungary (which has the lowest level of AWU per farm) indicating the highest level of productivity in this county (primarily for mixed farms). That implies that investments in Hungarian farms were oriented towards high capacity fixed assets. Except for Croatian mixed farms, total assets per AWU increased during the period 2015-2017.

Table 4: Total assets per AWU (in EUR)

Country	Mixed farms	Farms specialized in crop production	Mixed farms	Farms specialized in crop production
	2015		2017	
Croatia	56,736.00	70,841.00	55,741.78	71,451.35
Hungary	104,419.00	149,494.00	122,198.63	164,796.21
Romania	23,417.00	48,998.00	26,920.75	57,639.29
Bulgaria	21,860.00	60,275.00	28,024.71	64,999.45
Serbia	63,934.47	124,567.58	-	-

Source: According to MAFWM, 2016; EC, 2020; and author's calculation.

Data related to gross investments (SE516) and net investments (SE521) for mixed farms and specialized crop farms are in accordance with previously mentioned results are presented in the Table 5. and Table 6. The highest gross investments per farm for mixed farms are recorded in Hungary (although by the value of this indicator Serbia was right behind in 2015). On the other hand, Bulgarian farms specialized in crop production have the highest investments level (within this production type), because Bulgarian farmers cultivate the biggest UAA. At the same time, level of gross investments is much higher in crop production comparing to mixed farm type. In majority of observed cases gross investments were increased during the period 2015-2017, which was not the case for net investments. Analysis of net investments revealed that they are also higher for farms dealing with specialized crop production.

Table 5: Gross investments (in EUR)

Country	Mixed farms	Farms specialized in crop production	Mixed farms	Farms specialized in crop production
	2015		2017	
Croatia	711.00	3,058.00	1,479.00	4,474.00
Hungary	5,362.00	8,899.00	7,859.00	7,666.00
Romania	256.00	1,555.00	419.00	2,450.00
Bulgaria	2,348.00	25,224.00	3,065.00	21,382.00
Serbia	5,262.00	7,533.00		

Source: According to MAFWM, 2016; EC, 2020.

Table 6: Net investments (in EUR)

Country	Mixed farms	Farms specialized in crop production	Mixed farms	Farms specialized in crop production
	2015		2017	
Croatia	-1,467.00	-622.00	-946.00	1,023.00
Hungary	495.00	3,697.00	1,127.00	1,380.00
Romania	-489.00	-576.00	-610.00	-126.00
Bulgaria	486.00	10,706.00	206.00	3,801.00
Serbia	2,951.00	3,082.00	-	-

Source: According to MAFWM, 2016; EC, 2020; and author's calculation.

Analyse of net investments revealed significant differences between countries and production types. Mixed farms in Croatia and Romania have negative net investments (investments are lower than level of depreciation, which means that production capacity of such farms is decreasing), while in Bulgaria net investments are positive, although very close to zero. The most favourable situation is in Serbia (in 2015) and Hungary (in 2017). Better performance regarding the net investments is recorded for specialized crop farms. In both observed years in Bulgaria was invested the most, meaning that farmers were increasing their production capacities. In 2015, they invest three times more than Serbian and Hungarian farmers. The worst situation regarding investments is recorded for both types of farms in Romania. They have negative value of net investments during the entire observed period.

Net investments could also be determined per annual work unit (AWU), (Table 7.). AWU is related to regular workforce and is equivalent to "one person working full-time on the holding" (EU regulation 2015/2020). According to this indicator, Serbian farms have the highest net investments per one full time employed person for mixed farms. Concerning farms specialized in crop production value of this indicator in Serbia is lower than at Bulgarian or Hungarian farms.

Table 7: Net investments per AWU (in EUR)

Country	Mixed farms	Farms specialized in crop production	Mixed farms	Farms specialized in crop production
	2015		2017	
Croatia	-1,048.00	-377.00	-647.95	691.22
Hungary	367.00	3,133.00	771.92	1,045.45
Romania	-480.00	-543.00	-575.47	-112.50
Bulgaria	320.00	3,367.00	118.39	1,047.11
Serbia	1,255.74	1,407.31	-	-

Source: According to author's calculation.

Investment subsidies could be useful instrument to support development of agricultural production. Therefore, analysis included subsidies on investments (SE406) and subsidies on agricultural investments (SE409) for observed farm types and countries (Table 8.).

Table 8: Various types of investment subsidies (in EUR)

Subsidies on investments (SE406)				
Country	Mixed farms	Farms specialized in crop production	Mixed farms	Farms specialized in crop production
	2015		2017	
Croatia	0.00	0.00	0.00	0.00
Hungary	1,130.00	413.00	8.00	27.00
Romania	35.00	197.00	21.00	172.00
Bulgaria	446.00	1,536.00	224.00	2,015.00
Serbia	41.00	90.00	-	-
Subsidies on agricultural investments (SE409)				

Country	Mixed farms	Farms specialized in crop production	Mixed farms	Farms specialized in crop production
		2015		2017
Croatia	9.00	57.00	290.00	1,649.00
Hungary	1,187.00	443.00	74.00	51.00
Romania	1.00	25.00	0.00	6.00
Bulgaria	237.00	1,894.00	500.00	808.00
Serbia	-	-	-	-

Source: According to MAFWM, 2016; EC, 2020.

It is not disputable that EUs income and investment support to agri-sector keeps it to sustain in critical situations, or to avoid the slow-down in undertaken reforms. But, it has to be noted that income support compared to investment support takes the much higher share in overall package of subsidies, somehow leading to creation of unstable areas of high vulnerability (Coppola et al., 2020).

In previous table presented comparison is easy between countries which are EU members, because both indicators are recorded. On the other hand, in Serbian Farm Return for 2015 only indicator SE406 is presented. Therefore, it is impossible to make adequate comparison of such subsidies between Serbia and other countries involved in this research. Nevertheless, it could be noticed that in most countries farms specialized in crop production use more investments' subsidies (SE406 and SE409), comparing to mixed farms. The highest level of subsidies on investments (SE406) in 2017 was achieved in Bulgaria, while the highest subsidies on agricultural investments (SE409) in 2017 were recorded in Croatia. In both countries crop production was much more subsidized than mixed type of production. Although the subsidies represent the important instrument of national agricultural policy regarding the development of agriculture and improvement of farm's competitiveness, position and performances (Jovanović, Zubović, 2019), level of subsidies on investments in Serbia in 2015 was rather low.

Conclusion

Comparing the Serbian mixed and specialized crop farms with the same type of farms in neighbouring countries which are EU member states, it is evident that their size and value of total assets are similar or even higher. It is important that (comparing to neighbouring countries) Serbian farms have significant level of gross and net investments, allowing them to be more competitive. Although farms in Serbia receive rather small subsidies on investments, their total net investments and net investments per AWU are the highest for mixed type of farms (comparing to analysed countries), positively impacting technical and technological development. Such an intensive investment activity allows not only further improvement of livestock production, types which are usually present on mixed Serbian farms, but also development of certain livestock production types which are not present enough (such as cow – calf type of cattle production or goat milk production, whose profitability is closely related to the use of high capacity fixed assets). At the same time, this should be supported by increased level of appropriate subsidies.

Towards the interpretation of mentioned data it should be taken into account that threshold of economic size for FADN in Serbia is 4,000 EUR (the same threshold is implied

for Croatia and Hungary). At the same time, threshold for Bulgarian and Romanian farms is only 2,000 EUR which decreases their average performance when compared to Serbian farms.

Some future research could consider the comparative analysis towards the evidence of public support, i.e. subsidies on investments, based on FADN indicators in Serbia and EU member states.

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