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DETERMINATION OF LAND VALUATION FACTORS FOR THE PROCESS OF LAND CONSOLIDATION - A CASE STUDY IN SASCHIZ ADMINISTRATIVE UNIT IN ROMANIA

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Abstract

Land fragmentation is a phenomenon that affected Western Europe in the past and, starting from 1989, the countries of Eastern Europe. One of the ways in which the effect of land fragmentation can be diminished is the process of land consolidation. Through land consolidation, owner can get better shaped parcels that can help increase agricultural productivity. Using the existent literature in the field of land consolidation, this exploratory study proposes a series of factors for land evaluation for the land consolidation process. These factors are applied in Saschiz administrative unit in Romania using different type of data to calculate the score for each factor. The result shows how this framework functions in real conditions.

Key words*: systematic land registration, cadastre, operations, processes, cadastre.*

INTRODUCTION

Climate change and the growth of world population are challenges that have pushed decision makers around the globe to look for policies for a more efficient use of land and its soil. This must be done in a sustainable way to improve the use of its resources and systems (Mihailescu & Cîmpeanu, 2019; Coman et al., 2016). Subsistence agriculture cannot anymore feed the growing population of the world. There is a need for extending the arable land areas, sustainable land use and increase of farm yield (Nsabimana et al., 2023; Moteva, 2016).
Attaining food security by increasing agricultural productivity can make possible the achievement of the 17 Sustainable Development Goals and its 169 associated targets as defined by the United Nations. One of the ways in which land professionals can contribute to goals like: gender equality, increasing agriculture productivity or sustainable use of freshwater is by using the process of land consolidation that can reduce land fragmentation and increase agricultural output (Veršinskas et al., 2020; Hartvigsen, 2015).
Land fragmentation is a problem that increases production costs in agriculture, inefficiency and land abandonment (Di Falco et al., 2010; Latruffe & Piet, 2014). Eastern Europe has had the problem of land fragmentation after the anti-communist revolutions from 1989 when property started to return from state ownership to private ownership (Șuba et al., 2019; Sabates-Wheeler, 2002; Van Dijk, 2003). However, not in all these countries land reforms conducted in the 90s had the same effects. Baltic countries, Slovakia or the Czech Republic have a much less fragmented ownership than Romania or Bulgaria (Van Dijk, 2005; Van Holst et al., 2018), due to different ways in which the land was given back to the owners.
Romania is the country that has been affected the most by land fragmentation. According to (Eurostat, 2022) one third of the farms in existence in the EU are in Romania, more than twice than in Poland that is the next country in the classification. The problem does not only consist in the number of farms in existence, but also in the size of the farms. Over 90% of them have sizes that are less than 5 hectares

(Eurostat, 2022). This fragmentation is mainly caused by the land reforms conducted in the 90s. Through successive inheritances the land was split between the heirs, in accordance with the existent rural traditions (Rusu et al., 2002).

To counteract the effects of land fragmentation, most countries have implemented land consolidation projects (Hartvigsen, 2014). In this landscape, Romania is an exception. There have been few attempts to implement land consolidation projects in the country. None of these projects ended with a redistribution of parcels. The problems that have been signalled by different authors refer to lack of specialized institutions, legislation and the fact that land registration in Romania hasn't been finalized (Blenesi-Dima, 2010; Ciobanu, 2021; Dima et al., 2007; Păunescu et al., 2024).

This paper aims to provide a framework for evaluating land in the process of land consolidation for projects that may be developed in Romania in the future. The factors for evaluation of land in the land consolidation process will be taken from the existent literature regarding the subject and adapted to the specificities of the country. The land evaluation factors will be tested by applying them in a study area containing 766 parcels, in the Saschiz administrative unit from county Mures, Romania.

In the first section of this research, the literature concerning land fragmentation, land consolidation and land evaluation for land consolidation processes is analysed. In the second section, the methodology of the study is described in detail. In the third section, the factors for evaluation are determined from the existent literature and are applied in the study area. The fourth section of the study contains the conclusion of the research.

1. Land fragmentation

Land fragmentation is a sign of an underdeveloped agricultural system (Teshome et al., 2016). The effect of land fragmentation is less income for farmers and waste resources in agricultural production (Mert et al., 2023; Rashidpour & Azar, 2016). For (Ntihinyurwa et al., 2019) land fragmentation can be considered when: "more than 10 users are in 10 hectares, the average parcel is less than 1 ha, more than 50% of the owners have more than 2 parcels with irregular forms located in more than two different places more than 500 meters from home with more than two uses, land is fragmentated because of inheritance laws, land sharing or land redistribution". On the other hand, several authors have underlined some advantages that land fragmentation can provide in some instances. Having different parcels in different areas with different land use can constitute a form of protection against environmental changes and increase food security (Chigbu & Kalashyan, 2015; Van Hung et al., 2007). Regular shape parcels may not be appropriate where there are natural limits. Moreover, (Delgado, 1998; Bezus & Samofal, 2019) affirm that in some cases family farms can be more productive than large scale agricultural exploitations. However, contradicting these affirmations (Agarwal, 2010) and (Ruben & Lerman, 2005) show that group farms can mobilize more resources in a more efficient way, while (Sabates-Wheeler, 2005) talk about the increase agricultural output that group farms have.

2. Land consolidation

Land consolidation has been a tool implemented in many countries in Europe and Africa for a more efficient land management and sustainable development of rural areas (Demetriou, 2016). The result of the reallocation of land is parcels with better dimensions and shapes (Sklenicka, 2006).

Land consolidation represents an efficient instrument for agricultural development helping farmers to have less, bigger, better shaped parcels and proposes measures to adjust terrain parcel configuration (Akdemir et al., 2024). Land consolidation is designed to counteract the effect of land fragmentation, but its purpose goes further, involving complex social and economic reforms (FAO, 2007). Land consolidation is applied in the case of disparate parcels and represents a repositioning of the spatial location of the private ownership in order to form new land ownership that contain one or as less parcels possible with the same or higher value than the initial ones (FAO, 2007). In this process no owner should lose (Oldenburg, 1990). In a European context, land consolidation consists in "rearrangement and/or putting together of different, distributed

plots; removal of terraces and defiles; construction of rural roads; restructuring of local streams; and soil improvement" (Bronstert et al., 1995). However, in many countries, land consolidation has remained oriented to agriculture. This can be seen mostly in countries in Eastern Europe and East Asia where land consolidation is more concerned with the agricultural aspects of the process than with land improvements (Gorgan & Bavorova, 2022).

For (Louwsma et al., 2022) there are four types of land consolidation:

- Voluntary land exchange. It is the simplest type of land consolidation and implies voluntary exchanges of parcels between owners. The size and shape of parcels hardly change.
- Voluntary land consolidation. It is also based on the voluntary participation of the people but has a more systematic approach and it is coordinated by the authority. Improvements may be done on a small scale.
- Majority based land consolidation. It is based on the consent of the majority of the landowners and is done in a systematic way. Medium to large scale improvements is possible.
- Mandatory land consolidation. Land consolidation is decided by a public authority. Besides the redistribution of parcels there are a lot of improvements that are implemented.

In short, the process of land consolidation consists of the following steps (FAO, 2003; FAO, 2007):

- Initiation of the land consolidation project.
- Design of the project or the feasibility study in which the cost-benefit analysis is conducted, and the area is chosen.
- Inventory of the existing situation in which the legal rights for every parcel must be determined and an evaluation of land is conducted.
- Elaboration of the land consolidation plan in which the preferences of the owners are considered, and the parcels are relocated and reallocated in accordance with the evaluation conditions.
- Implementation of the land consolidation plan.
- Concluding phase in which the cadastral map is actualized with the new formed parcels, the owners are compensated for eventual loses and the new legal situation is established.

For the process of land consolidation to be applied with success, the cadastral situation of all land in the area must be clear. Information in the land administration system is diverse and can contain data concerning: the ownership, the location of parcels, the legal status of the parcels, land use and other data (Constantin et al., 2015). Without it, it is very difficult to apply the land consolidation process.

3. Evaluation of parcels in the land consolidation process

The process of land consolidation needs to have a type of land evaluation. There are two types of land evaluation that can be applied (Demetriou, 2016):

- Evaluation that reflects land productivity and soil quality that can be expressed in a form of a score for every parcel.
- Land market evaluation that is done to find out the monetary value of every parcel according to the traditional evaluation standardized methods.

In land consolidation, market-based valuation is often less relevant, as farmers tend to prioritize agricultural productivity over potential sale value. Consequently, Van Dijk (2003) considers agricultural output and soil quality as the key evaluation factors. However, Demetriou (2014) notes that these criteria are applicable mainly in extra-urban areas where construction is prohibited. Several factors are considered when assessing agricultural productivity for land consolidation, each assigned a specific weight. The weighted scores are summed to determine the overall value of each parcel. For Wyatt (1996) factors can be of four types: physical, legal, locational and economic. Branković et al. (2015) indicate that land evaluation in Serbian land consolidation projects considers soil fertility, climate conditions, and economic factors, while Tezcan et al. (2018) propose a broader approach with at least 14 evaluation factors (Table 1).

Table 1. Factors of land evaluation proposed by several authors

Demetriou, 2018	Tezcan et al., 2020	Ertunç & Uyan, 2022	Asiama et al., 2018	Ertunç et al., 2021	Wyatt, 1996
Factors of evaluation	Factors of evaluation	Factors of evaluation	Factors of evaluation	Factors of evaluation	Factors of evaluation
Size of the parcel	Parcel area	Area of parcel	Land tenure	Size of parcels	Size of the parcel
Shape of the parcel	Parcel share situation	Shape of the parcel	Proximity to town square	Soil fertility	Shape of the parcel
Slope of the parcel	Parcels adjacent to agricultural areas	Share statue of parcel	Road access	Slope	Slope
Elevation	Existing land use	Soil fertility of the parcel	Soil quality	Market value of the parcel	Elevation
Aspect	Fixed facility	Distance of the parcel from the village centre	Parcel shape	Distance to village centre	Land tenure
Stream	Zoning situation of agricultural area	Distance of the parcel to the road	Proximity to main road	Distance to water source	Soil type
Soil type	Distance to the district centre	Distance of the parcel to the water source	Slope	Distance to main road	Soil quality
Access (through different kind of roads)	Distance to a highway	Economic value of the parcel	Land use	Accessibility to main road	Distance to main road
Distance from the main road to the motorway	Availability of agricultural drainage system	-	Soil type	Parcels near the river edge	Distance to town square
Land use	Distance to natural resources	-	Elevation	-	Access to national/regional road
Irrigation	Availability of electrical power	-	-	-	Access feeder roads
Sea view	Proximity to forest	-	-	-	Access to other roads
Distance from residential zone	Presence of historical resources	-	-	-	Land use
	Status of state support	-	-	-	-

Each evaluation factor is assigned a score, and the sum of these scores determines the parcel's overall value in the land consolidation process. These scores are typically weighted based on the relative importance of each factor, with weights ranging from 0 to 1 or 0 to 10. While some researchers, like Zhou et al. (2017), emphasize soil quality, others prioritize factors such as area or shape. Alternatively, Asiama et al. (2018) suggest that equal weights can be used or adjusted based on landowners' preferences.

MATERIALS AND METHODS

1. Paradigm of research

Researchers generally operate within two main paradigms. The **positivist paradigm** views reality as objective and measurable through scientific methods (Park et al., 2020; Kaboub, 2008), aiming for objectivity and broad generalization (Firestone, 1987). In contrast, the **constructivist paradigm** sees reality as socially constructed, shaped by individuals' experiences, interpretations, and contextual influences (Adom et al., 2016; Alharahsheh & Pius, 2020).

This study, focused on land evaluation in the land consolidation process in the Saschiz administrative unit, adopts a predominantly constructivist approach. While it incorporates statistical methods aligned with positivism, the overall perspective reflects constructivist principles. These paradigms are not mutually exclusive but rather represent ends of a methodological spectrum, allowing researchers to draw from both as needed to explore complex realities (Morgan & Smircich, 1980).

2. Methodology and methods

Given the limited coverage of this research area in Romanian literature, legislation, and practice, the study adopts an exploratory approach, drawing on both positivist and constructivist paradigms. The methodology is predominantly qualitative and is structured as a case study focusing on a real-world context (Yin, 2009; Anderson, 1993). The study analyzes 766 parcels located in the Saschiz administrative unit, Mureș County, Romania. As such, the findings are context-specific and not intended for generalization.

The first method employed was content analysis, which involved a critical review of literature on land evaluation in consolidation processes, recognizing that texts are shaped by their social and contextual background. Content analysis, defined as "a method of analysing written, verbal or visual communication messages" (Cole, 1988), allows for categorizing terms or phrases with shared meanings (Cavanagh, 1997). From this analysis, a framework of evaluation factors relevant to the study area was developed.

In addition, statistical methods were used to assess each land evaluation factor - parcel shape, size, location, road accessibility, slope, flood risk, legal restrictions, irrigation, and soil quality - with results expressed in percentages and scores. Two software tools supported the analysis: "Reparcelare", developed specifically for land consolidation projects, and Global Mapper 18.1, a GIS application. These tools were used to calculate scores for each factor, as detailed in Table 2.

Table 2. The data use for calculating each factor

Factor	Application used	Data used	Explanation
Shape of the parcel	Reparcelare	Secondary data: data existent in the cadastral database	The application "Reparcelare" calculated automatically the score of each parcel based on the number of sides and the preset intervals
Surface of the parcel	Reparcelare	Secondary data: data existent in the cadastral database	The application "Reparcelare" calculated automatically the score of each parcel based on the preset surface intervals
Location of the parcel	Reparcelare	Secondary data: cadastral geodatabase with the location of each parcel	The application "Reparcelare" calculated automatically the distance to every parcel and calculated the score according to preset intervals
Accessibility to roads	Reparcelare	Secondary data: the location of the roads and the parcels from the cadastral geodatabase	"Reparcelare" calculated automatically the surface of road that the parcel has access to
Slope	Global Mapper Reparcelare	Primary data: Digital Terrain Model from aerial pictures. Secondary data: position of the parcel from the cadastral geodatabase	From the DTM, slopes were calculated automatically in Global Mapper for every parcel. The values of slope were introduced in application "Reparcelare" and intervals were preseted. The application calculated the score for every parcel
Legal restrictions	Reparcelare	Secondary data: textual data from the cadastral database	The application "Reparcelare" calculates automatically the score based on the type of restrictions
Irrigation	-	There is no data concerning irrigation in the area	-
Flood risk	Global Mapper Reparcealare	Primary data: DTM from aerial pictures Secondary data: historic data concerning the level of water overflow position of the parcel from the cadastral geodatabase	Based on the DTM an overflow of water was simulated to see the parcels that are affected by flood. Depending on this risk, intervals were preset in the application "Reparcelare" and the score was automatically calculated
Soil quality	Global Mapper Reparcelare	Secondary data: Pedologic map of the area georeferenced in Glaobal Mapper The values representing soil quality were introduced in "Reparcelare" application that calculates the score for each parcel	

3. Limitations

The premise of the study was that this was a voluntary land consolidation process in which all the owners agree with the project proposed and no litigations regarding the use of land exists. In practice, situations of conflict may arise. These situations were not considered for this study.

There are limitations concerning the use of research paradigms. Constructivist's methods and methodologies have a high degree of reliability, but they cannot be generalized. The lack of generalization has led authors like (Liu & Matthews, 2005) to affirm that "where no absolute truth, any truth exists is good as the other". However, the constructivism paradigm compensates with a high degree of reliability because of the small samples used. The findings are restricted only to that case and cannot be generalized.

There is no legislation in Romania concerning land consolidation. In this study, no legal obstacles were considered in the process of land evaluation for the land consolidation process. In the eventuality of such evaluation in practice, the legislation, if existent, must be considered.

RESULTS AND DISCUSSIONS

1. Evaluation factors

Taking into consideration Table 1, it can be observed that there are several features that are common for most authors in designing any process of land evaluation for the land consolidation process. Distance and access to roads are the most common conditions that appear, the transport of agricultural goods being an important factor for farmers. Size or area of the parcel is another important feature appearing in four different instances as well as land use, soil quality, slope, access to water sources or the existence of irrigation systems and the legal situation of the parcel. Another aspect that appears three times in Table 1 is the shape of the parcel. One of the purposes of the land consolidation process is to have better shaped parcels.

Considering the literature studied, the factors considered for land evaluation for the land consolidation process for this study were: shape of the parcel, surface of the parcel, location of the parcel, accessibility to the parcel, slope, irrigation and soil quality. However, the evaluation procedure must consider specificities to the area in which are applied. Romania has been confronted with floods on large surfaces that brought considerable damage to the agricultural sector and loss of life. There are parcels that are in the flood risk areas and that can decrease their value for the land consolidation process. That is why; the flood risk factor is introduced in the list for land evaluation for land consolidation purposes.

Although land tenure is commonly cited by many authors, it was not considered in this study. The research is based on the assumption that land consolidation in the area was voluntary, with all landowners consenting to participate - even in cases of shared ownership. Instead, legal restrictions, like areas that cannot benefit from improvements of are under legal constrains from exchanging or selling the land were considered. Therefore, the factor legal restrictions were introduced for this study.

The weight assigned for each factor can be express in percentages or from values from 0 to 1. There can be different weights, or all factors can have the same weight. For this study the same weight was assigned for each factor (Table 3).

Table 3. Weights assigned for each factor

Factor	Weight %
Shape of the parcel	11.11
Surface of the parcel	11.11
Location of the parcel	11.11
Accessibility to roads	11.11
Slope of the land	11.11
Flood risk	11.11
Legal restrictions	11.11
Irrigation	11.11
Soil quality	11.11

2. Application of land evaluation factors in the study area

The administrative unit of Saschiz, where the case study takes place, is situated in Mures County in Romania. The area chosen for the case study comprises 766 parcels.

Shape. The ideal parcel has four sides. These are the parcels that received the highest score. For every extra side, the score of the parcel was

reduced. In Table 4 it can be observed that under 1% of the parcels have an ideal shape and got the highest score, while most of the parcels have between 5 and 7 sides.

Table 4. Score for the factor shape

Number of sides	Score	Number of parcels	Percentage
4	10	2	0.26
5	9	374	48.82
6	8	149	19.46
7	7	83	10.84
8	6	52	6.79
9	5	30	3.92
10	4	28	3.65
11	3	14	1.83
12	2	15	1.96
13	1	11	1.44
>13	0	8	1.04

Surface. Saschiz administrative unit is situated in a hilly area. The ideal surface for a parcel in this area is between 20 and 50 hectares (Paunescu et al., 2024). However, the average surface that a parcel has in Saschiz is 4063 square meters. Considering this specificity of the area of study, 10 intervals of 5000 square meters was considered. For every 5000 square meters the parcels were awarded 1 score point extra compared to the previous interval. From Table 5 can be observed that large sized parcels are under 1% in the studied area, while small size parcels are the vast majority. This is not a surprise, as land consolidation is applied exactly to counteract land fragmentation and obtain larger, better shaped parcels.

Table 5. Score for the factor surface

Interval (hectares)	Score	Number of parcels	Percentage
>5.18	10	1	0.13
4.67-5.17	9	1	0.13
4.16-4.66	8	0	0
3.65-4.15	7	0	0
3.14-3.64	6	0	0
2.63-3.13	5	0	0
2.12-2.62	4	3	0.39
1.61-2.11	3	14	1.83
1.01-1.6	2	58	7.57
0.5-1	1	162	21.15
0.5 <	0	527	68.80

Location. As it can be seen in Table 6, the distance from the parcel to the village or district centre is well documented. However, more important for agricultural products is the distance to the processing or storage facilities. A point was placed, that represents the point of collection for agricultural products, outside of the study zone (Figure 1). In "Reparcelare" software, the shortest distance was calculated from the point of collection to the closest point of the parcel. The distance is calculated by application by simulating the shortest route on existent roads. The longest calculated distance is 5100.01 meters, while the shortest distance is 1297.23 meters. The shortest distance was deducted from the longest distance and the difference was split into ten intervals as in Table 6. It can be observed that the score of the parcels for this factor is dispersed in a more homogenous manner, in comparison with other factors.

Figure 1. The study area as seen in "Reparcelare" application

Table 6. Score for the factor location

Interval (meters)	Score	Number of parcels	Percentage
380.278<	10	1	0.13
380.278-760.556	9	33	4.31
760.556-1140.834	8	48	6.27
1140.834-1521.112	7	76	9.92
1521.112-1901.31	6	138	18.02
1901.31-2281.668	5	112	14.62
2281.668-2661.946	4	92	12.01
2661.946-3042.224	3	137	17.89
3042.224-3422.502	2	112	14.62
3422.502-3802.78	1	17	2.22
>3802.78	0	0	0

Accessibility. This factor is linked with the access that a parcel has to a road. The highest scores were attributed to the parcels that have the longest distance that overlaps the limit of

the parcel with a road. If the parcel is bordered by more than one road, then the sum of the distances that overlap the parcel was calculated (Table 7).

Table 7. Score for the factor accessibility

Score	Number of parcels	Percentage
10	0	0
9	3	0.39
8	0	0
7	1	0.13
6	4	0.52
5	25	3.26
4	21	2.74
3	19	2.48
2	39	5.09
1	615	80.29
0	39	5.09

Slope. Slope was determined using a digital terrain model obtained from aerial images. To calculate the score, in "Reparcelare" software were introduced the average maximum slope, that is 32.40%, and the average minimum slope which is 1.41%. The difference between the two values was divided into ten intervals. The highest score was awarded to the parcels with the minimum slope. It can be observed from Table 8 that most parcels are in the hilly area with slopes from 0.01 to 6.5 percent.

Table 8. Score for the factor slope

Interval	Score	Number of parcels	Percentage
0	10	0	0
0.01-3.24	9	183	23.89
3.25-6.49	8	231	30.16
6.5-9.74	7	196	25.59
9.75-12.99	6	71	9.27
13-16.24	5	25	3.26
16.25-19.49	4	40	5.22
19.5-22.74	3	18	2.35
22.75-25.99	2	1	0.13
26-29.24	1	1	0.13
29.25-32.40	0	0	0

Flood risk. To assess the risk of flooding for parcels a risk map for the river Scroafa that runs through Saschiz was used. This was done by taking the historic data concerning the level of the water overflow. A simulation was performed in the GIS software Global Mapper in order to see the parcels that can be affected by the overflow (Figure 2).

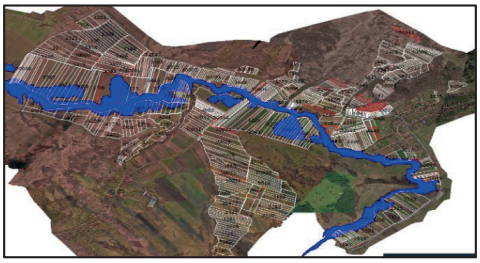

Figure 2. Overflow of the water in the study area as seen in Global Mapper application

The parcels that were least affected received the highest score. Taking into consideration 10 intervals from 0% flood affected parcel and 100% the scores were calculated as in Table 9. It can be observed that most of the parcels are in the safe area.

Table 9. Score for the factor flood risk

Interval (%)	Score	Number of parcels	Percentage (%)
0	10	571	74.54
1-9	9	52	6.79
10-19	8	50	6.53
20-29	7	27	3.52
30-39	6	20	2.61
40.-49	5	22	2.87
50-59	4	5	0.65
60-69	3	5	0.65
70-79	2	10	1.31
80-89	1	3	0.39
90-100	0	1	0.13

Legal restrictions. The legal restrictions considered were the legal impossibility to improve tha land, exchange or sell it. There were no legal restrictions in the study area of such, so all the parcels received the highest score.

Irrigation. There were no irrigation improvements in the area of study. That is why all the parcels received no points for this factor.

Soil quality. The soil quality is assessed using a system of points that takes into consideration a coefficient based on 17 indicators (Musat, 2014). These coefficients are written on pedologic maps. For this study the map for the study area was used. The map was georeferenced in the Global Mapper GIS application and a layer containing the geometry of the parcels was placed above (Figure 3).

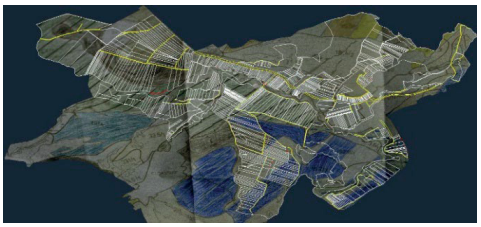

Figure 3. Parcels in the study area overlap on the pedologic map as seen in Global Mapper application

The highest soil quality score is 71.9, while the lowest soil quality score is 14.1. The difference was divided in 10 equal intervals and the score for soil quality was awarded as in Table 10.

Table 10. Score for the factor soil quality

Interval	Score	Number of parcels	Percentage
>72.68	10	50	6.53
66.18-72.68	9	27	3.52
59.67-66.17	8	2	0.26
53.16-59.66	7	2	0.26
46.65-53.15	6	20	2.61
40.14-46.64	5	13	1.70
33.63-40.13	4	16	2.09
27.12-33.62	3	151	19.71
20.61-27.11	2	148	19.32
14.1-20.6	1	335	43.73
<14.1	0	2	0.26

Based on all these factors, by applying the weights, the application "Reparcelare" calculates the score of every parcel that can be seen in the right corner of Figure 4.

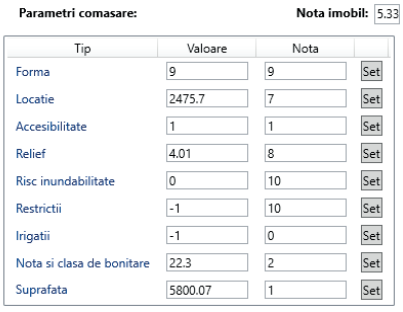

Figure 4. Example of score for one parcel as seen in "Reparcelare" application

Parcels are ranked from highest to lowest based on their total scores. Each owner's cumulative score, calculated by summing the values of all their parcels, determines their position in the reallocation and relocation phase of the land consolidation process (Figure 5).

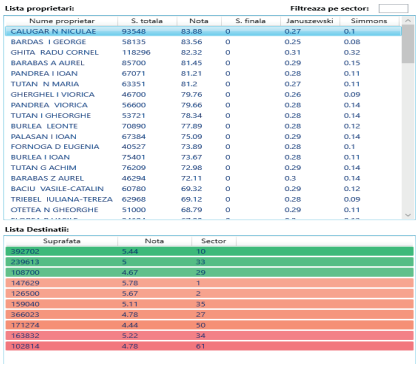

Figure 5. Classification of owners based on the added score of their parcels as seen in "Reparcelare" application

CONCLUSIONS

This research studies the existent literature concerning land evaluation for land consolidation processes. Based on conditions for evaluation determined by other researchers, this study proposes a series of factor for land evaluation that can be applied for a land consolidation project in Romania. These factors are adapted to the specificities of Romania and tested, with real data, in Saschiz administrative unit in Romania.

The factors that are used for land evaluation are: shape of the parcel, surface of the parcel, location of the parcel, accessibility to the roads, slope, legal restrictions, irrigations, flood risk, soil quality. The score is weighted with the same percentage and a score for each parcel is obtained. The results show that these factors can be applied to the study area, and, with the use of software applications and real data, the parcels can be evaluated for land consolidation purposes.

This study complements the studies conducted by (Demetriou, 2018; Tezcan et al., 2020; Ertunç & Uyan, 2022; Asiama et al., 2018; Ertunç, et al., 2021; Wyatt, 1996) and introduces two new factors that are specific to the study area: legal restrictions and flood risk.

The findings in this research can help Romanian researchers and policy makers to:

- Have a framework for land evaluation for land consolidation purposes;

- Design legislation for land consolidation;
- Complement these factors with other, more specific to the country in which land consolidation is applied.

These factors for land evaluation have taken into consideration the area studied and specificities of it and of the country. However, land consolidation is a multidisciplinary process in which are involved: land surveyors, agronomists, infrastructure engineers, landscapers or legal professional. All these professions can contribute to develop more appropriate factors that can be use in practice.

Future research can concentrate on applying these factors in more study cases and reevaluate these factors. Legislation design for land consolidation purposes is needed. Future research can also cover the topic of designing and testing of land consolidation application software that not just evaluate land but also help in the process of reallocating and relocating land parcels for land consolidation.

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