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Evaluation of economic sustainability on the agricultural husbandries in the Upper Danube region

Abstract: *At the end of the XX century, in the countries with developed market economy is more and more present the assertion that beyond its fundamental function (production of food and fibbers), agriculture can create landscapes, manage to the non-renewable natural resources and environmental protection, and can also contribute to the socio-economic development of the rural areas. Within the European Union countries (EU), rural policy as a starting point has renewal of all links between agriculture and nature in order to secure sustainable development, protect the agro-environment and preserve the food quality and safety. Based on that, the concept of agriculture sustainability was developed (or bio-economy), integrated into the concept of sustainable development of the whole economy.*

Survival and development of modern agriculture have found at crossroad, faced with the essential requirements of economic and environmental efficiency achievement, in other words profitability of production with minimal risk of environment damage. The process of EU enlargement and perspectives for Serbia, which derive from that, refer to the fact that in future development of domestic farms, business economics will occupy one of the crucial positions. Accordingly, the manager of agricultural husbandry must use appropriate methods, techniques and models for economic sustainability of agriculture evaluation, in order to be sure that financial assets of the farm are correctly invested (that they will achieve the best results).

*According the importance of natural resources, significance of agriculture, as well as strategic priority of its effectiveness and sustainability for the development of the Upper Danube region (in other w*ords Sombor city and Apatin and

Bač municipalities)[1], therefore in this paper evaluation of economic sustainability on the family husbandries within the aforementioned protected zone in the Republic of Serbia was presented. Considering microeconomic character of this work, the IDEA methodology (Indicateurs de Durabilité des Exploitations Agricoles)[2] was used.

Keywords: *Upper Danube region, IDEA methodology, agricultural husbandry*

Introduction

In its original context, one links sustainable development, defined as management of natural resources in a manner that ensures the preservation of their reproductive abilities, to the natural sciences. Accordingly, there is a need for re-adaptation of agriculture toward *sustainability* and *multifunctionality.*[3]

Depletability of natural resources, growth of environment pollution, erosion of biodiversity and the like, force us to think of the development model that allows the current generation to produce without compromising the right of future generations to meet their own needs.

It is for these reasons the FAO defines agriculture sustainability as a *development that allows "the preservation of land, water, plant and animal resources, that is environment-friendly, technically applicable, economically viable and socially acceptable".*[4]

Establishing and development of sustainable agriculture include:
- ensuring population food security (quantitative, qualitative and structural);
- preservation of the natural environment;
- valorization and the efficient use of agricultural resources;

1 Consulting support in realization of all activities, during the Strategy of sustainable development of the Sombor municipality (now city) - 2007-2015 establishment, was provided by the Standing Conference of Towns and Municipalities, under the Program of environmental protection in towns and municipalities in Serbia, 2004-2006. Consulting, research and technical support in realization of all activities, during the Strategy of sustainable development of the Apatin municipality - 2009-2019, establishment, was provided by the Regional agency for small and medium enterprises - Alma Mons doo, Novi Sad and the Institute of Agricultural Economics, Belgrade. Consulting, research and technical support in realization of all activities, during the Strategy of socio-economic development of Bač municipality - 2009-2014 establishment, was also provided by the Regional agency for SME's - Alma Mons doo, Novi Sad and the Institute of Agricultural Economics, Belgrade.

2 IDEA method has three spheres of sustainability (economic, environmental and social) which are mutually independent and non-cumulative (they cannot be summed).

3 Subić, J., Arsenijević, Đ., Mihajlović, D. (2005): Metode za ocenu održivog razvoja na poljoprivrednim gazdiunstvima. Tematski zbornik „Multifunkcionalna poljoprivreda i ruralni razvoj", Institut za ekonomiku poljoprivrede - Beograd, Departman za ekonomiku poljoprivrede i sociologiju sela Poljoprivrednog fakulteta Novi Sad, Ekonomski fakultet Subotica.

4 Ibidem.

- improvement of the competitiveness of agriculture and the realization of production surpluses;
- safeguard of balanced and stable incomes of farmers and increase of population living standards in rural areas.

Realization of this production method involves a multifunctional approach to agriculture and rural economy development, combining manufacturing activities on the farm and rural tourism and local infrastructure development, through the implementation of environmental protection measures and preservation of nature and rural heritage. Multifunctional characteristic reflects in the fact that agriculture, beside its main purpose of producing food and contributing to food security, has a variety of environmental, economic and social functions as well. Versatile agricultural functions relate to its very nature are closely linked and not easy to demarcate.

The orientation towards sustainable development causes changes in the production and consumption of agricultural and food products. Reorientation from the highly productive toward multifunctional agriculture, as a form of agriculture that can be achieved both at macroeconomic and microeconomic level, is in these circumstances of the utmost importance.

One of the basic principles of preserving and strengthening the agriculture multifunctional role is favoring the diversity of agricultural farms development modes. In order to make decisions regarding the economic, environmental and social effectiveness, the methodology for the assessment of farms sustainability was developed.

The concept of sustainable agriculture and rural development directs the Serbian farmers as well toward the willingness to adapt their production to the economic requirements in anticipation of the code of good agricultural practice, which is to concretize their obligations therein, and harmonization of national and EU legislation in this particular area.

Purpose and method

The main purpose of paper is to present the way how sustainable development of agricultural farms can be evaluated, emphasizing thereat the economic function of agriculture.[5]

Given the research that this work imposes, the IDEA methodology *(Indicateurs de Durabilité des Exploitations Buses)* was used. It was developed in 1999 on the request of the General Directorate for Education and Research *(Direction Général de l'Enseignement et de la Recherche - DGER)* of the Mi-

5 Evaluation of economic sustainability on agricultural husbandries respects specificities and characteristics of sustainable agriculture, so on certain way it differs from evaluation of conventional agricultural production.

nistry of Agriculture and Fishery of Republic of France, which needed an adequate assessment of sustainable development at the agricultural husbandries.[6]

IDEA methodology should indicate the technical deficiencies and identify the directions for improvement of implemented method of quantitative evaluation of agricultural practices deemed appropriate for certain biophysical and social environments. It can significantly benefit the decision making and is usable for every type of agricultural production system. Also, it has the possibility of establishing, at any given time, the agricultural husbandry diagnosis, by attributing grades for each set of criteria that is in compliance with the goals of sustainable agriculture.[7]

IDEA methodology consists of three spheres of sustainability (economic, environmental and social), independent one of another and are not cumulative (can not be summed). It uses several indicators that represent necessary, and often crucial information in the decision making process.[8]

Given the nature of the task and the type of calculation procedures, the methods for assessing the agricultural husbandries sustainability can be divided into 3 main groups:
- methods for assessing the economic sustainability;
- methods for assessing environmental sustainability;
- methods for assessing social sustainability.

Paper uses data collected in the Upper Danube region (i.e. on the territory of city of Sombor and the municipalities of Apatin and Bač) during 2011, by the survey of 3 agricultural farms whose developmental perspectives are in function of economic sustainability.

Results and discussion

Given the matter of this paper, emphasis is placed on the *assessment methods of the economic sustainability of agricultural husbandries,* which may be divided into two main groups:[9]

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6 Subić, J., Popović, V., Cvijanović, D. (2006): Mikromodeli za ocenu ekološke održivosti u poljoprivredi. Ekonomika poljoprivrede, br. 4/2006.

7 Subić, J., Arsenijević, Đ., Mihajlović, D. (2005): Metode za ocenu održivog razvoja na poljoprivrednim gazdiunstvima. Tematski zbornik „Multifunkcionalna poljoprivreda i ruralni razvoj“, Institut za ekonomiku poljoprivrede Beograd, Departman za ekonomiku poljoprivrede i sociologiju sela Poljoprivrednog fakulteta Novi Sad, Ekonomski fakultet Subotica.

8 Vasiljević, Z., Subić, J., Popović, V. (2010): Ecological Sustainability of Production in Agriculture. Conference Proceedings. XII International Symposium “Organizational Sciences and Knowledge Management”, Faculty of Organizational Sciences, Belgrade.

9 Subić, J., Arsenijević, Đ., Mihajlović, D. (2005): Metode za ocenu održivog razvoja na poljoprivrednim gazdiunstvima. Tematski zbornik „Multifunkcionalna poljoprivreda i ruralni razvoj“, Institut za ekonomiku poljoprivrede Beograd, Departman za ekonomiku poljoprivrede i sociologiju sela Poljoprivrednog fakulteta Novi Sad, Ekonomski fakultet Subotica.

- methods for evaluating economic efficiency;
- methods for assessing economic sustainability.

In order to assess the economic sustainability on the agricultural husbandries in the Upper Danube region, three farms were investigated, namely:

A. husbandry, which has at its disposal the facilities and sectors for production of primary agricultural products in the segment of livestock farming, crop, vegetable and fruit production, wholesale and retail activities and transportation services - from the territory of the city of Sombor;
B. husbandry, which has at its disposal the facilities and sectors for production of primary agricultural products in the segment of crop, vegetable and fruit production, wholesale and retail activities, as well as contract farming with co-operators from within closer and further surrounding - from the territory of the Municipality of Apatin;
C. husbandry, which has at its disposal facilities and sectors for production of primary agricultural products in the segment of crop production, wholesale and retail activities, as well as contract farming with co-operators from within closer and further surrounding - from the territory of the municipality of Bač.

To obtain the actual assessment of economic sustainability of agricultural husbandries in the Upper Danube area, the following data are given, related to both the production capacities and the economic-financial indicators *(Tables 1-3)*.

Agricultural husbandry A associated its production to the following capacities:
- arable land area of 898 ha (603 ha in its own property and 295 ha under lease);
- stable for dairy cows keeping (area of 2.200 m^2);
- office building, retail store and bakery (under lease), with complete production facilities and inventory (own property);
- machine and vehicle fleet.

Agricultural husbandry B associated its production to the following capacities:
- arable land area of 245 ha (5 ha in its own property and 240 ha under lease);
- commercial area of 465 m^2 (of which: veterinary station and warehouse for the receipt of the purchased raw agricultural products and production materials of 300 m^2; agricultural pharmacy with two convenient warehouse space areas of 120 m^2; and office area of 45 m^2) and gas station (under lease);
- cooperation with 250 selected co-operators, where many of them are significant producers (some are recorders) as in terms of amount of the cultivated land, as well as in quality and quantity of produced agricultural products;
- machine and vehicle fleet.

Agricultural husbandry C associated its production to the following capacities:
- mini dairy plant (area of 200 m^2) - out of order, within which is a retail shop (agricultural pharmacy 1);

- warehouse area (350 m^2), within which operates another retail facility (agricultural pharmacy 2), office space (80 m^2) and shop (area of 70 m^2) – available for rent;
- storage capacity for corn (2 x 100 t), with weighbridge;
- two shops (under lease) with convenient storages, in function as retail stores;
- machine and vehicle fleet.

Table 1. Economic-financial indicators of agricultural husbandry A (in 000 RSD)

Element	Unit of measure	Value
Gross profit (*BD*)	RSD	1,474.2
Cost of labour, without compensation (UR_{bn})	Average no. of workers	3
Total revenue (*UP*)	RSD	130,775.40
Total expenditures *(UR)*	RSD	129,301.20
Operating incomes (PP)	RSD	129,357.20
Financial incomes (*FP*)	RSD	172.20
Incidental and non-operating incomes (*VNP*)	RSD	1,246.00
Non-operating expenses (*PR*)	RSD	121,637.60
Financial expenses (*FR*)	RSD	6,249.60
Incidental and non-operating expenses (*VNR*)	RSD	1,414.00
Net income (*ČP*)	RSD	39,335.80
Output value (VP_r)	RSD	101,634.40
Value of used inputs (*VUPF*)	RSD	62,298.60
Financial need (*FP*)	RSD	24,278.79
Financial debts (*FD*)	RSD	101,522.40
Fixed assets (*SI*)	RSD	173,168.80
Depreciation (*A*)	RSD	9,721.60
Annuities (*a*)	RSD	29,976.80
Income from lead production (*PGP*)	RSD	60,980.64
Gross income (*BP*)	RSD	94,108.00
Short-term financial costs (*KFT*)	RSD	45,105.20
Intermediate consumption (*IMP*)	RSD	30,493.41
Operative costs (*OT*)	RSD	36,667.40
Buildings* (*TGO*)	RSD	3,547.61
Depreciation of buildings* (*AGO*)	RSD	9,721.60
Other expenses (D_rT)	RSD	0.00
Direct financial support (*DFP*)	RSD	1,400.00
Own capital, except land (SK_{oz})	RSD	173,168.80
Fixed capital, except land (FK_{oz})	RSD	79,144.80
Non-reproductive animals (*NŽ*)	RSD	541.80
Exploitation capital (*EK*)	RSD	244,766.20

*** In statistical annex of agricultural husbandry was given a cumulative position of: real estate, plant – facilities, equipment and biological assets.**

Source: Subić, J., Nastić, L., Jeločnik, M. (2011): Survey of agricultural husbandries in Upper Danube Region, Institute of Agricultural Economics Belgrade, internal documentation.

Agricultural husbandry A currently does not have official certificate for control of production quality (ISO 9001), but management has expressed intention to implement mentioned standard in close future. Husbandry reached final phase of HACCP standard implementation (standard for managing of products control).

Table 2. Economic-financial indicators of agricultural husbandry B (in 000 RSD)

Element	Unit of measure	Value
Gross profit (*BD*)	RSD	408.2
Cost of labour, without compensation (UR_{bn})	Average no. of workers	2
Total revenue (*UP*)	RSD	99,902.40
Total expenditures *(UR)*	RSD	99,494.20
Operating incomes (PP)	RSD	96,304.00
Financial incomes (*FP*)	RSD	2,667.60
Incidental and non-operating incomes (*VNP*)	RSD	930.80
Non-operating expenses (*PR*)	RSD	98,957.30
Financial expenses (*FR*)	RSD	517.40
Incidental and non-operating expenses (*VNR*)	RSD	19.50
Net income (*ČP*)	RSD	44,140.20
Output value (VP_r)	RSD	52,185.90
Value of used inputs (*VUPF*)	RSD	8,045.70
Financial need (*FP*)	RSD	10,558.83
Financial debts (*FD*)	RSD	30,413.50
Fixed assets (*SI*)	RSD	2,276.30
Depreciation (*A*)	RSD	85.80
Annuities (*a*)	RSD	11,703.90
Income from lead production (*PGP*)	RSD	36,530.13
Gross income (*BP*)	RSD	93,806.70
Short-term financial costs (*KFT*)	RSD	3,382.60
Intermediate consumption (*IMP*)	RSD	39,107.67
Operative costs (*OT*)	RSD	6,095.70
Buildings* (*TGO*)	RSD	33,097.77
Depreciation of buildings* (*AGO*)	RSD	85.80
Other expenses (D_rT)	RSD	0.00
Direct financial support (*DFP*)	RSD	1,820.00
Own capital, except land (SK_{oz})	RSD	2,276.30
Fixed capital, except land (FK_{oz})	RSD	913.90
Non-reproductive animals (*NŽ*)	RSD	416.00
Exploitation capital (*EK*)	RSD	90,697.10

*** In statistical annex of agricultural husbandry was given a cumulative position of: real estate, plant – facilities, equipment and biological assets.**

Source: Subić, J., Nastić, L., Jeločnik, M. (2011): Survey of agricultural husbandries in Upper Danube Region, Institute of Agricultural Economics Belgrade, internal documentation.

Agricultural husbandry B momentarily also does not possess official certificate for control of production quality (ISO 9001), but management has sincere intentions to implement mentioned standard in near future. Husbandry is in final phase of HACCP standard implementation.

Table 3. Economic-financial indicators of agricultural husbandry C (in 000 RSD)

Element	Unit of measure	Value
Gross profit (*BD*)	RSD	10.4
Cost of labour, without compensation (UR_{bn})	Average no. of workers	2
Total revenue (*UP*)	RSD	39,335.40
Total expenditures *(UR)*	RSD	39,325.00
Operating incomes (PP)	RSD	38,511.20
Financial incomes (*FP*)	RSD	1.30
Incidental and non-operating incomes (*VNP*)	RSD	822.90
Non-operating expenses (*PR*)	RSD	38,613.90
Financial expenses (*FR*)	RSD	257.40
Incidental and non-operating expenses (*VNR*)	RSD	453.70
Net income (*ČP*)	RSD	30,335.50
Output value (VP_r)	RSD	38,511.20
Value of used inputs (*VUPF*)	RSD	8,175.70
Financial need (*FP*)	RSD	7,381.92
Financial debts (*FD*)	RSD	5,344.30
Fixed assets (*SI*)	RSD	12,987.00
Depreciation (*A*)	RSD	4,178.20
Annuities (*a*)	RSD	9,100.00
Income from lead production (*PGP*)	RSD	30,808.96
Gross income (*BP*)	RSD	38,526.80
Short-term financial costs (*KFT*)	RSD	2,015.00
Intermediate consumption (*IMP*)	RSD	809.38
Operative costs (*OT*)	RSD	808.60
Buildings* (*TGO*)	RSD	4,178.98
Depreciation of buildings* (*AGO*)	RSD	4,178.20
Other expenses (D_rT)	RSD	0.00
Direct financial support (*DFP*)	RSD	0.00
Own capital, except land (SK_{oz})	RSD	12,987.00
Fixed capital, except land (FK_{oz})	RSD	13,945.10
Non-reproductive animals (*NŽ*)	RSD	351.00
Exploitation capital (*EK*)	RSD	19,424.60

*** In statistical annex of agricultural husbandry was given a cumulative position of: real estate, plant – facilities, equipment and biological assets.**

Source: Subić, J., Nastić, L., Jeločnik, M. (2011): Survey of agricultural husbandries in Upper Danube Region, Institute of Agricultural Economics Belgrade internal documentation.

As like in previous cases, *agricultural husbandry C* currently does not have official certificate ISO 9001, but management reconsiders its implementation. Husbandry reached the final phases of HACCP standard implementation.

Methods for evaluation of economic productivity

This is strict evaluation of the economic performances of certain agricultural husbandry, independently of all other deliberations, in order to compare the efficiency of husbandry with different dimensions of sustainability.

Labour productivity (principle of gross profit)

Indicator is expressed by ratio of gross profit of agricultural husbandry and cost of human labour (of family members or associate workers) *without compensations*, independently of farm investment and financing policies.

Formula for calculation of labour productivity has following form:

$$PR_{bd} = \frac{BD}{UR_{bn}}$$

Where: $BD = UP - UR = \left[\left(PP + FP + VNP\right) - \left(PR + FR + VNR\right)\right]$

PR_{bd} – labour productivity (*principle of gross profit*);
BD – gross profit;
UR_{bn} – amount of labour, *without compensation* (in hours or average number of workers);
UP – total revenue;
UR – total expenditure;
PP – operating incomes;
FP – financial incomes;
VNP – incidental and non-operating incomes;
PR – operating expenses;
FR – financial expenses;
VNR – incidental and non-operating expenses.

Selected agricultural husbandries within the zone of Upper Danube Region were achieved next results:

- *Agricultural husbandry A:*

$$BD = \left[\left(129{,}357.20 + 172.20 + 1{,}246.00\right) - \left(121{,}637.60 + 6{,}249.60 + 1{,}414.00\right)\right]$$

$$BD = 130{,}775.40 - 129{,}301.20 = 1{,}474.20\ \text{RSD}$$

$$PR_{bd} = \frac{1{,}474.20}{3} = 491.40\ \text{RSD}$$

- *Agricultural husbandry B:*

$$BD = \left[\left(96{,}304.00 + 2{,}667.60 + 930.80\right) - \left(98{,}957.30 + 517.40 + 517.40\right)\right]$$

$$BD = 99{,}902.40 - 99{,}949.20 = 408.20 \text{ RSD}$$

$$PR_{bd} = \frac{BD}{UR_{bn}} = \frac{408.20}{2} = 204.10 \text{ RSD}$$

- *Agricultural husbandry C:*

$$BD = \left[\left(38{,}511.20 + 1.30 + 822.90\right) - \left(38{,}613.90 + 257.40 + 453.70\right)\right]$$

$$BD = 39{,}335.40 - 39{,}325.00 = 10.40 \text{ RSD}$$

$$PR_{bd} = \frac{BD}{UR_{bn}} = \frac{10.40}{2} = 5.20 \text{ RSD}$$

Gained labour productivity shows gross profit of agricultural husbandry achieved per each unit of invested human labour (*without compensation*). *Having in sight economic effectiveness, achieved labour productivity on agricultural husbandry C is estimated as the most acceptable for sustainable development.*

Labour productivity (principle of net income)

By application of this indicator, it is possible to assess economic performances of husbandry after depreciation and financing of investments realized by farm owner. In this case, labour productivity is achieved as a ratio of net income (added value) of agricultural husbandry and cost of labour, *without compensation* (of family members or associate workers), independently of farm investment and financing policies.

Formula for this indicator calculation has next form: $PR_{čp} = \frac{ČP}{UR_{bn}}$,

where: $ČP = VP - VUPF$

$PR_{čp}$ – labour productivity (*principle of net income*);
$ČP$ – net income;
VP – output value;
$VUPF$ – value of used inputs.

Results gained on selected agricultural husbandries within the zone of Upper Danube Region are:

- *Agricultural husbandry A:*

$$ČP = 101{,}634.40 - 62{,}298.60 = 39{,}335.80\,\text{RSD}$$

$$PR_{čp} = \frac{39{,}335.80}{3} = 13{,}111.93\,\text{RSD}$$

- *Agricultural husbandry B:*

$$ČP = 52{,}185.90 - 8{,}045.70 = 44{,}140.20\,\text{RSD}$$

$$PR_{čp} = \frac{44{,}140.20}{2} = 22{,}070.10\,\text{RSD}$$

- *Agricultural husbandry C:*

$$ČP = 38{,}511.20 - 8{,}175.70 = 30{,}335.50\,\text{RSD}$$

$$PR_{čp} = \frac{30{,}335.50}{2} = 15{,}167.75\,\text{RSD}$$

This variant of labour productivity shows amount of net income of husbandry gained per each unit of spent labour (*without compensation*). *Focusing on economic effectiveness, gained labour productivity on agricultural husbandry B is estimated as the most acceptable for sustainable development.*

Methods for evaluation of economic sustainability

Economic performance, based on agricultural husbandry current profit maximization, is only a partial component of economic sustainability. It does not give complete evaluation of farm capability to maintain and reproduce itself in longer period. So there is a need for defining additional criteria of economic sustainability.

Economic capability

Observed in short and mid-term period, economic capability represents basic condition for sustainable development on agricultural husbandries. In essence, indicator points to mid-term economic result within assets of agricultural husbandry, creating on that way possibility for family labour compensation and self-financing.

Economic capability could be calculated by following formula:

$$ES = \frac{ČP - FP}{UR_{bn}}$$

Where: $FP = \left[1 - \left(\frac{FD}{SI}\right) \times A\right] + a$

ES – economic capability;
FP – financial need;
FD – financial debts;
SI – fixed assets;
A – depreciation;
a – annuities.

Selected agricultural husbandries within Upper Danube Region were gained next results:

- *Agricultural husbandry A:*

$$FP = \left[1 - \left(\frac{101{,}522.40}{173{,}168.80}\right) \times 9{,}721.60\right] + 29{,}976.80 = 24{,}278.79$$

$$ES = \frac{39{,}335.80 - 24{,}278.79}{3} = 5{,}019.00\ \text{RSD}$$

- *Agricultural husbandry B:*

$$FP = \left[1 - \left(\frac{30{,}413.50}{2{,}276.30}\right) \times 85.80\right] + 11{,}703.90 = 10{,}558.83\ \text{RSD}$$

$$ES = \frac{44{,}140.20 - 10{,}558.83}{2} = 16{,}790.68\ \text{RSD}$$

- *Agricultural husbandry C:*

$$FP = \left[1 - \left(\frac{5{,}344.30}{12{,}987.00}\right) \times 4{,}178.20\right] + 9{,}100.00 = 7{,}381.92\ \text{RSD}$$

$$ES = \frac{30{,}335.50 - 7{,}381.92}{2} = 11{,}476.79\ \text{RSD}$$

While on annual level there is great oscillation of net income, suggestion is that for calculation is better use of three-year averages.[10] *According annual data (in 2011), economic capability of agricultural husbandry B could be evaluated as the most acceptable for sustainable development.*

10 Considering main goal of this paper (demonstration of IDEA methodology in evaluation of economic sustainability on agricultural husbandries within the zone of Upper Danube Region), research was on annual level.

Price of specialization

This is indicator that represent ratio between total income from leading production and gross income of agricultural husbandry.

Formula for calculation of labour productivity has following form:

$$CS = \frac{PGP}{BP}$$

Where: *CS* – price of specialization;
PGP – income from lead production;
BP – gross income.

Results achieved on selected agricultural husbandries:

- *Agricultural husbandry A:* $CS = \frac{60{,}980.64}{94{,}108.00} = 0.65\,\%$
- *Agricultural husbandry B:* $CS = \frac{36{,}530.13}{93{,}806.70} = 0.39\,\%$
- *Agricultural husbandry C:* $CS = \frac{30{,}808.96}{38{,}526.80} = 0.80\,\%$

This indicator confirms the well-known rule that diversification of production activities on agricultural husbandry decrease farms' sensitivity on crisis impacts of economic origin (market trends, prices of inputs, premiums, etc.), natural disasters and parasitic diseases. *In context of greater diversification of production activities on agricultural husbandry achieving, price of specialization on husbandry B is evaluated as the most acceptable for sustainable development.*

Financial dependence

Autonomy and its opposition *dependence* are characteristics of relation type with bio-physics and socio-economic environment. Because of that researching of relative autonomy represents one of the key concepts of sustainable agriculture. Autonomy is changeable in relations within agricultural activities (autonomy contrary to dependence in inputs), as well as in relations of economic results (flexibility and adaptation of systems).

Mathematic formula for financial dependence has following form:

$$FZ = \frac{a + KFT}{\check{C}P + FP} = \frac{a + KFT}{BP - IP} = \frac{a + KFT}{BP - \left(OT + OM - AOM + GO - AGO + D_r T\right)}$$

Where: *FZ* – financial dependence;
a – annuities;
KFT – short-term financial costs;
IP – intermediate consumption;
OT – operative costs (operative expenses);
OM – equipment and mechanization;
AOM – depreciation of equipment and mechanization;
GO – buildings;
AGO – depreciation of buildings;
D_rT – other costs.

Achieved results on selected agricultural husbandries within the observed Region are:

- *Agricultural husbandry A:*

$$FZ = \frac{29{,}976.80 + 45{,}105.20}{39{,}335.80 + 24{,}278.79} = \frac{29{,}976.80 + 45{,}105.20}{94{,}108.00 - 30{,}493.40} = 1.18\,\%$$

$$FZ = \frac{29{,}976.80 + 45{,}105.20}{94{,}108.00 - (36{,}667.40 + 0.00 - 0.00 + 3{,}547.61 - 9{,}721.60 + 0.00)} = 1.18$$

- *Agricultural husbandry B:*

$$FZ = \frac{11{,}703.90 + 3{,}382.60}{44{,}140.20 + 10{,}558.83} = \frac{11{,}703.90 + 3{,}382.60}{93{,}806.70 - 39{,}806.70} = 0.28\,\%$$

$$FZ = \frac{11{,}703.90 + 3{,}382.60}{93{,}806.70 - (6{,}095.70 + 0.00 - 0.00 + 33{,}097.77 - 85.80 + 0.00)} = 0.28$$

- *Agricultural husbandry C:*

$$FZ = \frac{9{,}100.00 + 2{,}015.00}{30{,}335.50 + 7{,}381.92} = \frac{9{,}100.00 + 2{,}015.00}{30{,}335.50 - 809.38} = 0.29\,\%$$

$$FZ = \frac{9{,}100.00 + 2{,}015.00}{30{,}335.50 - (808.60 + 0.00 - 0.00 + 4{,}178.98 - 4{,}178.20 + 0.00)} = 0.29$$

Indicator allows assessment of business margin available to agricultural husbandry, considering economic circumstances and contracted loans. Annuities also cover land annuities although their hiding is desirable (because of financial reasons some entrepreneurs choose to register purchased land into the balance, or not).

On the other hand, short-term financial costs have to be added to annuity, how agricultural husbandry that resorts to short-term loans increases its dependence rate relating to the bank, as well as weakness to economic trends. *With aim to achieve higher relative autonomy, financial dependence of agricultural husbandry B is evaluated as the most acceptable for sustainable development.*

Sensitivity on support

Dependence of governmental (institutional) support could be considered as a factor of adaptation of agricultural husbandry, cause it depend of agricultural policy that becomes less stable and less protected than before (one of main reasons is globalization process).

In that context, sensitivity on support could be represented by following formula:

$$O_{np} = \frac{DFP}{\check{C}P + FP} = \frac{DFP}{BP - IP} = \frac{DFP}{BP - \left(OT + OM - AOM + GO - AGO + D_r T\right)}$$

Where: O_{np} – sensitivity on support;
DFP – direct financial support.

Selected agricultural husbandries achieved following results:

- *Agricultural husbandry A:*

$$O_{np} = \frac{1{,}400.00}{39{,}335.80 + 24{,}278.79} = \frac{1{,}400.00}{94{,}108.00 - 30{,}493.40} = 0.02\,\%$$

$$O_{np} = \frac{1{,}400.00}{94{,}108.00 - \left(36{,}667.40 + 0.00 - 0.00 + 3{,}547.61 - 9{,}721.60 + 0.00\right)} = 0.02$$

- *Agricultural husbandry B:*

$$O_{np} = \frac{1{,}400.00}{44{,}140.20 + 10{,}558.83} = \frac{1{,}400.00}{93{,}806.70 - 39{,}806.70} = 0.03\,\%$$

$$O_{np} = \frac{1{,}400.00}{93{,}806.70 - \left(6{,}095.70 + 0.00 - 0.00 + 33{,}097.77 - 85.00 + 0.00\right)} = 0.03$$

- *Agricultural husbandry C:*

$$O_{np} = \frac{1{,}400.00}{30{,}335.50 + 7{,}381.92} = \frac{1{,}400.00}{38{,}526.80 - 809.38} = 0.04\,\%$$

$$O_{np} = \frac{1{,}400.00}{30{,}335.50 - \left(808.60 + 0.00 - 0.00 + 4{,}178.98 - 4{,}178.20 + 0.00\right)} = 0.04$$

It is important to mention that IDEA method does not include sums from the contracts, which have character of awards for improvements on the land (they are not part of subsidies), in direct financial support. On other hand, observed method includes indirect support (for example prices protection), as form of financial support. *With main goal to achieve lower dependency from governmental support, sensitivity on support at agricultural husbandry A is evaluated as the most acceptable for sustainable development.*

Economic transferability

This indicator considers one of the aspects of agricultural husbandries sustainability they are usually facing with in cases of production activities quitting. It starts from the principle that if system is not transferable, it could not be sustainable. In essence, for insensibly renewal of generations, agricultural husbandry must survive in manpower. Economic transferability is expressed as ratio between own capital (except land) and volume of labour (without compensation).

Economic transferability could be calculated by following formula:

$$EP = \frac{SK_{oz}}{UR_{bn}}$$

Where: EP – economic transferability;
SK_{oz} – own capital, except land.

Selected agricultural husbandries gained next results:

- *Agricultural husbandry A:* $EP = \frac{173{,}168.80}{3} = 57{,}722.93$ RSD
- *Agricultural husbandry B:* $EP = \frac{2{,}276.30}{2} = 1{,}138.15$ RSD
- *Agricultural husbandry C:* $EP = \frac{12{,}987.00}{2} = 6{,}493.50$ RSD

Indicator gives advantage to these agricultural husbandries that are not significantly equipped. Assessment begins from evaluation of own capital (for individual agricultural husbandries), or from capital of association including current accounts of co-operators (in case of cooperative farms). *In accordance with principle of giving advantages to agricultural husbandries that are not significantly equipped, economic transferability of agricultural husbandry B is estimated as the most acceptable for sustainable development.*

Efficiency of production process

Efficiency of production system could be evaluated starting from its ability to achieve operating incomes under the low inputs level.

On that basis, mathematic expression for this indicator has next form:

$$E_{pp} = \frac{ČP + FP}{BP}$$

Where: E_{pp} – efficiency of production process.

Results achieved on selected agricultural husbandries are:

- *Agricultural husbandry A:* $E_{pp} = \frac{39{,}335.80 + 24{,}278.79}{94{,}108.00} = 0.68\,\%$

- *Agricultural husbandry B:* $E_{pp} = \frac{44{,}140.20 + 10{,}558.83}{93{,}806.70} = 0.58\,\%$

- *Agricultural husbandry C:* $E_{pp} = \frac{30{,}335.50 + 7{,}381.92}{38{,}526.80} = 0.98\,\%$

Indicator shows level of inputs effectiveness during their transformation in production process. It express economic effectiveness of resources and characterize all systems that valorise their ped-climatic potentials, in other words it reflects their artistry in resources transformation and commercialization. In accordance with that, efficiency of production process interprets by economic expression technical efficiency related to agro-ecological considerations. *Having in sight production system ability to achieve operating incomes under the low level of inputs, efficiency of production process at agricultural husbandry C is evaluated as the most acceptable for sustainable development.*

Capital turnover

Although it is not in IDEA methodology, capital turnover is according its importance very often in use as complementary indicator.

Formula for its calculation is: $k_{ok} = \frac{FK_{oz} + NŽ}{BP}$

Where: k_{ok} – capital turnover;
FK_{oz} – fixed capital, except land;
$NŽ$ – non-reproductive animals.

Selected agricultural husbandries achieved following results:

- Agricultural husbandry A: $k_{ok} = \frac{79{,}144.80 + 541.80}{94{,}108.00} = 0.85\%$

- *Agricultural husbandry B:* $k_{ok} = \frac{913.90 + 416.00}{93{,}806.70} = 0.01\%$

- *Agricultural husbandry C:* $k_{ok} = \frac{13{,}945.10 + 351.00}{38{,}526.80} = 0.37\%$

With this indicator it is possible to evaluate speed of engaged assets turnover, i.e. period in which invested assets could be recovered through gained financial incomes after products realization. *With aim to achieve higher turnover speed of engaged assets (capital turnover), agricultural husbandry B is evaluated as the most acceptable for sustainable development.*

Financial autonomy

Neither this indicator is not in IDEA methodology, but according its importance it is very often in use as complementary indicator.

Financial autonomy could be expressed as ratio between own capital (except land) and exploitation capital, or:

$$FA = \frac{SK_{oz}}{EK}$$

Where: *FA* – financial autonomy;
EK – exploitation capital.

Achieved results, on selected agricultural husbandries within the observed Region, are:

- *Agricultural husbandry A:* $FA = \frac{173{,}168.80}{244{,}766.20} = 0.71\%$

- *Agricultural husbandry B:* $FA = \frac{2{,}276.30}{90{,}697.10} = 0.03\%$

- *Agricultural husbandry C:* $FA = \frac{12{,}987.00}{19{,}424.60} = 0.67\%$

It is important to note that indicator takes care about balance of financial resources and rate of financial autonomy. *According to that, financial autonomy of agricultural husbandry A is the most acceptable for sustainable development.*

Conclusion

Given the economic function of agriculture and its impact on the development of economy and society, the authors of this paper are of the opinion that the use of IDEA methodology can be of great benefit for assessment of the economic sustainability of agricultural husbandries, in order to realize the expected production results. Although the majority of the criteria are relatively known, the manner of methodological view and their wide application possibility, provide a guideline toward sustainable agricultural and rural development, hence the idea to insist on introduction and implementation of the IDEA methodology, especially in terms of economic efficiency and economic sustainability of production on husbandries in the Upper Danube region.

Relying on the concrete results achieved with the use of criteria for assessment of the economic sustainability of the selected farms in the Upper Danube area, in summary can be estimated that the farm B is most capable to maintain and reproduce itself over the long period of time. In support of this conclusion is fact that the economic performance of the agricultural husbandry B has been rated as most appropriate for sustainable development:

- *in terms of economic efficiency,* farm B demonstrated most acceptable productivity (the *principle of net income);*
- *in terms of economic sustainability,* husbandry B demonstrated most acceptable economic capacity, cost of specialization, financial dependence, economic mobility, as well as the most acceptable capital turnover ratio.

On the other hand, space should left for ascertainment and application of new methods for evaluation of economic efficiency and economic sustainability of agricultural husbandries, and the possibility of free choice in the implementation of the concept of sustainable agriculture and rural development.

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