

# Value added and its generation in agrarian enterprises

## *Pridaná hodnota a jej tvorba v agrárnych podnikoch*

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**Abstract:** This article sets out to analyze the value added generation in the Slovak agrarian sector at the time of the accession to the EU compared to which we are severely lagging behind in the overall generation of gross value added. A more detailed analysis of the value added generation over the recent years in a group of agricultural enterprises being legal entities indicates that the enterprise efficiency expressed in terms of value added generation is markedly differentiated depending on the natural conditions of the locations where individual businesses operate. Great differences in the added value between enterprises can also be found in the group of enterprises having the same natural conditions. The reason for this is a differentiation in the degree to which intensification inputs are utilized due to high prices, lack of financial resources, inefficient combination of inputs used and insufficient recognition of the importance of the value added by managers, particularly in planning of production structures and production finalization grade.

**Key words:** intermediate consumption, added value, natural conditions, production structures

**Abstrakt:** V stati analyzujeme tvorby pridanej hodnoty v slovenskom agrárnom sektore v období vstupu do EÚ, kde v celkovej tvorbe hrubej pridanej hodnoty značne zaostávame. Podrobnejšia analýza tvorby pridanej hodnoty v súbore poľnohospodárskych podnikov – právnických osôb v posledných rokoch nasvedčuje, že výkonnosť podnikov meraná tvorbou pridanej hodnoty výrazne objektívne diferencuje podľa prírodných podmienok, v ktorých podniky hospodária. Veľké rozdiely medzi podnikmi v úrovni pridanej hodnoty sa nachádzajú aj v podnikoch s rovnakými prírodnými podmienkami. Na príčine sú diferencovaná miera využívania intenzifikačných vstupov pre ich vysoké ceny a nedostatok zdrojov, neracionálna kombinácia používaných vstupov i nedocenenie významu pridanej hodnoty manažérmi, najmä pri plánovaní produkčných štruktúr a miery finalizácie produkcie.

**Kľúčové slová:** výrobná spotreba, pridaná hodnota, prírodné podmienky, produkčné štruktúry

## THEORETICAL ISSUES

Three fundamental production resources are productively used in the agricultural production sector: land, labour and capital. To make their use effective, an additional, fourth economic resource is needed being designated as conducting business, or sometimes as management. Its role, however, is defined quite precisely; the factor is supposed to combine three fundamental production resources to make them provide production or services, and satisfy the consumers' needs. A successful accomplishment of this task by managers in agricultural enterprises is the first pre-requisite of a successful business.

The question of what is the success in business was answered by the authors Hisrich and Peters (1996) in the following words: "... business is a process of making something else that has a value by putting in required time and effort". Hence the success in business is considered to be a new value, or a newly created value.

This argument may possibly explain why the value added indicator focused on measuring the newly created value is used for expressing the efficiency of enterpris-

es, or factors influencing it. In international comparisons, too, there is currently a growing trend towards measuring efficiency of sectors, or enterprises using the value added indicator. In this article, we want to focus our attention on this ultimate economic indicator in agricultural enterprises.

The value added indicator is thoroughly watched in the EU countries also in the agricultural sector. Official agricultural statistical reports published by the EUROSTAT always include data on gross and net added value generation. In Slovakia, the importance and informational value of this indicator was first pointed out by Hutník (1997) and the VÚEPP (Ševčíková 2001). Calculations of the added value in the Slovak agriculture within the Aggregate Agricultural Account is made every year by the VÚEPP in Bratislava (Varoščák 1999, 2000). Less attention is paid to the added value generation in agricultural enterprises.

## MATERIAL AND METHODS

The added value is one of the new indicators expressing efficiency of enterprises, or of the entire agricultural

sector. It was not until the time of transformation of the Slovak economy to market conditions and the time of the preparation for inclusion into the European integration structures that this indicator received attention.

The gross added value in agriculture as a whole has been monitored in Slovakia since the economic agricultural account started to be compiled. The results of this account are annually published by the Ministry of Agriculture of the SR in *Správy o poľnohospodárstve a potravinárstve SR* (Agriculture and Food Industry Reports of the SR) that has been our data source. The added value is also the object of monitoring in the annual survey of economic activity of enterprises presented in Information Bulletins of agricultural business entities, which data will be utilized in our 2001 and 2002 monitoring. The respective data were obtained from the database of the Ministry of Agriculture of the SR operated by the VÚEPP in Bratislava.

Our methodological data processing uses sorting, comparison and statistical analysis methods including regression analysis.

### ADDED VALUE GENERATION IN SLOVAK AGRICULTURE

Monitoring of the added value generation in Slovak agriculture has been carried out since the time the eco-

nomical Agricultural Account is compiled, which is currently made according to the EU methodology in the VÚEPP Bratislava.

How the value added generation in Slovakia has developed is presented in the Table 1.

The table shows a strong correlation between the gross added value and the development of gross agricultural production, the gross added value also partly correlating with the total agricultural production and the development of intermediate consumption. The gross added value generated in Slovak agriculture for the evaluated period has been rather stagnant since 1998.

The development of gross added value is influenced by the development of the gross agricultural production and by its structure, by the development of intermediate consumption and price development if the trends are analyzed using standard prices. One of the reasons behind a low dynamics of gross added value is a slow growth of intermediate consumption evidently caused by increasing prices of inputs purchased and the lack of financial resources in enterprises, in particular. Another cause is fluctuating trends, or stagnation of gross and total agricultural production.

The added value, however, is an indicator enabling to evaluate besides performance of agriculture, also its efficiency from the perspective of the entire sector. For the

Table 1. Development of selected indicators in the agriculture of the SR in SKK million, c.p.

Indicator	1997	1998	1999	2000	2001	2002 <sup>1</sup>
Gross agricultural production	62 381	58 519	56 039	52 684	60 263	61 987
Total agricultural production	–	65 099	62 084	60 306	68 188	69 807
Intermediate consumption	37 401	46 644	43 781	45 626	49 136	50 005
Gross added value	21 396	18 444	18 303	14 680	19 052	19 802

Source: *Správa o poľnohospodárstve a potravinárstve SR* (2000, 2001, 2002, 2003)

<sup>1</sup> estimate

Table 2. Added value generation in 2000, international comparison in EUR per hectare a.l.

Country	Final production	Inputs	Gross value added	Value added per		% of intermediate consumption	% RV of GAP
				one worker	inputs		
EU 15	2 015	957	1 059	20 866	1.107	47.5	54.64
Belgium	4 965	3 030	1 935	28 389	0.638	61.0	46.59
Germany	2 426	1 431	995	16 501	0.695	59.3	49.60
Greece	2 209	564	1 645	12 564	2.918	25.5	72.29
Spain	1 154	395	760	21 517	1.926	34.2	63.69
Ireland	1 238	673	565	18 353	0.840	54.4	20.69
Austria	1 538	863	676	10 061	0.783	56.1	48.44
France	2 102	1 055	1 047	32 374	0.992	50.2	57.22
Slovakia	576	406	170	2 902	0.418		45.19
Czech Republic	600	421	180	3 528	0.427	69.8	38.91
Hungary	969	611	356	7 768	0.582		53.63

Source: Slovak, Czech, Hungarian, Latvian, Polish, Romanian and Slovenian Agriculture in Comparison with the EU Countries (2001), authors' own calculations

purposes of such an evaluation, we will use data related to the value added generation in an international comparison illustrating the position SR holds with respect to this indicator. Value added generation is a weak spot of the Slovak agriculture as is indicated in the Table 2.

In all indicators shown in the Table 2, the Slovak Republic reports the worst values. The value of final production per area unit in Slovakia is lower than a third of the average level attained in the EU. As regards the amount of the added value per area unit, Slovakia reaches only 16% of the EU average. The value of inputs in the Slovak agriculture reaches only 42% of the EU average. Slovakia is also very inefficient in the utilization of inputs purchased for the added value generation where its output per input unit is slightly more than a third of outputs produced in the EU. The Slovak labour productivity in the value added per employed is reported only at 14% of the EU average.

Even though the comparability of the data above is not accepted uniformly due to mechanical currency conversions, it cannot be denied that Slovakia is lagging behind in the volume of inputs used and efficiency of factors employed.

The generation of the added value in the agriculture as a whole also reflects how this indicator is generated in individual business entities. The gross added value generated in individual enterprises shows, in particular, the efficiency of inputs purchased, which in 2002 amounted to 26.7% of the output value as provided by the VÚEPP in Bratislava (Kubánková, Burianová 2003). The value added further depends on the structure of production in individual enterprises since it is considerably differentiated in individual production activities.

## GROSS ADDED VALUE GENERATION IN SLOVAK BUSINESS ENTITIES

The role of the added value indicator as a criterion in assessing the efficiency of an enterprise and its growth management should also be reflected by the practices of managers in agricultural enterprises. However, the re-

search we have done in a group of agricultural enterprises does not attest much to this fact.

In the text below, we will assess the value added generation in agricultural enterprises of the SR taking into considerations factors objectively causing its differentiation. These factors include natural conditions, economic level of enterprises and enterprise management's interest in generating added value and boosting its growth.

The objective influence of natural conditions on agricultural production manifesting itself by differentiation of results based on quality of soil and climatic conditions is also reflected in the volume of production inputs used, in the efficiency of these inputs as well as in the added value generation. Using traditional production areas for the purposes of natural condition categorization gives the distribution of enterprise efficiency as is presented in Table 3. The table data contain some results selected from the Information Sheets for the year 2002 obtained from 1 234 agricultural enterprises – legal entities in the SR.

A large number of enterprises included in the research give a realistic picture of how enterprises are differentiated by natural conditions. Enterprise efficiency drops from the maize production region to the mountain production region irrespective of whether it is measured by total revenues or value added generation. The aforementioned indicators provide a high degree of correlation but the added value decrease is higher than the fall in revenues as we progress towards less favorable natural conditions.

As information sheets give no data on consumption of intermediate products purchased, the intermediate consumption indicator including also the intermediate product consumed in the production process replaces it. The relative indicator expressing the added value in SKK per 1 SKK of intermediate production achieves the highest values in enterprises located in most favourable production regions but the drop in input transformation efficiency within regions is lower than the efficiency reduction.

There are considerable differences between production regions also in the availability of active production assets – equipment and machines, which points to under

Table 3 Natural conditions and added value generation in 2002, SKK/ha

Indicator	Production region				
	maize	sugar beet	potato	potato and cereals	mountain
Number of enterprises	499	180	213	100	242
Revenues	46 090	39 974	30 227	24 902	22 052
Gross added value	11 186	9 245	5 306	4 134	3 756
Intermediate consumption	24 983	22 531	17 062	13 839	11 230
VA/IC	0.472	0.410	0.311	0.298	0.334
Machines and equipment	7 578	6 318	4 810	3 639	3 119
Subsidies	2 579	3 311	3 528	3 999	4 180

Source: CD published by the Ministry of Agriculture of the SR (2002), authors' own calculations

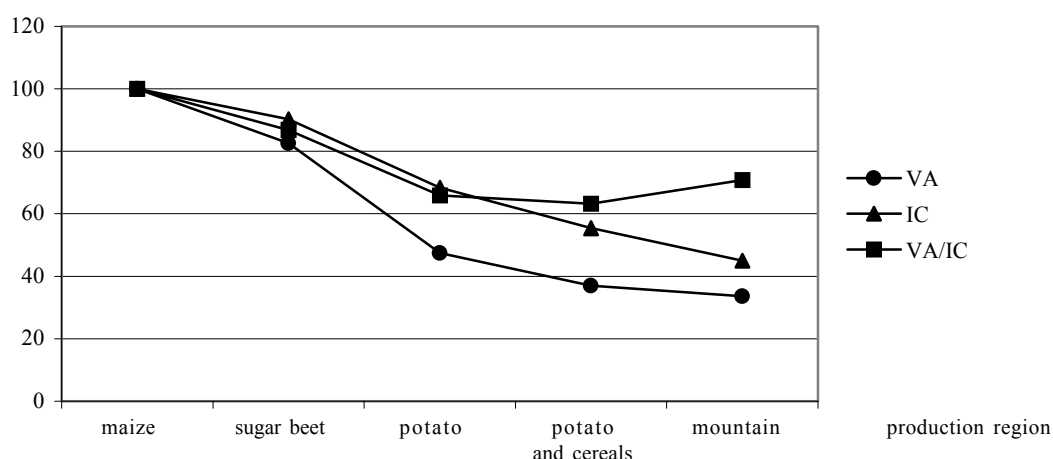


Figure 1. Added value generation in Slovak production regions, 2002

sizing of fixed assets in less favorable conditions. Subsidy distribution is perhaps in line with the need of providing higher subsidies to production regions operating under less favorable production conditions.

Figure 1 displays the added value generation and its efficiency provided that the following indicators in the maize production region (value added – VA, intermediate consumption – IC and intermediate consumption efficiency – VA/IC) are set to 100.

It is intriguing that generation of both the value added and intermediate consumption declines in the least favorable production conditions, which is objectively correct,

but simultaneously, the efficiency of the value added generation grows since the decrease in VA is attenuated.

The Ministry of Agriculture of the SR divided enterprises according to their natural conditions into enterprises operating under the less favorable natural conditions (LFNC) and those operating under the more favorable natural conditions (MFNC). This categorization is based on land price groups. Table 4 illustrates value added generation data using some relative indicators obtained from the above-mentioned categorization.

The most marked differences between the less and more favourable natural conditions can be seen in relation to the productivity of labour obtained from the val-

Table 4. Value added generation in various natural conditions

Indicator	LFNC		MFNC	
	2000	2001	2000	2001
Productivity of labor from VA	84 000	129 000	157 000	246 000
VA per SKK 1 of wages	0.76	1.08	1.33	1.83
VA per production in %	20.22	25.10	28.81	34.65
VA per SKK 1 of fixed assets	69.48	79.01	99.97	117.65

Source: Správa o poľnohospodárstve a potravinárstve SR (2002), p. 254, adapted

Table 5. Value added generation in enterprises of the maize production region, Slovak Republic, 2002, SKK/ha

Indicator	Profitable	Unprofitable	Profitable/unprofitable (%)
Number of enterprises	374	125	299.2
Revenues	48 949	37 084	131.9
Gross value added	12 485	7 094	175.9
Intermediate consumption	25 819	22 351	155.1
VA/IC	0.483	0.317	152.3
Machines and equipment	8 429	4 899	172.0
Subsidies	2 704	2 184	123.8

Source: CD published by the Ministry of Agriculture of the SR (2003), authors' own calculations

ue added that is almost double in MFNC as in the less favorable conditions. The value added per SKK 1 of wage costs behaves in a similar way. Other indicators produce smaller differences; yet they remain to be seen and are differentiated between individual years.

Let us analyze differences in the generation of value added in a group of agricultural enterprises being legal entities that operate approximately under the same natural conditions of the maize production region but differ in their economic level. A part of those enterprises reports profitable business while another part operates in red numbers.

In 2002, the agriculture as a whole earned a profit, which is also reflected in the Table 5 where there are three times more of profitable businesses than of the loss-making ones in the maize production region. Other indicators show no such marked differences.

The greatest differences between profitable and loss-making enterprises are found in the value added generation and in fitting of enterprises with machines and equipment (fixed assets). Therefore, we can draw the conclusion that the value added has not become a criterial indicator in the group of unprofitable businesses. This position can rather be attributed to the revenue indicator where the difference between the two enterprise groups is the smallest along with subsidies.

Other indicators showing very similar differences are the volume of the intermediate consumption per area unit and efficiency of the intermediate consumption in the process of its transformation into the added value. A low-

er degree of production input consumption and a lower efficiency of input transformation not only result in a lower value added generation but also are causes of losses generated in this group of businesses. The third factor to be analyzed is managers' competence and disposition of resources in enterprises with the value added indicator serving as a criterion. This ability may be expressed only conditionally as the practical effort of corporate managers to upvalue inputs in order to increase the company's outputs.

Our research is based on a group of agricultural enterprises being legal entities that conduct their business in the maize production region, from which group businesses achieving extreme values have been excluded. The entire group includes, in total, 469 agricultural enterprises for the year 2001.

Only some indicators related to the value added generation have been selected from the available data. Initially, their variation within the group is displayed (Table 6).

Variation of values within the group under analysis is very high. Numerous enterprises report even a negative value added while there is a high variation particularly in revenues, production and intermediate consumption. Relations affecting the value added generation would be more striking when presented using the enterprise categorization (Table 7).

The enterprises have been divided into four groups based on the amount of their intermediate consumption per area unit in order to monitor the development of relevant indicators related to the value added generation.

Table 6. Variation of indicators in the group of enterprises operating in the maize production region in 2001, SKK/ha

Indicator	Minimum	Maximum	Average
Revenues	3 240	366 450	44 460
Value added	-31 600	78 660	10 290
Production	550	144 700	32 170
Intermediate consumption	2 240	96 900	22 590
Machines and equipment	0	58 250	6 510
Subsidies	330	22 000	3 110

Source: CD published by the Ministry of Agriculture of the SR (2003), authors' own calculations

Table 7. Agricultural enterprises operating in the maize production region according to their intermediate consumption, 2001, SKK/ha

Indicator	Up to 20 000	20 001-30 000	30 001-40 000	Over 40 000
Number of enterprises	256	118	60	35
Revenues	24 879	46 949	63 345	106 712
Gross value added	5 427	13 493	16 662	23 658
Intermediate consumption	13 643	24 673	34 909	52 361
VA/IC	0.397	0.546	0.477	0.451
Machines and equipment	3 670	7 720	10 649	15 632
Subsidies	2 373	3 106	3 963	6 388

Source: CD published by the Ministry of Agriculture of the SR (2002), authors' own calculations

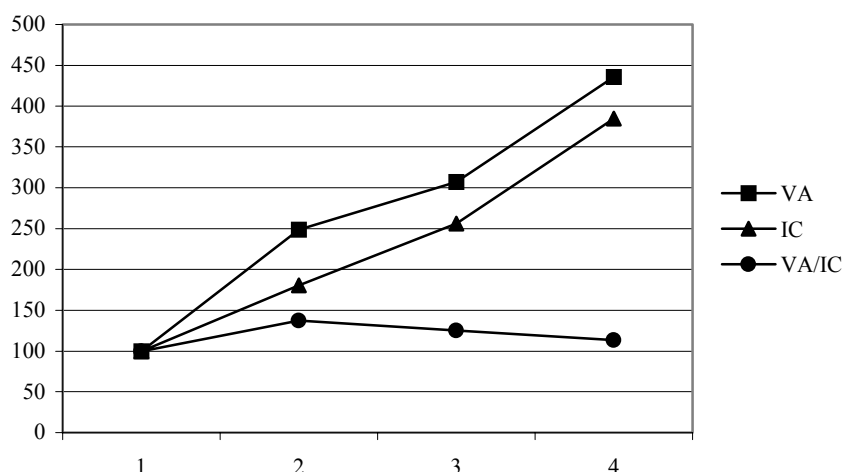


Figure 2. Value added in enterprise groups

Division of the group by frequency considerably diverges from the standard distribution being very asymmetrical since more than a half of the enterprises belongs to the group with the lowest intermediate consumption per area unit. There is a constantly falling number of enterprises having resources for a more intense growth of the intermediate consumption. This attests to a dire situation regarding the intensification of the Slovak agriculture in the most favourable production conditions represented by the maize production region.

Revenues are the most sensitive factor responding to the growth of intermediate consumption, as there is almost five-fold difference between the first and the last groups. A similar difference can also be found in the machinery and equipment fitting of enterprises, which points to a correlation between intensity and material/technical fitting of enterprises. There is a four-fold difference in the average intermediate consumption inputs as well as in the value added generation.

However, the effect of intermediate consumption growth is not reflected in the growth of intermediate consumption efficiency. The data presented in the table imply that the value added per unit of intermediate consumption grows only up to the second group, decreasing in the rest. The reason may be inadequate struc-

turing of the intermediate consumption, its improper allocation into sectors, production structures, price influences as well as any other factors that could not be identified using the database we had at our disposal.

Subsidies were provided to enterprises intriguingly in line with the amount of their intermediate consumption, or production rate in spite of the fact that they were not allocated by that criterion. The subsidy amount undoubtedly has some influence over the entire intensification process.

Figure 2, again, illustrates the configuration of the three above-mentioned indicators expressing the value added generation provided that the respective values in the first enterprise group are set to 100.

If increments in the intermediate consumption within the given group of enterprises are conditionally regarded as increments in intensification contributions per area unit, even if this supposition is deliberately inaccurate, the following results will be obtained (Table 8).

The growth of intermediate consumption is not manifested in the necessary growth of further final indicators. The contribution of the intermediate consumption expressed as its increase by SKK 10 000 on the previous level is reflected in the first contribution by a growth of SKK 22 070, in the next the growth value falls

Table 8. Intermediate consumption growth and value added in the maize production region, 2001 (SKK/ha)

Indicator	1 <sup>st</sup> contrib.	2 <sup>nd</sup> contrib.	3 <sup>rd</sup> contrib.
Revenues	22 070	16 396	43 367
Gross value added	8 066	3 169	6 996
Intermediate consumption	11 030	10 236	17 452
VA/IC	0.15	-0.07	-0.03
Machines and equipment	4 050	2 929	4 983
Subsidies	733	857	2 425

Source: CD published by the Ministry of Agriculture of the SR (2002), authors' own calculations

Table 9. Simple linear regression functions

Dependent variable ( <i>Y</i> )	Variable – explanatory ( <i>X</i> )	<i>a</i>	<i>bX</i>	Determination coefficient
Production	intermediate consumption	3 502.60	1.319	0.9582
Revenues	intermediate consumption	429.80	1.727	0.944
Revenues from own products	intermediate consumption	5 437.15	1.083	0.895
Value added	intermediate consumption	3 164.78	0.3489	0.632

Table 10. Multifactor linear regression functions

<i>Y</i>	<i>X</i> <sub>1</sub>	<i>X</i> <sub>2</sub>	<i>X</i> <sub>3</sub>	<i>X</i> <sub>4</sub>	<i>a</i>	<i>r</i> <sup>2</sup>
Value added	1.528	–6.5 E	0.981		1 466.3	0.848
Value added	–2.424	1.6596	0.00087	0.0936	–1 492	0.850

*X*<sub>1</sub> – intermediate consumption; *X*<sub>2</sub> – fixed assets; *X*<sub>3</sub> – wages; *X*<sub>4</sub> – cattle (in pieces)

while the last contribution increases the revenues by SKK 43 367.

A similar development can be observed in the gross value added even though the increment values are substantially smaller. This is also reflected in the declining efficiency of the intermediate consumption in relation to the value added generation. Trends similar to those found in revenues are also noticed in the machine and equipment value. A positive development of growing intermediate consumption can only be seen for subsidies, which may imply that the government acted in support of the intensification process.

## QUANTIFYING OF RELATIONS IN THE VALUE ADDED GENERATION

We used linear single-factor and multiple-factor regression functions to quantify cause-and-effect relations with a view to reveal factors most influencing the value added generation.

Some results are presented in the Table 9.

Again, we are making use of data obtained for the year 2001 from the group of 469 agricultural enterprises being legal entities that operate in the maize production region.

The greatest intermediate consumption effect is manifested in revenues where 1 SKK of intermediate consumption earns SKK 1.727 in revenues and it is in this indicator, too, that the value of the determination coefficient is the highest. The intermediate consumption effect declines for other final indicators; the dependence closeness test decreases, too. The effect of intermediate consumption on the value added growth by SKK 0.348 corresponds to the data in Table 7, but what is surprising is the low value of dependence closeness.

Multifactor linear functions are presented in Table 10.

The coefficient of the first multifactor regression function with the gross value added as the dependent variable implies a high influence of wages and intermediate consumption while fixed assets exert a negative influence.

The second function where cattle as an additional factor were included suggests that the influence of the intermediate consumption is negative and the function has lower testing values than the former one.

## CONCLUSION

The value added as an indicator of financial results has its importance from the macroeconomic as well as microeconomic perspective. Its development enables to assess changes in the efficiency of the entire sector, or an enterprise. The results of enterprise group analyses have confirmed that the value added has not yet become a criterial indicator.

While natural factors objectively differentiate the development and level of the value added, its high degree of differentiation in enterprises operating under the same production conditions also reflects the attitude of its managers towards the management of the enterprise.

In view of Slovakia's severe lagging behind the current EU countries in the value added generation, it is necessary to change our attitude towards this indicator if we wish to maintain and improve our competitiveness in EU markets.

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