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# FACTOR ANALYSIS OF THE UTILIZATION AND OWNERSHIP STRUCTURE OF AGRICULTURAL LAND AREAS IN ROMANIA

ABSTRACT

The Romanian agriculture seen from the perspective of land structure and ownership forms is characterized by specific elements at territorial level. The purpose of this paper is to classify the counties from Romania according to the main variables that characterize the agrarian structures, through specific methods like factor analysis and cluster analysis. The research works identified six clusters with similar characteristics delimiting the Romanian agricultural profile. The results obtained have allowed us to conclude that the agricultural policy measures should be tailored in accordance with this classification, which range from counties with a high share of arable land and a high percentage of the leased in land to counties with a high share of pastures and meadows and a high share of land areas into ownership.

**Key words:** utilized agricultural area, ownership forms, principal component analysis, cluster analysis.

**JEL Classification:** C38, C82, Q15.

## 1. INTRODUCTION

The agricultural area structures from the point of view of land utilization and ownership forms are fundamental elements that define the development mode of agricultural activities, delimiting the land utilization size for the crop and animal production sector, and at the same time providing an exhaustive picture of the territorial distribution of ownership forms. Thus, the study of the territorial distribution patterns in Romania's agriculture becomes extremely important, first of all due to the characteristics induced by the agricultural land utilization and use modality. Anyhow, the Romanian agriculture performance is directly affected by the agricultural land fragmentation and by the prevalence of small-sized farms, these defining characteristics determining the exclusion of most agricultural holdings from the Community support and the prevalence of self-consumption.

In this context, the agrarian structure became, under multiple aspects, an element that hinders the economic growth process in the rural area. The investigation of patterns imprinted by the agricultural area structure through the assessment of factors influencing the farming activity in the territory adds to the research studies in this field (Otiman, 2012; Brînaru and Dona, 2015), which draw the attention on the fact that Romania's agricultural structure can be adjusted by speeding up the land consolidation process and the physical farm size increase.

## 2. STATE OF KNOWLEDGE

In the specialty literature, the different forms of the structural changes were incorporated in exploratory patterns focusing on multiple types of quantitative and qualitative analyses. Kobrich (2003) recommends their utilization within the mathematical models of factor and cluster analysis, also specifying the need to construct typologies based on representative situations.

In this context, we can mention that the studies in this field start from the structural problems identified in agriculture in many countries, such as: the diminution in number of the population employed in agriculture, the high number of family farms, the different ownership forms, etc. These try to classify the regions under various forms, in order to ensure their comparability. Carmona (2010), for instance, focuses on the link between the typology of agricultural farms and the land utilization modality, while D'Amico *et al.* (2013) identifies six groupings that characterize the European agricultural systems, Romania being included, together with Bulgaria, Hungary and Poland, in the category of the East-European countries with a small-sized farm typology, very low productivity of land and labour and a low educational level of farmers. Rashidpour and Rasouli Azar (2016) try to identify the determinant factors that hinder land consolidation, putting into evidence the economic, social and political factors.

## 3. MATERIAL AND METHOD

The principal components analysis (PCA), a specific method of the multivariate analysis, represents the preceding step to grouping the variables through the cluster analysis. The combination of the two methods is frequently met in the classification and assessment of agricultural systems (Lesschen *et al.*, 2005). The application of PCA needs: checking up the internal consistency of the data base (Cronbach alpha model); application of the *KMO test* (Kaiser-Meyer-Olkin) for capturing the partial correlations between variables (the factor analysis validation needs values close to 60% or over); the application of Bartlett test (Bartlett's Test of Sphericity) for checking up the multi-collinearity of the correlation matrix; choosing the Varimax rotation option (minimization of the number of variables with big factor loadings) and the Bartlett scores calculation method (the Bartlett test must have a $p<0.05$ probability). The Cluster type analysis permits the classification of variables into relatively homogeneous groups and the identification of groupings with similar characteristics (Everitt *et al.*, 2001). The application of this analysis presupposes: the utilization as inputs of factor scores resulting from PCA; the hierarchical clustering using Ward's method (Hair, 1998); *k-means cluster* application for generating the number of clusters for the identification of the distribution patterns of counties, according to the structural typology.

The research works on the characterization of the agricultural land utilization and land tenure were based on the data supplied at county level by the last Structural Farm Survey in 2013. The factor analysis initially made had in view to generate two factor analyses, taking separately the utilized agricultural area (UAA) structure by the land utilization mode and the UAA structure by ownership forms. The Kaiser-Meyer-Olkin Measure test run only based on the land utilization variables and which identifies the global sampling measure was under 0.5 (0.255 respectively), suggesting that the factor analysis is inacceptable, as there are no correlations over 0.3 between the analyzed variables.

This led to the generation of a single PCA model on the basis of the following variables:

- Share of arable land in UAA;
- Share of pastures and hayfields in UAA;
- Share of permanent crops in UAA;
- Share of leased in UAA in total UAA;
- Share of UAA into ownership in total UAA;
- Share of UAA owned by the units with legal status in total UAA.

The factor analysis had in view these variables due to their high variability in the territory. The descriptive analysis of the necessary variables for the PCA model (Table 1) revealed that in Romania we have about 59% arable land, 37% pastures and hayfields and about 3% permanent crops (fruit farming, vine farming and other permanent crops).

*Table 1*

UAA descriptive analysis by the land utilization pattern

| | Minimum | Maximum | Average | Standard deviation |
|---|---|---|---|---|
| Var 1. Share of arable land (in UAA) | 12.66 | 94.84 | 59.25 | 23.080 |
| Var 2. Share of pastures and hayfields (in UAA) | 3.23 | 86.90 | 36.97 | 23.236 |
| Var 3. Share of permanent crops (in UAA) | 0.11 | 9.62 | 2.55 | 2.104 |

*Source*: Authors' processing of Structural Farm Survey 2013 data in SPSS.

In Romania, in the year 2013, according to the descriptive analysis of the database, on the average, about 64.1% of UAA was land into ownership and about 24.8% was leased in land, while about 41.7% of UAA was farmed by the units with legal status.

*Table 2*

UAA descriptive analysis by land use mode (ownership structure)

| | Minimum | Maximum | Average | Standard deviation |
|---|---|---|---|---|
| Var 4. Share of leased in land | 1.61 | 61.19 | 24.84 | 15.927 |
| Var 5. Share of land area into ownership | 19.87 | 93.96 | 64.06 | 21.337 |
| Var 6. Share of land area owned by the agricultural units | 15.48 | 77.32 | 41.73 | 15.691 |

*Source:* Authors' processing of Structural Farm Survey 2013 data in SPSS.

## 4. RESULTS AND DISCUSSIONS

For data comparability purposes, these variables were standardized, obtaining Z score value for each county, after which, by applying the Hull translation, the variables necessary for the PCA model were generated (Table 3).

The Kaiser-Meyer-Olkin Measure test on the global sampling measure is 0.631, which suggests that the analysis is acceptable (Table 4).

*Table 3*

Z score generation and variable projection (Hull Technique)

| Counties | Z score | | | | | | Hull Scores * | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Z1 | Z2 | Z3 | Z4 | Z5 | Z6 | Var1 | Var2 | Var3 | Var4 | Var5 | Var6 |
| Alba | -0.316 | 0.487 | -0.213 | -0.862 | 0.891 | -0.330 | 45.58 | 56.81 | 47.02 | 37.93 | 62.48 | 45.38 |
| Arad | 0.258 | -0.160 | 0.979 | 0.556 | -0.486 | -0.686 | 53.61 | 47.76 | 63.71 | 57.78 | 43.19 | 40.39 |
| Argeş | -0.463 | 0.605 | -0.293 | -0.346 | 0.177 | 1.839 | 43.51 | 58.47 | 45.89 | 45.16 | 52.48 | 75.75 |
| Bacău | -0.307 | 0.200 | -0.671 | -0.233 | 0.178 | 0.166 | 45.7 | 52.8 | 40.61 | 46.73 | 52.49 | 52.33 |
| Bihor | -0.225 | 0.488 | 0.029 | 0.274 | -0.229 | -0.592 | 46.85 | 56.83 | 50.41 | 53.84 | 46.8 | 41.71 |
| Bistriţa-Năsăud | -1.343 | 1.359 | -1.352 | -1.413 | 1.409 | -0.047 | 31.19 | 69.03 | 31.07 | 30.22 | 69.73 | 49.34 |
| Botoşani | 0.356 | -0.540 | -0.355 | 0.648 | -0.609 | -0.867 | 54.99 | 42.44 | 45.04 | 59.07 | 41.48 | 37.86 |
| Brăila | 1.031 | -1.320 | 1.343 | 1.281 | -1.194 | -0.672 | 64.43 | 31.52 | 68.8 | 67.93 | 33.28 | 40.6 |
| Braşov | -0.396 | 0.042 | -0.261 | -1.203 | 1.323 | -1.065 | 44.45 | 50.59 | 46.34 | 33.16 | 68.52 | 35.09 |
| Buzău | 0.766 | -0.437 | 0.032 | 0.301 | -0.369 | 0.694 | 60.72 | 43.89 | 50.44 | 54.22 | 44.84 | 59.72 |
| Călăraşi | 1.827 | -2.071 | 2.268 | 1.542 | -1.452 | -0.762 | 75.58 | 21 | 81.75 | 71.59 | 29.67 | 39.33 |
| Caraş-Severin | -1.186 | 1.236 | 0.591 | -1.197 | 1.213 | 0.068 | 33.4 | 67.31 | 58.27 | 33.25 | 66.98 | 50.95 |
| Cluj | -0.934 | 0.966 | -0.812 | -0.814 | 0.870 | -0.694 | 36.92 | 63.52 | 38.63 | 38.61 | 62.18 | 40.29 |
| Constanţa | 2.282 | -1.569 | 1.132 | 1.130 | -1.070 | -0.350 | 81.95 | 28.04 | 65.85 | 65.82 | 35.03 | 45.1 |
| Covasna | -0.449 | 0.424 | -0.718 | -0.956 | 1.050 | -1.109 | 43.71 | 55.94 | 39.95 | 36.61 | 64.7 | 34.48 |
| Dâmboviţa | -0.654 | 0.307 | -0.962 | 0.385 | -0.528 | 1.221 | 40.85 | 54.3 | 36.54 | 55.39 | 42.6 | 67.1 |
| Dolj | 0.229 | 0.182 | -0.258 | 1.276 | -1.253 | -0.050 | 53.2 | 52.55 | 46.39 | 67.87 | 32.46 | 49.29 |
| Galaţi | 1.414 | -1.597 | 0.478 | 1.097 | -1.150 | 0.657 | 69.8 | 27.64 | 56.69 | 65.36 | 33.9 | 59.19 |
| Giurgiu | 1.059 | -0.790 | 0.975 | 1.421 | -1.367 | -0.528 | 64.83 | 38.94 | 63.66 | 69.9 | 30.86 | 42.61 |
| Gorj | -1.459 | 1.401 | -1.379 | -0.816 | 0.742 | 0.810 | 29.57 | 69.62 | 30.69 | 38.57 | 60.38 | 61.34 |
| Harghita | -1.172 | 1.276 | 0.177 | -2.019 | 2.149 | -1.161 | 33.59 | 67.87 | 52.48 | 21.74 | 80.09 | 33.74 |
| Hunedoara | -1.026 | 1.158 | -0.316 | -1.507 | 1.597 | -0.976 | 35.64 | 66.21 | 45.57 | 28.9 | 72.36 | 36.34 |
| Ialomiţa | 1.651 | -1.852 | 1.958 | 1.459 | -1.361 | -0.811 | 73.11 | 24.07 | 77.41 | 70.42 | 30.94 | 38.65 |
| Iaşi | 0.719 | -0.751 | 0.149 | 0.469 | -0.560 | 0.333 | 60.06 | 39.49 | 52.09 | 56.56 | 42.16 | 54.65 |
| Maramureş | -1.387 | 1.374 | -1.673 | -1.676 | 1.670 | 0.257 | 30.58 | 69.23 | 26.58 | 26.53 | 73.38 | 53.59 |
| Mehedinţi | -0.986 | 1.086 | -1.294 | 0.377 | -0.407 | 0.621 | 36.2 | 65.21 | 31.88 | 55.27 | 44.3 | 58.7 |
| Mureş | -0.464 | 0.354 | -0.710 | -0.421 | 0.477 | -0.662 | 43.5 | 54.96 | 40.07 | 44.1 | 56.68 | 40.73 |
| Neamţ | 0.332 | -0.201 | 0.147 | -0.169 | 0.229 | -0.982 | 54.65 | 47.19 | 52.06 | 47.63 | 53.21 | 36.26 |
| Olt | 0.562 | -0.486 | 0.306 | 1.253 | -1.235 | -0.021 | 57.86 | 43.19 | 54.28 | 67.54 | 32.72 | 49.71 |
| Prahova | 0.045 | 0.062 | 0.472 | -0.244 | 0.100 | 1.219 | 50.63 | 50.86 | 56.61 | 46.58 | 51.4 | 67.07 |
| Sălaj | -1.010 | 0.928 | -1.122 | -0.613 | 0.534 | 0.727 | 35.86 | 62.99 | 34.29 | 41.42 | 57.48 | 60.18 |
| Satu Mare | 0.131 | -0.042 | -0.191 | 0.469 | -0.490 | 0.321 | 51.83 | 49.41 | 47.32 | 56.57 | 43.15 | 54.49 |
| Sibiu | -0.689 | 0.213 | -0.300 | -1.085 | 1.153 | -0.635 | 40.36 | 52.98 | 45.8 | 34.81 | 66.15 | 41.12 |
| Suceava | -0.904 | 0.966 | -1.358 | -0.687 | 0.756 | -0.866 | 37.35 | 63.53 | 30.99 | 40.38 | 60.58 | 37.88 |
| Teleorman | 1.680 | -1.493 | 1.408 | 1.291 | -1.213 | -0.668 | 73.52 | 29.1 | 69.71 | 68.08 | 33.02 | 40.65 |
| Timiş | 0.631 | -0.554 | 1.115 | 0.805 | -0.735 | -0.649 | 58.83 | 42.24 | 65.61 | 61.26 | 39.71 | 40.92 |
| Tulcea | 0.885 | -1.213 | 1.916 | 0.689 | -0.649 | -0.344 | 62.4 | 33.02 | 76.83 | 59.64 | 40.91 | 45.18 |
| Vâlcea | -1.280 | 1.234 | -1.353 | -0.903 | 0.693 | 2.276 | 32.08 | 67.27 | 31.06 | 37.35 | 59.7 | 81.86 |
| Vaslui | 0.891 | -1.246 | 0.471 | 0.635 | -0.747 | 0.957 | 62.47 | 32.56 | 56.59 | 58.89 | 39.54 | 63.4 |
| Vrancea | -0.100 | -0.027 | -0.355 | -0.194 | -0.109 | 3.360 | 48.6 | 49.63 | 45.03 | 47.29 | 48.48 | 97.03 |

*Note: $Var_i$=14*Zscore+50

*Source*: Processing of FSS 2013 data in SPSS.

*Table 4*

The variable correlation matrix, KMO test, Bartlett test and communalities

| | | Correlations | | | | | | Communality | |
|---|---|---|---|---|---|---|---|---|---|
| | | Var1 | Var2 | Var3 | Var4 | Var5 | Var6 | Initial variables | Extracted variables |
| Correlations | Var1 | 1.000 | -.973 | .830 | .860 | -.841 | -.178 | 1.000 | .947 |
| | Var2 | -.973 | 1.000 | -.829 | -.838 | .821 | .164 | 1.000 | .927 |
| | Var3 | .830 | -.829 | 1.000 | .663 | -.628 | -.311 | 1.000 | .805 |
| | Var4 | .860 | -.838 | .663 | 1.000 | -.995 | -.029 | 1.000 | .917 |
| | Var5 | -.841 | .821 | -.628 | -.995 | 1.000 | -.067 | 1.000 | .929 |
| | Var6 | -.178 | .164 | -.311 | -.029 | -.067 | 1.000 | 1.000 | .936 |
| Kaiser-Meyer-Olkin test | | | | | | | | | .631 |
| Bartlett test | Chi-Square | | | | | | | | 492.029 |
| | df. | | | | | | | | 15 |
| | Sig. | | | | | | | | .000 |

*Source*: Data processing in SPSS.

The Bartlett's sphericity test measuring the difference between the proper correlation matrix and the identity matrix is significant ($p < 0.001$), which permits us to reject the null hypothesis and to conclude that there are correlations within the database opportune for PCA running. The analysis of communalities generated by the PCA analysis reveals that, initialy, 100% of the variance of variables is due to correlations (co-variance) in the database, and after extracting the factors through PCA, these explain about 95% of the Var1 variance, about 93% of the variance of Var2, Var5 and Var6 variables, about 92% of the Var4 variance and 81% of the Var3 variance.

The optimum factorial solution is that with two extracted factors (Table 5). The first factor explains 72.4% of the total common variance of variables and the second factor 18.6%. On a cumulated basis, these two factors explain 91.0% of the total common variance of variables. The rotation of variables through the orthogonal Varimax method makes it possible to notice that the loading is much bigger for the first factor (4.278) compared to the second factor (1.182).

*Table 5*

Factor projection and explained variance of variables

| | Component | Initial Eigen Values | | | Extracted sum of the quadratic saturations | | | Sum of quadratic saturations after factor rotation | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | % of variance | % Cumulative | Total | % of variance | % Cumulative | Total | % of variance | % Cumulative |
| Initial | 1 | 851.161 | 72.378 | 72.378 | 851.161 | 72.378 | 72.378 | 838.530 | 71.304 | 71.304 |
| | 2 | 219.092 | 18.630 | 91.008 | 219.092 | 18.630 | 91.008 | 231.723 | 19.704 | 91.008 |
| | 3 | 71.221 | 6.056 | 97.064 | | | | | | |
| | 4 | 29.418 | 2.502 | 99.566 | | | | | | |
| | 5 | 5.073 | .431 | 99.997 | | | | | | |
| | 6 | .035 | .003 | 100.000 | | | | | | |
| Rotation | 1 | 851.161 | 72.378 | 72.378 | 4.343 | 72.378 | 72.378 | 4.278 | 71.304 | 71.304 |
| | 2 | 219.092 | 18.630 | 91.008 | 1.118 | 18.630 | 91.008 | 1.182 | 19.704 | 91.008 |
| | 3 | 71.221 | 6.056 | 97.064 | | | | | | |
| | 4 | 29.418 | 2.502 | 99.566 | | | | | | |
| | 5 | 5.073 | .431 | 99.997 | | | | | | |
| | 6 | .035 | .003 | 100.000 | | | | | | |

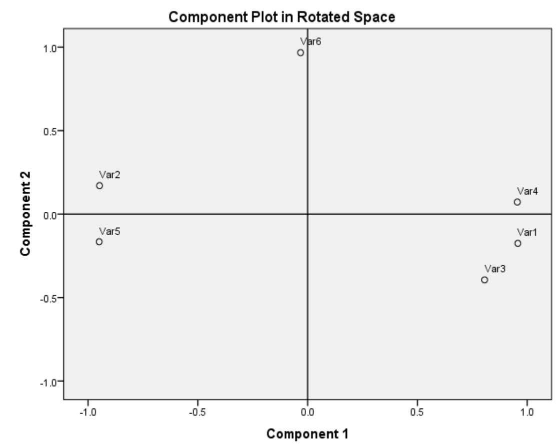
*Source*: Data processing in SPSS.

After the factor rotation it can be noticed that the variables (Var1) “Share of arable land in UAA”, (Var3) “Share of permanent crops in UAA” and (Var4) “Share of leased in UAA in total UAA” strongly and positively correlates with the first factor, while the variables (Var2) “Share of pastures and hayfields in UAA” and (Var5) “Share of UAA into ownership in total UAA” strongly and negatively correlates with the first factor, and (Var6) “Share of UAA owned by the units with legal status in total UAA” strongly and positively correlates with the second factor (Table 6).

*Table 6*

The structure matrix by the orthogonal rotation of factors

| | | Rotation | |
|---|---|---|---|
| | | Component | |
| | | 1 | 1 |
| Var1 | Share of arable land in UAA | .957 | |
| Var2 | Share of pastures and hayfields in UAA | -.948 | |
| Var3 | Share of permanent crops in UAA | .806 | |
| Var4 | Share of leased in UAA in total UAA | .955 | |
| Var5 | Share of UAA into ownership in total UAA | -.949 | |
| Var6 | Share of UAA owned by units with legal status in total UAA | | .967 |




Source: Data processing in SPSS

Factor 1, which includes the highest variability quantity, is directly (positively) and strongly correlated with the percentage of arable land and the leased in area, on one hand, and on the other hand is inversely (negatively) strongly correlated with the percentage of pastures and hayfields and with the area into ownership. The second factor suggests us that the area farmed by the agricultural units represents a distinctive variable in only 19% of cases (counties).

The PCA model generated, as it was shown above, a final solution with two factors (two principal components). By the order of their importance, we have the following variables:

- Var1 – Share of arable land in UAA;
- Var4 – Share of leased in UAA in total UAA;
- Var3 – Share of permanent crops in UAA;
- Var5 – Share of UAA into ownership in total UAA;
- Var2 – Share of pastures and hayfields in UAA;
- Var6 – Share of UAA owned by units with legal status in total UAA.

Thus, starting from the obtained saturations, the final factors and the aggregated index with regard to the classification of counties are projected, according to the following equations:

AI Structure UAA = Factor 1 + Factor 2

where:

Factor 1 = 0.957*Var1+0.955*Var4+0.806*Var3 -0.949*Var5-0.948*Var2

Factor 2 = 0.967*Var6

The projected aggregate index classifies the counties, so that those counties are situated on the first places that have crop production as the main production profile, with high shares of leased in areas and of the utilized areas by the agricultural units. The last places are held by the counties with livestock production as main profile, with high shares of pastures and hayfields and high values of land into ownership (Table 7).

*Table 7*

Classification of counties by aggregation on factor basis

| | **Factor 1** | **Factor 2** | **AI Structure UAA** |
|---|---|---|---|
| Călăraşi | 158.52 | 38.03 | 196.56 |
| Ialomiţa | 147.43 | 37.38 | 184.81 |
| Constanţa | 134.54 | 43.61 | 178.15 |
| Galaţi | 116.54 | 57.24 | 173.78 |
| Teleorman | 132.63 | 39.31 | 171.94 |
| Brăila | 120.52 | 39.26 | 159.78 |
| Giurgiu | 113.9 | 41.21 | 155.11 |
| Vaslui | 93.26 | 61.31 | 154.57 |
| Tulcea | 108.46 | 43.69 | 152.16 |
| Olt | 91.63 | 48.07 | 139.70 |
| Timiş | 89.96 | 39.57 | 129.53 |
| Iaşi | 76.03 | 52.85 | 128.88 |
| Vrancea | 34.91 | 93.83 | 128.74 |
| Buzău | 66.39 | 57.75 | 124.14 |
| Dolj | 72.49 | 47.67 | 120.16 |
| Arad | 71.57 | 39.06 | 110.63 |
| Satu Mare | 53.98 | 52.69 | 106.67 |
| Prahova | 41.57 | 64.85 | 106.43 |
| Botoşani | 65.75 | 36.61 | 102.36 |
| Dâmboviţa | 29.53 | 64.89 | 94.42 |
| Argeş | 16.53 | 73.25 | 89.78 |
| Neamţ | 44.51 | 35.06 | 79.57 |
| Bihor | 38.6 | 40.34 | 78.93 |
| Bacău | 21.23 | 50.6 | 71.83 |
| Mehedinţi | 9.27 | 56.76 | 66.03 |
| Vâlcea | -29.02 | 79.16 | 50.15 |
| Mureş | 10.16 | 39.39 | 49.54 |
| Alba | 4.59 | 43.88 | 48.47 |
| Sălaj | -12.76 | 58.19 | 45.43 |
| Sibiu | -4.22 | 39.76 | 35.54 |
| Caras-Severin | -16.7 | 49.27 | 32.57 |
| Braşov | -1.42 | 33.93 | 32.51 |
| Covasna | -5.43 | 33.34 | 27.91 |
| Gorj | -33.42 | 59.31 | 25.89 |
| Cluj | -15.88 | 38.96 | 23.08 |
| Suceava | -18.43 | 36.63 | 18.19 |
| Hunedoara | -33 | 35.14 | 2.14 |
| Bistriţa-Năsăud | -47.86 | 47.71 | -0.14 |
| Maramureş | -59.24 | 51.82 | -7.42 |
| Harghita | -45.13 | 32.63 | -12.51 |

*Source*: Data processing in SPSS

The characterization of the types of agricultural regions by the factors delimiting the UAA structure requires their classification into groups with similar characteristics. Thus the projection is continued by the cluster analysis, which permits this grouping, while delimiting the mean characteristics for the projected clusters. The projection based on the *k-means cluster* method permitted the following assessments (Table 8).

*Table 8*

Counties grouping by clustering (k-means cluster method)

| **Cluster** | Factorial distribution | **1** | **2** | **3** | **4** | **5** | **6** |
|---|---|---|---|---|---|---|---|
| Aggregate index | | 186.51 | 161.22 | 119.73 | 80.09 | 35.39 | -4.48 |
| Scores mean–factor 1 | | 1.691 | 1.209 | 0.467 | -0.187 | -0.888 | -1.527 |
| Scores mean–factor 2 | | -0.756 | -0.129 | 0.434 | 0.541 | -0.164 | -0.685 |
| No. counties | | 3 | 6 | 10 | 6 | 11 | 4 |
| Counties | | Călăraşi, Ialomiţa, Constanţa | Galaţi, Teleorman, Brăila, Giurgiu, Vaslui, Tulcea | Olt, Timiş, Iaşi, Vrancea, Buzău, Dolj, Arad, Satu Mare, Prahova, Botoşani | Dâmboviţa, Argeş, Neamţ, Bihor, Bacău, Mehedinţi | Vâlcea, Mureş, Alba, Sălaj, Sibiu, Caraş-Severin, Braşov, Covasna, Gorj, Cluj, Suceava | Hunedoara, Bistriţa-Năsăud, Maramureş, Harghita |
| Share of leased in UAA | Fact. 1 Positive influence | 55.42 | 43.32 | 30.57 | 18.73 | 11.69 | 5.22 |
| Share of arable land (in UAA) | | 91.03 | 83.93 | 71.58 | 60.36 | 39.20 | 21.08 |
| Share of permanent crops (in UAA) | | 1.20 | 2.34 | 3.32 | 3.35 | 2.27 | 1.54 |
| Share of UAA into ownership | Fact. 1 Negative influence | 25.00 | 36.83 | 58.19 | 72.90 | 80.07 | 91.62 |
| Share of pastures and hayfields (in UAA) | | 6.90 | 12.49 | 23.62 | 34.72 | 57.46 | 76.61 |
| Share of UAA owned by agricultural units | Fact .2 Positive influence | 69.75 | 58.97 | 44.70 | 33.77 | 30.84 | 29.32 |

*Source*: Data processing in SPSS.

The factor analysis of Romania's agriculture by the land utilization mode and ownership permitted the classification of regions into six homogeneous classes, namely (Map 4.1):

**–** ***Class I*** **V*ery developed crop profile*** – agricultural profile based on crop production (around 90% arable land), with specialized agricultural structures (around 70% of UAA farmed by agricultural units) based mainly on leased in land (around 55% of UAA is leased in land) **(Călăraşi, Constanţa, Ialomiţa)**;

– ***Class II Developed crop profile*** – agricultural profile based on crop production (around 80% arable land), with prevailing specialized agricultural structures (around 60% of UAA farmed by agricultural units) based on leased in land and private ownership (around 40% of UAA is leased in land and 40% land into ownership) **(Brăila, Galați, Giurgiu, Teleorman, Tulcea, Vaslui)**;

– ***Class III Medium crop profile*** – agricultural profile based on crop production (around 70% arable land), with agricultural structures mainly consisting of individual farms (only around 45% of UAA is farmed by agricultural units), based on private land into ownership (around 60% of UAA is land into ownership and only 30 % leased in land) (**Arad, Botoșani, Buzău, Dolj, Iași, Olt, Prahova, Satu Mare, Timiș, Vrancea**);

– ***Class IV Mixed profile*** – agricultural profile mainly based on crop production, but also with livestock production (around 60% arable land and 35% pastures and hayfields), with agricultural structures mainly consisting of individual farms (only around 30% of UAA is farmed by agricultural units), based mainly on private ownership (around 80% land into ownership) (**Bacău, Bihor, Dâmbovița, Neamț, Mehedinți**);

– ***Class V Developed livestock profile*** – agricultural profile mainly based on livestock production (around 58% pastures and hayfields), with agricultural structures mainly consisting of individual farms (only about 33% of UAA is operated by agricultural units), mainly based on private ownership (around 73% land into ownership) (**Alba, Brașov, Caraș-Severin, Covasna, Cluj, Gorj, Mureș, Sălaj, Sibiu, Suceava, Vâlcea**);

– ***Class VI Very developed livestock profile*** – agricultural profile mainly based on livestock production (around 76% pastures and hayfields), with agricultural structures mostly consisting of individual farms (around 70% of UAA, based mainly on private ownership) (**Bistrița-Năsăud, Harghita, Hunedoara, Maramureș**).

## 5. CONCLUSIONS

The factor analysis applied at the level of variables specific to the agrarian structure from Romania made it possible for us to draw the following conclusions: the increase of the share of arable land and permanent crops, as well as of the leased in land share leads to the increase of the principal extracted factor; the increase of the land areas under pastures and hayfields and of the land area into ownership leads to the decrease of the principal factor; the increase of the utilized agricultural area by the agricultural units leads to an increase of the second factor and hence to a supplementary increase of the final variation.

The analysis suggests that at country level we have two distinct poles that are represented by extreme patterns in the agricultural land utilization, namely:

counties with a high share of arable land and a high share of leased in land (pure crop production profile); counties with a high share of pastures and hayfields and a high share of areas into ownership (pure livestock profile). The agricultural policy measures should take into account this classification in order to narrow the economic gaps created between the different zones of Romania.

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