

Typological analysis of agricultural holdings in Western Moldova

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Vol. 32 / 2022, 93-104



Published:

online first

23 May 2022

ABSTRACT: The study aims to analyze agricultural holdings in western Moldova in 2010, according to data from the Agricultural Census. Farms play an important role at international and national level because they capitalize on the agricultural potential of land, animals and agricultural machinery, contributing to the creation of a modern agriculture that develops the rural economy. Western Moldova stands out in Romania with a high agricultural potential, but which is not sufficiently exploited. The economy of this area is precarious, especially in rural areas, being currently in an early stage of development due to the development of agricultural holdings. The study aims to develop spatial typologies that analyze at the territorial level, in Western Moldova, the areas that capitalize on agricultural land by using agricultural holdings, depending on the agricultural area used, the size of the agricultural area used, the way of owning the agricultural area. The final result is the analysis of agricultural typologies, depending on the classification of agricultural holdings, which is done by standardizing the values of the indicators used and highlighting the positive and negative deviations, establishing the profile of each basic administrative unit.

KEY WORDS: agricultural holdings, agriculture, European funds, rural area, Western Moldova.

1. Introduction

The typologies of agricultural holdings characterize rural areas from an economic point of view. The economic characteristics have an important role in highlighting the state of an area, customizing each basic administrative unit, depending on the situation of the analyzed economic indicators. Agricultural holdings value agricultural land, livestock and other means of production, interconnected in a unitary system, in order to carry out works, provide services and obtain efficient agricultural products.

From an occupational point of view, the rural area is mainly a production area in which the activities of the primary sectors have a rather high share from an economic point of view. Rusali (2013) states that the sectors of agri-food production (field crops, meadows, vegetables, viticulture, fruit growing, animal husbandry), forestry and forestry, wood industrialization, mining,

agriculture related industry, domestic industry and crafts have a high share in general activity in rural areas. Most of the professions practiced in rural areas are practical, manual professions, some of which require professional qualification.

In 2000, Vincze stated that the authentic rural space is distinguished in all respects (economic structure, population, occupations, culture, social life, etc.) from urban, industrial, port areas, etc. The rural area has characteristics that give it individuality and authenticity compared to other areas. In this sense, the paper aims to highlight the particularities of the rural area from an economic point of view by analyzing the occupation of the population, corroborated with the age groups and the level of education.

The priority of rural development is the modernization of agriculture and the rural economy, by substantiating the vital economic and social functions of the agri-food system: ensuring a balanced diet of the population, the need for raw materials for non-agricultural activities and an active and profitable export of agri-food products. In 2012, Cuciureanu mentioned in a study that the rural economy is represented by agriculture and is a major market for the branches in question downstream of them, directly contributing to the development of non-agricultural branches and sectors related to rural areas.

Regarding the rural economy, Késmárki (2006) says that the development of agriculture leads to an increase in yield per unit and an increase in labor productivity. Takács (2007) mentions that the development of agricultural holdings is framed in the technical development, which determines economic progress.

Palma Lampreia Dos Santos and Ahmad (2020) note that at European level, agricultural activity has an important contribution to European and global food security, as well as to the conservation of the rural environment and livelihoods. Olorunfemi et al. (2020) state that the agricultural sector has a very important contribution to food in the twenty-eight European Member States of the European Union (EU), while Palma Lampreia Dos Santos (2019) mentions that agricultural activity has positive effects on cohesion social and productivity.

In the European Union, agricultural land covers 1,845,340 (km²) (FADN, 2019), and arable land represents approximately 25.3% of the total European area. Also, about 25% of the total population of the Member States of the European Union live in rural areas (World Bank, 2018), and about 4.5% of them are directly employed in the agricultural sector.

At European level, agriculture is supported by agricultural policy, which directly supports and contributes to the development of agriculture. The Common Agricultural Policy (CAP) has allocated funds for the periods 2007-2013 and 2014-2020, which support the development of agriculture, in particular agricultural holdings. European Union agricultural subsidies also play an important role in the study area. In this respect, depending on the types of farms identified, it can be deduced whether European funds for agriculture determine and influence the development of agriculture.

The Romanian literature includes case studies on farms and, among them, there is the study of Bacter and Gherdan (2021) for Bihor County in which bison farms are analyzed, starting from the premise that subsistence agriculture in Romania is characterized by small specialized farms that support with products their own farm and a certain area. In the study of Grzelak et al. (2022) the farms in Poland, in the Wielkopolska region, are analyzed, the importance of agricultural holdings is highlighted from an economic and social point of view, the role of European funds being existential. This study also emphasized the need for agricultural holdings to be based on sustainable agriculture.

In Romania, the effective absorption rate of funds granted through the National Rural Development Program for the period 2007-2013 was approximately 90%, 8.45 billion euros, of
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which 7.25 billion euros European funding, of 9.3 billion euros available. According to data promoted by the Romanian Ministry of Agriculture and Rural Development, payments to beneficiaries amounted to 8.10 billion euros through the EAFRD and the national budget, while payments of 6.83 billion euros were made from the EAFRD to beneficiaries. To these were added the pre-financing received in 2008 amounting to EUR 0.56 billion, which led to an absorption rate of the allocation of EAFRD funds of 91.3%. The main investments made for the modernization of agricultural holdings in the animal and plant sectors were through measure 121 "Modernization of agricultural holdings", which amounted to a number of 2863 contracts (of which 478 animal sector, 2,255 plant sector and 130 mixed farms). The contracted public value was 790.25 million euros, and the payments were 648.77 million euros. Through the LEADER program, 611 commercial agricultural holdings were financed (a contracted value of 33.12 million euros and a paid value of 30.65 million euros).

The National Rural Development Program 2014-2020 included 14 financing measures with an allocation of 9.85 billion euros. The most important measures related to agricultural holdings were 4.1 "investments in agricultural holdings", with a budget of 205,776,952 euros and 6.1 "support for the installation of young farmers", with a budget of 111,209,889 euros. Thus, Romanian farmers were able to access non-reimbursable European funds for the development of agricultural holdings.

2. Study area

The study is conducted in Western Moldova in Romania which includes the following counties: Botoșani, Iași, Vaslui, Galați, Suceava, Neamț, Bacău and Vrancea. They are located in the eastern part of Romania, and the relief of the study area is complex, from plains to hills, plateaus, mountains, subcarpathians and depressions. The main physical and geographical units in Botoșani County are the Siret Hills and the Upper Jijia Plain; from Iași County are the Moldavian Plain and the Central Moldavian Plateau; from Vaslui County are the Central Moldavian Plateau and the Barlad Plateau; from Galați county are Covurluiului Plateau, Tecuciului Plain, Covurluiului Plain, Siretului Inferior Meadow and Lunca Prutului de Jos; from Vrancea county are the Vrancea Mountains, the Subcarpathian Hills, the Lower Siret Plain, the Tutovei Hills and the Râmnicu Plain; from Bacău county are Tarcăului Mountains and Siretului Valley; from Neamț County are the Eastern Carpathians and the Moldavian Plateau; from Suceava County are the Eastern Carpathians and the Suceava Plateau. Among the main physical-geographical units of Romania, in the study area are: the Moldavian Plateau, part of the Eastern Carpathians, the Subcarpathians of Moldova, part of the Curvature Sub-Caps and part of the Romanian Plain.

The characteristics of the relief influence the practice of agriculture, customizing the agricultural holdings for each component county of Western Moldova.

3. Methods

The study was conducted using data from the 2010 Agricultural Census (FADN, 2019). Indicators used are:

1. Agricultural holdings (number) which have used the agricultural area and / or kept livestock;
2. Agricultural holdings, the used agricultural area and the used agricultural area that returned on average on an agricultural holding, by localities;

3. Agricultural holdings (number), according to the way of holding the used agricultural area, by localities;
4. Agricultural holdings (number) that use the arable land, according to its ownership, by localities;
5. Agricultural holdings (number), by size classes of the used agricultural area, by localities;
6. Agricultural holdings (number), by arable land size classes, by localities;
7. Agricultural holdings (number), by size classes of the total area, by localities;
8. Agricultural holdings (number), with used agricultural area, unused agricultural area and other areas, by categories of use, by localities;
9. Agricultural holdings (number) that used agricultural machinery and equipment, by type of agricultural machinery and equipment used, by localities;
10. Agricultural holdings (number) with persons who worked in agriculture, according to the legal status of agricultural holdings, by localities;
11. Arable land;
12. Agricultural land.

The maps for this study (Figures 1, 2, 3, 4, 5 and 6) resulted from the use of the "hierarchically ascending classification" in the Philcarto software, by selecting the indicators listed in the legend of each map. Thus, each map has 5 classes, which are highlighted in the legend under each map as - C1 +, - C2 +, - C3 +, - C4 + and - C5 +. Following the results of the set of indicators for each map, the classes in the legend were described. The results of the hierarchically ascending classification highlight for each area the deviations from the average of the analyzed indicators. In this way, the administrative units in the study area are classified according to the results of the statistical data for agricultural holdings and the agricultural typologies are highlighted.

The study also aimed to highlight the ownership of agricultural and arable land on farms, in addition to highlighting their size. The aggregate indices are mapped in the Philcarto software to perform a spatial analysis and to observe the applicability of the described methods. Also, the indicators used are percentage values.

4. Results and discussion

The typology of agricultural holdings in the studied area is made in a regional context in order to observe the classification of rural areas for this reason. Rural areas depend on the way of capitalizing on the potential, and the development of agricultural holdings is a stage in this regard. Through the National Rural Development Program (PNDR) 2007-2013, over 85,000 farmers, entrepreneurs and local public authorities have benefited from non-reimbursable European funds amounting to approximately 9 billion euros.

Romania is distinguished by a peculiarity of agriculture, which is represented by the management of agricultural area: half of it is managed by commercial farms, efficient and competitive, and the other half belongs to subsistence and semi-subsistence farms. The utilized agricultural area (OR) in Romania is decreasing, a general trend in the European Union. In the period 2005-2010, the agricultural area used decreased by 4.3% (from 13.9 million ha to 13.3 million ha). In the structure by categories of use, the largest share is represented by arable land (62.4%), followed by pastures and hayfields (33.9%). The regional distribution of the agricultural area used depends on the variety of the relief and the socio-economic conditions. The agricultural area used has high values especially in the West and South Regions, and the predominant arable land in the South-East (16.5%) and South-Muntenia (17.5%). In the Central and North-West regions, pastures and

hayfields hold more than half of the agricultural area used (65.6% and 52.8% respectively) (PNDR, 2014-2020).

The physical and economic dimensions of agricultural holdings in Romania differ significantly from EU averages. In 2010, on the territory of the country were 32.1% (3,859,040) of the total agricultural holdings in the European Union (10.0% less than in 2005). The average size of a farm in Romania (3.4 ha OR / farm, increasing by only 0.1 ha OR / farm compared to 2005) is 4 times smaller than that of the European Union (14.3 ha OR), and the degree of fragmentation is very high, the average surface of the plot being 0.45 ha, each farmer owning on average 4.8 plots (PNDR, 2014-2020).

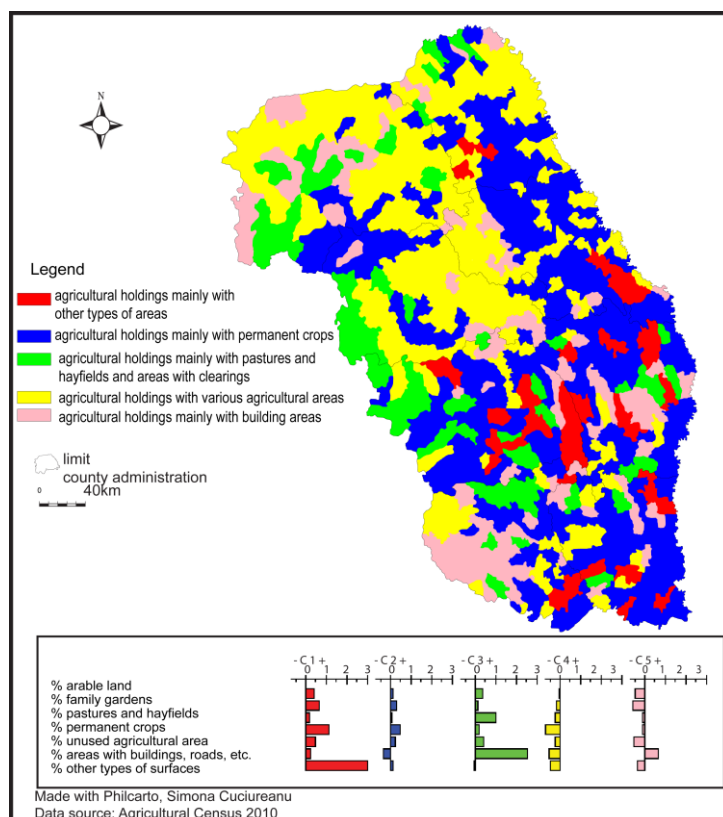


Figure 1 Typology of agricultural holdings of basic administrative units in Western Moldova depending on the agricultural area used (2010).

In the counties of Western Moldova are registered a number of 974328 agricultural holdings at the level of 2010. Most agricultural holdings, in number, are in Suceava county (159392), then in Bacău county (145632), Iași (138393), Neamț (126458), Botoșani (111020), Vaslui (109896), Galați (92863) and Vrancea (90674). In the study space, the agricultural area used, which returns on average (hectares), on an agricultural holding that uses the agricultural area shows that Vaslui County has the largest area 295.84 hectares (15.25%), followed by Botoșani County with 271.82 hectares (14.01%), Iași county 266.18 hectares (13.72%), Galați county 262.76 hectares (13.54%), Suceava county 262.38 hectares (13.52%), county Vrancea 197.5 hectares (10.18%), Bacău 193.25 hectares (9.96%) and Neamț County 189.78 hectares (9.78). It can be noticed that although the largest number of farms is in the counties of Suceava and Bacău, the farms in these areas do not use an agricultural area, on average, large. The map below illustrates a classification of agricultural

holdings according to the agricultural area used. The following categories of classification of territorial administrative units were identified at the level of the study area: agricultural holdings mainly with other types of areas, agricultural holdings mainly with permanent crops, agricultural holdings mainly with pastures and hayfields and areas with buildings, mainly agricultural holdings with various agricultural areas and mainly agricultural holdings with building areas.

The map in Figure 1, "Typology of agricultural holdings of basic administrative units in Western Moldova depending on the agricultural area used", was made using the indicators arable land, family gardens, pastures and hayfields, permanent crops, unused agricultural area, building areas, roads, etc. and other types of surfaces. Figure 1 has two captions, one below the map showing the 5 classes and the listed indicators, which show the deviations from the average of each indicator on a scale from 0 to 3. Following the analysis of the results, the classes in Figure 1, which are at legend.

It can be seen that in Suceava and Neamț counties (Figure 1) predominate agricultural holdings with various agricultural areas, in Vrancea county predominate agricultural holdings with building surfaces, in the Galați, Vaslui, Iași and Neamț counties predominate agricultural holdings with permanent crops and Botoșani county is dominated by agricultural holdings with permanent crops and agricultural holdings mainly with various agricultural areas. In this respect, the agricultural holdings in the study area use the agricultural area for various crops, which denotes the practice of agriculture. The counties in the eastern part of the study area are suitable for land use for agricultural crops and, in this sense, farms exploit these characteristics.

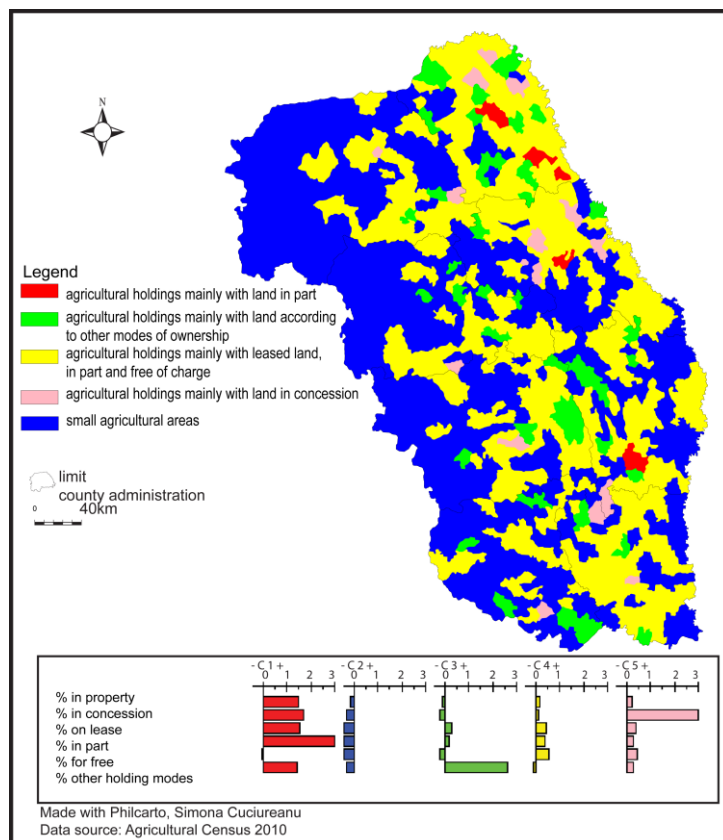


Figure 2 Classification of basic administrative units in Western Moldova according to the agricultural holdings by the way of holding the agricultural area (2010).

The agricultural areas used by the agricultural holdings are "owned", "free title", "concession", "partly", "lease". Figure 2 "Classification of basic administrative units in Western Moldova according to the agricultural holdings by the way of holding the agricultural area" uses the indicators regarding the ownership of agricultural land, which shows how the territorial administrative units of Western Moldova are classified. The legend below the map in Figure 2 highlights the 5 classes (- C1 +, - C2 +, - C3 +, - C4 + and - C5 +) and the indicators used to make it the way to own agricultural land on a farm (in property, in concession, on lease, in part, for free and other holding modes).

In the counties in the western part of the area (Suceava, Neamț, Bacău and Vrancea counties) they have small agricultural areas, while in the eastern part of the study area (Botoșani, Iași, Vaslui and Galați) there are predominant farms with leased agricultural land, in part and free of charge. It can be seen that agricultural holdings have developed on land that is not privately owned. The agricultural holdings that have owned agricultural areas are small, being several administrative units in Botoșani, Iași and Vaslui counties, with agricultural lands in concession.

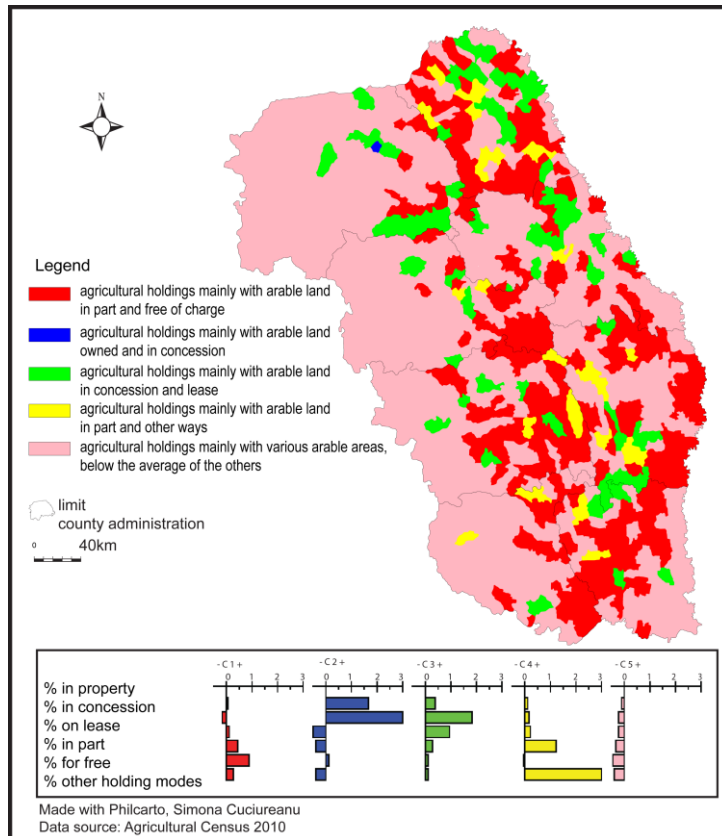


Figure 3 Classification of basic administrative units in Western Moldova in operation of agricultural holdings by arable land ownership (2010).

Arable land on agricultural holdings is "owned", "free title", "concession", "in part", "lease" (Figure 3). The legend below the map in Figure 3 describes the classes of indicators listed (- C1 +, - C2 +, - C3 +, - C4 + and - C5 +) and you can see the classification of farms according to the deviations from the average from 0 to 3 for each indicator. The legend on the left of the map describes the classes

resulting from the analysis of the results of the hierarchically ascending classification. At the level of Western Moldova, the following categories of agricultural holdings have been identified: with arable land in part and free of charge, with arable land in ownership and concession, with arable land in concession and lease, with arable land in part and other ways holding and with various arable areas. In the western counties of the study area (Suceava, Neamț, Bacău and Vrancea counties) the category of agricultural holdings with various arable areas predominates, below the average of the other classes, while in the eastern counties (Botoșani, Neamț, Vaslui and Galați) holdings with part arable land and free of charge predominate. Thus, the areas that have been identified with agricultural holdings that use land for crops, are as a form of ownership in part and free of charge, which shows that the owners of agricultural holdings have sought to identify a way to capitalize on land and agricultural potential. After classifying the administrative units according to the above indicators, it is necessary to identify the size class of the agricultural and arable land used by the agricultural holdings.

The classification of the territorial administrative units according to the size class of the used agricultural area of the agricultural holdings highlights the following categories at the level of Western Moldova (figure 4): size between 0.1 hectares and 2 hectares, between 0.1 hectares and 0.5 hectares, between 2 hectares and 30 hectares, between 30 hectares and over 100 hectares and small size, below previous averages. In the legend below the map you can highlight the listed indicators and the classes resulting from their analysis (- C1 +, - C2 +, - C3 +, - C4 + and - C5 +). Deviations for each indicator are from 0 to 2.

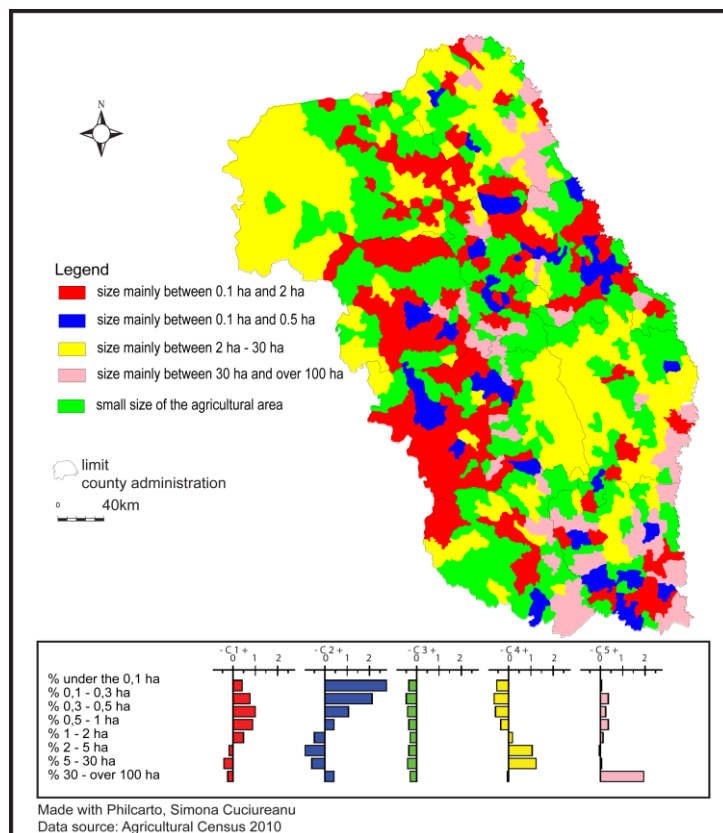


Figure 4 Typology of agricultural holdings of basic administrative units in Western Moldova depending on the size of the agricultural area used (2010).

In the study area, in Suceava, Botoşani and Vaslui counties, the class between 2 hectares and 30 hectares predominates, in Neamţ and Bacău counties the class between 0.1 hectares and 2 hectares predominates, in Vrancea county the small size class predominates, while in Iaşi and Galaţi counties there are several classes. In Galaţi county there are size classes between 30 hectares and over 100 hectares and between 2 hectares and 30 hectares, while in Iaşi county the size classes between 0.1 hectares and 2 hectares and between 0.1 hectares and 0.5 hectares predominate. The typology of agricultural holdings according to the size of the agricultural land class shows that there are a small number of administrative units that have large areas. This aspect also indicates the main activity of these agricultural holdings, so they are for crops.

The classification of territorial administrative units according to the size class of the arable area used of agricultural holdings (Figure 5) has the role of highlighting the typology of territorial administrative units, in the context in which most farms deal with crops. The size of the arable land used by agricultural holdings is from less than 0.1 ha to over 100 ha, these size classes used to make the map in Figure 5 can be seen in the legend below the map. Also in this legend are the classes resulting from the hierarchical ascending use, - C1 +, - C2 +, - C3 +, - C4 + and - C5 +.

It can be seen that at the territorial level, in all counties in Western Moldova, agricultural holdings that use small arable land predominate. Botoşani, Suceava, Bacău and Vaslui counties stand out with agricultural holdings with arable land between 0.5 hectares and 30 hectares, while Galaţi county stands out with territorial administrative units with agricultural holdings that have between 30 hectares and 100 hectares.

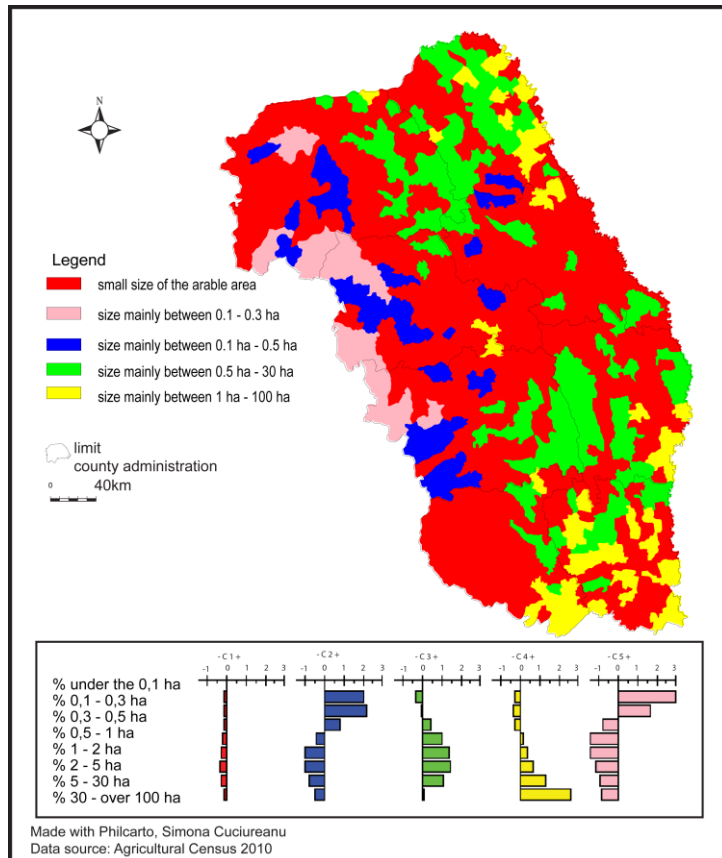


Figure 5 Typology of agricultural holdings of basic administrative units in Western Moldova by size class of arable land used (2010).

The following classification of territorial administrative units (Figure 6) used the following indicators: total number of agricultural holdings, agricultural holdings that used agricultural land and owned livestock, agricultural holdings that used agricultural land and agricultural holdings that owned livestock. The legend below the map shows the classes of indicators used - C1 +, - C2 +, - C3 +, - C4 + and - C5 +. Following the analysis of the results of these indicators, they were described in the classes in the legend on the left of the map. Following the use of these statistical data, the following classifications emerged at the level of the study area: territorial administrative units with agricultural holdings with livestock and using agricultural land above the general average, territorial administrative units with agricultural holdings with livestock above the general average, territorial administrative units with agricultural holdings with livestock, territorial administrative units with agricultural holdings with agricultural areas and territorial administrative units with a small number of agricultural holdings. At the territorial level, there are territorial administrative units with a small number of agricultural holdings, followed by territorial administrative units that have agricultural holdings that use the agricultural area.

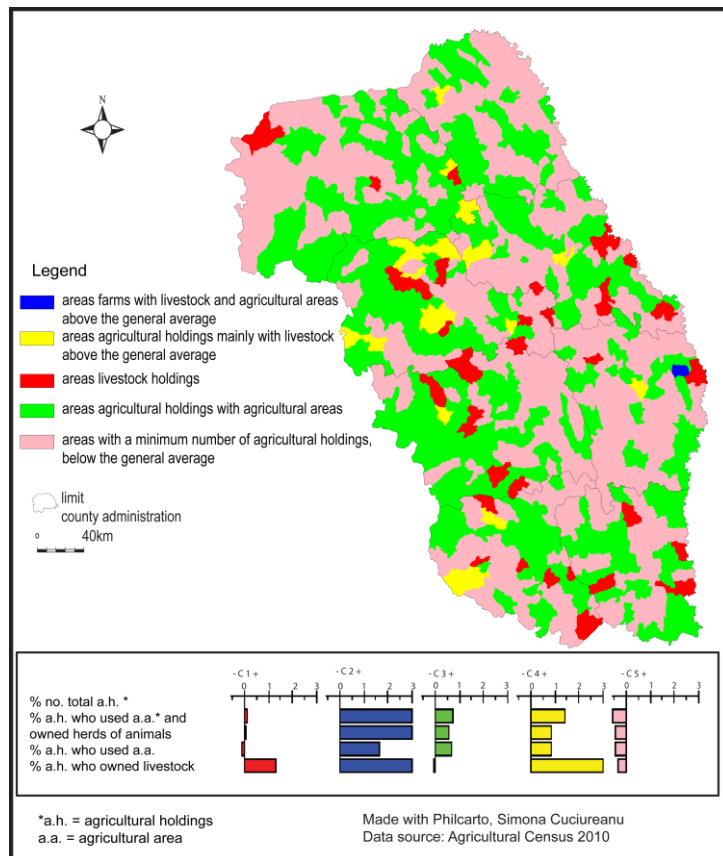


Figure 6 Spatial typology of basic administrative units in Western Moldova by farm (2010).

In Romania, according to the data from the General Agricultural Census from 2010 (FADN, 2019), compared to 2002, small farms predominate, under 5 hectares, which represent 93.1% of the total farms and use 29.7% of the agricultural area used. Farms over 50 hectares are much smaller in number (21,210), which manage 52% of the utilized agricultural area. In this sense, following the census it was found that for most agricultural holdings, Romania has a low level of economic

development. Thus, it can be observed that in Romania the farms that have a semi-subsistence character and a high market orientation potential predominate.

At the level of the study area, according to the analyzed data, the preponderance of subsistence farms is observed. Agriculture is used in Western Moldova, but the level of development is low, being at the level of subsistence or transition from subsistence to semi-subsistence. The study highlights the fact that agricultural holdings are also influenced by the types of land used, how they are owned or their size class. However, agricultural holdings are also influenced by natural geographical factors, especially the characteristics of the relief, so that the counties in the western part of the study area are influenced by this aspect (Suceava, Neamț, Bacău, Vrancea).

There are prospects for the development of agricultural holdings, by accessing European funds. Following the publication of the data from the next census, it will be possible to observe how the agricultural holdings have evolved, how the territorial administrative units are classified compared to 2010 and the factors that influenced this evolution can be searched.

5. Conclusion

Following the study, it was observed that in Western Moldova the largest number of farms are in the counties of Suceava and Bacău. Farms in these areas do not use a large agricultural area. The counties with the largest average agricultural area used in agricultural holdings are Vaslui, Botoșani and Iași. At the level of the study area, agricultural holdings mainly use arable land, which is used for land cultivation, while their size is small.

The trend of agricultural land is declining, but agricultural holdings are a solution for capitalizing on agricultural potential. In this context, it can be seen that subsistence agriculture predominates in Western Moldova. Farms need to seize development opportunities by accessing European funds. In Western Moldova there are 2,501,821.42 hectares of agricultural land, while 1,603,050.03 hectares are arable land (64.08%) and 859,946.6 hectares are non-agricultural non-arable land. The agricultural potential of the study area is high, and agricultural holdings are a solution for land use and development of the area.

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