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FINANCING AGRICULTURAL HOLDINGS: EVALUATION OF THE MEASURE 'SETTING UP OF YOUNG FARMERS', BASED ON THE RURAL DEVELOPMENT PROGRAMME OF GREECE 2007–2013

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Abstract. The object of this paper is to examine the relevant investment plans, and to evaluate the effectiveness of the financing programme for young farmers. Hierarchical cluster analysis is applied in the present study on a sample of agricultural holdings that submitted an investment plan, in order to be included in the programme 'Rural Development 2007–2013, Measure 1.1.2. Setting up of Young Farmers'. In order to evaluate the effectiveness of the programme, two investment plan typologies are formulated. These typologies are defined according to the human work units and the gross value added, as presented in the current status of the holdings (first typology) and in the future target-level status (second typology) following the completion of the investment plans. The second level profile of the clusters was examined using tests of independence (χ^2-test), and the additional parameters introduced were: the geographical location of the agricultural holdings, the level of realised investments and the type of production. The inclusion of young farmers in this specific programme, apart from attracting young people to rural regions, also leads to an increase in the size of the holdings, based on the performed labour, and to an improved agricultural income. However, it is observed that the implementation of the investment plans does not seem to have affected the type of production applied at the holdings.

Keywords: financing, investment plans, young farmers, rural development, hierarchical cluster analysis.

AIMS AND BACKGROUND

The object of this paper is to examine the investment plans and evaluate the effectiveness of the financing program for the setting up of young farmers, according to parameters that also constitute the acceptance criteria for entering the programme. An additional aim is to carry out a diagnostic test of the investment

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plans progress, and to define groups of agricultural holdings, that can become a target for improving the rural development program.

The ageing population employed in agriculture and the difficulties pertaining to the succession of agricultural holdings constitute basic structural problems affecting agriculture in Europe[1–3].

In Greece, the support measures for young farmers for the purpose of creating their own agricultural holdings, and those for improving their competitiveness, have essentially been applied since the early 1990's, within the framework of the operational programs of the Ministry of Rural Development and Food, with the support of the Community Support Frameworks (A΄, B΄ and C΄ C.S.F.)[4,5]. Attracting young people to rural regions and encouraging them to become involved in agriculture, in order to increase agricultural employment levels and maintain the population levels in rural regions, are two steps attempted in Measure 1.1.2. 'Setting up of Young Farmers', Priority Axis 1 'Improving the competitiveness of the agricultural and forestry sector', of the Rural Development Programme for Greece 2007–2013 (R.D.P. 2007–2013) 'Alexandros Baltatzis'[5–7]. The Measure aims to set up 12 000 young farmers, with a total financing cost of 304 989 343 Euro, of which 70.9% are the EU contribution and 29.1% are covered by national funds[6,7].

In order to take part in the Programme, young farmers are asked to present a detailed dossier (investment plan), with full details regarding the initial financials level of the farm (*current status*) and to identify the target-level status it must arrive at, following the investment plan completion (*future status*)[8]. A binding objective of the programme is the creation of an agricultural holding, with an overall labor requirement of over one (1) HWU* and an agricultural income** (defined according to the Gross Value Added) that is higher than the reference income by 80% (as defined in each case) upon completion of the business plan. An essential condition is that the income at the agricultural holding must show an increase of at least 10% compared to the current status of the holding at the time the application for funding is submitted. The amount of aid per investment plan amounts to 50 000 Euro in total, with a minimum of 10 000 Euro; it varies according to the following criteria[6,7]:

– whether the agricultural holding operates in a mountainous, disadvantaged or standard region;

– what the farm type of production is upon completion of the business plan (a – multi-annual crops: trees, vineyards; b – market-gardening and floricultural activities; c – other plant production activities; d – animal husbandry; e – mixed activities);

* The term HWU is used to describe the labour performed on a farm by a natural person on a full employment contract during a calendar year; it is equal to 1750 hours of employment.

** Agricultural income pertains to the total gross value added (GVA) of the agricultural holding. The latter is defined as the value of sales from all the production sectors – products at the farm minus the sales VAT, minus the obvious expenses (sum of paid expenses and depreciations).

– what the overall income at the agricultural holding is upon completion of the investment plan.

EXPERIMENTAL

The data used in this paper refers to a sample of 301 investment plans and is related to one-off payments for the initial setting up of young farmers. These plans were submitted for approval to the Departments of the Region of Central Macedonia, within the framework of the Operational Programme 'Rural Development 2007–2013 – Alexandros Baltatzis, Measure 1.1.2. Setting up of Young Farmers'. The definition of the sample was made using simple random sampling[9]. The selected sample of investment plans comprises 14% of the total number of investment plans submitted.

In particular, in order to evaluate the effectiveness of the aid programme for young farmers, two investment plan typologies are developed in the sample. These typologies are defined based on hman work units (HWU) and gross value added (GVA), as described both in the current status of the farms (first typology), and in the future target status, following the completion of the investment plans (second typology). Hierarchical cluster analysis was used to develop the two typologies. The cluster formation was carried out using the Ward criterion, while the square of Euclidean distance was used as a measure of (dis)similarity between the holdings[10–13]. The analysis was made with the SPSS ver. 15 statistical package[13]. Before being entered into the analysis, the variables were transformed into *z*-scores. Then, with the help of the double entry tables and based on the test of independence (χ^2-test), the second level profile of the clusters in the improvement plan typology was defined[14–17]. More specifically, the following relations were examined: (a) between the current status clusters and first with the geographical location of the agricultural holdings and second with the level of realised investments; (b) between the future status clusters and first with the geographical location of the agricultural holdings and second with the level of realised investments.

RESULTS

By applying hierarchical cluster analysis on the financial data of the farms current status, the first investment plan typology of young farmers is defined. Three clusters of agricultural holdings are formed: cluster C_1 that comprises 95 farms (31.6%), cluster C_2 that comprises 86 farms (28.6%) and cluster C_3 with 120 (39.8%) farms. The formation of the 3 clusters is statistically significant.

Based on the data in the first typology (Table 1), we observe that the first cluster (C_1) consists of 95 farms belonging to young farmers, with mean HWU and GVA values of 3.2 and 12 025 Euro, respectively. Cluster C_1 consists of high-intensity agricultural farms, as regards the 'labour' coefficient, with a high agricultural

income. The second cluster (C_2) includes 86 farms of low intensity as regards the 'labour' coefficient, with a low agricultural income (mean HWU and GVA values are 1.444 and 6392.06 Euro, respectively). The third cluster (C_3) comprises 120 farms, with a relatively low labor intensity, but with a high agricultural income (mean HWU and GVA values are 1.559 and 15 278.45 Euro, respectively). The statistical test of independence χ^2 showed (Table 2) that there is a statistically significant relation between the investment plans of the current status clusters and the geographical location of the agricultural holdings. With the help of the Cramer *V* correlation coefficient, we can examine the intensity of the relation between the above-mentioned parameters (the Cramer $V = 0.424$). The relation between these parameters is strong. Furthermore, the test of independence χ^2 also indicated a statistically significant relation, between the current status clusters and the level of realised investments. Furthermore, a statistically significant relation emerges between the current status clusters and the type of production. The relation between the above-mentioned parameters is of medium intensity. Next, the typology of the investment plans involving the farms current status is analysed. In Table 3 we present the second level profile of cluster C_1. We observe that the first cluster (C_1) consists of agricultural farms of which 74.7% operate in disadvantaged regions, 15.8% in mountainous regions and, finally, 9.5% in standard regions. In the first cluster, 69.5% of the improvement plans refer to investments over 50 000 Euro, while 30.5% refer to investments lower than 50 000 Euro. Furthermore, 75.8% of the farms cultivate multi-annual crops, while 24.2% are involved in other plant production activities.

Table 1. Typology of the investment plans involving the farms current status

Clusters	Mean values				No of investment plans
	HWU	Std. D.	GVA	Std. D.	
1st cluster (C_1)	3.200	0.519	12025.09	1209.35	95
2nd cluster (C_2)	1.444	0.561	6392.06	1818.00	86
3rd cluster (C_3)	1.559	0.505	15278.45	5821.20	120

Table 2. Correlation of the investment plan parameters with the first typology

Investment plan parameters	1st current status typology
Geographical location of the agricultural holdings	the Cramer V=0.424, χ^2=108.386, df=4, p=0.000*
Level of realised investments	the Cramer V=0.247, χ^2=18.350, df=2, p=0.000
Type of production	the Cramer V=0.243, χ^2=35.532, df=8, p=0.000

* The level of statistical significance (p-value) of the statistical test of independence χ^2 was calculated using the Monte-Carlo simulation method[18] and the SPSS v.15.0 software.

Table 3. Second level profile of cluster C_1

Geographical location	1st cluster (C_1)			
	standard	disadvan-taged	mountainous	total
Absolute frequency	9	71	15	95
Percentage of the row total (%)	9.5	74.7	15.8	100
Standardised balance	–4.1	6.5	–3.3	
	Level of investment			
	investments over 50 000 Euro	investments under 50 000 Euro		
Absolute frequency	66	29		95
Percentage of the row total (%)	69.5	30.5		100
Standardised balance	3.1	–3.1		
	Type of production			
	(1)	(2)	(3)	(4)	(5)	
Absolute frequency	72	0	23	0	0	95
Percentage of the row total (%)	75.8	0	24.2	0	0	100
Standardised balance	1.1	–2.8	1.2	–1.2	–1.5	

The second level profile of cluster C_2 is presented in Table 4. This cluster (C_2) consists of agricultural farms that operate in disadvantaged regions at a rate of 61.6%, while 33.7% operate in mountainous regions and 4.7% in standard regions. In the second cluster, 61.6% of the improvement plans refer to investments under 50 000 Euro, while 38.4% relate to investments over 50 000 Euro. In 77.9% of the farms, the agricultural type of production is related to multi-annual crops, 20.9% focus on other plant production activities and 1.2% has a mixed production. The third cluster (C_3) consists (Table 5) mainly of agricultural farms that operate in standard regions (50%), but also in disadvantaged (15%) and mountainous regions (35%). Of the improvement plans in the third cluster, 59.2% pertain to investments over 50 000 Euro, and 40.8% to investments under 50 000 Euro. The agricultural type of production in 64.2% of the farms involves multi-annual crops, market-gardening in 13.3%, other plant production activities in 16.7%, animal husbandry in 2.5% and a mixed production in 3.3%.

Table 4. Second level profile of cluster C_2

Geographical location	2nd cluster (C_2)			
	standard	disadvantaged	mountainous	total
Absolute frequency	4	53	29	86
Percentage of the row total (%)	4.7	61.6	33.7	100
Standardised balance	–5.0	3.2	1.3	
	Level of investment			
	investments over 50 000 Euro	investments under 50 000 Euro		
Absolute frequency	33	53		95
Percentage of the row total (%)	38.4	61.6		100
Standardised balance	–4	4		
	Type of production			
	(1)	(2)	(3)	(4)	(5)	
Absolute frequency	67	0	18	0	1	86
Percentage of the row total (%)	77.9	0	20.9	0	1.2	100
Standardised balance	1.5	–2.6	0.2	–1.1	–0.4	

Table 5. Second level profile of cluster C_3

Geographical location	3rd cluster (C_3)			
	standard	disadvantaged	mountainous	total
Absolute frequency	60	18	42	120
Percentage of the row total (%)	50	15	35	100
Standardised balance	8.5	–9.1	2	
	Level of investment			
	investments over 50 000 Euro	investments under 50 000 Euro		
Absolute frequency	71	49		120
Percentage of the row total (%)	59.2	40.8		100
Standardised balance	0.8	–0.8		
	Type of production			
	(1)	(2)	(3)	(4)	(5)	
Absolute frequency	77	16	20	3	4	120
Percentage of the row total (%)	64.2	13.3	16.7	2.5	3.3	100
Standardised balance	–2.4	5.0	–1.3	2.1	1.8	

After applying hierarchical cluster analysis on the future status data, as described in the investment plans, the second typology of young farmers is formulated (Table 6). Two investment plan clusters are identified in relation to the

agricultural holdings: cluster S_1 with 127 farms (42.20%) and cluster S_2 with 174 farms (57.80%). The formation of the 2 clusters is statistically significant. The first cluster S_1 includes 127 improvement plans by young farmers, with mean HWU and GVA values of 4.818 and 23 188.3, respectively. The second cluster (S_2) consists of 174 improvement plans, with mean HWU and GVA values of 2.393 and 17 941.2, respectively. Based on the data pertaining to the formulated clusters, we can conclude that the two clusters that describe the expected target-level status, comprise investment plans with improved HWU and GVA data. More specifically, S_1 consists of investment plans that correspond to agricultural farms with the highest HWU and GVA values, compared to S_2.

Table 6. Typology of the investment plans involving the farms future status

Clusters	Mean values				Number of investment plans
	HWU	Std. D.	GVA	Std. D.	
1st cluster (S_1)	4.818	1.222	23188.3	6334.83	127
2nd cluster (S_2)	2.393	0.832	17941.2	4550.80	174

The statistical test of independence χ^2 (Table 7) showed that there is a statistically significant relation between the future status clusters and the geographical location of the holding. The relation between the above-mentioned parameters is of medium intensity (the Cramer V=0.314). Furthermore, the test of independence χ^2 showed that there is a statistically significant relation between the future status clusters and the level of realised investments. The relation between the above-mentioned parameters (the Cramer V=0.234) is of medium intensity. In addition, there is a statistically significant relation between the clusters and the farm type of production. The intensity of the relation between the above-mentioned parameters is weak (the Cramer V=0.211).

Table 7. Correlation of the investment plan parameters with the second typology

Investment plan parameters	2nd future status typology
Geographical location of the agricultural holdings	the Cramer V=0.424, χ^2=29.635, df=2, p=0.000*
Level of realised investments	the Cramer V=0.234, χ^2=16.532, df=1, p=0.000
Type of production	the Cramer V=0.211, χ^2=8.173, df=4, p=0.000

* The level of statistical significance (p-value) of the statistical test of independence χ^2 was calculated using the Monte-Carlo simulation method[18] and the SPSS v.15.0 software.

Next, the typology of the investment plans involving the farms future status is analysed. The second level profile of clusters S_1 and S_2 is presented in Tables 8 and 9. The first cluster of the typology (S_1) consists of investment plans from agricultural farms that mainly operate in disadvantaged (65.4%) and mountainous regions (20.5%), and only 14.2% in standard regions. Agricultural investments over 50 000 Euro are included in 70.1% of the plans, and the agricultural type of production of the majority (67.7%) involves multi-annual crops, with 7.9% involved in market gardening, and 23% in other agricultural activities. The second future status cluster (S_2) comprises investment plans from agricultural holdings that operate in mountainous (34.5%) and disadvantaged (33.9%) regions, while 31.6% operate in standard regions. In addition, 53.4% of the investment plans refer to agricultural investments under 50 000 Euro, while the agricultural type of production in most cases (74.7%) involves multi-annual crops, with 3.4% cultivating vegetables, 17.8% being involved in other agricultural activities, 1.1% focusing on animal husbandry activities and 2.9% having a mixed type of production.

Table 8. Second level profile of cluster S_1

Geographical location	1st cluster (S_1)			
	standard	disadvantaged	mountainous	total
Absolute frequency	18	83	26	127
Percentage of the row total (%)	14.2	65.4	20.5	100
Standardised balance	–3.5	5.4	–2.7	
	Level of investment			
	investments over 50 000 Euro	investments under 50 000 Euro		
Absolute frequency	89	38		127
Percentage of the row total (%)	70.1	29.9		100
Standardised balance	4.1	–4.1		
	Type of production			
	(1)	(2)	(3)	(4)	(5)	
Absolute frequency	86	10	30	1	0	174
Percentage of the row total (%)	67.7	7.9	23.6	0.8	0	100
Standardised balance	–1.3	1.7	1.2	–0.3	–1.9	

Table 9. Second level profile of cluster S_2

Geographical location	2nd cluster (S_2)			
	standard	disadvan-taged	mountainous	total
Absolute frequency	55	59	60	174
Percentage of the row total (%)	31.6	33.9	34.5	100
Standardised balance	3.5	–5.4	2.7	
	Level of investment			
	investments over 50 000 Euro	investments under 50 000 Euro		
Absolute frequency	81	93		174
Percentage of the row total (%)	46.6	53.4		100
Standardised balance	–4.1	4.1		
	Type of production			
	(1)	(2)	(3)	(4)	(5)	
Absolute frequency	130	6	31	2	5	174
Percentage of the row total (%)	74.7	3.4	17.8	1.1	2.9	100
Standardised balance	1.3	–1.7	–1.2	0.3	1.9	

CONCLUSIONS – PROPOSALS

Through the financing program for young farmers, and more specifically, through the one-off payment for their initial setting up, through financial support in the form of interest rate subsidies, but also through investment aid for their agricultural farms, an attempt is made to create the necessary conditions for increasing the size of agricultural holdings and for adopting new practices and innovations in agriculture.

After the application of hierarchical cluster analysis on the data regarding the farms current and future target-status in relation to the young farmers investment plans, two typologies are formulated. The first typology comprises three clusters: the first cluster (C_1) mainly consists of agricultural farms, with a satisfactory valorisation of labour and a high agricultural income. The second cluster (C_2) mainly consists of agricultural farms, with low intensity labour and a low agricultural income. The planned investments described in their investment plans are limited. The third cluster (C_3) mainly includes agricultural farms with low intensity labour and a high agricultural income. Based on the planned investments, the three clusters of agricultural holdings in the first typology are transformed into two new clusters. The typology that describes the intended goal of the investment plans consists of two clusters. The first cluster (S_1), mainly consists of farms, which productively exploit labour and achieve an effective increase to their agricultural income. The

second cluster (S_2) mainly comprises investment plans from farms located in all regions. The largest percentage of the investment plans described are under 50 000 Euro; the agricultural type of production is mainly focused on multi-annual crops, but also on animal husbandry activities.

However, as we can see from a study of the future status typology, and from the correlations between the clusters, the implementation of the investment plans does not seem to have affected the type of production practised at the farms. In actual fact, the investment plans have not led to the development of any new productive activities that better correspond to the prevalent conditions in disadvantaged and mountainous regions, such as e.g. animal husbandry, that would more effectively valorise the comparative advantages of the said regions. Furthermore, in cases where we have a low valorisation of the labour coefficient, the lack of focus on more intensive crops results in a limited competitiveness.

Based on the typological analysis of the investment plans, specific policy measures can potentially arise for targeted groups of agricultural holdings belonging to young farmers. More specifically, the farms in the second cluster (C_2) should be studied in relation to the kind of investments they have planned, their type of production, and their structure. It is recommended that training be provided to the beneficiaries of the said farms on modern production and management techniques and methods, and a shift be introduced towards a range of new activities, like animal production, greenhouse crops, etc.

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