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CHAPTER V

IMPORTANCE OF THE COSTS CALCULATION AT THE FAMILY FARMS IN SERBIA

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CHAPTER V

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1. Introduction

The producers cannot affect their products' selling prices, because they are established on the market under influence of supply and demand, but they could have influence on the cost price of their products and services. With reduction of unnecessary costs, there affects on decrease of the cost price, which increases a difference between selling price of own product or service and cost price, i.e. it increases achieved profit.

During determination of costs, it is inevitable, among recognition of some costs elements, to know also kinds of costs, while the elements can be differently allocated on different places and carriers of the costs. On one hand, it depends on nature of specific product's production, and on the other, it depends on purpose of the costs tracking. According to that, it is possible to classify the costs in different ways (*Vasiljevic, Tomic, 2001*).

According to the cost origin, all costs could be split onto the following: costs of materials, depreciation costs, labor costs, services charges, own services, included interests, taxes and contributions.

According to structure complexity, the costs can be qualified as **the simple (elemental)** or the **complex** ones. The elemental costs consist of one element (e.g. the costs of specific material, labor etc.). The complex costs consist of two or more elements (e.g. the costs of services).

According to possibility to be transferred to some carriers, the costs are divided onto **direct** and **indirect** ones. **The direct costs** are those which directly and in total refer to production of certain production lines (costs of seeds, fodder, raw material). Unlike them, the **indirect costs**, in their total amount, refer to more production lines in enterprise or in husbandry (depreciation of administration buildings, working costs of administrative staff and similar). Therefore, while allocating indirect costs on some production lines (carriers), there must be applied appropriate principles or „keys“ for their allocation.

Depending on their dependence on production size or level of production capacities use, the costs can have a character of **fixed (permanent)** or **variable (unstable) costs**.

The **fixed costs** in their total amount do not change along with changes of the production volume. They comprise: depreciation (calculated according to time method); insurance costs and costs of fixed capital keeping; interest on loans, taxes and contributions; a part of indirect costs, etc.

Observed by product unit, the fixed costs are decreasing with increase of production volume or level of capacity use, up to certain limit. Unlike them, the variable costs in total amount change together with the change of production volume. They primarily com from the consumption of various materials and labour, which directly depend on production volume.

The trend of variable costs can be treble:

- **proportional** (when total costs amount changes proportionally to the changes of production volume and where the costs per product unit stay unchanged, independably from the production volume changes);
- **digressive** (when total amount of costs changes slower than production volume, while the costs per product unit decrease);

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- **progressive** (when total amount of costs changes faster than changes in production volume, while the costs per product unit increase).

2. Calculations as the Method of the Costs Determination

The procedure of the costs determination in production, processing or realization of the products is called **making the calculations**. Besides determination of total costs and costs per product unit (cost price of the product), there are also calculated in the calculations the other economic business parameters (total and market value of production, financial result, level of efficiency and profitability of production, etc.)

The reasons for making calculations in an enterprise or at the farm are different. Some of them are the following:

- determination of production costs and cost price for produced products;
- determination of the costs for production services;
- determination of optimal structure, size and intensity of production;
- determination of investments and their economic effectiveness;
- determination of optimal utilization period for agricultural machinery;
- determination of upper limit for the fixed assets purchasing price, as well as the lower limit for the final products' selling price, etc. (Vasiljevic, Tomic, Canak; 2005).

Classification of calculations can be done by different criteria. One of the classifications is onto the **micro-economic** and **macro-economic** calculations, according to criteria of calculation level approach (Andric; 1998).

Micro-economic calculations are made at the standpoint of an individual economic subject (enterprise or farm), and all elements of calculation are determined according to the concrete data linked to analyzed enterprise (farm), while the **macro-economic calculations** are made for the wider territorial areas (region, state and similar).

Considering time of calculation-making and purpose, there could be **plan (advance) calculation** or the **final (secondary) ones**.

In order to solve different organizational and economic problems of economic subjects, in theory of costs there have been worked out, and in practice applied, many methods of micro-economic calculations for calculating production costs and economic results of business activities, as following:

- The cost calculation of the technical fixed assets;
- Analytical calculation of the production lines based on total costs;
- Analytical calculation based on variable costs (direct costing calculation);
- Differential (organic) calculation;
- Calculation of optimum;
- Investment calculation.

3. Direct Costing Calculation

Due to relatively simple methodical procedure of calculation, as well as possibilities of more significant practical appliance, in the practice of developed market economies it is often used an **analytical calculation based on variable costs (*Direct costing method*)**. This calculation was appeared as a response to a need that in economic subjects business, due to sudden changes of market conditions, finds more efficient way of determination and analysis of costs in relation to possible or appeared changes of structure, size and way of doing business, i.e. more adequate analytical base, which uses management for more efficient management of costs and business-decisions-making in an enterprise or at the farm.

Classical analytical calculation of some production lines' or products' total costs in current terms of business, where often is required speed and efficiency in decision-making, is less favorable for such purposes, because all direct and part of indirect costs of production and sales of the produced products are covered by it, as well as total variable and fixed costs which appear in one production line, due to

which this calculation requires much more data and arithmetical operations and time for elaboration (Vasiljevic, Tomic, Canak; 2005).

The analytical calculation based on variable costs is especially favourable when calculating costs on family farms, which do not deal with book-keeping, and therefore do not dispose with necessary data for making analytical calculation of total costs (full cost price of the product).

Making analytical calculations based on variable costs starts by determination of total value of production, which can be produced by multiplication of the produced quantities of the products and their market prices. From the obtained value it is deducted the variable costs of production for the produced products. The character of variable costs, for example, in agricultural production have the following costs: costs of material (seed, manure and mineral fertilizer, means for plant protection, food etc.), variable costs of machines utilization (fuel and oil), and variable part of indirect costs.

The labor costs can be observed, depending on the organization in an enterprise or at the farm, as fixed or variable ones and therefore can be included or excluded during determination of contribution margin value. The result of analytical calculation based on variable costs is, so called, **contribution margin or contribution reimbursement (gross financial result)**.

The contribution margin is defined as difference between total value of production (value of main product plus value of accompanying products and premiums) and proportional variable costs, and in mathematical form it can be presented as following:

$$CM = VP - VC$$

CM – contribution margin;

VP – value of production;

VC – variable costs.

The contribution margin shows how much value has been obtained for covering of the fixed costs left after covering variable costs, as well as for realization of positive financial result.

The calculation based on variable costs enables direct comparison of financial success of two different lines or phases of production in equal fixed costs, as well as comparison of two or more different intensities of one same line or phase of production.

The contribution margin, as indicators of some lines/phase of production success, can add up in order to get total contribution margin for the enterprise or husbandry in total. If we deduct total fixed costs of the enterprise (or husbandry) – costs of production capacities and various indirect costs, from this value, we get total profit or loss for the enterprise (husbandry) on the whole.

In calculation based on variable costs, the fixed costs are not allocated on specific production lines. However, this calculation can be used also for getting full cost price of specific products, if fixed costs are allocated on specific lines or phases of production.

4. Examples of Direct Costing Calculations Elaboration at the Family Farms

The calculations were made based on value of production and costs, which realized on area of 1 ha, i.e. per a head of cattle, depending of production type, for period of 1 year. The costs and value of production are presented both in *RSD/ha (or RSD/head)* and in official currency of the European Union (*EUR/ha, i.e. EUR/head*), aiming to provide the comparison of production's value indexes.

The models of **crop cultures** calculations are expressed in two separated tables: contribution margin of variable costs and structure of variable costs (mineral fertilizers, plant protection chemicals and mechanization operations). The reason for such presentation is to provide the comparison of the production costs/results amounts in the case of renting the mechanization services of using own mechanization.

For *breeding animals*, the base for calculation is one head of cattle in period of one year. In that case, the calculation models are also expressed in two separated tables: contribution margin and structure of variable costs (fodder).

The *monetary incentives* are expressed in structure of production value under special item

The *effects of incentives* on the production value and contribution margin of variable costs, as in the plant production, as well as in the livestock production, are shown in special table.

Accordingly, in the tables it is expressed the incentive effect through:

- participation of incentives in value of production;
- participation of incentives in variable costs;
- participation of incentives in contribution margin.

In the case of calculations based on variable costs for breeding animals, the methodological approach is also the same, except if there are some specific items of production value or costs.

The winter wheat, maize and cow milk are very important agricultural products, as well as significant factors of agro-economy competitiveness in Serbia. Those are the reasons why those products have been selected for analysis and presentation of detailed calculations based on variable costs, as well for analysis of the incentive effects influence on economic results of the production².

Table 1. Calculation based on variable costs in production of winter wheat

Description	Quantity	Unit	Price (RSD/UM)	Total (RSD/ha)	Total (EUR/ha)
(I) Value of production					
Grain	5,000.00	kg	12.50	62,500.00	659.42
Straw	2,100.00	kg	2.92	6,132.00	64.70
Incentive				12,000.00	126.61
Total				80,632.00	850.73
(II) Variable costs					
Seed	330.00	kg	20.00	6,600.00	69.63
Mineral fertilizer				16,250.00	171.44
Plant protection chemicals				8,500.00	89.68
Costs of mechanization				26,500.01	279.58
Total				57,850.01	610.33
(III) Contribution margin (I-II)				22,781.99	240.40

Source: Group of authors (2009): Contribution margin of variable costs in agricultural production (internal documentation).
The Institute of Agricultural Economics, Belgrade.

The elaborated direct costing calculation in production of winter wheat is presented in *Table 1*

In structure of variable costs the most represented are the costs which refer to operations by mechanization (Table 2).

² The research was done in 2009, in AP Vojvodina area, and refers to results collected by surveying of selected development-oriented farms. Those are registered farms, whose owners are physical bodies, who apply various technologies of production, do not have the same approach to supply of needed production means and do not sell their products on the same market.

Table 2. Variable costs in production of winter wheat

Description	Quantity	Unit	Price (RSD/UM)	Total (RSD/ha)	Total (EUR/ha)
Mineral fertilizers					
NPK 15:15:15	300.00	kg	34.31	10,291.67	108.58
KAN 27%	300.00	kg	19.86	5,958.33	62.86
Totally				16,250.00	171.44
Plant protection chemicals					
Karate zeon	0.20	l/ha	7,501.67	1,500.33	15.83
Duet ultra	0.60	l/ha	5,976.30	3,585.78	37.83
Artea	0.50	l/ha	5,291.01	2,645.51	27.91
Peak	0.02	kg/ha	38,419.04	768.38	8.11
Totally				8,500.00	89.68
Operations by mechanization					
Tillage	4.00	hours /ha	1,219.33	4,877.30	51.46
Spreading mineral fertilizers	0.30	hours /ha	5,419.22	1,625.77	17.15
Discing	2.20	hours /ha	2,216.95	4,877.30	51.46
Harrowing	1.00	hours /ha	2,438.65	2,438.65	25.73
Sowing	0.70	hours /ha	2,787.03	1,950.92	20.58
Spraying	2.00	hours /ha	1,625.77	3,251.54	34.30
Combining	1.50	hours /ha	3,685.07	5,527.61	58.32
Transport	2.00	hours /ha	975.46	1,950.92	20.58
Total				26,500.01	279.58

Source: Group of authors (2009): Contribution margin of variable costs in agricultural production (internal documentation).
The Institute of Agricultural Economics, Belgrade.

The effect of incentive in production of winter wheat is presented in Table 3

Table 3. Effect of incentives in production of winter wheat

Description	Total (RSD/ha)	Total (EUR/ha)	Effect of incentives (%)
(I) Value of production ($\%=(I_1/I)*100$)	80,632.00	850.73	14.88
(I ₁) Amount of incentives	12,000.00	126.61	
(II) Variable costs ($\%=(I_1/II)*100$)	57,850.01	610.33	20.74
(III=I-II) Contribution margin ($\%=(I_1/III)*100$)	22,781.99	240.40	52.67

Source: Group of authors (2009): Contribution margin of variable costs in agricultural production (internal documentation).
The Institute of Agricultural Economics, Belgrade.

Table 4. Calculation based on variable costs in maize production

Description	Quantity	Unit	Price (RSD/UM)	Total (RSD/ha)	Total (EUR/ha)
Mineral fertilizer					
KAN 27%	400.00	kg	19.86	7,944.00	83.81
NPK 15:15:15	400.00	kg	34.31	13,724.00	144.80
Total				21,668.00	228.61
Plant protection chemicals					
Acetosav	2.00	l/ha	476.53	953.05	10.06
Cambio	2.50	pieces	531.73	1,329.33	14.03
Motivel	1.20	l/ha	2,431.35	2,917.62	30.78
Total				5,200.00	54.87
Operations by mechanization					
Tillage	4.00	hours/ha	1,219.33	4,877.32	51.46
Spreading mineral fertilizers	0.30	hours/ha	5,419.22	1,625.77	17.15
Discing	2.20	hours/ha	2,216.95	4,877.30	51.46
Harrowing	1.00	hours/ha	2,438.65	2,438.65	25.73
Sowing	1.40	hours/ha	2,787.03	3,901.84	41.17
Spraying	1.00	hours/ha	1,625.77	1,625.77	17.15
Cultivating with top dressing	1.75	hours/ha	929.01	1,625.77	17.15
Gathering	1.50	hours/ha	1,923.23	2,884.85	30.44
Transport	2.00	hours/ha	975.46	1,018.18	10.74
Total				24,875.45	262.45

Source: Group of authors (2009): Contribution margin of variable costs in agricultural production (internal documentation).

The Institute of Agricultural Economics, Belgrade.

In *maize* production, the results of elaborated calculation based on variable costs are presented in Table 4. In *structure of variable costs* there are also the most presented costs which refer on operations by mechanization (Table 5).

Table 5. Variable costs in maize production

Description	Quantity	Unit	Price (RSD/UM)	Total (RSD/ha)	Total (EUR/ha)
Mineral fertilizer					
KAN 27%	400.00	kg	19.86	7,944.00	83.81
NPK 15:15:15	400.00	kg	34.31	13,724.00	144.80
Total				21,668.00	228.61
Plant protection chemicals					
Acetosav	2.00	l/ha	476.53	953.05	10.06
Cambio	2.50	pieces	531.73	1,329.33	14.03
Motivel	1.20	l/ha	2,431.35	2,917.62	30.78
Total				5,200.00	54.87
Operations by mechanization					
Tillage	4.00	hours/ha	1,219.33	4,877.32	51.46
Spreading mineral fertilizers	0.30	hours/ha	5,419.22	1,625.77	17.15
Discing	2.20	hours/ha	2,216.95	4,877.30	51.46
Harrowing	1.00	hours/ha	2,438.65	2,438.65	25.73
Sowing	1.40	hours/ha	2,787.03	3,901.84	41.17
Spraying	1.00	hours/ha	1,625.77	1,625.77	17.15
Cultivating with top dressing	1.75	hours/ha	929.01	1,625.77	17.15
Gathering	1.50	hours/ha	1,923.23	2,884.85	30.44
Transport	2.00	hours/ha	975.46	1,018.18	10.74
Total				24,875.45	262.45

Source: Group of authors (2009): Contribution margin of variable costs in agricultural production (internal documentation). The Institute of Agricultural Economics, Belgrade.

The effect of incentives in maize production is presented in Table 6

Table 6. Effect of incentives in maize production

Description	Total (RSD/ha)	Total (EUR/ha)	Effect of incentives (%)
(I) Value of production ($\%=(I_1/I)*100$)	76,000.00	801.86	15.79
(I ₁) Amount of incentives	12,000.00	126.61	
(II) Variable costs ($\%=(I_1/II)*100$)	55,743.45	588.13	21.53
(III=I-II) Contribution margin ($\%=((I_1/III)*100$)	20,256.55	213.73	59.24

Source: Group of authors (2009): Contribution margin of variable costs in agricultural production (internal documentation). The Institute of Agricultural Economics, Belgrade

In case of cow milk production (Simmental cattle breed), the results obtained on the basis of variable costs calculation have been presented in Table 7.

Table 7. Calculation based on variable costs in production of cow milk (Simmental cattle breed)

Description	Quantity	Unit	Price (RSD/UM)	Total (RSD/head)	Total (EUR/head)
(I) Value of production					
Milk	5,000.00	l	27.00	121,500.00	1,281.96
Calf	150	kg	230.00	25,185.00	265.73
Culled cow	650	kg	95.00	10,497.50	110.75
Incentives	5,000.00	l	1.40	7,000.00	73.86
Total				164,182.50	1,732.30
(II) Variable costs					
Fodder				85,625.00	903.52
Veterinarian services				8,000.00	84.41
Straw				4,000.00	42.20
Other costs				2,000.00	21.10
Total				99,625.00	1,051.23
(III) Contribution margin (I-II)				64,557.50	681.07

Source: Group of authors (2009): Contribution margin of variable costs in agricultural production (internal documentation). The Institute of Agricultural Economics, Belgrade.

In the structure of variable costs the most presented are those costs which refer to supply of concentrates (Table 8).

Table 8. Variable costs (fodder) in production of cow milk (Simmental cattle breed)

Description	Quantity	U.M.	Price (RSD/UM)	Total (RSD/head)	Total (EUR/head)
Fodder					
Concentrate	1,300.00	kg	25.97	33,761.00	356.22
Maize silage	3,410.00	kg	3.62	12,344.20	130.25
Hay	2,010.00	kg	12.08	24,280.80	256.19
Pasture	6,300.00	kg	2.42	15,246.00	160.86
Total				85,632.00	903.52

Source: Group of authors (2009): Contribution margin of variable costs in agricultural production (internal documentation). The Institute of Agricultural Economics, Belgrade.

The effect of incentives in production of cow milk (Simmental cattle breed) is presented in Table 9.

Table 9. Effect of incentives in production of cow milk (Simmental cattle breed)

Description	Total (RSD/head)	Total (EUR/head)	Effect of incentives (%)
(I) Value of production (%=(I ₁ /I)*100)	164,182.50	1,732.30	4.26
(I ₁) Amount of incentives	7,000.00	73.86	
(II) Variable costs (=%=(I ₁ /II)*100)	99,625.00	1,051.23	7.03
(III=I-II) Contribution margin %=(I ₁ /III)*100)	64,557.50	681.07	10.84

Source: Group of authors (2009): Contribution margin of variable costs in agricultural production (internal documentation). The Institute of Agricultural Economics, Belgrade.

Right to use assets according to *Decree on premium for milk for year 2009* had agricultural producers, who delivered at least 2,500 liters of milk (quarterly). The premium per 1 l of milk was 1.4 RSD, and was paid off for cow, sheep and goat raw milk³.

5. Conclusion

Agricultural production (both the plant and the livestock one) represents very complex process, which imposes daily decisions-making for keeping or increasing the profit in an enterprise or at the farm. On the other hand, a postulate of competitive market causes new organization way in dealing with agriculture, in form of development-oriented (commercial) farm.

In order to start the production process, agricultural production subject has to purchase necessary means of production, e.g. seed and planting material, fertilizers, plant protection chemicals, fuel, fodder, veterinarian services, agricultural mechanization, labor force etc. The imperative of profit realization imposes a need that total realized value of production must be higher than amount of total production costs.

The *profit (or loss)*, as business result realized by agricultural enterprise or farm, represents sum of profits (or losses) of particular production lines. Accordingly, the enterprise or farm should know in which productions they realize the profit or loss and in what amount. In other words, in order to make correct business decisions, there must specify costs and results of production per specific production and lines.

For each of specific production which the agricultural subject deals with, it is necessary to make special calculation of planned or realized value of production and costs, in order to separate those the most profitable productions. In that context, the calculations should contain simple, clear and easily applicable analysis model of various kinds of plant and livestock production, or processing. Besides, the calculations can present the amount of incentive assets, too, as well as their influence on profitability and competitiveness of agricultural farm.

The calculations based on variable costs provide fast and simple review of agricultural enterprise or family farm business in one year of production, as well as the calculation of expected economic results in the case of production size changes, or transition from one kind of production to another. This methodical procedure can be also significant analytical instrument, which will help consultants of different specialties in creation of husbandry's economic analysis, while it can serve to agricultural producers as a base for control of own production technology and achieved results.

Direct costing calculation is particularly convenient method for monitoring of the costs and benefits at the family farms in Serbia, as they are not obliged to keep the books for the time being, so they do not have at

³ Decree on milk premium for 2007: 3 RSD for lit of milk produced in hilly-mountainous area and 2 RSD for lit of milk produced in low land area. Decree on milk premium for 2008: 2.4 RSD for lit of milk produced in hilly-mountainous area and 1.4 RSD for lit of milk produced in low land area

disposal the detailed records on their production economic parameters. If they like to be market oriented and competitive, they should permanently monitor their economic parameters of production and obtained costs. ⁸

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