

Article submitted to the Proceedings Book of the VI th . International Symposium– 2022, Theme: “Biosphere & Environmental Safety”		ISBN: 978-963-449-285-6 Online May 5-6, 2022 ICEEE, Óbuda University, Budapest, Hungary
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INNOVATION BY SUBSIDIES IN AGRICULTURAL PRODUCTION IN HUNGARY IN 2010S

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One of the main issues is income conditions of agricultural producers for period of 2008 and 2020 in Hungary in order to keep producers in this sector and in rural areas. The analyse method the special program for social sciences. The study analyses the income conditions of agricultural producers based on the total factor income per annual working unit. Total factor income per annual working unit has very strong correlations with gross value added –GVA in current price by 0.988, because of if the agricultural production, as output increased – even with less or little input as current production use – therefore the gross value added also can increase, which can be base for increasing income of annual working unit. This prosperity process can be followed by increase of total factor income per annual working unit (AWU) for period 2008-2020, when this has increased two times more by 210% for this time period. Total factor income per annual working unit has very strong correlation with total factor income by 0.969, when in Hungary the total factor income has increased by 162.7%, which also stimulated increase of total factor income per annual working unit. Gross value added should make considerable influence on the increase of the total factor income per AWU. Therefore, correlations have been very strong between themselves by 0.991 for the same period. The number of AWU should also decrease somehow, in order to increase the total factor per AWU, but it has only strong contradict correlations by Minus 0.585.

Keywords: Annual working unit, correlation system, gross value added, income conditions, statistical analyse, total factor income

INTRODUCTION

The case-study aims at analysing the importance of the agricultural industry in Hungary from point of view of innovation for production technologies supported by subsidies provided from public finance and increasing the income possibilities for agricultural producers by the other words agricultural holdings. It is important for all Hungarian economy that the agricultural producers included family farmers, mostly small and medium entrepreneurship not to escape for this economics sector. Because the agricultural sector provides renewable energy resources, mostly food for human society. There is not sustainable society without sustainable agricultural industry, because this sector only produces food for supplying demands of the consumers in human society. This condition makes agricultural industry be the first and basic strategic sector. All of these economic-social aims of this study are very actual even for further prosperity of agricultural sector.

The case-study focuses on the emphasizing the correlations of different economic variables, namely **gross value added on the basic price (GVA1)**, **real gross fixed asset accumulation all (GFAAcc2)**, **taxes (TAXES3)**, subsidies (Subsidies4), total factor income (TFIncome5), number of annual working unit (NumberAWU6), total factor income per annual working unit (TFIAWU7), subsidies per gross fixed asset accumulation (SGFAAcc8). These economic variables are setting up each-others, because

the gross value added (1) is decreased by the gross fixed asset accumulation (2) and taxes (3), but this one is increased by the subsidies (4), which all of these calculations provide total factor income (5). Additionally, to creating total factor income, there is an also important view that how this total factor income is distributed for the annual working units and also, how many AWU-s can participate in share of total factor income. Because the income-able and profitability, finally as efficient agricultural production are depending not only from innovative developed level, but as well as the number of AWUs. Because a greater number of AWUs provides less factor income per each one AWU, or little number of AWUs provide or income per AWU. Therefore, the study analyses the correlations between number of AWUs (6) and income conditions of each one AWU (7).

The study also analyses the possible measure of the subsidies, therefore how the subsidies can be proportionate to the gross fixed asset accumulation (8). Because the gross fixed asset accumulation should include the innovation prosperity as essence of the advanced production technological process. There are two basic elements, which are important to be analysed in this study, namely the *innovation* for interest of sustainable agricultural prosperity and the income conditions by the other words, namely *total factor income per AWU*, who AWUs are responsible for the operating innovative advanced technology for interest of sustainable agricultural prosperity.

Also, the final important issue of the study how the subsidies can be measured for comparing with the gross fixed asset accumulation, naturally the *proportionate of the subsidies* for all of the gross fixed asset accumulation. From these points of views mentioned before some *hypotheses* can be summarised, which are as follows:

- 1- It can be proofed that the gross value added (GVA1) has very strong correlations with gross fixed asset accumulation (GFAAcc2), total factor income (TFIncome5) and total factor income per annual working unit (TIFAWU7).
- 2- It can be proofed that the gross value added (GVA1) has strong correlations with taxes (TAXES3), subsidies (Subsidies4) and contradicted correlations with number of annual working units (Minus) (NumberAWU6).
- 3- It can be proofed that the subsidies (Subsidies4) have very strong correlations with taxes (TAXES3) and strong correlations with gross fixed asset accumulation (GFAAcc2).
- 4- It can be proofed that the total factor income (TFIncome5) has very strong correlations with total factor income per annual working unit (TIFAWU7).

The analyse of data was needed for collecting main agricultural data base from the Hungarian Central Statistical Offices, which can also be used for the Eurostat of the European Union.

The EU declared about the subsidies concerning reforms as follows (ECA 2016; OECD 2003):

2003 Reform: The CAP reform, which introduced the decoupling of direct aid from agricultural production and payment of land to maintain land, environmental protection, food safety, animal and plant health and animal welfare (also known as mutual matching). The 2003 CAP reform has emphasized the promotion of production ("a support from production ") and an income support scheme which was largely based on the level of subsidies received by each agricultural growers during the given reference period.

2013 Reform: CAP Reform for the 2014-2020 period. Its purpose is to provide a more balanced distribution of available support and rewarding farmers with sustainable management practices through a specific "more environmentally friendly support". It also strives to improve the market orientation of EU agriculture, while farmers with external uncertainties and aims to further support rural development in the Member States. In the 2013 reform, payments were even more separated from their previous background, while gradually moved to payments per hectare in all Member States. The structure of direct payments has also been transformed and since 2015, for all farmers, a hectare-based basic payment, the "more environmentally friendly support for the agricultural practice, which is a result of the agricultural practice, which is a result of the agricultural producers, which is considered to be affected by economic producers" and composed of payments for young farmers. Member States, within certain limits, have a significant room for manoeuvre and to manage payments to address specific policy problems.

Although from a financial point of view, direct payments are the most significant; this is not the only tool that affects farmers the income of your income. More rural development measures at EU level, and a number of market and promotion measures for specific agricultural sectors. The Commission can intervene in a crisis situation by opening restricted access to intervention public or private

storage in specific markets, which affects market prices and thus agriculture producers' income. (ECA 2016; OECD 2003).

Subsidies for holdings concerning Hungarian fiscal practice, which developed from it, built on the application of non-conventional instruments of active government regulation and fundamentally based on the Fundamental Law (Hungary's constitution) adopted in 2011, particularly its chapter on Public Finances and the cardinal laws pertaining to public finances (see more detailed in Lentner, 2020 and Lentner 2021).

Some expert declared that the countries in Central and Eastern Europe (CEE) and the Newly Independent States (NIS) are a diverse group in terms of their economic and social structures, and technology and innovation profiles, as well as in their patterns and extent of resource use. Many of them still require industrial growth to realize their national development objectives and to reduce the income gap with industrialized countries. The challenge for them is to find and implement a model of industrial growth that is more resource and energy efficient, and is low carbon and low waste (Ürge-Vorsatz et al. 2006; McKane et al 2009; Buchan 2010; Mostert 2010).

In spite that the agricultural prosperity in Hungary has realized a considerable increase, there are *some important difficulties, which have remined for the researched period*. The subsidies were considerable for Hungarian agricultural holdings and their share was - in the real gross fixed asset accumulation, by the other name consumption of fixed capital - more than share of total subsidies in field of consumption of fixed capital in all of the EU, namely by about 88%, while in Hungary this was 185% by the end of the same year, as 2016. The main problem was that the Hungarian agricultural producers by the other name *holdings were very separated* in the examined – analysed period. Therefore, *number of the AWU-s* in Hungary was higher than in the former 15 EU-member states, which led to *less total factor income per AWU* in Hungary than in cases of former EU member states. The *weak capital force* of Hungarian holdings could ensure somehow backwardness for them and less competitive positions in single market of the EU, even the international market competitiveness in fields of mechanization, food manufacture. The Hungarian holdings need more for the *extension services* and supervisory for creating the planning, making projects and to become more competitive, increasing qualified demands to balance their less competitive backwardness comparably with competitiveness of farmers of former EU-member states. The *lack of capital* and somehow *lack of knowledges* need more extending activities to mitigate their backwardness accompanying with *improving the bank services* to supply credits for holdings. Also, it is important to develop the *product channel systems* in fields of each different kinds of agricultural and food products. Improving the mechanization should be realised even for small and medium scale farms in Hungary.

MATERIALS AND METHODS

The actual statistical method is based on the SPSS system (Special Program for Social Sciences) including eight economic variables accompanying with different years included in the time period. The SPSS statistical analyses are based on the works of Sajtos - Mitev (2007).

This analyses method includes calculation of the total factor income based on gross value added, fixed capital, other taxes and subsidies, and also, changes of gross value added (GVA1) *on basic price (output-input)*, gross fixed asset accumulation (GFAAcc2), taxes (TAXES3), subsidies (Subsidies4) and real total factor income (TFIncome5) in agriculture of Hungary in value in Million HUF (Hungarian Forint) between 2008-2020 (HCSO 2021), (mez0002), (mez0005). The SPSS analyses focus on the correlation matrix among economic variables, and finally the Dendrogram using ward linkage, rescaled distance cluster combine concerning the SPSS owned calculation based on the data-bases coming from HCSO (2021).

STATISTICAL ANALYSIS AND GRAPHICAL PRESENTATION

In this part of the case-study there are short describes about tables and figures demonstrating the data-base. The Table 1 includes the Abbreviation of economic variables either by short names or their

meanings for determining the time-length and source of data bases, which the analyses are connected. The other tables and figures demonstrating the analysing process following data base.

Table 1. Abbreviation of economic variables

Variables Abbreviation	Variable names	Period	Source/Data base
GVA1	Gross value added on the basic price	2008-2020	HCSO, 2021
GFAAcc2	<i>Real gross fixed asset accumulation all</i>	2008-2020	HCSO, 2021
TAXES3	Taxes	2008-2020	HCSO, 2021
Subsidies4	Subsidies, in Million HUF	2008-2020	HCSO, 2021
TFIncome5	Total Factor Income	2008-2020	HCSO, 2021
NumberAWU6	Number of Annual Working Unit	2008-2020	HCSO, 2021
TFIAWU7	Total Factor Income / Annual Working Unit	2008-2020	HCSO, 2021
SGFAAcc8	Subsidies/ Gross Fixed Asset Accumulation	2008-2020	HCSO, 2021

Source: System of agricultural accounts at current basic prices, in %, in current basic price, in Million HUF, HCSO (Hungarian Central Statistical Office), 2021, Budapest, Hungary
https://www.ksh.hu/stadat_files/mez/hu/mez0002.html
https://www.ksh.hu/stadat_files/ara/hu/ara0051.html
<https://statinfo.ksh.hu/Statinfo/haViewer.jsp?wcf15eb7a36=x>
<https://statinfo.ksh.hu/Statinfo/haDetails.jsp>

Table 2. Calculation of the Total Factor Income based on gross value added, fixed capital, other taxes and subsidies during period of 2008-2020 (2008=100) in percent based on Million HUF

Title/Years	2008	2010	2012	2014	2016	2018	2020
GVA1	100	-20	110	147	158	163	178
GFAAcc2	100	-4	114.5	141	112	172	204
TAXES3	100	133	187	182	202	218,2	266
Subsidies4	100	117	143	164	137	147	158
TFIncome5	100	-10	121.6	155.4	161.4	153.8	162.7
NumberAWU6	100	102	-0.4	106.4	-0.2	-10	-22.4
TFIAWU7	100	-12	122.2	146	162	171	210
SGFAAcc8	152	183	190	177	185	129	117

Source: HCSO (Hungarian Central Statistical Office, 2021): System of agricultural accounts at current basic prices, Budapest, Hungary, (mez0002), (mez0005)

In case of Table 3 the correlation matrix provided data, which can be titled as values for the correlations among the economic variables by two different kinds of levels, namely if the value as correlation among economic variables are between 0.800 and 1.000, this means that the correlation is very strong, if this value is between 0.500 and 0.800, in this case the correlation is strong, or if the value is under 0.500 the correlation is not important for the aims of the researches and analyses.

The sign “Minus” is not a negative value, but the correlations are contradicted among the economic variables. The negative economic variables have contradicted correlations with all of other variables, which are not negative.

Table 3. Correlation Matrix^a

	GV A1	GFAA cc2	TAXE S3	Subsidi es4	TFInco me5	NumberA WU6	TFIAW U7	SGFAA cc8
GVA1	1.000	.941	.706	.638	.991	-.617	.988	-.483
GFAAcc2		1.000	.762	.675	.906	-.625	.964	-.681
TAXES3			1.000	.831	.671	-.816	.781	-.475
Subsidies4				1.000	.656	-.459	.666	-.188
TFIncome5					1.000	-.585	.969	-.370
NumberAWU6						1.000	-.687	.387
TFIAWU7							1.000	-.547
SGFAAcc8								1.000

a. This matrix is not positive definite.

Source: SPSS owned calculation based on the HCSO (Hungarian Central Statistical Office, 2021): System of agricultural accounts at current basic prices, Budapest, Hungary, (mez0002), (mez0005)

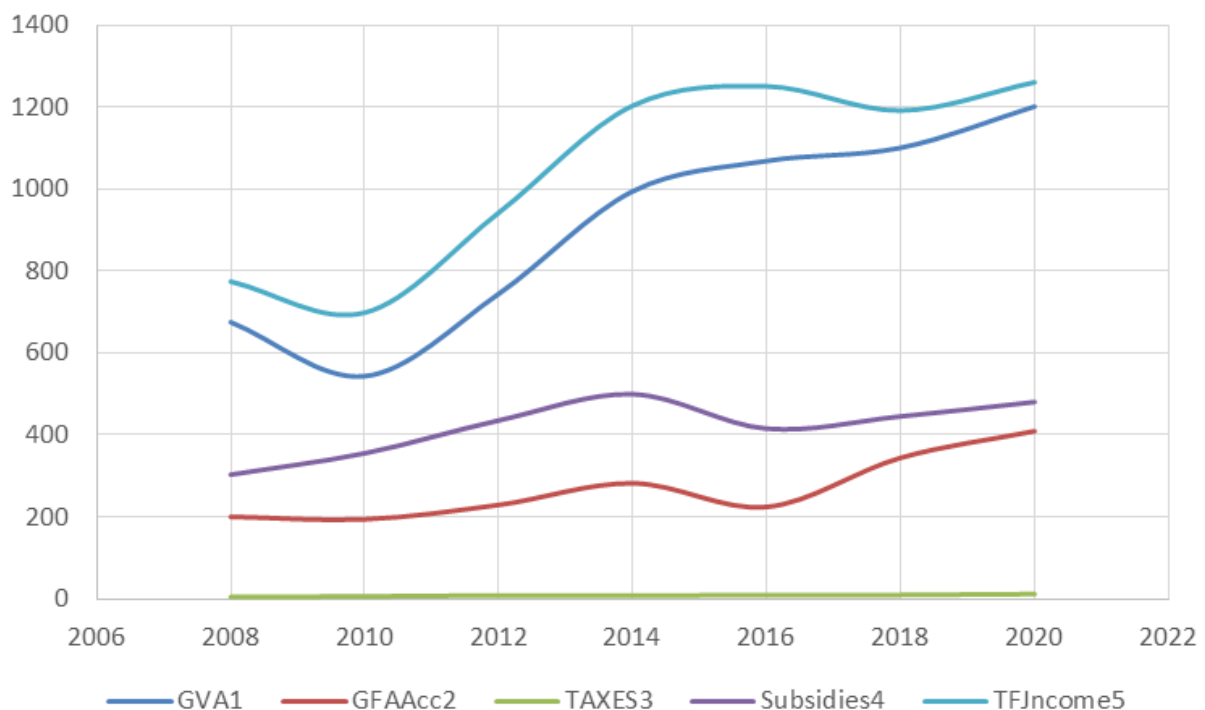


Figure 1. Changes of gross value added (GVA1) on basic price (output-input), gross fixed asset accumulation (GFAAcc2), taxes (TAXES3), subsidies (Subsidies4) and real total factor income (TFIncome5) in agriculture of Hungary in value in Million HUF between 2008-2020

Source: HCSO (Hungarian Central Statistical Office, 2021): System of agricultural accounts at current basic prices, Budapest, Hungary, (mez0002), (mez0005)

Total Factor income (TFIncome5) = {GVA1 – GFAAcc2 – Taxes3} + Subsidies4

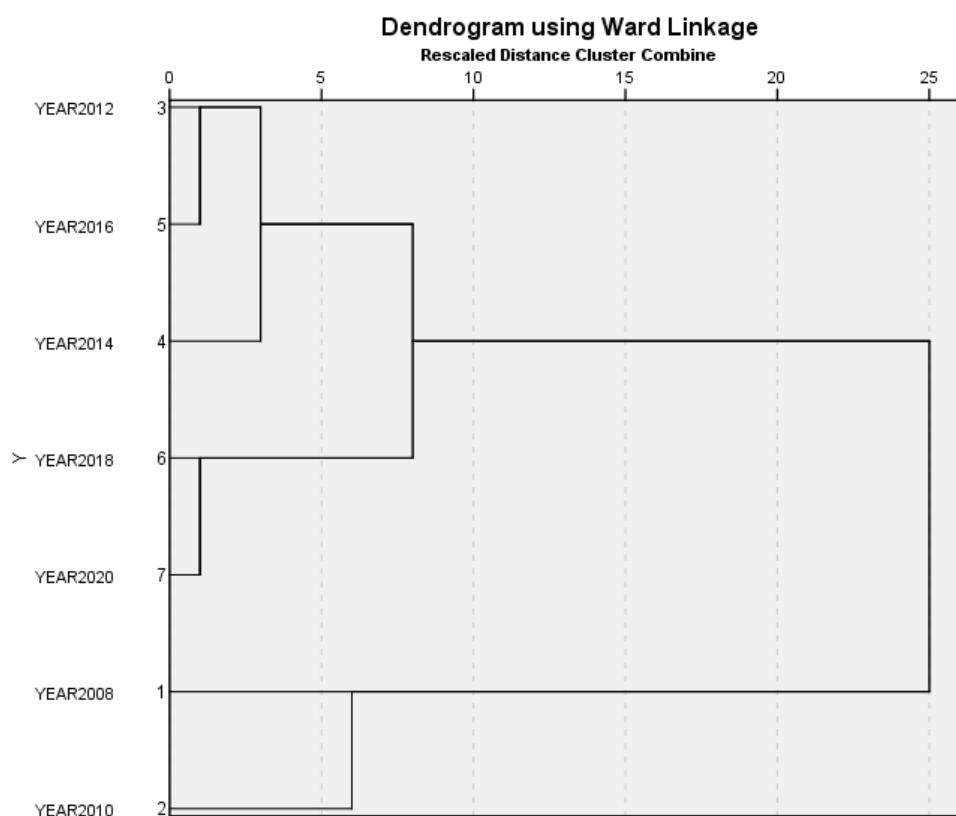


Figure 2. Dendrogram using Ward Linkage, Rescaled Distance Cluster Combine

Source: SPSS owned calculation based on the HCSO (Hungarian Central Statistical Office, 2021): System of agricultural accounts at current basic prices, Budapest, Hungary, (mez0002), (mez0005)

RESULTS AND DISCUSSION

TFI (total factor income) per AWU (annual working unit) (TFIAWU7) has very strong correlations with *gross value added* (GVA1) in current price by 0.988, because of if the agricultural production, as output increased – even with less or little input as *current production use* – therefore the *gross value added* also can increase, which can be base for increasing income of annual working unit. This prosperity process can be followed by the increase of total factor income per AWU for the period of 2008 and 2020, when this has increased two times more by 210% for this time period. Also, the total factor income per AWU (TFIAWU7) has very strong correlation with total factor income (TFIncome5) by 0.969, when in Hungary the total factor income has increased by 162.7%, which also stimulated increase of TFI per AWU. Naturally the GVA also should make considerable influence on the increase of the total factor income per AWU. Therefore, correlations have been very strong between themselves by 0.991 for the same period. The number of AWU (NumberAWU6) should also decrease somehow, in order to increase the total factor per AWU, but it has only strong contradicted correlations by (Minus) 0.585.

The number of AWU has decreased only by moderate level as 22.4%. Their number has decreased from level of 435 thousand to level of 337 thousand for the twelve years. The difficulty of the Hungarian agriculture is little land used concentration, which shows a relatively large number of AWU. This can be proofed by the little average measure of holding in Hungarian agriculture, for example by the end of 2016 the utilised agriculture area per holdings was averagely hectare land, while the 81% of the holdings had less than five hectare utilised agricultural areas (EC 2021; Table 3; Figure 1; HCSO 2021).

Also, the real gross fixed asset accumulation (consumption of fixed capital) (GFAAcc2), has very strong correlations with the total factor income per AWU (TFIAWU7) by 0.964 between 2008-2020, because the increasing trends of the gross fixed asset accumulation have been by 204% for the same period.

The investment for the agricultural production in Hungary stimulated to introduce new innovative advanced technology – even highly developed technology (hightec), which also can provide favourable production conditions for obtaining better income possibility for holdings.

Additionally, to the total factor income per AWU, the gross fixed asset accumulation has also very strong correlations with increasing or decreasing total factor income (TFIncome5) by 0.906, which also are very closed to 1.000 value or 100%. This means that the more innovative favourable conditions of the gross fixed asset accumulation provide adequate bases for the better price income with producing price level. Therefore, the total factor income conditions can increase more.

If the adequate investments can be realised in the Hungarian agriculture by increasing volume of gross fixed asset accumulation, this can stimulate increasing more selling products for consumers with accompanying increasing incomes of holdings and by increasing capital strengthen, agricultural producers will be stimulated to realise more investments, as fixed capital by creating more jobs even in agricultural sector to strengthen the rural development.

The number of annual working units (NumberAWU6) also should decrease in order that the total factor income per AWU could increase, therefore total factor income per AWU (TFIAWU7) has strong negative correlation by the other word contradict correlation with changes of number of annual working unit by (Minus) 0.687. But concentration of agricultural production by decreasing number of annual working units can concentrate or increase the investment as real gross fixed asset accumulation, which means that this last economic variable has strong contradict correlations with number of AWU by (Minus) 0.626.

The real gross fixed asset accumulation is also depending on changing taxes by 0.762 and subsidies by 0.675 strong correlations. In case of Hungarian agriculture, the value of taxes is not so considerable amount, therefore the real gross fixed asset accumulation can increase, accompanying with the little increase of taxes. The little increasing amount of taxes does not restrict the investment process even in fields of gross fixed asset accumulations. Therefore, the increasing trend can be in fields of either taxes or gross fixed assets in the same time. Also, the subsidies (Subsidies4) stimulate to increase the real gross fixed asset accumulation by strengthening the capital force of holdings and to introduce more innovative investments in the agricultural sector.

In order to overview the importance and measure of subsidies (Subsidies4) given by public financing resources, the share of the subsidies can be measured comparably to the gross fixed asset accumulation (GFAAcc2 by the other name as the consumption of fixed capital, as 100%. In this case the share of subsidies was 152% in 2008; 183% in 2010; 190% in 2012; 177% in 2014; 185% in 2016; 129% in 2018; 117% in 2020. These data show that the measure of subsidies comparably to gross fixed asset accumulation has been fluctuating between 117% and 190% for the researched period of 2008-2020. Most of the cases measure of subsidies was averagely one and half times more than the value of the gross fixed asset accumulation, which means that the subsidies mainly focused on the innovative technological development in the agricultural industry.

The agricultural holdings can only develop the agricultural innovative technology and production by subsidies, otherwise the agricultural industry cannot develop to supply demands of the world market and single market of the European Union, therefore the Hungarian agricultural holdings will lose their market-share and will be backwardness in the international competition even in the Hungarian domestic market.

The Table 3 shows the correlations between the gross fixed asset accumulation (GFAAcc2) and share of subsidies in gross fixed asset accumulation (SGFAAcc8), which means that the correlations are strong between both of them, but contradicted by (Minus) 0.681, namely by one hand if the gross fixed asset accumulation increases the share of the subsidies decreases in fixed asset accumulation. By the other hand if the gross fixed asset accumulation decreases the share of the subsidies increases in fixed asset accumulation.

These correlations can be true, because the measure of subsidies for holdings (agricultural producers, companies, family farms) is somehow determined by the common agricultural policy of the European Union for longer time-lengthen, as seven-year period based on the common budget of the EU.

Naturally the national budget of the EU-member states can contribute more financial subsidies for the agricultural production additionally to the subsidies coming from the common budget. From this point of view, the share of the subsidies can be somehow fixed comparably to measure of the gross fixed asset accumulation, therefore, if the gross fixed asset accumulation increases the share of subsidies can decrease or increase in case of decreasing measure of fixed asset accumulation. This is generally true in case of agricultural industry in Hungary, but some branches of this sector can be different from these correlations between these two economic variables.

The gross fixed asset accumulation can mostly be depending from the willingness of agricultural companies and family farmers (agricultural holdings) and incentives of the agricultural policy from the EU level and national economic levels of the EU-member states in direction to make agricultural investment activities be more ambition. Naturally the willingness of agricultural producers in direction into the investment is based on the national and international backwardness. For example, price level of agricultural and food products in the single market of the EU and in the world market; price level of the agricultural input accompanying with income conditions for agricultural holdings can make influences on the performance of agricultural holdings either in Hungary or in the EU.

Also, the *share of the subsidies* in gross fixed asset accumulation (SGFAAcc8) is important, because from these correlations of these two economic variables, these subsidies are important to increase extending innovative production technologies by investment in field of the agricultural production. The share of the subsidies shows their importance and efficiency for the increasing trends of investments.

Also, the share and *measure of the subsidies can be compared the measure of the total factor income* (TFIncome5), namely this was 41% in 2008; 55.4% in 2010; 48% in 2012; 41.5% in 2014; 35% in 2016; 37% in 2018; 36% in 2020 (Table 1; Table 2; Table 3; Figure 1; HCSO 2021). In these cases, the share and measure of the subsidies has considerably been less than measure of the total factor income for the researched period comparably to the measure of the gross fixed asset accumulation. The reason generally is that the aim of the subsidies was not just only to complete the total factor income for annual working units, but subsidies wanted to increase the developed level of the agricultural engineer mechanizations and mechanical equipment including agricultural machines, irrigation system, veterinary means and milking machines, cereal-corn drying stores, closed-concrete animal manure stores and others.

Logic of the subsidies, as public finance that the innovative development financed by subsidies, therefore, more yields and output resulted by innovation can lead to more price income even by the same level of producing price as in earlier. This can be titled as *intensive agricultural development* in EU, which means increase of yield per hectare and per animal unit, which this last one is one milking-cow. Therefore, the subsidies aim first at developing agricultural production by intensive innovation and then to increase the total factor income even per annual working unit.

The *subsidies (Subsidies4)* also have very strong correlations with *taxes (TAXES3)* by 0.831, because both of them have had consequent and prosperity increasing trends for the whole researched period. Naturally if the taxes increase, the subsidies obligatory should increase in order that farmer and agricultural holdings must not have income-looses.

In the same time increasing trends of the subsidies are accompanying with increase of the gross value added, which provides proof that the subsidies first aim at increasing level of the innovative advanced technological development. Therefore, the subsidies have strong correlations with the gross value added (GVA1) by 0.638. Additionally, to above mentioned correlations the subsidies have strong correlations with increase of total factor income by 0.656 and total factor income per AWU by 0.666, because the subsidies have positive influences on the increasing trends of total factor income in any cases.

The *taxes (TAXES3)* have contradicted correlations with increasing or decreasing number of annual working unit (NumberAWU6) by (Minus) 0.816 in Hungary, because if the number of AWU increases the taxes are decreasing, which can be experienced in the data base (Table 1; Table 2; Table 3; HNSO 2021). Naturally if the total factor income or total factor income per AWU increase the taxes should also increase in the same time, therefore taxes have strong correlations with total factor income per AWU (TFIAWU6) by 0.781 and with total factor income (TFIncome5) by 0.671 within the researched period.

The gross value added (GVA1) has also very strong correlations with real gross fixed asset accumulation (GFAAcc2) namely by 0.941, which means that investment intensity can make considerable influences on the increasing output and even decreasing input, as production cost by using more efficient technologies probably closed to the innovative technologies. Also, more gross value added can stimulate more income for realising further more intensive advanced investment. In the case of little increase of taxes (TAXES3), the gross production, as output and within the output the gross value added can increase.

Mostly the low level of the taxes can basically stimulate the agricultural production, therefore, increase of the output and gross value added, finally this low level of taxes can ensure more supply the demands of domestic and international markets. It can be seen, that the gross value added has strong correlations by 0.706 with the level of taxes.

The gross value added (GVA1) has strong contradicted correlations with economic variable namely number of AWU (NumberAWU6) by (Minus) 0.617. From this point of view, this means that the efficient use of AWU, as an input can be implemented, then a smaller number of AWU can provides more gross value added. Naturally if one element of input can be cheaper – even by decreasing number of AWU – the gross value added, as result of output-input = GVA, can increase. In case of Hungarian agricultural industry this trend can be followed. But also, the negative trend can happen in case of some economic difficulties, which can make cost of AWU be higher level, therefore the gross value added can be declining.

In case of Hungarian agriculture after 2012 the positive trend of gross value added could realise by little decrease of number of AWU, which can also be followed in Figure 1, where the gross value added could increase by the same rate accompanying with growing rate of total factor income concerning the better income position of the AWU. This could also be realised by the similar or closed growing rates of subsidies and gross fixed asset accumulation. Either favourable growing rate of gross fixed asset accumulation can provide better possibility to use advanced innovative production technologies or consequent increase of subsidies providing more income possibility for holders to increase their fixed assets as investments at low level of taxes - can contribute to the highly level increase of total factor income (Figure 1; HCSO 2021).

From the finds of the study how much the subsidies can have sensitive role in the agricultural innovative production development, which either provides more financial resources or the innovative technologies can be invested by more financial support into gross fixed asset accumulation.

The gross fixed asset accumulation (GFSScc2) decreases value of the gross value added (GVA1 = output-input) with value of taxes (TAXES3) together, but the subsidies (Subsidies4) contribute to increase the total factor incomes (TFIncome5). At agricultural industrial level this total factor income is distributed to all of annual working units (AWU) (NumberAWU6), which will be finally as total factor income per AWU (TFIAWU7).

The *Figure 2* shows the dendrogram using ward linkage; rescaled distance cluster combine based on the SPSS owned calculation and concerning system of agricultural accounts at current basic prices (HCSO 2021), (mez0002), (mez0005).

Figure 2 shows that in the different years how the economic variables changed therefore based their changes they distribute years into different clusters. This means that in the year2012 and year2016 and period between themselves with year 2014 were successful, while the year2008 and year2010 were not successful. Naturally the corona virus period could make little decline for the agricultural prosperity in year2018 and year2020.

CONCLUSIONS AND RECOMMENDATIONS

From the finds of the study how much the subsidies can have sensitive role in the agricultural innovative production development, which either provides more financial resources or the innovative technologies can be invested by more financial support into gross fixed asset accumulation.

The gross fixed asset accumulation (GFSScc2) decreases value of the gross value added (GVA1 = output-input) with value of taxes (TAXES3) together, but the subsidies (Subsidies4) contribute to increase the total factor incomes (TFIncome5). At agricultural industrial level this total factor income

is distributed to all of annual working units (AWU) (NumberAWU6), which will be finally as total factor income per AWU (TFIAWU7).

The *subsidies* as themselves cannot be enough for the realising innovative prosperity for agricultural sector, because this needs for the self-capital force of agricultural holdings based on the factor incomes and their continuous improving knowledge to use more advanced innovative technologies based on the favourable national, international markets and single market of EU.

Finally, some *hypotheses* can be proofed based on the finds of the researches and analyses, which are as follows:

- 1- The gross value added (GVA1) has very strong correlations with gross fixed asset accumulation (GFAAcc2) by 0.941, total factor income (TFIncome5) by 0.991 and total factor income per annual working unit (TIFAWU7) by 0.988.
- 2- The gross value added (GVA1) has strong correlations with taxes (TAXES3) by 0.706, subsidies (Subsidies4) by 0.638 and contradicted correlations with number of annual working units (Minus) (NumberAWU6) by -0.617.
- 3- The subsidies (Subsidies4) have very strong correlations with taxes (TAXES3) by 0.831 and strong correlations with gross fixed asset accumulation (GFAAcc2) by 0.675.
- 4- The total factor income (TFIncome5) has very strong correlations with total factor income per annual working unit (TIFAWU7) by 0.969.

For the further agricultural conditions there some important elements should be followed by agricultural holdings in Hungary to supply adequate and qualified demanded agricultural and food products based possible vertical integrated product channel accompanying with horizontal cooperation among farmers and agricultural producers within given kinds of products as for example crops, animal, animal products and fruit -vegetables and others.

ACKNOWLEDGEMENT

The study was supported by the Kálmán Széll State Finance Research Workshop, Faculty of State Scientific and International Studies, National University of Public Service.

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