COOPERATIVIZATION IN ROMANIAN AGRICULTURE: EVOLUTION AND CURRENT PERSPECTIVES

Silvius STANCIU[1,2]

[1]"Dunărea de Jos" University of Galati, Romania, E-mail: sstanciu@ugal.ro
[2]Romanian Academy,"Costin C. Kiritescu" National Institute for Economic Researches, E-mail: sstanciu@ugal.ro

Corresponding author: sstanciu@ugal.ro.

Abstract

Organizing small agricultural producers into cooperatives can improve production value, operational efficiency, and access to European funds.The study analyzes the evolution of collectivization in Romanian agriculture using open-access literature and official data from theMinistry of Agriculture and Rural Development. Data were statistically processed and graphically represented to examine geographic distribution, cooperative status, and economic performance, while identifying challenges faced by Romanian agricultural cooperatives.Principal component analysis (PCA), heat maps, and volatility coefficient analysis were employed to uncover territorial patterns and assess the stability of cooperative development across Romania, providing a comprehensive understanding of the factors influencing cooperative dynamics at the county and regional levels. Findings reveal a concentration of cooperatives in certain counties, reflecting infrastructure differences, cooperative traditions, and institutional support levels. Many cooperatives struggle beyond initial stages, with financial performance remaining fragile due to governance difficulties, limited market access, and funding challenges. Access to European funds and external support could greatly enhance cooperative sustainability.The study underscores the critical role of agricultural cooperatives in rural development and suggests policies for increased durability, including ongoing fiscal support, member professionalization, and short supply chain development.

Key words: *agricultural cooperatives, rural development, Romania, sustainability*

INTRODUCTION

Cooperativization remains a current issue for Romanian agriculture, given that the sector is characterized by significant disparities.

Thus, there is a very large number of small agricultural holdings engaged in subsistence activities, alongside very large farms spread over tens of thousands of hectares.

According to the agricultural census, Romania has a total of 2.9 million farms (31.8% of the 9.1 million agricultural holdings in the EU Member States). Around 63.8% of European farms have an area smaller than 5 hectares. In Romania, 90.3% (approximately 2.6 million farms) fall into this category, and over half of these small holdings are located in the country. The average size of a Romanian farm is 4.42 hectares, compared to the European average of 17.4 hectares, according to Eurostat statistics [3].

The Romanian agricultural sector ranks among the top 10 at the European Union level. As of 2023, the sector's share in Romania's gross domestic product reached approximately 3.9%, according to data fromthe World Bank [11].

Agriculture provides employment for about 20.9% of Romania's labor force, placing the country first in the EU in this regard [4].

The association of farmers is an unpopular phenomenon in Romania, and this can be understood when correlated with the forced collectivization of peasants during the communist regime—an era marked by abuses from the authorities, excesses committed by party activists, and forced adhesion or donation of agricultural land [6].

The belief that joining a cooperative leads to the loss of land ownership is so deeply rooted that farmers must be reassured on this matter, requiring both entrepreneurial training programs and promotion of the agricultural cooperative model [9].

The transition from a centralized system, in which property rights had virtually lost their meaning, to the privatization of agricultural

land brought about a sense of euphoria that lasted for decades. However, today, land owners face difficulties in exploiting their holdings [1].

An aging rural population, possessing small and highly fragmented plots of agricultural land, often relies on leasing to specialized entities, usually being dependent on a limited number of offers available on the market. At the same time, leasing is correlated with the expansion of farm sizes, often through rental, and sometimes through sale [2].

Cooperativization of small farmers could represent a means of reviving national agricultural production by increasing productivity and economic efficiency. Through this form of association, farm infrastructure can be improved, including the construction and modernization of storage facilities. Primary processing units may be established, enabling the production of higher value-added finished products, the diversification of distribution channels, and better capitalization of available resources [12].

A focus on digitalization, increased economic efficiency, the adoption of circular economy systems, and the development of short supply chains are additional advantages linked to modernization (Florea et al., 2023) [5].

In this context, the paper analyzes the evolution of collectivization in Romanian agriculture based on the open-access literature and official data from the Ministry of Agriculture and Rural Development, regarding teh following aspects: geographic distribution, cooperative status, economic performance, and challenges faced by Romanian agricultural cooperatives

MATERIALS AND METHODS

Scientific data bases such as Clarivate, Research Gate, and Google Scholar were used to gather bibliographic references, primarily through open-access articles. These sources were complemented by reports from the European Commission and national agricultural statistics. The research relied on data provided by the Ministry of Agriculture and Rural Development (MADR) regarding

agricultural cooperatives, supplemented within formation from Eurostat and the National Institute of Statistics (NIS). These data were statistically processed, graphically represented, and interpreted.

Artificial intelligence (AI) tools, including ChatGPT, were used to correct language and formatting errors and ensure the accuracy of terminology in English. AI-supported statistical tools were also employed for the processing of several data series. These tools enabled the generation of the heatmap (year–countymatrix), a biplot chart based on principal component analysis (PCA), as well as the volatility index analysis regarding the cooperative phenomenon across Romania's regions.

AI-assisted statistical processing facilitated more efficient identification of patterns and the extraction of territorial typologies from complex, multiannual data sets provided by MADR. The results obtained were compared with other scientific sources in the literature for validation purposes.

RESULTS AND DISCUSSIONS

The public data provided by theMinistry of Agriculture and Rural Development (MADR) regarding agricultural cooperatives in Romania includes functional data series for the 2018–2023 period. These data sets contain identification details, legal and operational status, and, in somecases, economic indicators, NACE codes, the number of cooperative members, submitted financial statements, and the current status of the cooperative (active or dissolved). The institution's website hosts 11,360 records [7].
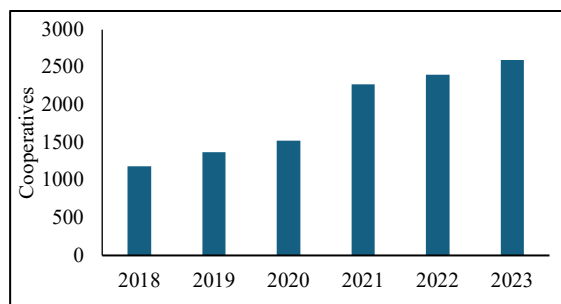

Fig. 1. Evolution of cooperatives in Romania
Source: Author's elaboration based on [7].

The evolution of the number of cooperatives duringthe 2018–2023 period is illustrated in Figure 1.

According to Figure 1, the period 2018–2023 saw a steady increase in the number of active agricultural cooperatives in Romania, rising from 1,186 units in 2018 to 2,600 units in 2023, with an average annual growth of approximately 235 units per year. This upward trend is likely associated with a growing interest among Romanian farmers in joining associative structures, driven by a better understanding of the cooperative model, the availability of European support measures, and the possible maturation of the cooperative sector in Romania. The county-level evolution of these associative forms is presented in Table 1.

Table 1. Agricultural cooperatives by county

County	2018	2019	2020	2021	2022	2023
Alba	31	38	42	61	64	72
Arad	29	35	39	64	70	82
Argeș	18	23	25	32	36	36
Bacău	14	22	33	33	34	38
Bihor	29	34	39	65	73	88
Bistrița Năsăud	41	49	51	73	77	83
Botoșani	125	127	129	137	138	143
Brașov	35	36	42	57	57	57
Brăila	12	13	13	31	37	38
București	11	12	12	15	16	17
Buzău	28	34	37	61	65	67
Caraș Severin	20	21	22	30	30	30
Cluj	44	46	67	83	95	108
Constanța	42	51	52	76	84	100
Covasna	16	18	18	56	63	62
Călărași	33	40	43	56	55	56
Dolj	64	76	82	136	143	152
Dâmbovița	31	38	41	59	63	68
Galați	16	18	20	38	44	46
Giurgiu	12	18	20	34	36	41
Gorj	11	20	21	23	26	27
Harghita	26	27	34	60	63	67
Hunedoara	7	9	16	31	35	39
Ialomița	22	28	29	52	57	61
Iași	29	31	33	56	54	57
Ilfov	14	12	12	13	16	17
Maramureș	24	36	40	61	63	66
Mehedinți	9	12	17	30	29	28
Mureș	13	16	17	53	58	66
Neamț	9	16	21	31	32	33
Olt	51	58	66	87	91	95
Prahova	14	15	17	19	24	27
Satu Mare	29	44	46	82	85	94
Sibiu	4	6	11	25	29	36
Suceava	43	48	56	67	65	65
Sălaj	24	28	33	42	42	48
Teleorman	82	82	83	107	106	108
Timiș	44	52	56	87	92	102
Tulcea	10	11	13	53	57	73
Vaslui	23	21	23	34	34	41
Vrancea	33	34	34	43	44	44
Vâlcea	14	18	19	21	21	22

Source: Author's elaboration based on [7].

The analysis of the data presented in Table 1 shows that the highest absolute growth rates were recorded in the counties of Dolj (+88), Cluj (+64), Bihor (+59), Satu Mare (+65), Timiș (+58), and Constanța (+58). These counties are characterized by a predominance of small and medium-sized farms, active agricultural activity, and a functional support infrastructure (including APIA centers, active LAGs, agricultural universities, etc.). While many counties in Transylvania recorded significant increases (Cluj, Timiș, Arad, Satu Mare), supported by a dynamic entrepreneurial environment, in the Moldavia region, only Botoșani and Suceava show visible progress.

At the regional level (Table 2), the evolution reflects a growing interest in associative structures in agriculture, likely driven by public policies, financing opportunities (including EU funds), and the farmers' need to access markets more efficiently. All development regions in Romania recorded positive trends, with the most visible momentum occurring in Transylvania. The North-West (+296) and Center (+235) regions had the highest absolute growth rates. The Western and Bucharest–Ilfov regions (with limited agricultural activity) had the lowest growth rates.

The accelerated development recorded in 2021 and continued thereafter is likely the result of new support mechanisms introduced at the European level, the expansion of agricultural advisory networks, and the promotion of good practice models.

Table 2. Agricultural cooperatives by region

Region	2018	2019	2020	2021	2022	2023
Bucuresti-Ilfov	25	24	24	28	32	34
Center	125	141	164	312	334	360
North-East	243	265	295	358	357	377
North-West	191	237	276	406	435	487
South-East	141	161	169	302	331	368
South-Muntenia	212	244	258	359	377	397
South-West Oltenia	149	184	205	297	310	324
West	100	117	133	212	227	253

Source: Author'selaborationbased on [7].

The evolution of the closure of agricultural production cooperatives in Romania during the analyzed period is presented in Figure 2.

The number of agricultural cooperatives that closed in Romania followed an upward trend, particularly after 2020, reaching a peak of 40 units in 2023. This development may be the result of structural challenges or management-

related issues, which can occur even though the national trend shows the continuous establishment of new cooperatives. The top five counties in terms of the number of cooperative closures are Dolj (23), Satu Mare (19), Vrancea (14), Constanța (12), and Mehedinți (12).
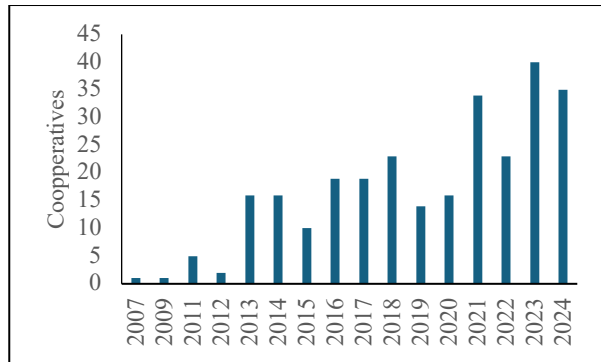

Fig. 2. Closed Agricultural Cooperatives
Source: Author's elaboration based on [7].

The evolution of the agricultural cooperative phenomenon in Romania can be further analyzed through principal component analysis (PCA), using AI tools [8]. PCA allows the identification of dominant axes of variation among Romanian counties, considering the annual evolution in the number of cooperatives (2018–2023), the frequency of closures, and optionally, their affiliation with development regions or NACE activity codes. The resulting biplot (Figure 3) provides a two-dimensional representation of both counties and variables, enabling the identification of natural groupings, correlations, and the direction of influence of the main factors.

For simplification, counties were labeled using the official Romanian administrative codes, according to legal regulations [10].

The PCA biplot in Figure 3 illustrates the existence of similarities between counties based on the evolution of the number of agricultural cooperatives during the analyzed period. Counties positioned on the right side of the graph (such as Olt, Dolj, and Teleorman) stand out due to a consistently high number of cooperatives through out all years. Counties located on the left side (e.g., Ilfov, Giurgiu, or Tulcea) exhibit a lower and more unstable level of cooperative activity. The redarrows indicate the influence of each year on the distribution,

and their proximity (particularly in 2022 and 2023) suggests a shared recent growth trend. The graphical representation generated by PCA allows for the identification of distinct territorial patterns and counties with similar behavior in the development of agricultural cooperatives.
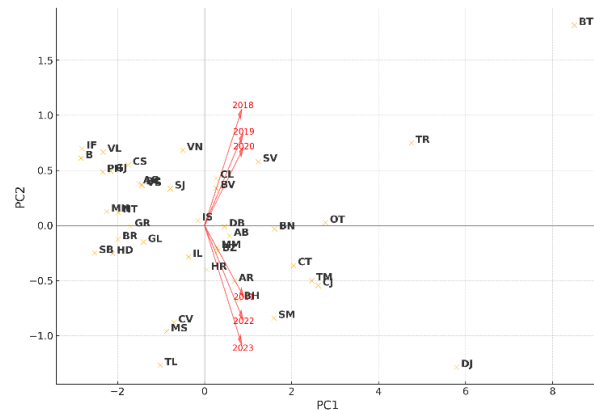

Fig. 3. PCA biplot – County-level typologies in cooperative development
Source: Author's elaboration based on [7] and [8].

The annual distribution of functional agricultural cooperatives in Romania, by county (2018–2023), represented using official county administrative codes, is shown in Figure 4.

The value of each cell corresponds to the number of cooperatives registered in the respective year.
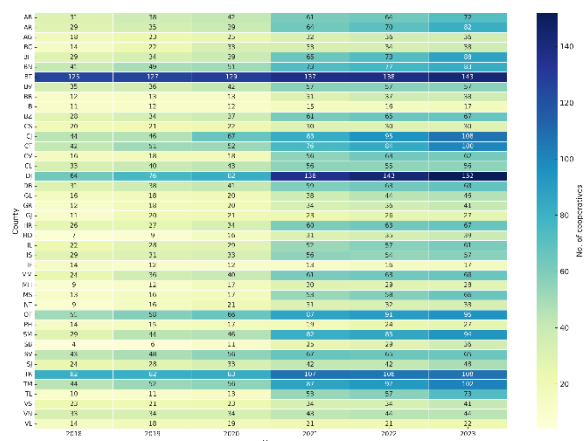

Fig. 4. Heat map of agri cooperatives, by county
Source: Author's elaboration based on [7] and [8].

The heatmap highlights the intensity of the cooperative phenomenon at the county level across Romania. Darker shades on the map indicate a higher number of cooperatives.

According to the graphical representation, counties such as Botoșani, Dolj, Olt, and Teleorman consistently record high values, indicating a mature and active cooperative environment. At the opposite end, counties like Ilfov, Tulcea, and Giurgiu exhibit persistently low levels of cooperative activity throughout the entire period, signaling slow or volatile development.

The increasing trend in the number of cooperatives is visible in most counties during the analyzed period, suggesting a national shift toward cooperative organization—likely influenced by EU agricultural policies and the availability of European funding instruments. The heat map provides a comparative visual perspective on the territorial dynamics of cooperatives, allowing the identification of highly dynamic areas and regions with weaker development.

To better assess the development of agricultural cooperatives in the 2018–2023 period from the perspective of stability, a volatility coefficient was calculated at the county level. This indicator is expressed as the ratio between the standard deviation and the average number of functional cooperatives. It is useful for identifying counties with unstable dynamics, characterized in the short term either by a rapid influx of newly created cooperatives or by numerous closures within a short period. The calculated data are presented in Table 3.

Counties with a high volatility coefficient (above 0.5)—such as Giurgiu, Ilfov, Tulcea, Caraș-Severin, and Gorj—are characterized by a low number of agricultural cooperatives and frequent fluctuations, or by a late and uneven development of the cooperative sector. In such cases, the volatility index may reflect a possible institutional fragility within the associative framework. To address this situation, public support should be targeted specifically toward the consolidation and stabilization of cooperatives in these counties. Conversely, counties such as Dolj, Botoșani, Buzău, and Vaslui display low volatility, which indicates a predictable local environment with viable mechanisms for supporting cooperative development.

This complementary approach, based on volatility, allows for an analysis not only of the intensity of the cooperative phenomenon but also of its territorial resilience. From this perspective, volatility analysis serves as a useful diagnostic tool for the design of differentiated public policies tailored to the sensitivity of specific regions or counties.

Table 3. Average number of cooperatives by county, standard deviation and volatility coefficient

County	2018	2019	2020	2021	2022	2023	Aver.	Standard dev.	Volatility coeff.
Alba	31	38	42	61	64	72	51.33	15.05	0.29
Arad	29	35	39	64	70	82	53.17	19.78	0.37
Argeș	18	23	25	32	36	36	28.33	6.80	0.24
Bacău	14	22	33	33	34	38	29.00	8.29	0.29
Bihor	29	34	39	65	73	88	54.67	21.93	0.4
Bistrița-Năsăud	41	49	51	73	77	83	62.33	15.90	0.26
Botoșani	125	127	129	137	138	143	133.17	6.54	0.05
Brașov	35	36	42	57	57	57	47.33	9.91	0.21
Brăila	12	13	13	31	37	38	24.00	11.55	0.48
București	11	12	12	15	16	17	13.83	2.27	0.16
Buzău	28	34	37	61	65	67	48.67	15.99	0.33
Caraș-Severin	20	21	22	30	30	30	25.50	4.54	0.18
Cluj	44	46	67	83	95	108	73.83	23.84	0.32
Constanța	42	51	52	76	84	100	67.50	20.67	0.31
Covasna	16	18	18	56	63	62	38.83	21.62	0.56
Călărași	33	40	43	56	55	56	47.17	9.01	0.19
Dolj	64	76	82	136	143	152	108.83	35.54	0.33
Dâmbov.	31	38	41	59	63	68	50.00	13.90	0.28
Galați	16	18	20	38	44	46	30.33	12.62	0.42
Giurgiu	12	18	20	34	36	41	26.83	10.65	0.4
Gorj	11	20	21	23	26	27	21.33	5.25	0.25
Harghita	26	27	34	60	63	67	46.17	17.47	0.38
Hunedoara	7	9	16	31	35	39	22.83	12.68	0.56
Ialomița	22	28	29	52	57	61	41.50	15.54	0.37
Iași	29	31	33	56	54	57	43.33	12.42	0.29
Ilfov	14	12	12	13	16	17	14.00	2.27	0.14
Maram.	24	36	40	61	63	66	48.33	15.82	0.33
Mehedinți	9	12	17	30	29	28	20.83	8.51	0.41
Mureș	13	16	17	53	58	66	37.17	22.19	0.6
Neamț	9	16	21	31	32	33	23.67	9.05	0.38
Olt	51	58	66	87	91	95	74.67	17.06	0.23
Prahova	14	15	17	19	24	27	19.33	4.71	0.24
Satu Mare	29	44	46	82	85	94	63.33	24.53	0.39
Sibiu	4	6	11	25	29	36	18.50	12.12	0.66
Suceava	43	48	56	67	65	65	57.33	9.18	0.16
Sălaj	24	28	33	42	42	48	36.17	8.49	0.23
Teleorman	82	82	83	107	106	108	94.67	12.35	0.13
Timiș	44	52	56	87	92	102	72.17	22.23	0.31
Tulcea	10	11	13	53	57	73	36.17	25.59	0.71
Vaslui	23	21	23	34	34	41	29.33	7.41	0.25
Vrancea	33	34	34	43	44	44	38.67	5.02	0.13
Vâlcea	14	18	19	21	21	22	19.17	2.67	0.14

Source: Author's elaboration based on [7] and [8].

CONCLUSIONS

The evolution of agriculturalcooperatives in Romania during the 2018–2023 period reveals a growing interest in associative structures, particularly in regions with active agricultural sectors and functional support infrastructure. The total number of functional cooperatives

has nearly tripled, with the most significant increases observed in counties such as Dolj, Cluj, and Bihor. This expansion reflects both the incentives provided by public policies and farmers' adaptation to market demands and resource constraints.

The territorial analysis revealed major disparities in the development of the cooperative sector. Counties such as Olt, Dolj, and Teleorman consistently recorded high cooperative density, while others, such as Ilfov and Tulcea, remained at low and unstable levels. The PCA biplot confirmed the existence of distinct county-level typologies, with a notable upward trend in 2022–2023. The heatmap clearly illustrated the intensification of the cooperative phenomenon, along with the widening of territorial disparities. The volatility coefficient analysis highlighted areas where cooperative development is unstable and vulnerable to failure.

Overall, the findings indicate that the development of agricultural cooperatives in Romania is not only expanding but also undergoing territorial divergence. This calls for differentiated support mechanisms, including fiscal stability, technical assistance, and structured access to European funding. AI-assisted statistical processing has significantly contributed to uncovering hidden patterns and extracting relevant territorial typologies, enhancing the analytical value of the study.

The results obtained can assist policy makers in designing tailored public policies aligned with the local cooperative profile, contributing to the strengthening of associative structures in agriculture and the reduction of territorial disparities.

REFERENCES

[1]Burcea, M., Vlad, I. M., Oltenacu, N., 2023, Romania's agricultural land fund and the dynamics of the land ownership during the period 1990–2020. Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development, 23(3), 77–84. https://managementjournal.usamv.ro/pdf/vol.23_3/volume_23_3_2023.pdf. Accessed on April 1, 2025.
[2]Butnaru, E.-S., 2015, Leaseandits impact on the land market. ScientificPapersSeries Management, Economic Engineering in Agricultureand Rural Development, 15(1), 81–86.

https://managementjournal.usamv.ro/pdf/vol.XV_1/Art 10.pdf. Accessed on April 1, 2025.
[3]Eurostat, 2022a (November). Farms andfarmland in the European Union - statistics. Statistics Explained. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Farms_and_farmland_in_the_European_Union_-_statistics, Accessed on April 1, 2025.
[4]Eurostat, 2022b,(November). Farmers and the agricultural labour force - statistics. Statistics Explained. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Farmers_and_the_agricultural_labour_force_-_statistics. Accessed on April 1, 2025.
[5]Florea, A.-M., Bercu, F., Radu, R. I., Stanciu, S., 2019, A Fuzzy Set Qualitative Comparative Analysis (fsQCA) of theAgriculturalCooperativesfrom South EastRegion of Romania. Sustainability, 11(21), 5927. https://doi.org/10.3390/su11215927.
[6]Iordachi, C., Dobrincu, D., 2009, Transforming peasants, property and power: The collectivization of agriculture in Romania, 1949–1962 (NED – New edition, 1st ed.). Central European University Press. https://www.jstor.org/stable/10.7829/j.ctt1282pw. Accessed on April 1, 2025.
[7]Ministry Of Agriculture amd Rural Development, 2023, (December 29). Agricultural cooperatives). https://www.madr.ro/cooperative-agricole.html. Accessed on April 1, 2025.
[8]OpenAI., 2023, ChatGPT (Mar 14 version). https://chat.openai.com. Accessed on April 1, 2025.
[9]Popescu, A. M., Mateoc-Sîrb, N., Neamţu-Popescu, A., 2015, Research on agricultural association of the Romanian farmers and the efficiency recovery of food products resulting from their work. Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development, 15(4), 265–270. https://managementjournal.usamv.ro/pdf/vol.15_4/Art40.pdf. Accessed on April 1, 2025.
[10]Romania's Government, 2003, December 31). Lista (List comprising the county codes of Romania – Regulation). Law 5. https://lege5.ro /Gratuit/giztqmjz /lista-cuprinzand-codurile-judetelor-din-romania-norma?dp=giytamjsheyts. Accessed on April 1, 2025.
[11]World Bank, 2024, Agriculture, forestry, andfishing, value added (% of GDP) – Romania. World Bank Open Data. fromhttps://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=RO. Accessed on April 1, 2025.
[12]Zlati, M. L., Florea, A. M., Antohi, V. M., Dinca, M. S., Bercu, F., Fortea, C., Silvius, S., 2023, Financing Romanian AgriculturalCooperatives' Investments for the 2023–2027 Horizon. Sustainability, 15(3), 2306. https://doi.org/10.3390/su15032306.