INNOVATIVE DEVELOPMENT OF AGRICULTURAL BUSINESS AND RURAL AREAS

Conference proceedings

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The Third Annual International Scientific Conference „Innovative Development of Agrarian Business and Rural Areas" (IDARA) is organized to support scientific research and the dissemination of its results. Trough advances in scientific knowledge, the goal of the annual conference is to reveal opportunities for development, justify policy changes and ultimately contribute to improving business conditions and the quality of life for rural residents.

A strategic task for the organizing committee is to continue to be the leading annual conference for cutting-edge theory and practice of agribusiness development, innovation, management and economics, promoting progress through excellence in scientific and applied research, interaction and exchange of experts and researchers between scientific institutions, consulting and business structures.

The IDARA conference seeks to bring together representatives of the international academic community (university professors, experts, researchers, doctoral students, undergraduates and others) and to create opportunities for interactive discussions, interpersonal exchange of experience, promotion of science and personal and collective affirmation.

The IDARA Annual Conference is committed to the highest standards of publication integrity and academic honesty. All activities related to the organization of the conference and the publication of the results take into account the good practices of leading scientific institutions. The organizing committee expects compliance with standards of ethical behavior from all parties involved: authors, editors, reviewers and publisher. Conference organizers follow Committee on Publication Ethics (COPE) guidelines on how to deal with potential acts of misconduct.

All received full papers are subject to a plagiarism check with StrikePlagiarism software – the program used at the University of National and World Economy, Sofia. If plagiarism is identified, the report is removed and the author is denied participation in the conference.

After the plagiarism check, all full articles go through double-blind peer review from the International Program Committee or external reviewers depending on the topic, title and subject of the article. Peer reviewers provide a critical assessment of the paper, may recommend improvements, and suggest that the paper be: accepted as submitted; to be accepted with corrections or not to be admitted for presentation at the conference and publication. The peer review recommendations are not mandatory for acceptance by the author, however it is strongly advised that the author explains any issues related to research methodology and discussion.

IDARA 2023 covered a wide range of topics related to agrarian business, business models, innovative marketing solutions, the development of rural areas in the context of the economy transforming towards sustainability, etc. The forum delved into areas such as opportunities for revitalization of rural areas, impact of local factors for changes on labor and farm number, digital solutions for the administration of land management processes, demographic processes and problems in rural areas,

the workforce in agriculture, the use of agricultural lands and the applied technologies for their protection, green economy, utilization of waste, environmental protection activities, benefits of managing food loss and waste for sustainable rural development, the role of agricultural subsidies in shaping young farmers' decision-making, etc.

Participation in the conference took more than seventy researchers representing eight countries from different universities, eminent faculties, scientific institutes, colleges, associations, etc.

CONTENTS

INTRODUCTION

The conference proceedings include the papers presented at the third consecutive International Scientific Conference, „Innovative Development of Agrarian Business and Rural Areas", organized by the Department of „Economics of Natural Resources" of the University of National and World Economics on September 28 and 29, 2023.

The development of agrarian business in the conditions of the Common Agricultural Policy, the processes of digitization and globalization, climate changes, the COVID-19 pandemic and others posed a number of challenges to agrarian business and rural areas. They led to the need to look for new solutions in the field of policies, business models, the transition to a green economy, bio-economy, circular economy and others. On this basis, a number of problems, discussion questions and strategic opportunities arose for researchers and experts in the agrarian economy and regional development.

The topic of the scientific conference aroused wide interest in the scientific community. Requests for participation in the conference were received from 72 authors with 37 abstracts of reports. Compared to the participants last year, the number of participants increased by 26%.

After checking for originality and 2 anonymous reviews, 30 papers with 64 authors were included and presented in the conference program. Due to various reasons related to the topic, the scientific quality of the reports and others, 23.3% of them were rejected.

The participants in the conference from Bulgaria are representatives of nine research institutions and specifically:

- ✓ three Bulgarian universities: University of National and World Economy, Sofia; Trakia University, Stara Zagora; D. A. Tsenov Academy of Economics Svishtov;
- ✓ two higher schools: Higher School of Security and Economics, Plovdiv; Higher School of Agribusiness and Regional Development, Plovdiv;
- ✓ four research institutes: Institute for Economic Research at the Bulgarian Academy of Sciences, Sofia; Institute of Agrarian Economics at the Agricultural Academy, Sofia; Institute of Viticulture and Winemaking at the Agricultural Academy, Pleven; Institute of Animal Science at the Agricultural Academy, Kostinbrod;

A significant part of the authors (34.4%) are researchers and teachers from seven countries and, more specifically, from university institutes such as:

- ✓ Slovak university of agriculture in Nitra, Slovakia;
- ✓ The University of Poloponnese, Greece;

- ✓ The Institute of Agrarian and Food Economics – the National Research Institute of Warsaw, Poland;
- ✓ University of Agriculture in Kraków, Poland;
- ✓ University of Niš, Serbia;
- ✓ Bina Nusantara University, Indonesia;
- ✓ University of Prizren, Kosovo;
- ✓ Sopron University, Hungary.

The high quality of the approved papers was achieved thanks to the established international program committee of the conference, which includes prominent researchers in the field of agrarian economics, rural development, green economy and bioeconomy from 14 countries in the world. The high quality of the approved papers was achieved thanks to the established international program committee of the conference, which includes prominent researchers in the field of agrarian economics, rural development and the green economy from 14 countries. Among them are authoritative scientists such as Prof. Hrabrin Bashev (Bulgaria), Assoc. Prof. Michael Sykuta (USA), Prof. Emilio Galdeano Gómez (Spain), Prof. Elena Horska (Slovakia) and others whose research has been cited more than a thousand times.

In the plenary session and at the meetings sections, were presented reports in several thematic directions:

- ✓ Innovative business models for the development of agrarian business and rural areas;
- ✓ European and national policies for innovative development of agriculture and rural areas;
- ✓ Digitization, diversification and sustainable growth in rural areas;
- ✓ Bioeconomy, green architecture and business;
- ✓ Innovative approaches to agricultural and rural management.

Four presentations were included in the plenary session. Two of them evaluate and compare the main characteristics and utilization of agricultural land in Serbia and Bulgaria and opportunities for revitalization of rural areas in Poland and Bulgaria after the war in Ukraine. The other two reports were dedicated to the multi-criteria analysis of rural sustainability in Bulgaria and the impact of local factors for change on labor and farm number in Bulgaria.

Within the thematic direction „Innovative business models for the development of agrarian business and rural areas", conference participants were presented on the problems of innovative marketing solutions and value creation in agribusiness (the case of the Slovak winery), innovative irrigation solutions, personality-related determinants of entrepreneurship in the light of own research in the agribusiness sector as well as a literature analysis of farmers' attitudes towards the adoption of sustainable agricultural practices. Of particular interest were the studies of cooperatives in Bulgaria (past and present), as well as the scenarios for the development of agricultural cooperatives in Bulgaria until 2027.

In the second thematic direction, „European and national policies for innovative development of agriculture and rural areas", the problems of the contribution of European development programs – competitiveness – innovation and in general for the economy of the Peloponnese region for the last 20 years in production were discussed; the role of agricultural subsidies in shaping the decisions of farmers in the Greek agricultural sector, as well as the effect of free state financing on the productivity of the example of cooperatives in the south-eastern region of Bulgaria, etc. This part also presented the study of Institutions and mandates for climate change adaptation in Bulgarian rural areas.

The problems of „Digitization, diversification and sustainable growth in rural areas", included in the third direction, were the subject of analysis and evaluation of the largest number of studies. Of particular interest were the papers on Impact of demographic factors on economic activity in Bulgaria's rural territories, about the conditions, problems and perspectives of the labor force in rural areas of Bulgaria, as well as the cluster analysis of districts in Bulgaria according to the development of the agrarian sector. Another group of papers are dedicated to territorial approaches for sustainable development and management of rural areas, to Consumer perceptions towards local products (the case of Kosovo) and the characteristics and levels of provision of agro-ecosystem services.

Within the framework of the fourth direction, „Bioeconomy, green architecture and business" are included papers dedicated to environmental protection activities in Bulgaria (comparative analysis in regional aspect); of the potential of no-till technology for environmental protection; on building a sustainable future by implementing the green economy concept in Bulgaria and the Bulgarian agricultural sector; on the information base of green business in Serbia, etc. Special attention was paid to the problems of tackling food loss and waste in rural development (the benefits of promoting food recovery and redistribution in Indonesia), as well as to reducing food waste when eating out – a research on the perceptions of Bulgarian students.

Under the last thematic direction, „Innovative approaches to agricultural and rural management" a study of digital solutions for the administration of land management processes in the Republic of Bulgaria was presented.

IMPACT OF LOCAL FACTORS FOR CHANGES ON LABOR AND FARM NUMBER IN BULGARIA

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Abstract

The purpose of this study is to analyze the impact of local factors for changes in labor force and farm number in Bulgaria based on the last two censuses conducted in the years 2010 and 2020. The local factors are considered those conditions and prepositions apart from the national and regional causes driving the development and tendencies in the farm structure. The local level in this study is municipality territory, which is adopted as an unit for defining rural and not-rural areas. The evolution of labor worked in Bulgarian agriculture and the number of farms is steadily declining between both censuses, which is a general finding, where is interesting to identify the local differences and particularities.

For the sake to analyze the local specifics, the Territorial Shift Share Analysis (TSSA) is applied. The TSSA is an analytical tool built on the basis of Shift Share Analysis (SSA), designed to determine the contribution of local determinants to the changes in the number of agricultural farms and labor force having in mind and estimating the changes driven by national and regional causes.

The results show that about 72% of the observed changes ascertained as a decrease in farms in the country can be prescribed to macroeconomic, national influencing causes, about 19% has more regional roots and only about 9% of the decrease in the number of farms can be connected to local characteristics and factors. In the case of the labor force, the structure of the factor influence is similar, as around 69% of the total change in the labor force can be pertained to macroeconomic reasons, 21% can be traced to regional conditions and 10% to local circumstances. This structureis very similar and shows that local factors also contribute to the reduction in the number of farms and the labor force in the Bulgarian agriculture, which means that there is almost no local initiative for complement support of this production. The regional factors also have a certain impact, even though more limited than the macroeconomic and national environment, as it is deemed that as much as the regions differ from each other, the greater is the weight and impact of the regional level to the estimated changes.

Keywords: agriculture, changes, labor, farms, Bulgaria
JEL: *J01; Q1; R11*

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Introduction

Due to interregional and intraregional imbalances, issues related to regional policies are constantly on the agenda among stakeholders and politicians. The reason for this is that regional disparities are increasingly deepening and growing, which provokes researchers to focus research on the adequacy of applied strategies (Gezici, F. and Hewings, G., 2004; Monastiriotis, V., 2008; Totev, S., 2011; Timiryanova, V. et al., 2021). After the integration of Bulgaria into the EU in 2007 and the accompanying socio-economic challenges, approaches to regional politics have changed. A number of measures and support schemes were included in order to harmonize regional interventions with those of the EU. However, there are still regional differences (Doitchinova and Stoyanova, 2020). that often contrast with the overall 'picture'. The activities and performance in agriculture is very important to the state of rural areas because agriculture is still crucial sector for those areas. It is assumed that capacity of rural communities depends on their responses to external changes by adapting the functions and structure of their internal components (Doichinova and Wrzochalska, 2022).

The purpose of this study is to analyze the impact of local factors for changes in labor force and farm number in Bulgaria based on the last two censuses conducted in the years 2010 and 2020. The local factors are considered those conditions and prepositions apart from the national and regional causes driving the development and tendencies in the farm structure. The local level in this study is municipality territory, which is adopted as an unit for defining rural and not-rural areas. The evolution of labor worked in Bulgarian agriculture and the number of farms is steadily declining between both censuses, which is a general finding, where is interesting to identify the local differences and particularities.

Methodology

In the study is adopted a method for investigating the territorial local impact on the changes in number of farms and amount of the working force in agriculture on municipal level. The selected method is designed to demarcate the national and regional influence on the evolution of those indicators and to estimate the isolated local impact. For the sake to fulfill such study is adopted the Territorial Share Shift Analysis (TSSA), which is similar and modified model of the popular Shift Share Analysis (SSA). The adopted model is proposed by Ivanov (2020, 2022), applied also by Todorov (2021) and Mikova (2022) and is working by the similar principle

of the SSA. It assumes the impact of national and regional factors on the local and municipal level can be presented in a linear function and the leftover from their linear estimated outcomes and the real new values regarding the farm number and labor force scale is prescribed to the territorial driving change itself. In contrast to classical SSA, which is envisaged to estimate the share shift on the industrial regional level, the TSSA is applied on territorial level insofar, there are three separate stages – municipal, regional (NUTS 3) and national. The last two are prior calculated and the remaining to the actual value is conjectured to be local, municipal print on the observed change. The SSA analysis itself is based on the methodology for estimating „local shifts" in economic industries (Herzog and Olsen, 1977), and the algorithm is evolved and used for the first time as an analytical tool in the early 1960s by Ashby (1970), Dunn (1960). The basic elements of the calculation algorithm of Shift Share Analysis (SSA) are the sectoral shifts in the observed regional shares (SS), the national shifts (NS), the intermediate shifts (IS) and, as a result, the internal, net shiftson the concrete territorial unit (RS) is derived (Herzog and Olsen, 1977). The classic computation is as follows:

$$SS = NS + IM + RS \tag{1}$$

The equation (1) is also used in the territorial analysis TSSA for estimating the municipal changes in farm number and labor where the assumption is that the local changes are driven by firstly the general national trends in agriculture, reflect the regional impact and have local specifics explicated by territorial shifts.In the TSSA model, the estimation of the equation components are in linear and relative dispersion mode as follows:

$$NS_K = LIV_{t-1} * \frac{NIV_t}{NIV_{t-1}} \tag{2}$$

$$RS = LIV_{t-1} - NS_K - LIV_{t-1} * \frac{(RIV_t - RIV_{t-1})}{(RIV_t + RIV_{t-1})} \tag{3}$$

$$TSS = LIV_t - \frac{NS_K}{2} - \frac{\left(LIV_{t-1} + *\frac{(RIV_t - RIV_{t-1})}{(RIV_t + RIV_{t-1})} *\right)}{2} \tag{4}$$

The indicators composed of the above formulas are local values for the number of farms and number of labor force in Bulgarian agriculture in the time of Census 2010 (LIV_{t-1}) and Census 2020 (LIV_t). The NS and RS are national and regional shifts, whereas the NIV and RIV are national and regional values of farms and labor in the both periods. The TSS is the territorial share shift, which is searched variable resulted afterward on estimated NS and RS.

Having in mind the TSS values are natural values varying hugely among all municipalities, it is chosen to carry out normalized assessment of the absolute changes of indicators using the Relative Comparative Assessment tool (RSA) introduced by Ivanov (2022). It represents an assessment ranged in scale from 0 to 1 based on the averages in the TSS and the coefficient of variation (CV). The equation is drafted as:

$$TSSA_k = \frac{TSS_k}{AVR_{TSS} + AVR_{TSS} * CV} * (0.5 + 0.5 * CV^2) \tag{5}$$

The $TSSA_k$ is the appraisal of the natural number of TSS for each municipality (k) on the indicators farm number and labor, which is collated with the average level of all TSS. In order to apply properly the methodology since the TSS values have in many cases irrational negative numbers, the preliminary treatment is carried out to transform all municipal TSS values with positive values.

From the research point of view, it is interesting along with the assessment of TSS to cluster the municipalities depended on the changes determined by TSS values. The clustering approach is elaborated by Ivanov (2023) and embodies in the algorithm the coefficient of variation in TSS and the number of municipalities and the observation cases, which is principal approach to make such grouping. The applied equation for clustering, primarily oriented to calculate number of clusters is:

$$CN = \log_{1+TSSDL} TSSN * ACF \tag{6}$$

$$ACF = \sqrt{\frac{CV_{TSS}}{\frac{\sqrt{CV_{TSS}}}{\sqrt{TSSN}}/TSSDL}} \tag{7}$$

The idea behind the cluster number calculation (CN) is that it is function of the observations of TSS (TSSN) and the coefficient of variation in TSS absolute values, where as high is the TSSN so high is supposed to be CN, whereas the ACF (Adjusted Cluster Factor) modified it by coefficient of variation, which may propel up the cluster number, when the CV is up and reduce the cluster number regardless the TSS number, when it is minimal.

Results
Influence of local factors on changes in the number of farms in Bulgaria
This part analyzes the influence of factors on changes in the number of farms in Bulgaria based on the last two censuses conducted in 2010-2020 (Fig. 1). Based on the obtained results, five farms have a coefficient of 0-0.2, which gives an indication of their decrease for the period. Unfavorable internal (local) factors in the respective municipalities definitely played a key role. These are farms located in cities such as

Velingrad, Dobrich, Kirkovo, Plovdiv, and Sandanski. The results reveal that at the municipal level, in addition to rural areas, there are also non-rural areas, which is especially surprising for cities with well-developed economies such as Plovdiv and Dobrich. More than half of agricultural holdings (135 units) fall into a group with a coefficient of 0,21-0,45, which means that for them predominantly external factors have contributed to the decrease in their number in the respective municipalities. In this case, national and regional reasons were driving the development and trends in the structure of agricultural holdings. There are 115 farms in the middle range (0,46-0,55), which is comparable to the national average. The respective municipalities have similar results and situations as the average for the country and for all regions.

Figure 1. Share of changes in the number of farms in Bulgaria according to the influence of local impact

Source: authors on MAF Agrostatistics Census data

There are 8 municipalities with a coefficient of 0.56-0.80, and the increase in their number is mainly due to the influence of external factors. In this group, domestic factors are assumed to have contributed to the trend toward an increase in the number of farms. These are the municipalities of Belitsa, Kyustendil, Nedelino, Pomorie, Petrich, Sarnitsa, Tervel, and Yakoruda, mostly located in border areas. These areas are represented by mostly small and medium-sized farms, in mountainous areas, with a predominant livestock specialization and, less often, mixed crop-livestock farming. Only one region (Dobrich-village Municipality) falls into the last group (0,81-1), where it can definitely be assumed that the synergistic effect of internal and external factors played a dominant role in increasing the number of farms there. It is important to consider the results obtained for the absolute values of

TSSitself. In this case, clusters were defined and formed. In order to visualize the change in the number of farms, a model was made, establishing that 12 clusters can be distinguished based on the obtained figures. They show the number of municipalities that fall into each cluster. Cluster 7 unites the largest number of municipalities (158) with an increase in the number of farms in absolute size in the range from -147 to +82. About ¼ of the municipalities (Cluster 6) represent a decrease in holdings in the range of -147 to -376 units. for the period 2010-2020 (fig. 2). The remaining clusters group a smaller number of municipalities with a proportional decrease or increase in farms.
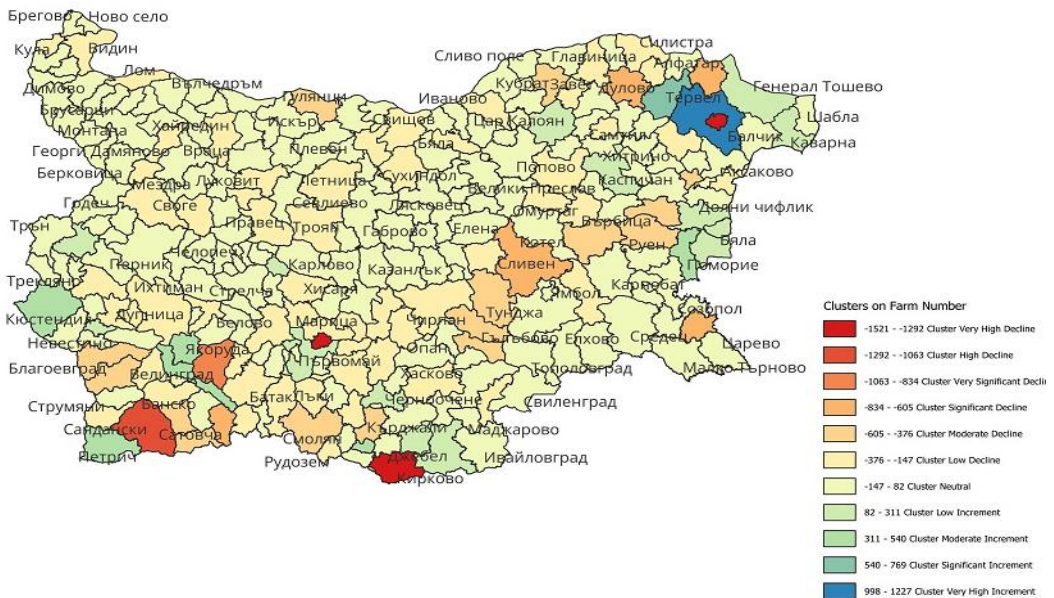
Figure 2. Clusters based on changes in the number of agricultural holdings in Bulgaria according to the influence of local factors

Source: authors on MAF Agrostatistics Census data

Influence of local factors on changes in labor input in Bulgarian farms

The development of labor input in farms in the country shows a decrease by 224,635 AWU in 2020 compared to 2010.Negative trend covers the majority of municipalities, and the reasons for this can be sought both in the complex specificity of the local factors determining the development and importance of agriculture within the local economic development, and in the impact of external determinants for the area.

The distribution of the number of municipalities according to the impact of local factors on changes in labor input in farms is shown on figure 3. Adjusted RS values determine an unfavorable local impact only in two municipalities – Kirkovo (0,00) and Satovcha (0,18). The reduction of AWU used on farms in both regions was

occurred at a faster rate, than the established decline at the district level, and compared to the national average decrease reported. Low values of the indicator testify to the need for more targeted policies and mechanisms to create local conditions favorable to the development of agricultural production. The number of municipalities with constrict local impact on changes in labor input in farms is the largest – 130, having adjusted RS values in the range between 0.21-0.45. In this case, the changes can be explained primarily by the impact of factors occurring at the regional or national level. Anastasova-Chopeva (2019) indicated as the main reasons for the reduction of the labor as a whole in the agriculture of Bulgaria the unfavorable demographic base for the formation of the necessary labor force in terms of quantity and quality; a low degree of attractiveness of the quality of life in the villages; lower than the average labor productivity for the EU-27, which affects the competitiveness of Bulgarian agricultural products; lower profitability in agriculture compared to other sectors of the economy; limited financial resources and difficult access to them; insufficient qualification of personnel and a weak innovation culture. In a study of Harizanova-Metodieva and Harizanova-Bartos is reported „there is a negative correlation between the number of employed persons and subsidies in agricultural sector, which probably means that the subsidies to some extent serve to compensate for the decrease in the number of persons employed in agriculture“. It can be added that the subsidy increase leads to more investment opportunities, which reduces the demand of labor force.
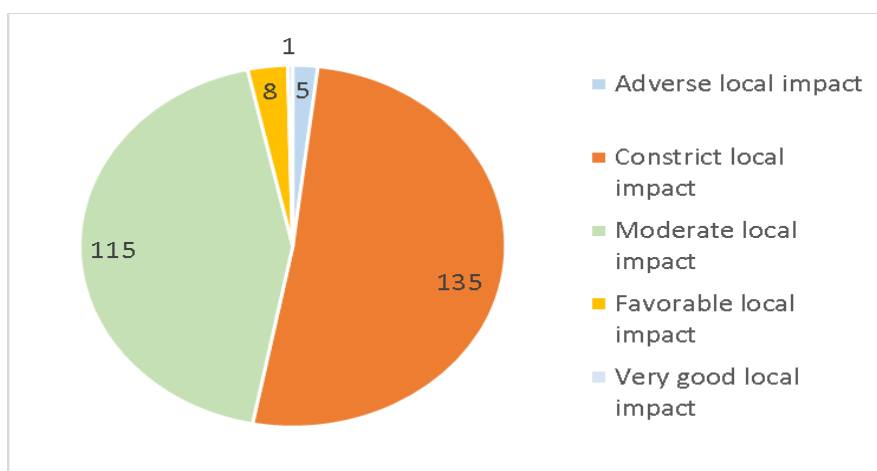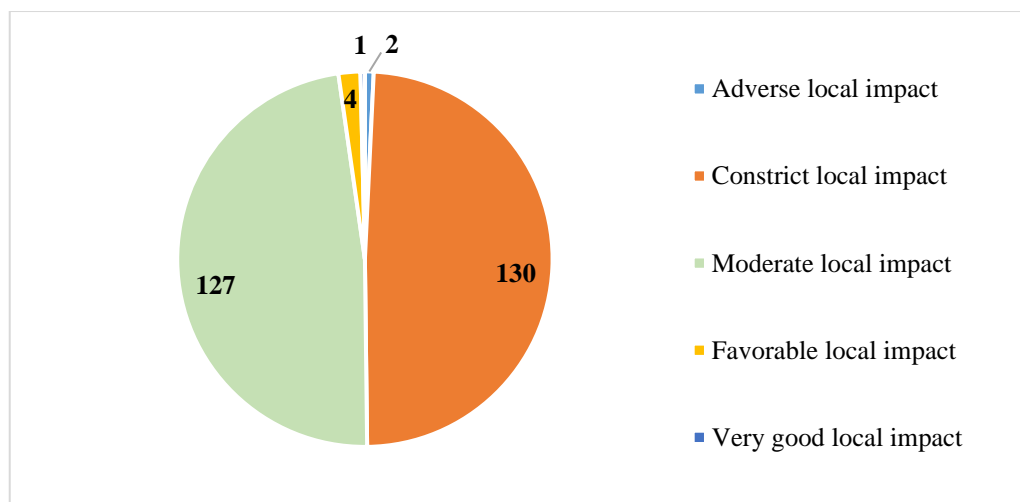

Figure 3. Share ofchanges in the labor input in farms in Bulgaria according to the influence of local factors

Source: authors on MAF Agrostatistics Census data

There are 127 municipalities in the middle scale of the range with estimates of adjusted RS between 0,46 and 0,55, for which the change in labor input in farms is close to the national average. In this case, the influence of local factors is moderate. The number of municipalities that fall into the scale with limits 0.56-0.80 is four – Karnobat, Pomorie, Ruen and Yakoruda.In this case, the influence of external factors is reinforced by the favorable impact of the factors of the internal environment – local and regional policies, economic and market conditions, labor supply, social and cultural environment, etc. All this has an effect in the direction of increasing the labor input in farms between 2010 and 2020.Three of the municipalities – Karnobat, Pomorie and Ruen are bordering, located in the same region of the Burgas district, which shows that mainly the synthesis between local and regional resources and conditions is decisive for the positive dynamics in terms of the labor input in agriculture. The agricultural sector occupies an important place in the economy of the three municipalities, with more developed crop production (mainly cereal production, viticulture, fruit growing and, to a lesser extent, vegetable production) compared to livestock production. The obtained results come close to the data reported by Doitchinova et al. (2022), according to which expert assessments of the role of agriculture in creating new jobs in rural areas are highest in the Southeast region (3.92), which also includes the Burgas district (3.17). According to the same study, the potential for providing jobs in agriculture in the Blagoevgrad district, where the municipality of Yakoruda is located, has an expert assessment of 4.00. The only municipality with assessment TSS in the highest part of the evaluation scale between 0,81-1 is located in the Blagoevgrad region – the municipality of Petrich (0.90).In this case, the impact of regional and national factors is combined with a very good influence of local factors.

Based on the absolute TSS values, 12 clusters were distinguished, indicated in Fig. 4. Cluster 7 covers the largest number of municipalities – 134.The limits of regional change for this cluster range from -104 to +279, which means that the differences in the rates of change of labor input in farms at the local level are close to those of the district and the national average. The municipalities covered by clusters 1 to 6 have a more significant decrease than the national and regional average rates. The majority of municipalities are grouped in cluster 6 with values between – 487 to -104, reflecting the rate of decline of the labor input in farms. The rate of regional change in 29 municipalities covered by cluster 8, which combines the absolute values of the change between +279 to +662, can be defined as a low increment. The remaining four clusters group 8 municipalities with more pronounced advantages at the local level, which determine rates of relative growth between +662 to +2194.
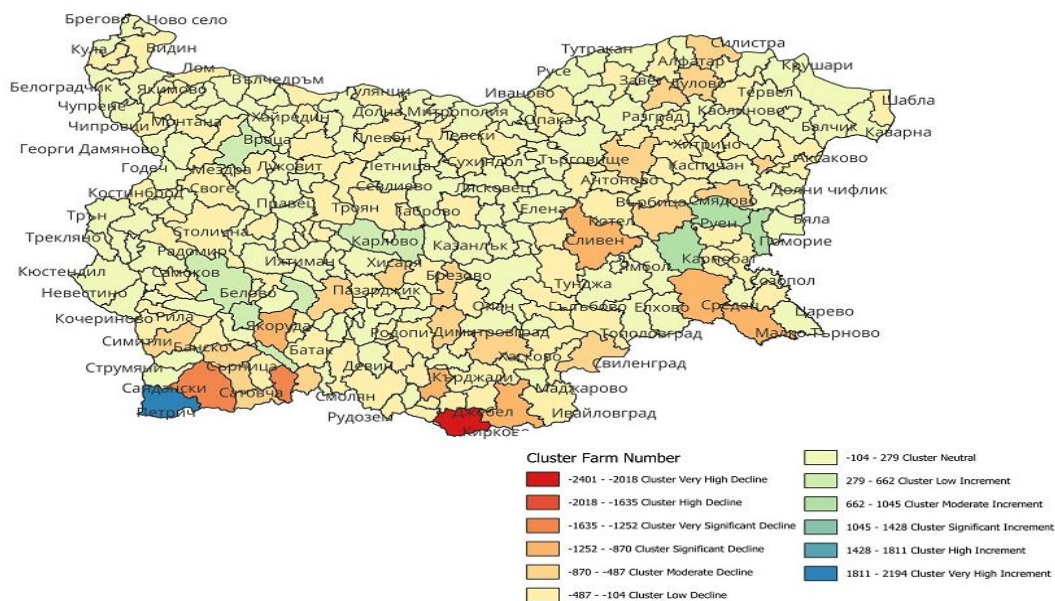
Figure 4. Territorial location of municipalities, distributed in clusters according to the impact of local factors on the change of labor in farms
Source: authors on MAF Agrostatistics Census data

Conclusion

The present analysis shows that the identified significant fall in the number of farms in Bulgaria leads to a tangible decrease in the number of Annual working units in agriculture, which in most cases is due not only to adverse national and regional causes, but also to local circumstances. The number of farms is reducing in the period between the two Censuses of 2010 and 2020. mostly at the cost of small and self-subsistent households, which is rather explained not by local and regional factors, but to macroeconomic and sectoral ones. The agricultural production in tiny and small farms can hardly provide sufficient income for those employed in it compared to other economic alternatives, which is the primary reason for the shrink in the observed indicators. In addition to that, the unattractiveness of agricultural production, especially for family farms, where the family workforce is engaged with a very high intensity, also leads to a leave of working force, which means difficult to involve new comers and to retain those already in the sector.

An additional finding can be drawn from the analysis, that about 72% of the decrease in farms in the country is imputed to macroeconomic, nationally tied causes, about 19% has more regional roots and only about 9% of the decrease in the number of farms can be attributed to local characteristics and factors. In the case of the labor force, the structure of the factor influence is similar, as around 69% of the total change in the labor force can be prescribed to macroeconomic reasons, 21% can be

traced to regional conditions and 10% to local circumstances. This structureis very similar and shows that local factors also contribute to the reduction in the number of farms and the labor force in the Bulgarian agriculture, which means that there is almost no local initiative for complement support of this production. The regional factors also have a certain impact, even though more limited than the macroeconomic and national environment, as it is deemed that as much as the regions differ from each other, the greater is the weight and impact of the regional level to the estimated changes.

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ANALYSIS OF MAIN CHARACTERISTICS AND UTILIZATION OF AGRICULTURAL LAND IN SERBIA AND BULGARIA

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Abstract

Land is the most important resource for the sustainable development of agriculture. Optimal use of land for the production of a sufficient amount of food, while simultaneously preserving biodiversity and its quality, is very important within the policy of preserving resources for future generations. Safety in food production represent one of the most important goals of sustainable development consist in actual the 2030 Agenda. We face numerous problems related to land. Degradation due to excessive use of modern agrotechnical means in food production, deforestation, erosion, excessive urbanization, floods are just some of the most common problems in land policy. An important problem is the abandonment of land use for agricultural production and its underutilization.

Serbia and Bulgaria have significant areas of agricultural land. The subject of research in this paper is the share of agricultural and arable land in the total land area in Serbia and Bulgaria. The focus of the analysis is the average size of farm land, the percentage of irrigated land, and the production structure on farms, as well as the contribution of agriculture to the realization of added value in the creation of GDP. Agriculture and the food industry play a significant role in creating GDP, employment and exports and reducing the foreign deficit. Bearing in mind that the Republic of Serbia is in the process of joining the European Union, it is necessary to reform the agricultural policy and adapt it to the Common Agricultural Policy. This is one of the most important and demanding reforms in the integration policy process. The entire European model of agricultural development is based on the concept of sustainable development. Agricultural land policy in this process is of great importance and the experiences of EU member countries are important.

The results of the research should indicate different experiences and recommendations that can be useful in agricultural land management policy. Land policy measures are aimed at creating optimal conditions for agricultural production while achieving the goals of all dimensions of sustainable development. Strategic approach in land management policy in Bulgaria provides guidelines and an example of good practice for taking measures and activities in the direction of its improvement in the Republic of Serbia. These results are also the basis for examining the causes of insufficient utilization of available natural resources and the balanced development that ensures the production of sufficient quantities of food and the preservation of the environment.

Keywords: agricultural land, arable land, sustainable development
JEL codes: *Q15, Q18, Q24*

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Introduction

Agriculture is a very important sector for the economic development of any country. Agriculture contributes to the economic development of the country, but its percentage share in the economic structure decreases as the country becomes more economically developed. That is why we can consider agriculture as a strategic economic activity.

The development of agriculture depends on natural conditions. Their impact on development depends on the level of development of a country's economy. If the level of development is higher, the influence of natural factors is lower, and vice versa. In the conditions of the energy and raw materials crisis, there is an increase in the importance of natural resources for the development of agriculture in the national economy. The use of resources as a factor in agricultural production is a particularly sensitive issue, bearing in mind that we must preserve these resources for future generations as well. Optimum use and conservation of resources, on the one hand, as well as the production of sufficient quantities of quality food, on the other hand, are imperative in modern conditions of development. The subject of research in this paper is agricultural land, as a condition, but also a factor of agricultural production in Serbia and Bulgaria. The paper aims to point out its basic characteristics, possibilities for better use, and, in particular, limitations for its preservation and use within agricultural activities and for future generations.

To include the economy of the Republic of Serbia in European integration, it is necessary to implement agricultural policy reforms by harmonizing them with the Common Agrarian Policy, which requires structural adjustments to the European model of agricultural development, which is based on the concept of sustainable development. The current policy and objectives within the land policy of Bulgaria can serve as a good example for directing strategic activities of land management policy in the Republic of Serbia.

Sustainable management of natural resources to develop multifunctional agriculture

Land policy is the basis of agrarian policy and is regulated by the Law on Agricultural Land (Zakon o poljoprivrednom zemljištu, 2006). The limited land as a natural resource requires responsible management of agricultural and land policy measures to preserve and rationally use it. Land policy measures are aimed at improving the property structure and creating optimal conditions for organizing agricultural production, which achieves the best production and economic effects.

Land, as one of the main factors of agricultural production, has suffered great damage and losses in recent years through soil and air pollution, erosion, excessive urbanization, and floods. The use of pesticides and fertilizers are just some of the current problems facing agriculture. Therefore, the soil is very endangered and it is necessary to pay maximum attention to its protection. Soil protection is very important because the quality of agricultural products depends on the quality of the soil. Viana et. al (2022) state that agriculture is vital for food security and supporting the goals of sustainable development, especially SDG 2 – zero hunger (Avtar et al., 2020; DeClerck et al., 2016; FAO, 2017, Hurduzeu, 2022).

The problem of abandoned land exists. On the one hand, we have preserved biodiversity, while on the other hand, it is necessary to lead a policy of rational use of land for food production (Fayet et. al, 2022).

Varlamov et. al (2020) classified the factors that influence the assessment of the resource potential of agricultural land use into the following groups: environmental factors, production factors, and organizational-technological factors. They conclude that the assessment of the resource potential of agricultural land use is complex and it is necessary to simultaneously assess the sustainability of agricultural land use.

The sustainability of food and agriculture has great potential for revitalizing rural areas, ensuring inclusive growth for countries, and initiating positive changes throughout the 2030 Agenda (FAO, 2018, p. 5; Jovanović, Radukić, 2008). To the concept of sustainable development, there is a need to protect and improve renewable and non-renewable natural resources used for agricultural purposes.

The methods applied in agriculture until now will have to be changed to a large extent, to achieve the sustainability of the existing agricultural systems and enable the production of sufficient quantities of food in the future. Multifunctional production is a branch that strives to preserve natural resources and produce healthy, environmentally safe food, so its development represents a perspective that many countries strive for.

The idea of the multifunctionality of agriculture is characteristic of the most developed member states of the European Union, which have technologies, infrastructure, knowledge, and capital to the extent that allows them to take care of their non-market functions as well. Healthy and quality soil is a key component of sustainable agriculture. According to the Agriculture and Rural Development Strategy of the Republic of Serbia for the period 2014-2024, sustainable agriculture is the main orientation of the strategic action of the agricultural policy of the Republic of Serbia, which sees multifunctional agriculture as one of the most important economic activities.

Basic characteristics of agricultural land in Serbia and Bulgaria

In the Republic of Serbia, agriculture contributes about 12% of added value in the creation of GDP. In the structure of the GDP of the Republic of Serbia, service activities have a dominant and increasing share, while industry and agriculture have

a declining trend. Despite the slight downward trend, agriculture and the food industry play a significant role in creating GDP, employment, and exports and reducing the country's foreign trade deficit.

In Bulgaria, the agricultural sector participates in GVA with 5% in 2021. As in Serbia, services (72.1%) and industry (23.8%) have a dominant share in creating GVA. (Ministry of Agriculture, Republic of Bulgaria, 2023).

Regarding the economic structure of agriculture in the Republic of Serbia, small commodity production is the most represented (the average area of an agricultural farm is about 4.5 hectares of arable land compared to over 20 hectares in the European Union). A special problem of agriculture in the Republic of Serbia is the extensiveness of production on fragmented holdings and the fact that labor productivity and holding size in the agricultural sector are positively correlated. Medium-sized farms (from 1 to 5 hectares), of which as many as 76.8% in the Republic of Serbia are non-specialized, all-purpose farms, rent little land, employ little labor, have outdated machinery, have little economic strength, have little credit borrowing capacity, low level of use of irrigation systems, have an unfavorable age and educational structure, low yields and small marketable surpluses (Pejanović, 2010).

In Bulgaria, the tendency is to reduce the number of smaller plots and increase the number of large farms (from 10 to 50 ha). „The average farm size has significantly increased from 6.2 ha in 2007 to 10.1 ha in 2010 to 15.5 ha in 2013 and reached 20.6 ha in 2016. The consolidation of agricultural holdings is associated with a pronounced trend of reduction in the number of farms of size up to 1 ha." (European Commission, Final Report: Data and information on agricultural land market regulations across EU MS, 2021) The share of small farms (less than 1ha) relative to all farms from 70.5% in 2010 decreased to 59.3% in 2016.

„Trend of intensification and consolidation toward bigger agricultural holdings will be kept." (Yovchevska, et al. 2022) However, these changes, if they are not accompanied by adequate measures that support the interests of farmers on the one hand, and soil conservation on the other, will not be sustainable in the long term.

The Republic of Serbia has the lowest percentage of irrigated areas of European countries and those in the immediate vicinity. If we want to engage in serious agricultural production, whose products will be competitive with European ones, both in terms of volume and quality, then the construction of irrigation systems, as well as the commissioning of previously built systems, must be a priority in the coming period.

Both Serbia and Bulgaria record a low level of agricultural land irrigation. In Serbia, only 1.48% of agricultural land was irrigated in 2020. In 2016, 1.85% of agricultural irrigated land was recorded in Bulgaria. (World Bank, 2023, Agricultural irrigated land) Compared to other countries of the European Union, but also the Western Balkans, this is extremely unfavorable for the future growth of agricultural production.

Bearing in mind the structure of agricultural production in the Republic of Serbia, the available resources, and the achieved level of productivity, it is necessary for changes to take place in the direction of increasing productivity, stabilizing yields, and changing the production structure in plant production. The production of grain (wheat and corn), vegetables, and fruit has a large yield potential. According to the achieved results, the production of industrial plants in the Republic of Serbia is at the level of developed European countries and there is not much room for yield growth. On the other hand, there is potential for the growth of areas of industrial crops (oil crops, energy crops), which would significantly contribute to the increase in the value of agricultural production, but also to the much-needed change in its structure. In these activities, development must be directed towards new technologies and quality standards (Ministarstvo poljoprivrede i zaštite životne sredine, 2014).

Table 1. Land under cereal production (hectares)

Country /Year	2016	2017	2018	2019	2020
Serbia	1766713	1718273	1721439	1707375	1748963
Bulgaria	1816636	1729267	1817770	1927560	1956320

Source: World Bank (2023d)

As in Serbia, a similar tendency can be observed in Bulgaria through *stable cereal production* (Table 1). Namely, after a slight decrease in the area under cereal production in 2017 compared to 2016, there is a growing tendency of land under cereal production until 2020. In Bulgaria, there is a tendency for faster growth of land under cereal production compared to Serbia.

The volume of agricultural production in the Republic of Serbia has fluctuated in the last ten years due to lower yields per hectare. Higher yields in the European Union by almost 60% indicate that the implementation of agro-economic measures in the production of the Republic of Serbia is not controlled and implemented. Standard agrotechnical measures are not applied, there is a low level of surface irrigation in plant production, inadequate genetic potential, and inadequate agro-economic support in production are used. Changes in the dynamics of agricultural production indicate cyclicality in plant production due to the influence of the weather factor, the absence of application of agrotechnical measures, and a modest incentive export policy.

The Republic of Serbia has favorable natural conditions for the development of agriculture. *Agricultural land areas* are a significant factor in the competitiveness of agriculture in the Republic of Serbia.

Serbia and Bulgaria have *large areas of agricultural land*. The area designated for agriculture in 2021 was 5,227,350 ha, which is about 47% of the territory of the

country. The utilized agricultural area (UAA) is formed by arable land, permanent crops, nurseries, permanent grasslands, and kitchen gardens. In 2021 it amounted to 5,046,597 ha (without significant change compared to last year), which was 45.5% of the country's territory. (Ministry of Agriculture, Republic of Bulgaria, 2023)
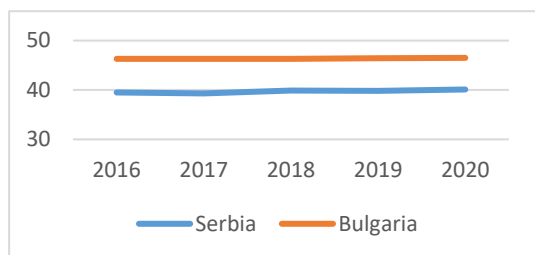
Figure 1. Agricultural land (% of land area)
Source: World Bank (2023b)
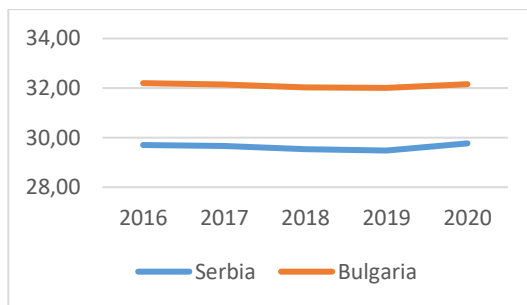
Figure 2. Arable land (% of land area)
Source: World Bank (2023c)

Of the total land area in Bulgaria, agricultural land makes up about 46%, while in Serbia 40% (Figure 1). In both countries, there is a slight increase in these areas, namely in Bulgaria from 46.3% in 2016 to 46.5% in 2020, while in Serbia the increase is from 39.5% in 2016 to 40.1% in 2020.
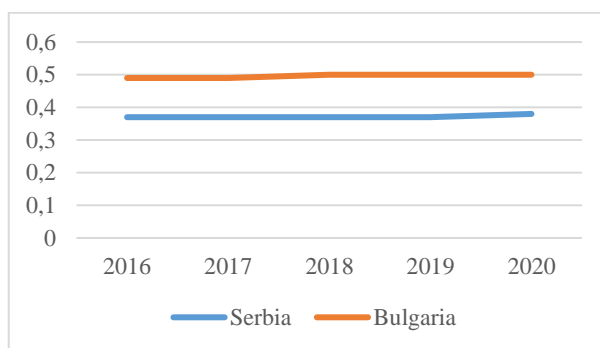
Figure 3. Arable land (hectares per person)
Source: World Bank (2023c)

As for arable land, both Serbia and Bulgaria record a similar share of the total land area. In Bulgaria, arable land accounts for 32% of land area, while in Serbia, 29.77% of arable land in total land area is present (Figure 2). A higher percentage of arable land per person (0.5 ha per person) is recorded in Bulgaria compared to Serbia, where arable land per person is about 0.38 ha (Figure 3).

In the latest Strategy of Common Agricultural Policy Bulgaria aims to promote the sustainable development of the agricultural sector by supporting viable farm income and enhancing competitiveness. Special attention is also paid to attracting young and small farmers. The plan includes significant support for sustainable farming practices. The „significant contribution to the protection of natural resources, including by promoting investments that target them" stands out. (European Commission, Bulgaria's CAP Strategic Plan, 2023)

In terms of land management policy, the new strategic plan for Bulgaria, as well as other EU countries, strongly supports greening and guidelines that lead to sustainable development. „Interventions are aimed at reducing greenhouse gas emissions from agriculture, increasing organic carbon in soils, improving the quality of soil and water, producing energy from renewable resources, supporting low-intensity agricultural practices and sustainable management of forests." (European Commission, Bulgaria's CAP Strategic Plan, 2023) These should be recommendations for the future agrarian policy of Serbia, within which green growth, green practice, as well as the use of land in a sustainable way, should be imperative.

Conclusion

What emerges as a conclusion is that the state, with the help of the legal system and public administration, should first create favorable conditions for the rational use of available resources and thereby provide its contribution to increasing efficiency and developing competitive advantages. In addition to the line ministry, it is necessary to activate all other entities interested in raising competitiveness to a higher level.

Serbia and Bulgaria have significant areas of agricultural land. Serbia should follow the reform of Bulgaria, which is reflected in the consolidation of land and the increase of the land category of larger areas, especially those of 10-50 hectares. The construction of irrigation systems, as a necessity for stable plant production in modern conditions accompanied by uncertain climate changes, is imperative, both for Serbia and Bulgaria. Improving the competitiveness of agricultural production is a common goal that can be achieved through the rational use of resources, the application of standardized technology, the application of modern knowledge in production and processing, the increase of economy in business, the introduction of modern technologies in production and processing, with greater respect for economic, energy and environmental criteria.

There is a necessity, both for Serbia and Bulgaria, to simultaneously support the competitiveness of agricultural production, along with measures to support sustainable development and conservation of resources for future generations.

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RURAL SUSTAINABILITY IN BULGARIA: MULTI-CRITERIA ANALYSIS

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Abstract

Sustainable development is essential for long-term evolution of the society as a whole, considering the future generation as well. It is a key concept of the 21st century reflecting the present and the future of humanity. Within the European Union, it is of primary interest and a fundamental goal. Currently, the European Green Deal serves as a strategic framework for the transition and policy development to accomplish this goal. It recognizes rural areas as important to contribute in terms of land use, biodiversity conservation, economic activity, and prosperity of society. Rural areas are important as a main source of supplies and resources for the society and as a space for living and working. The current challenges, such as economic crises, depopulation, and climate change, may limit their sustainable development. The active rural development policy and its growing role within the European policies supports the processes of adaptation and transformation towards the sustainability goals. Addressing these challenges requires a comprehensive approach as achieving sustainability requires considering the economic, social, and environmental dimensions of rural development. It means to consider a range of social, economic, and environmental factors and their interrelationships in order to identify and prioritize sustainable development options for rural areas. Therefore, the multiple criteria analysis of the various aspects of rural development, taking into account different sustainability indicators is a required precondition. This paper assesses rural areas sustainability in Bulgaria based on the multi-criteria analysis exploring the time-related changes of the available Sustainable Development Indicators and comparing them to the observed indicators at the European level. The findings indicate progress in some aspects (ecological based on the analysis of greenhouse gas and ammonia emissions from agriculture). The study also identified serious barriers in economic and social dimensions analysing the performance of rural economy, the developments in business structures, employment and unemployment rates, and the rural demography (population, migrations and at-risk-of-poverty rate). The paper concludes with recommendations for promoting sustainable development that enhance economic opportunities and improve social demography..

Keywords: sustainable development, environmental sustainability, social sustainability, economic sustainability, sustainable development indicators

JEL code: *Q01, R51, O18*

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Introduction

The European Union (EU) has been actively promoting sustainable development as a fundamental goal, and it recognises the need to consider the impact of different factors on the ability of the member states to develop sustainably (Adelle et al., 2006; Häbel & Hakala, 2021). Currently, the European Green Deal guides the EU's transition to sustainability (Fernández et al., 2021), serving as a strategic framework for policy development to achieve the aims of the Paris Agreement and the UN 2030 Agenda for Sustainable Development.

The Green Deal also recognizes the importance of rural areas in achieving these goals and emphasizes the need for rural development that is balanced, fair, green, and innovative (Sekulić et al., 2023). Rural areas play a crucial role because they are not only important for agricultural production but also for the preservation of biodiversity and the provision of ecosystem services (Prandecki et al., 2021). However, the specific challenges they face require different measures to support their transition to a climate-neutral economy (Sikora, 2020). The current discussion considers the most challenging the economic issues, depopulation, and climate change, which also limit rural sustainable development. Addressing these challenges requires a comprehensive approach because achieving sustainability involves the three dimensions: economic, social, and environmental.

Rural areas have always been acknowledged as important as a main source of supplies and resources for the society and as a space for living and working. Moreover, rural development is a complex and multifaceted process that requires careful consideration and analysis, recognizing the capacity of EU rural policy to facilitate sustainability transition (Wieliczko et al., 2021). Other studies have examined the different aspects of sustainable rural development (Zinchuk et al., 2018; Popović et al., 2019). Sustainable rural development is a crucial aspect of promoting the well-being and prosperity of rural communities. It involves implementing strategies and initiatives that address the economic, social, and environmental needs of these communities (Cvijanovic et al., 2017). Many studies have explored different approaches and factors that contribute to sustainable rural development and its governance in Bulgaria as well (Doitchinova et al., 2019; Nikolova et al., 2022; Lazarova et al., 2023).

Overall, sustainable rural development requires a comprehensive and integrated approach that considers the unique characteristics and needs of rural communities. It means considering a range of social, economic, and environmental aspects and their interrelationships to identify and prioritize sustainable development options for rural areas.

This paper presents a research study that assesses the sustainable development of rural areas in Bulgaria by exploring the time-related changes of the available Sustainable Development Indicators and comparing them to the observed indicators at the EU level. The findings of the study indicate progress in some aspects, but the research also identified serious barriers to rural sustainability in Bulgaria. The paper

is structured as follows. Section one of the paper is the Introduction. Section 2 presents the materials and methods used in this study. Section 3 presents the data processing results and the discussion. The Section 4 concludes.

Materials and Methods

Currently, sustainable development has been actively promoted as a fundamental goal, which is a development, which encompasses economic, social, and environmental objectives. Therefore, multiple criteria analysis of the various aspects of rural development is essential for measuring sustainability indicators, taking into account the differences and considering a range of social, economic, and environmental factors. In this regard, the Indicators of Sustainable Development play a crucial role and many studies have focused on developing and evaluating them for rural development. These indicators provide a quantitative and qualitative assessment of all aspects of sustainable development, including its three complementary dimensions, and facilitating an understanding of the interrelations among different sectors (Mabhaudhi et al., 2021; Rahma et al., 2019). Several studies have highlighted the importance of selecting appropriate indicators that are sensitive, composite, and responsive to changes over time (Mabhaudhi et al., 2021). It is important to note that sustainable development indicators are not limited to environmental aspects. They also encompass social and economic dimensions. Doherty et al. (2021) stated that indicators of sustainable development can address issues such as poverty alleviation, food security, and biodiversity conservation (Doherty et al., 2021).

One of the challenges in developing indicators for sustainable development is the complexity of measuring various dimensions of sustainability and the difficulties in assessing its multifaceted nature. Indicators play also a crucial role in translating the concept of sustainable development into practical terms, guiding the decision-making processes and providing a framework for setting concrete development goals and evaluating the progress (Mally, 2012). In this regard, the United Nations (UN) has established a set of indicators to measure progress towards achieving this goal. The UN's indicators of sustainable development are outlined in the 2030 Agenda for Sustainable Development, which includes 17 Sustainable Development Goals (SDGs) and their respective targets (Gain et al., 2016). In the context of the EU, Ledoux et al. (2005) explained that sustainable development indicators have been adopted to monitor and assess the EU-wide sustainable development strategy. These indicators provide a critical assessment of the current status of sustainability and help identify policy trends in different areas (Ledoux et al., 2005).

The second crucial issue in sustainability measurement is the challenges associated with mapping and monitoring these indicators. The availability and quality of data vary across countries and regions, making it difficult to compare progress (Kraak et al., 2018). Therefore, the assumed set of indicators used in current analysis reflects the commonly accepted selections for such analyses (Barska et al., 2020) and

the official data availability. The proposed indicators set is also in agreement with the indicator selection by the EU policy as well (SDGs – Overview). The values of the indicators used in this study were obtained from the EU database Eurostat (link in references). Table 1 summarizes all of the studied indicators in the paper.
The analysis of the chosen indicators includes measuring the time-related changes during the study period accompanied by the relevant descriptive statistics.

Table 1. Sustainable development indicators for analysis.

Economic	Social	Environmental
Economic performance, GDP, GVA	Rural population age distribution	Greenhouse gas emissions from agriculture
Employment	Migrations	Ammonia emissions from agriculture
Business structures	At-risk-of-poverty rate Unemployment rate	

Results and Discussion

The issue of economic sustainability of rural regions may be assessed in different ways, by measuring economic growth through assessing incomes and expenditures in rural households, sectorial (agriculture) productivity, or selected economic indicators determined for the region, locally, and for the individuals. In this study the Gross domestic product (GDP) has been used as the measure of rural well-being, The Figure 1 presents the total GDP of rural economy in Bulgaria, combined with their comparison to the average for the EU. It is visible that both increased over the time, but are still clearly lower than the EU average, reaching one-fifth in 2021.
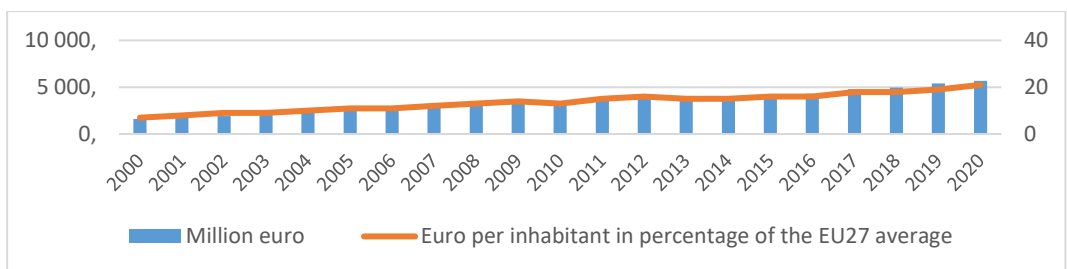
Figure 1. Gross domestic product at current market prices in rural areas of Bulgaria
Source: Eurostat; own calculations

Next, Figure 2 presents the number of small and medium-sized enterprises related to the total number of enterprises in rural areas during the study time duration. The reported share is unfavourable and suggests less supportive for small businesses and

entrepreneurship environment. Undoubtedly, the economic development encompass the increase of new rural businesses as well. Encouraging them through favourable conditions attracts young generation to rural areas, additionally enhancing their growth potential. In this context small and medium-sized enterprises proved to be successful not only to adapt to the local conditions but also to generate higher degree of job creation and income provision.
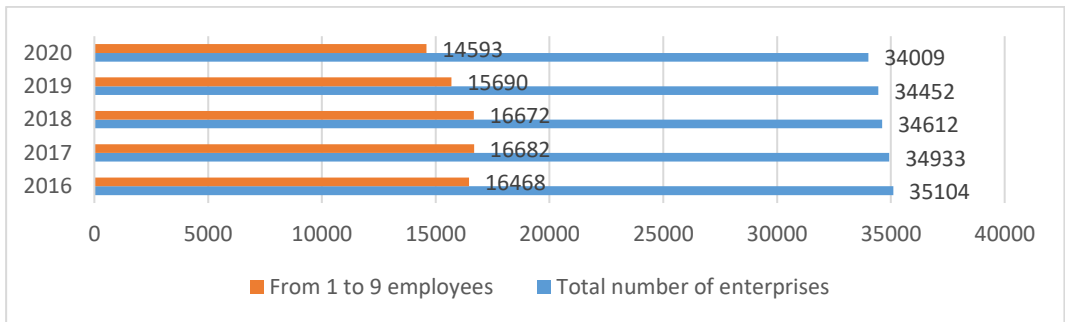
Figure 2. Business demography in rural areas in Bulgaria
Source: Eurostat; own calculations

The data about employment shows a clear downward trend in total numbers as well as in the employment in the agricultural sector as the last decreased with several times higher speed (Figure 3). In this regard, youth unemployment rates continue to be at high levels and required specific attention (Figure 4).
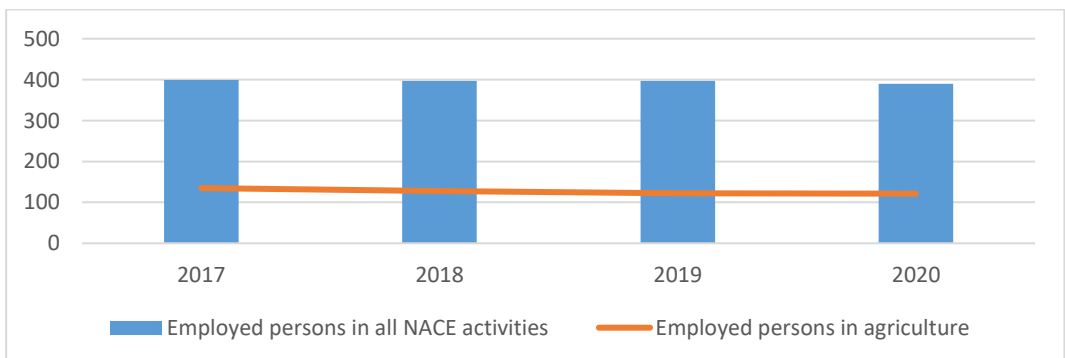
Figure 3. Employment in rural areas in Bulgaria
Source: Eurostat; own calculations
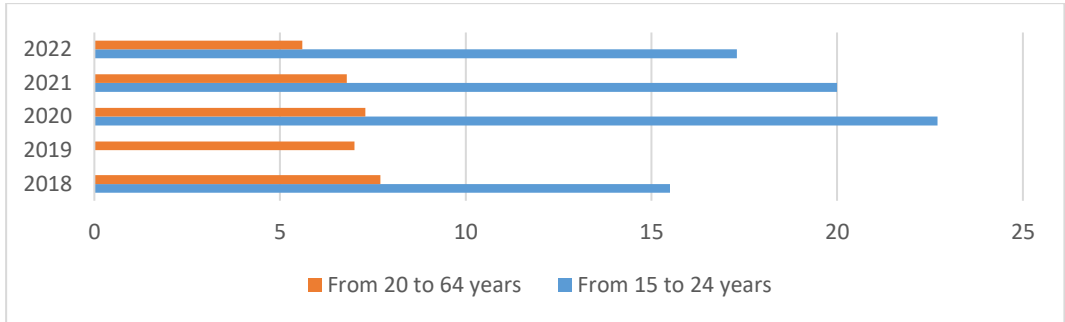
Figure 4. Unemployment rates in rural areas in Bulgaria, %
Source: Eurostat; own calculations

According to the available data (Figure 5), the number of rural residents was not constant and increased last years. The increase may be related to the pandemia and it seems to be for two years only. These changes are also led by the changes in rural residents' age distribution (Figure 5). It is visible that the number of children and teenagers is clearly lower in contrast to the different situation in the case of adults and seniors. Thus, the rural population in Bulgaria continues to be an ageing society, with a significant share of people over retirement age.
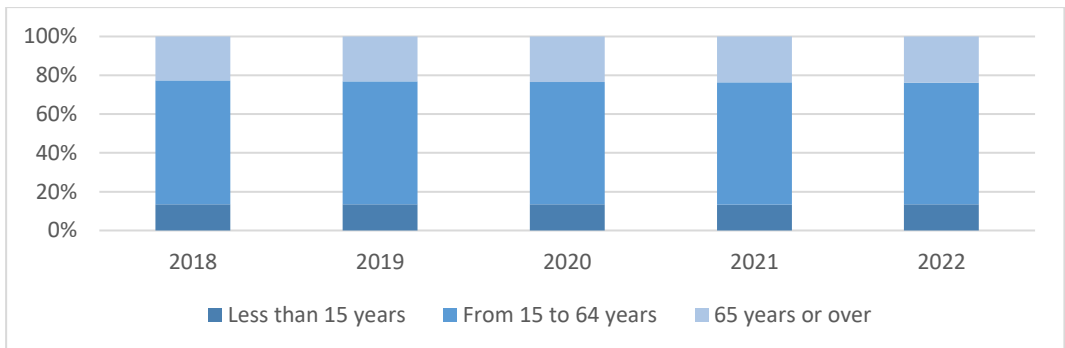
Figure 5. Population in rural areas in Bulgaria
Source: Eurostat; own calculations

Figure 6 presents the registered migration balance to and from rural settlements in Bulgaria during the studied period, and it is visible that over the studied period, the number of new registered rural residents is higher than the number of the population leaving rural settlements in exactly this two years.

Together with the unfavourable level of education (Figure 7), this decreases the work capacity of rural regions. As seen in the Figure 7, the population of Bulgarian rural areas with higher education is more than half of the average for EU, respectively 9% and 22%.
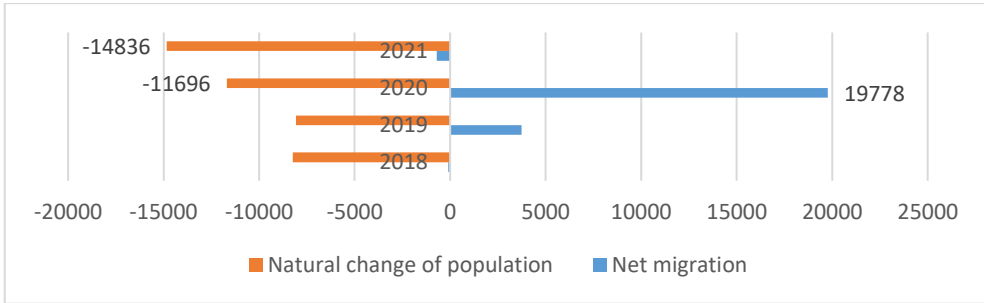
Figure 6. Demographic balance in rural areas of Bulgaria
Source: Eurostat; own calculations
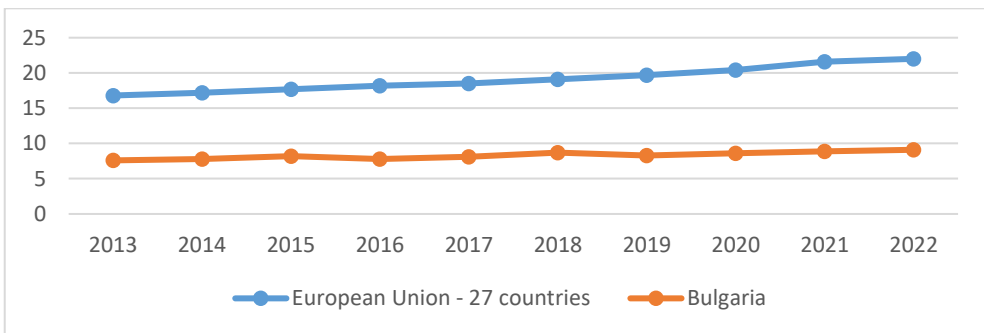
Figure 7. Population by educational attainment level in rural areas in Bulgaria and the EU, %
Source: Eurostat; own calculations

One of the important indicators of sustainable development is the population at risk of poverty. According to Eurostat data, presented in the last Figure 8, 31% of the population in rural areas of Bulgaria was in danger of poverty. This value is higher and not comparable with the EU average (22.5%) and is one of the highest share among EU member states.
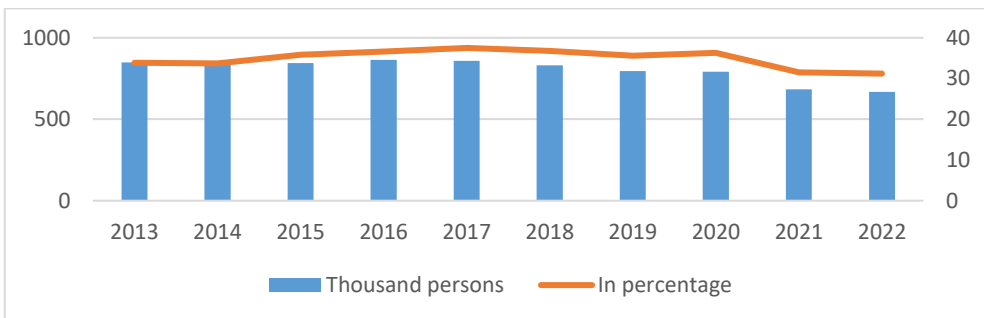
Figure 8. At-risk-of-poverty rate in rural areas in Bulgaria
Source: Eurostat; own calculations

The environmental quality in rural regions, directly affecting the quality of life of the rural population, is, in our opinion, highly related to the Greenhouse gas and Ammonia emissions from agriculture as the main production sector with regard to the use of natural resources, especially land. The Eurostat data presented in the Figures 9 and 10 shows the negative pressure exerted by Bulgarian agriculture on the natural environment.
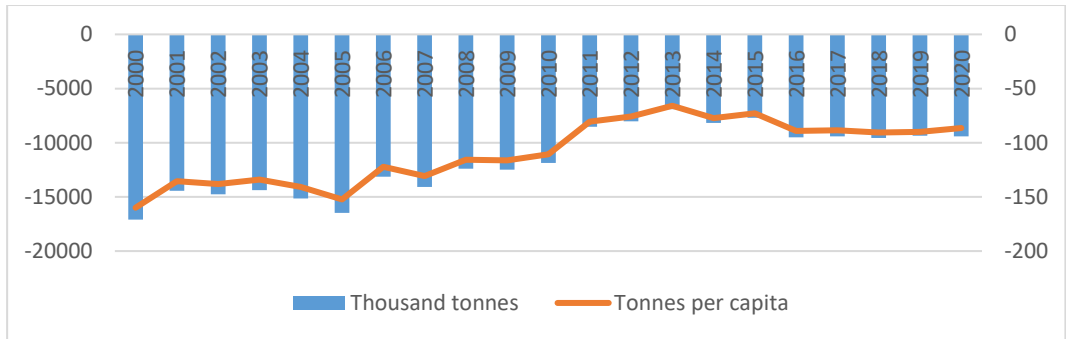
Figure 9. Net greenhouse gas emissions of the Land use, Land use change and Forestry sector in Bulgaria

Source: Eurostat; own calculations
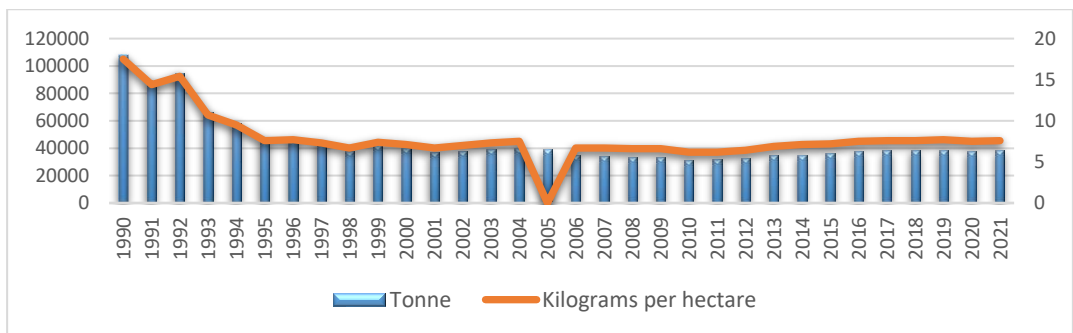
Figure 10. Ammonia emissions from agriculture in Bulgaria

Source: Eurostat; own calculations

However, these levels are still lower than the average measured at the EU level and in countries such as the Netherlands, Poland, Belgium, Germany, which significantly developed agriculture. This pressure may be reduced in the future by an increase in area of organic farming and implementation of the nature friendly practices.

Conclusions
In conclusion, rural development is a complex issue that requires careful consideration and analysis. Although using Indicators of Sustainable Development has its

challenges and limitations, they are essential tools for measuring progress towards achieving sustainability goals. Moreover, they are used to establish a framework for concrete goals, evaluate progress, and make informed policy development decisions. The study revealed a progress towards SDGs but the status is worse in Bulgarian rural areas than the EU's. It emphasized the need for interventions and measures at any level to reduce depopulation and greater priority on human capital development to promote sustainable rural development. Economic growth, use of local resources, entrepreneurship, innovations, and infrastructure development are all-important aspects to consider in future strategies in Bulgaria.

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OPPORTUNITIES FOR REVITALIZATION OF RURAL AREAS IN POLAND AND BULGARIA AFTER THE WAR IN UKRAINE

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WRZOCHALSKA, AGNIESZKA[2]

Abstract

As a result of the armed conflict in Ukraine, nearly a third of Ukrainians have been forcibly displaced from their homes. This is one of the largest displacement crises in the world and in our time. Bulgaria and Poland were among the first EU countries to welcome the migrant wave in the early hours of the war. The aim of this paper is to identify the current problems and certain socio-economic prospects of Ukrainian migrants in Poland and Bulgaria after the start of the military conflict The article also aims to try to answer the question of whether it is possible to revive rural areas in Poland and Bulgaria, given the potential that incoming foreigners (mostly Ukrainian citizens) represent for our countries. To achieve the set goal, the authors use quantitative and qualitative methods, representative official statistical data from the NSI, migration services, non-governmental organizations, results of primary research, office studies, Internet sources etc. The application of the scientific method, as well as the inductive and deductive methods helps to analyze demographic and socio-economic processes in their dynamic development and highlight their impact on the socio-economic environment in Bulgaria and Poland.

The authors reveal the need to make more effective use of the economic and social potential of migrants and the opportunities for rural revitalization in both host countries. The integration of migrant business into the economic environment of Bulgaria and Poland requires not only training of the migrants themselves, but also of the institutions and society as a whole regarding the benefits of this activity. This is definitely an underestimated area with huge potential that is underutilized for the socio-economic development of rural areas and ensuring a normal and peaceful existence for Ukrainian families in the chosen host country.

Key words: refugees, migration, Ukraine, rural areas
JEL: *J15, J24, F51*

Introduction

Russia's aggression against Ukraine in February 2022 and the continuing hostilities resulted in an influx of Ukrainian citizens to Poland, Bulgaria and other countries in Europe and the World. Thousands of Ukrainian citizens, mostly women, children and the elderly were forced to leave their homeland and head to foreign countries for protection and asylum. These processes led to more dynamic migration move-

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ments into Bulgaria and especially Poland. The speed of displacement is still outpacing the implementation of solutions – such as return, resettlement or local integration. Against the backdrop of the demographic changes facing Bulgaria and Poland, inclusion should be a core element of the country's employment policies. This requires political will and active public and social responsibility.

According to the Office of the United Nations High Commissioner (UNHCR), there are currently (as of Jan. 31, 2023) 2,569,000 refugees from Ukraine in countries in Europe considered to be more affluent, which are not neighboring Ukraine. In addition to Poland and Germany (1 million 55 thousand), the largest number of refugees is in the Czech Republic (491 thousand), Italy (170 thousand) and Spain (168 thousand). In Bulgaria, the figure is more than 164 thousand. Poland, of all countries, hosts the largest number of these refugees. According to statistics from the Polish Border Guard (Straż Graniczna.2023), from February 24, 2022 to April 30, 2023, the number of people from Ukraine who crossed the Polish border was more than 11 million. They were mainly women with children. According to estimates, there are about 1.2-1.5 million refugees on Polish territory (Uchodźcy,2022). This figure is also confirmed by UNHCR data, according to which the number of refugees from the territory of Ukraine (as of February 21, 2023) was more than 1.6 million which accounted for 4.3% of the Polish population. Taking into account still economic migrants (before the outbreak of war), it can be estimated that the group of Ukrainian citizens in Poland is about 3 million people (which accounted for nearly 8% of the population). In Bulgaria, the number of refugees from Ukraine is estimated at more than 2.5% of the population. These numbers are based on estimates, as there is no single database collecting all the information in both Poland and Bulgaria. In terms of population, a large effort is also made by: Estonia (the number of refugees is 5% of the population), the Czech Republic (4.7%), Moldova (4.2%). Germany is much further away, where refugees from Ukraine account for 1.3% of the population.

Methodology

The main focus of the article is to identify current problems and selected socioeconomic perspectives of Ukrainian migrants in Poland and Bulgaria who arrived after the start of the armed conflict.

The purpose of the article is also to try to answer the question of whether it is possible to revive rural areas in Poland and Bulgaria, given the potential that the incoming foreigners (mainly Ukrainian citizens) represent for our countries.

In order to achieve the set goal, the authors use quantitative and qualitative methods, representative official statistical data from the National Statistical Institute, migration offices, NGOs, results of primary research, desk research, internet sources, etc. The application of the scientific method, as well as the inductive and deductive

methods helps to analyze demographic and socio-economic processes in their dynamic development and highlight their impact on the socio-economic environment in Bulgaria and Poland. The similar cultures, economic and social development, education, qualifications and traditions in identical economic sectors create positive preconditions for rapid integration, cooperation and continuity between Ukrainian migrants and the native population of Poland and Bulgaria.

Discussion and analysis of the issues
In the structure of refugees from Ukraine, groups of people stand out who: intend to return to their homeland after the war, stay in the country to which they migrated, change the country of their current residence, and people who are still undecided with regard to their future plans. The characteristics of the aforementioned groups are very similar. The refugee group is dominated by women. Refugees are relatively young people of working age. More than half were between the ages of 35 and 59, a third were between the ages of 18 and 34, and only nearly one in ten was over the age of 60 (Table 1). About three-quarters of the total migrants worked in Ukraine. A small group were homemakers. A sizable group was made up of people with children, including those up to 4 years old, as well as families with people with special needs. In the countries to which the refugees emigrated, some children started school (in the early childhood education system) and received preschool care. However, some of the young children remained in the care of their mothers Providing preschool care to children especially in the younger age groups, on the one hand, was a challenge, especially in the first months of the refugee influx, for the education systems and society for all refugee-receiving countries, especially Poland and Bulgaria, but on the other hand, the efforts made in this regard enabled Ukrainian parents to get to work. Especially since relatively well-educated people came from Ukrainian areas. In the refugee structure, more than half of them had a university degree, a quarter had technical and vocational education, and a fifth had secondary education. In addition, students accounted for about 3% of the total refugees. Compared to the educational structure of Poles and Bulgarians, the refugee group presents a higher level of education. Therefore, it represents a potential to be exploited in the labor market (Table 2).

Actions taken in both countries at all levels, primarily access to the labor market and long-term solutions aimed at full integration of refugees in this field, contributed both to improving the material situation of Ukrainian citizens and in the future may translate into future benefits for the Polish and Bulgarian economies.

It should be mentioned that already before the hostilities, Poland was an attractive place to work and live for its eastern neighbors. According to IEP data, before the war there were about 1.4 million Ukrainian citizens working in Poland, most of them relatively young men who came for work purposes. Some of them returned to the country after the war broke out. Economic immigrants from Ukraine had already

had a positive impact on the Polish labor market and the Polish economy before the war broke out, alleviating labor shortage problems. It is estimated that between 2013 and 2018 they contributed to generating 13% of Poland's GDP growth (Uchodźcy...2022). At the end of September 2022, there were 24,100 companies with Ukrainian capital. Of this, from January to September, 3.6 thousand new companies with Ukrainian capital were established in Poland, as well as 10.2 thousand Ukrainian sole proprietorships and. Which represents 54% of foreign sole proprietorships and 41% of companies with foreign capital established in Poland during this period. Three-quarters of these companies were established out of a need to raise funds to support themselves and their families (Debkowska, Kłosiewicz-Górecka, 2022).

Table 1. Profile of Ukrainian Migrants (in %)

	Refugee profiles to plans for the near future			
	Return to Ukraine	Stay in current host country	Move to other host country	Uncertain
Distribution by gender				
Females	88	94	77	86
Males	12	6	23	14
Distribution by age				
18-34 yrs	32	34	38	33
35-59 yrs	52	55	52	56
60+ yrs	16	11	10	11
Family composition				
% of respondens alone	24	22	35	23
% with infants (0-4)	16	22	14	18
% with children (5-17)	57	58	42	55
% with elderly persons (60+)	24	22	17	22
% with at least 1 family member with specific needs	27	23	20	33
Main activity in Ukraine				
Working	75	77	78	76
Housekeeping	9	8	7	5
Unemployed	3	3	3	4
Student	11	9	6	9
Retired	3	3	6	6
Others	0	1	0	2

Source: Reports and Assessment, Lives on hold: Profiles and Intentions of Refugees from Ukraine

Table 2. Educational structure of refugees from Ukraine and residents of Poland and Bulgaria (persons aged 15-64 in 2021))

Education profile	Refugee of Ukraine	Poland	Bulgaria
w %			
University or higher	54	29	26
Technical or Vocational	25	22	29
Secondary	19	36	15
Only primary/None	3	13	30

Source: Reports and Assessment, Lives on hold: Profiles and Intentions of Refugees from Ukraine, Statistics Poland, National Population and Housing Census 2021.

By the end of 2022, over 7120 Ukrainian citizens with temporary protection have started working in Bulgaria, which represents over 15% of the working age population fleeing the war in Ukraine. This figure of over 7120 does not include those employed on civil contracts and those on probation. The Ukrainian citizens who have started working on a labour contract are distributed in almost all regions of the country and in about 20 sectors of the economy in 9 different occupational fields. More than half of the employed Ukrainian citizens are employed in the hotel and restaurant industry, followed by trade and manufacturing. Among the occupations that employed Ukrainians pursue are those that do not require special qualifications Employment of refugees translates into an increase in GDP due to both an increase in the number of workers and increasing labor productivity, made possible by greater specialization and development of major metropolitan areas, reducing the shortage of workers. These processes have led to more dynamic migration movements in Bulgaria and especially in Poland. In the context of the demographic changes facing Bulgaria and Poland, integration should be a key element of national employment policy. This requires political will and active public and social responsibility.

Ensuring the effective integration and inclusion of migrants in represents a social and economic investment that makes European societies more cohesive and sustainable. The integration of Ukrainian migrants can be a win-win process, benefiting society as a whole. The presence of Ukrainian nationals on the territory of Bulgaria and Poland, is the challenges of providing care for the youngest children and integrating children and young people into the existing education systems. It is also the positive impact of these people on the demographic situation and the labor market, which has included a significant number of well-educated people, but mostly with language barriers with respect to local languages. All of these challenges primarily affect large urban areas. According to the Polish Economic Institute, the territorial distribution of refugees coincides with the places of greatest concentration of Ukrainian communities in Poland before the outbreak of war. These are mainly

large production centers, as people seeking refuge from the war went primarily to their relatives and friends. As in Bulgaria, refugees were also eager to settle coastal areas and some resorts are actively used as refugee shelters. Refugees marginally choose to live in rural areas Figure 1.
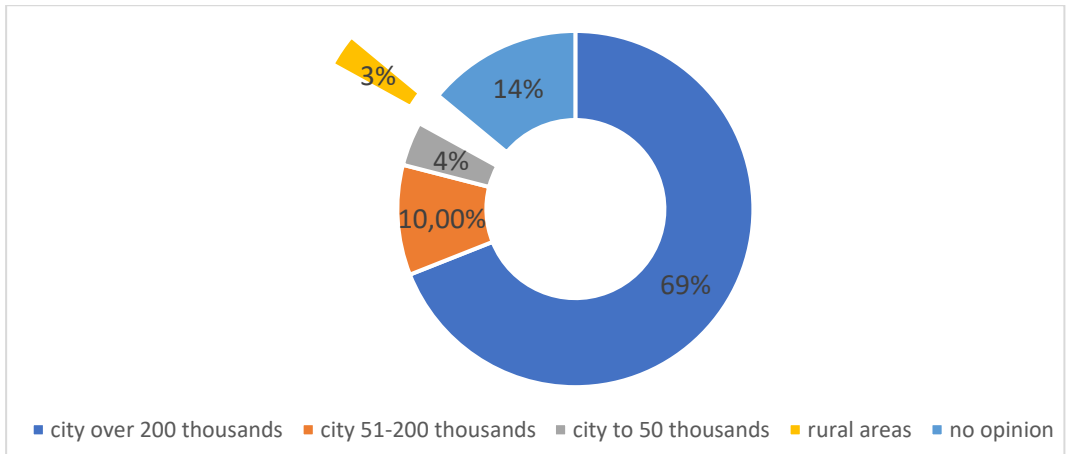
Figure 1. Preferences of refugees from Ukraine in relation to the place of stay (as of April 2022)

Source: Uchodźcy z Ukrainy w Polsce. Wyzwania i potencjał integracji. Monitor Deloitte, październik 2022

There is a clear trend in both countries regarding the concentration of Ukrainians in and around major cities. This poses risks with regard to the cost of supporting refugees, unsustainable tax revenues by working representatives of this group, the increase in housing prices, rental prices associated with increasing demand with rigid supply, and insufficient number of places available especially in the preschool system, but also overcrowding of schools. However, it is not excluded that in the near future, as a result of a number of measures taken, small urban centers and rural areas will also become an attractive place to live and work for a certain group of immigrants and refugees.

Ukraine, as a country, has a tradition and experience in agriculture, which means that the adaptation of a large number of Ukrainians would benefit both them and the local population. Of course, the challenges vary by region. But first of all, rural regions face problems related to negative demographic trends, and the lack of agricultural labour can help refugees find good livelihoods. A well-prepared migration strategy can translate in to: an increase in GDP due to both an increase in the number of workers and rising labor productivity, a reduction in the labor shortage and an improvement in the demographic structure of Poland and Bulgaria, and will have a positive impact on the pension system.

The results of the observations, experiences and analyses to date can be used to adjust policies and take further measures to more effectively manage the influx of refugees, to both countries as beneficiaries of international protection, and to integrate them more effectively and efficiently into socio-economic life.

In Bulgaria and Poland, it is crucial to create opportunities for the private sector to include asylum seekers and beneficiaries of international protection in their workforce. Past assistance efforts and their many good examples in both countries have proven to be an effective way to overcome stereotypes and prejudices. Increased efforts and past experiences and successes are therefore key steps in removing fears and encouraging more companies to open up to this integration. In many European countries, incentives have been created to support companies in integrating refugees, both through language and vocational training and government subsidies.

There is a noticeable positive attitude in both Polish and Bulgarian society towards migration, including in smaller population centers. Authorities in smaller cities, their communities as well as migrants also see the potential for benefits from integration. Medium-sized and small cities are more adaptable to changing realities and provide opportunities to test new policy approaches and programs and implement projects at lower costs.

Conclusions

In the past two years, as a result of the war, there has been a large influx of Ukrainian citizens to Poland, Bulgaria and other countries in Europe and the World. As a result of the war in Ukraine, a sizable number of relatively young and well-educated people have flowed into the territories of Poland and Bulgaria. The influx of Ukrainian citizens created a number of challenges to their integration into socioeconomic structures (social welfare, education systems for Ukrainian children, or the position of adults in the labor market), but these challenges primarily affected large urban areas, as refugees marginally chose to live in rural areas.

The lives of Ukrainian migrants involve the experience of separation, the horrors of war, resettlement and adaptation, sometimes discrimination in the new place, nostalgia for the home left behind, which are gradually replaced by hopes and desires for a new beginning and better opportunities. In this regard, the lives of migrants and their relatives are often characterized by contradictions and tensions, as migrants are morally involved in different directions and spaces within the social and kinship networks in which their life trajectories are intertwined (Svašek 2008: 216). The focus is on problems related to their regularization, housing, social welfare, internal security issues, etc. Family migration, however, changes priorities – the focus is now on securing the lives of families in the host country and continuing a normal existence in the country of choice.

Nevertheless, regardless of the hostilities in the country, the number of migrants from Ukraine in both Poland and other European countries is expected to be higher

than at the beginning of 2022, and given the scale of the influx so far, Poland and Bulgaria could become new immigration destinations in both the European and global context. Therefore, it can be expected that rural areas will also receive an influx of immigrants in the near future, as large cities will become overwhelmed by the scale of the phenomenon. It therefore becomes necessary to conduct information activities on the attractiveness of rural areas as a place to live and work, and to offset the fears and insecurities of immigrants associated with life outside urban areas.

The group of people who would like to settle in a rural area in order to develop their own business – agricultural or other type of rural business, could also be encouraged by creating conditions that will further support the decision to settle in a rural area (internet, health and education services). This could be implemented through national incentive programmes for those working in these areas in rural areas. The development of migrant entrepreneurship is a young emerging field, which with the help and involvement of local business organizations to integrate migrant businesses into the countries economy would be an opportunity for new additional services and development. The integration of migrant businesses into the economic environment of the host country requires not only the education of the migrants themselves, but also of the institutions and society at large on the benefits of this activity. This is clearly an undervalued area with enormous potential that is underutilised for socio-economic development.

The preservation and expansion of agrarian production would also be helped by preserving the potential of the traditional backyard farm as a source of natural and healthy food through the legal right to keep a minimum number of animals in the homestead. There is also a need to increase security and strengthen measures to protect agricultural produce in backyards and fields from increased domestic crime in villages.

The main areas to be addressed are:
- free language courses
- getting support for vocational guidance and motivation to start work;
- obtaining support at the workplace through an assured consultant, job fairs etc.;
- receiving benefits including rent, overheads and internet for an initial incentive;
- municipal and district administrations need to establish workable mechanisms for the social inclusion and integration of refugees from Ukraine.

Successful practices would bring migrant groups into society and equal opportunities to pursue professional opportunities. Ukrainians have a tradition of private business development, with language skills and labour market expectations remaining major issues. There are also difficulties with the recognition of educational qualifications, Simple regulations for the recognition of educational qualifications would need to be developed.

Investing in agriculture is an effective long-term strategy for job creation, especially at a time when we all expect the global food crisis to worsen. Migration is seen as a way to address some of the existing challenges of cities, and integration is a way to ensure that migrants and refugees actively participate in local communities. Preserving livelihoods and populating rural areas will not only improve the overall situation in the sector but will also help refugees become productive participants in society and reduce the financial burden they carry on their shoulders.

In both countries, therefore, there is a need to develop comprehensive plans that also take in to account the possibility of another wave of refugees and systemic assistance in the long term.

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ENVIRONMENTAL PROTECTION ACTIVITIES IN BULGARIA – COMPARATIVE ANALYSIS IN REGIONAL ASPECT

STOYANOVA, ZORNITSA[1]

Abstract

Environmental protection activities differ according the specifics of the regions. They lead to optimal use of resources, reduction of climate impact, ensuring security of energy supply, improving the health of ecosystems etc. The aim of the paper is to be prepared a comparative analysis between the planning regions in terms of environmental protection activities and on this basis to be determined the place of each region and to be evaluated the effectiveness of the financial sources used for environmental protection activities. The paper presents literature review of some environmental protection activities. The paper analyzes data related to the environmental protection activities undertaken in the planning regions related to household waste submitted for recycling, waste water discharged from treatment plants, installed renewable energy sources capacities, research and development expenditure, number of buildings financed under the National program for energy efficiency of multi-family residential buildings. Comparative analysis of environmental protection activities by planning regions is prepared in order to be presented the trends of some indicators and to be made a comparison between the regions. On the basis of the data analysis, the comparison between the planning regions for the period 2017 -2021 was made, and they were ranked in three groups – active, moderately active and low active. The analytical part of the paper also includes DEA analysis to be found the most effective region according to the chosen inputs. In all DEA models, the aim is to evaluate the effectiveness of indicators such as tangible fixed assets (TFA) with ecological use, expenditures for research and development and financial resources under the Operational program environment (OPE). These indicators are defined as Inputs. For outputs are chosen generated municipal waste, waste water discharged without treatment, CO_2 emissions and destroyed territories. Based on the analysis are made some general conclusions and recommendations for increasing the engagement of the region to carry out environmental protection activities. The South Central and South Western regions are the most active in terms of carrying out activities that lead to environmental protection, the South Eastern and North Eastern regions can be defined as moderately active, and the North Central and North Western regions as low active in terms of environmental protection activities. In order to increase the engagement of the regions to carry out environmental protection activities, various initiatives can be taken, most often related to better understanding of ecological benefits, taking political actions and implementation of regulations in economic sectors related to the environment and natural resources, spreading of good practices.

Key words: environment, planning region, regional differences

JEL: *P28, R11*

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Introduction

The activities that are undertaken to reduce the negative impact of human on the environment are diverse, related to transition to renewable energy and improvement of energy supply, waste management, implementation of integrated water management etc. They depend on the geographical location of the region and its natural characteristics, the government policy to support economic sectors of the countries, the attitudes and behavior of producers and consumers to take measures to reduce the pressure on natural resources.

The transition to renewable energy sources and the optimal use of solar, wind, hydroelectric and geothermal energy to decrease greenhouse gas emissions and reduce the climate change are leading initiatives of the countries. Panwar et al. (2011) consider that renewable technologies are clean sources of energy and have a number of advantages related to the rational use of resources, reducing the impact on the environment by decreasing the greenhouse gas emissions and global warming while at the same time they lead to less waste generation. The authors define renewable energy as sustainable for the current and future needs of society, not only in an ecological aspect, but also in an economic and social one. Zakhidov (2008) relates the role of renewable energy sources to the improvement energy and water supply in a regional aspect, improving the quality of life. The author consider that renewable energy improves the possibilities of disadvantaged areas such as desert and mountain areas to use their regional advantages and to develop sustainably. Owusu and Asumadu-Sarkodie (2016) express a similar opinion, but they also add the possibilities of renewable energy sources to achieve energy security.

Together with the development of the system of renewable energy sources, it is necessary to develop energy efficiency and to be taken measures to improve it in construction, industry, transport and other economic sectors. Mircheva (2022) points out the benefits of the efficient use of resources and the achievement of energy efficiency such as the reduction of the negative impact on the environment and climate change, adding the advantages of energy efficiency for improving the quality of life. Regarding energy efficiency, Georgiev (2011) expresses his concern that a significant increase in greenhouse gas emissions is expected if solutions are not found and measures are not taken for reduce of the consumption of electrical energy. Śleszyński and Frączek (2015) share a similar opinion and consider that achieving energy efficiency, reducing heat waste and the decrease of the amount of used electricity are the key factors for reducing greenhouse gas emissions.

Investing in tangible fixed assets with ecological use is also an activity that would lead to the protection of natural resources such as water, air, soil and would have a

positive impact on waste and noise. Chiprianov et al. (2014) consider that because of the requirements laid down in EU policies and the desire of enterprises to produce competitive and ecologically oriented production, more and more of them apply management policies and make investments aimed at the environmental and human health protection, optimal use of resources and sustainable management, carry out pollution control. In his study, Xiaowen (2021) measured and analyzed the relationship between the type of energy used in industry and the environmental impact. The author proved statistically that investment in fixed assets has a positive effect on industrial wastewater emissions, sulfur dioxide emissions and industrial smoke.

Activities related to encourage waste reduction, increasing recycling levels and the development of a circular economy will have a positive effect on the environment, minimizing waste and pollution. According to Ivanova (2016), in order to achieve ecological efficiency in production, it is necessary to take measures, on the one hand, to utilize waste by transforming it into fuels or materials, and on the other hand, to carry out activities to increase energy efficiency. Krasteva (2018) adds that waste management is essential for the efficient use of resources. Petkov et al. (2023) emphasize the negative economic and environmental impact of waste disposal or incineration and the benefits of recycling and reusing valuable materials contained in waste.

Activities related to water resource management have a significant impact on both environmental protection and human health. The health of ecosystems and society is closely related to the quality and quantity of water resources. Integrated water resource management is a process that can help countries to deal with water problems in an efficient and sustainable way (Stoyanova, 2021). When and Montalvo (2018) consider that integrated water management leads to the sustainable use and regeneration of water resources, the protection of ecosystems and the construction of the necessary infrastructure. The complex and interrelated issues in the water sector require an integrated approach in water resource management to cope with uncertainty in water sector.

It can be summarized that activities related to environmental protection lead to the occurrence of many positive effects such as optimal use of resources, reduction of climate impacts, ensuring security of energy supply, improving the health of ecosystems and society, increasing the quality of life etc.

Methodology
The aim of the paper is to be prepared a comparative analysis between the planning regions in terms of environmental protection activities and on this basis to be determined the place of each region and to be evaluated the effectiveness of the financial sources used for environmental protection activities.

The paper analyzes data related to the environmental protection activities undertaken in the planning regions related to household waste submitted for recycling,

waste water discharged from treatment plants, installed renewable energy sources capacities, research and development expenditure, number of buildings financed under the National program for energy efficiency of multifamily residential buildings. On the basis of the data analysis, the comparison between the planning regions for the period 2017 -2021 was made, and they were ranked in three groups – active, moderately active and low active. The selection of indicators is based on the available data for planning regions from National statistical institute (NSI) and Institute for market economy (IME).

Data envelopment analysis (DEA) is a method that is widely used in environmental research. Sözen and Alp (2009) perform a DEA to evaluate the efficiency in terms of harmful substance emissions and energy consumption. Castellet and Molinos-Senante (2016) in their research measure the effectiveness of the used financial resources for different operational costs for water treatment and pollutants removed from the wastewater. Yang and Chen (2021) also use a DEA to evaluate the efficiency of wastewater treatment plants in terms of energy used and pollutants released from the water. Albores et al. (2016) use DEA to evaluate the efficiency of using waste to create energy. They search also the maximization of positive (energy) and reduce of negative (pollutants) outputs. In this paper DEA was applied in order to be found the most effective region according to the chosen inputs. The decision making units (DMU) are the six planning regions in Bulgaria. The model is Input oriented with constant return to scale (CRS). Four input-oriented models were constructed. In all four models, the aim is to evaluate the effectiveness of indicators such as tangible fixed assets (TFA) with ecological use, expenditures for research and development and financial resources under the Operational program environment (OPE). These indicators are defined as Inputs. For outputs are chosen as follows: generated municipal waste, waste water discharged without treatment, CO_2 emissions and destroyed territories. The results of the DEA show in which of the planning region regardless of the higher use of TFA with ecological use, higher expenditures for research and development and sources under OPE, the amount of the generated municipal waste, waste water discharged without treatment, CO_2 emissions and destroyed territories are the same.

Analysis of the environmental protection activities by planning regions

In a comparative aspect for the period 2017-2021, household waste submitted for recycling is increasing in all planning regions. For the analyzed period, the household waste submitted for recycling in the South Central region increased around 4 times from 16 thousand tons to 62 thousand tons (Figure 1). This region is also in the first place in increase of the submitted household waste for recycling per capita from 11 to 45 kg. per person.

In North Central region this indicator increased three times from 14 thousand tons to 42 thousand tons, and per capita it increased from 17 to 56 kg per person. In the

North Eastern region, they increased 2.5 times from 20 thousand tons to 50 thousand tons. In the South Eastern and North Western regions, they increased twice as a total amount and per capita the submitted waste for recycling increase more than twice. The leaders in terms of the amount of household waste submitted for recycling in 2021 are the South Western region with 95 thousand tons and the South Central region with 62 thousand tons.

	2017	2018	2019	2020	2021
■ North Western region	9	17	17	27	18
▨ North Central region	14	22	24	18	42
▥ North Eastern region	20	27	30	21	50
▢ South Eastern region	18	20	13	19	36
▧ South Western region	73	103	72	42	95
▨ South Central region	16	26	29	17	62
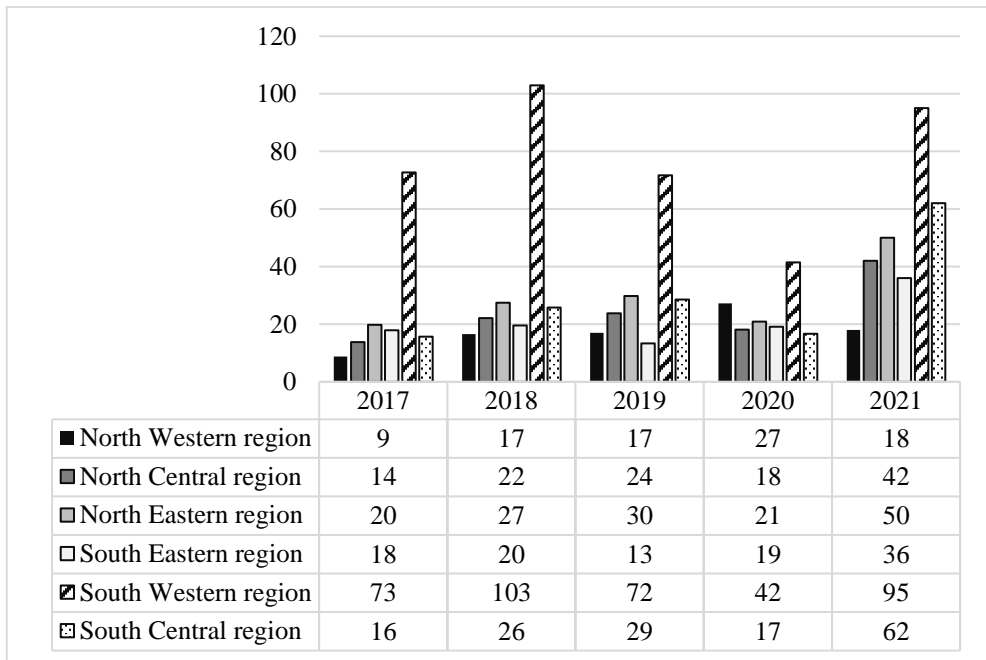
Figure 1. Household waste submitted for recycling for the period 2017 – 2021, thousand tons
Source: NSI, Environment, Waste from economic activity

There is a decrease in the number of municipal waste landfills in all planning regions for the period 2017-2021 (Figure 2). This is due to the creation of regional landfills and closure of existing smaller municipal landfills. In 2021 the largest number of landfills is observed in the South Central region, followed by the South Eastern and South Western. The number of landfills and installations for the treatment of household waste is the least in the North Central region.

	North Western region	North Central region	North Eastern region	South Eastern region	South Western region	South Central region
■2017	12	10	13	15	30	24
■2018	10	6	9	12	20	15
■2019	9	7	10	14	15	14
■2020	10	8	11	14	14	16
■2021	10	7	9	14	14	19
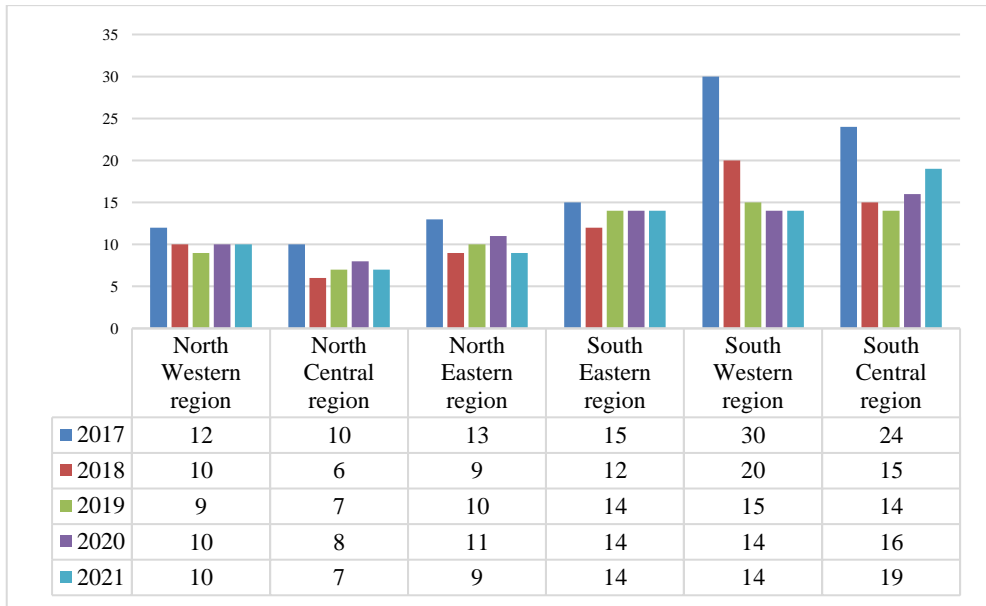
Figure 2. Number of landfills and installations for the treatment
of household waste for the period 2017 – 2021
Source: NSI, Environment, Waste from economic activity

Statistics regarding the availability of tangible fixed assets (TFA) with ecological use is an indicator which has impact on the activities for environmental protection as they include facilities, installations and equipment through which the environment is protected or restored. TFA with ecological use lead to the protection of water, air, soil, influence in a positive aspect on the waste and noise. According to the NSI methodology, they also include monitoring and control equipment. The data shows that the most investments for the period 2017-2021 for the TFA with ecological use were made in the South Eastern planning region (Figure 3). In second place is the South Western region, where an increase in investments in TFA with ecological use for the period 2017-2021 is observed. The increase is from 2,103,843 thousand BGN to 2,921,972 thousand BGN. South Western region is followed by the South Central region, where also is observed an increase in investments in environmentally friendly TFA. The last three places are occupied as follows by the North Eastern, North Western and North Central regions, and in two of them the availability of TFA with ecological use for the period 2017-2021 increases (North Eastern and North Central) and in one it decreases (North Western).

	North Western region	North Central region	North Eastern region	South Eastern region	South Western region	South Central region
2021	952775	882788	1049843	3349832	2921972	1716102
2020	966706	880448	1102670	3169663	2761424	1587122
2019	956369	870113	1017077	3048683	2530489	1467027
2018	917246	805800	974754	3019579	2373636	1432581
2017	1014851	770345	952616	3207707	2103843	1418936

Figure 3. Availability of tangible fixed assets with ecological use, thousand BGN
Source: NSI, Environment, Tangible fixed assets with ecological use

The data on the operating municipal treatment plants can also be linked to the activities for the environmental protection and, in particular, of water resources. In the three Northern planning regions and in the South Eastern they are increasing. In the South Western their number remains the same, and in the South Central region they decrease from 41 to 38 numbers (Figure 4). Comparatively, in 2021, the largest number of operating municipal treatment plants is in the Southern planning regions. In first place is the South Central region (38), followed by South Western (36) and South Eastern (33). The fewest water treatment plants are in the in the North Central region – 19.

	North Western	North Central	North Eastern	South Eastern	South Western	South Central
■ 2021	27	19	23	33	36	38
■ 2020	26	18	23	33	36	38
■ 2019	26	18	23	28	37	41
■ 2018	25	16	23	28	37	41
■ 2017	25	16	22	29	36	41
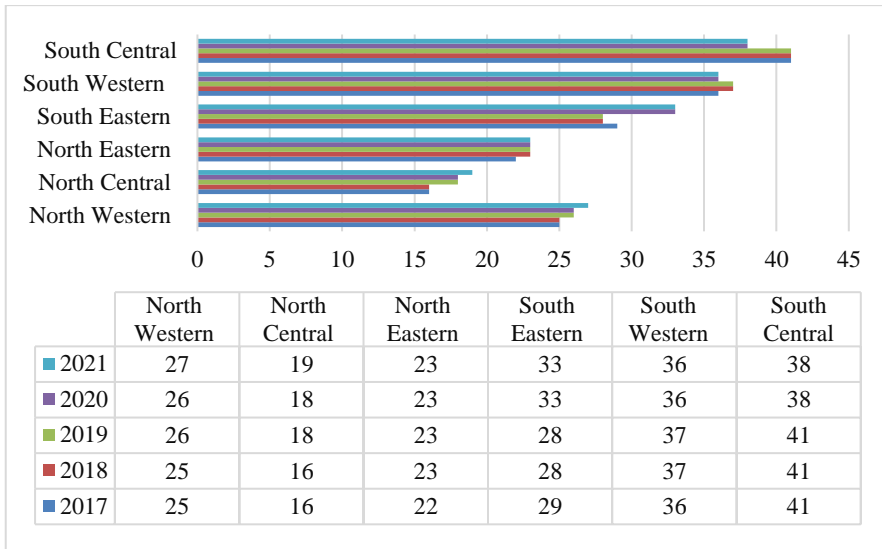
Figure 4. Number of operating municipal wastewater treatment plants

Source: NSI, Environment, Water statistic

In accordance to the air protection in planning regions is papered an analysis of statistical data on installed renewable energy sources (RES). They differ across different planning regions. In the South Central region, the capacities are the highest – 9,963 kW per capita (Figure 5). This is due to the water resources which are found in this planning region.
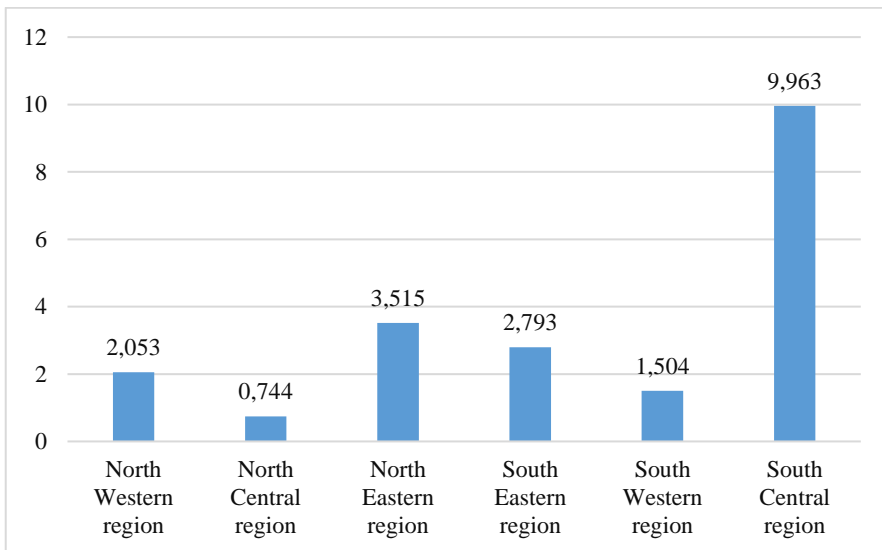
Figure 4. Installed RES capacity per capita (kW), 2020

Source: IME, 2021

The lowest capacities are in the North Central region – 0.744 kW. In the next place is the North Eastern region, where the installed RES capacities are 3,515 kW. Large part of the installed capacities is related to the use of wind energy through the creation of wind energy parks. In the South Eastern region 2,793 kW of RES capacity per capita have been installed. In fourth and fifth place in terms of installed RES capacities are the North Western planning region – 2,053 kW and the South Western – 1,504 kW per capita.

Figure 6 presents data on the number of buildings financed and put into operation under the National program for energy efficiency of multifamily residential buildings on 30 June 2023.

Figure 6. Number of buildings financed under the National program for energy efficiency of multifamily residential buildings, 30 June 2023

Source: https://www.mrrb.bg/bg/energijna-efektivnost/nacionalna-programa-za-ee-na-mnogofamilni-jilistni-sgradi/aktualna-informaciya-za-napreduka-po-programata/

Leading positions are occupied by the three southern planning regions. South Western planning region is in the first place, where the most buildings were financed in the districts of Blagoevgrad and Sofia. In second place is the South Central region, with the highest number of projects under the program realized in the Plovdiv and Haskovo districts, and in third place is the South Eastern region, with leading regions Burgas and Stara Zagora. In the three Northern planning areas, the number of buildings financed under this national program ranged from 155 to 178.

Expenditures for research and development follow an increasing trend for the period 2017-2021 in five of the planning regions (Figure 7). They decreased for the analyzed period only in the North Eastern region, from 51,626 BGN to 48,188 BGN. The highest increase was in the South Western and South Central regions, respectively from 538,651 BGN to 827,264 BGN and from 69,352 BGN to 86,104 BGN. The trends in terms of expenditures for research and development activities per capita are similar. They are the highest in the South Western planning region – 399 BGN per capita, and for the period they increased to the highest extent in this region, followed by the South Central region, where they increased from 49 BGN to 62 BGN per capita.

	North Western region	North Central region	North Eastern region	South Eastern region	South Western region	South Central region
2021	34996	32565	48188	44887	827264	86104
2020	31830	31642	45651	45087	778431	91149
2019	32106	30462	63852	47798	736037	91877
2018	37437	26612	49750	42137	603853	69115
2017	31285	30226	51626	39094	538651	69352
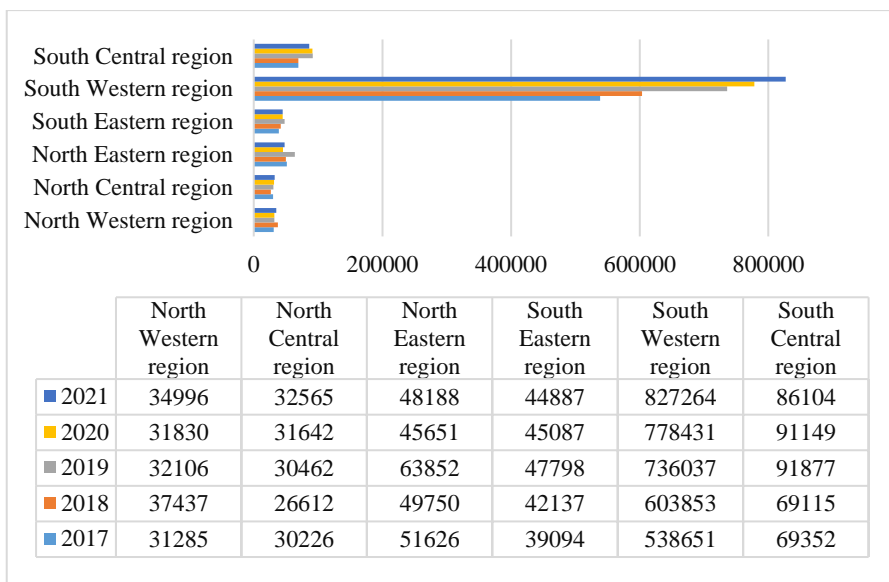
Figure 7. Expenditures for scientific research and development activities by planning regions for the period 2017 – 2021

Source: NSI, Business statistics, Total intramural R&D expenditure by regions and sectors

Results from the DEA model
Data from the DEA regarding the three types of expenditures related to environmental protection activities and waste water discharged without treatment in 2021 show the effectiveness of the used sources (Table 1). The South Central region is defined as the most effective in terms of the expenditures for environmental protection activities and the amount of waste water discharged without treatment, followed by the South Eastern and North Western regions. The effectiveness of expenditures for research and development, funds from OPE for 2021 and the availability of TFA with ecological use is the lowest in the North Eastern region, i.e. no matter how much these financial sources increase in the region, the amount of

wastewater without treatment remains the same. The effectiveness of the three types of expenditures related to environmental protection activities and generated household waste is high in all six planning regions. The most effective DMU are North Central and North Eastern regions. Most efficient in terms of analyzed expenditures and disturbed territory is South Eastern region, followed by North Central. The least efficient DMU in this model is South Central region. Regardless of how much expenditures for research and development, availability of TFA with ecological use and funds from OPE increase, CO_2 emissions remain at the same levels in the North Western, North Central, South Central, and South Western regions. The most efficient unit in terms of analyzed expenditures and CO_2 emissions is the South Eastern planning region.

Table 1. Results of DEA

DMU	Waste water discharged without treatment (output), 2021	Rank	Household waste (output), 2021	Rank	Disturbed territories (output), 2021	Rank	CO_2 emissions (output), 2019	Rank
North Western	0,71653	3	0,75424	4	0,57606	3	0,16167	5
North Central	0,45114	4	1,00000	1	0,78918	2	0,28058	4
North Eastern	0,11773	6	1,00000	1	0,56852	3	0,52173	2
South Eastern	0,84808	2	0,97178	2	1,00000	1	1,00000	1
South Western	0,37478	5	0,87474	3	0,53596	3	0,37452	3
South Central	1,00000	1	0,87576	3	0,40634	4	0,12326	5

Source: own calculation

Conclusion

Based on the data analysis, the regions are classified in three groups: active, moderately active and low active according to the realized environmental protection activities. South Eastern and South Central regions have the best positions in terms of most of the analyzed indicators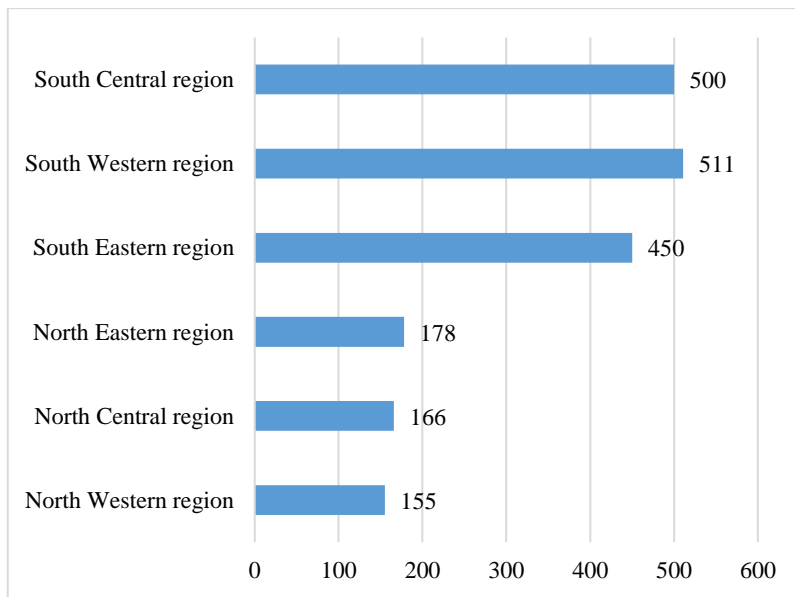 – household waste submitted for recycling, operating municipal wastewater treatment plants, number of buildings financed under the National program for energy efficiency of multifamily residential buildings, expenditures for scientific research and development activities. South Western and South Eastern regions are also leaders in availability of TFA with ecological use (Table 2). South Eastern and North Eastern regions can be defined as regions that are moderately active in environmental protection activities. They are in intermediate positions in four of the six analyzed indicators. The North Central and the North

Western regions are in last place in most of the indicators. The North Central region ranks last in five of the six analyzed indicators, and the North Western region in four of the indicators.

Table 2. Classification of the regions according to the realized environmental protection activities

Environmental protection activities	Active	Moderately active	Low active
Household waste submitted for recycling for the period, 2021	SW, SC	NC, NE	SE, NW
Tangible fixed assets with ecological use, 2021	SW, SE	SC, NE	NW, NC
Operating municipal wastewater treatment plants, 2021	SW, SC	SE, NW	NE, NC
Installed RES capacity per capita (kW), 2020	SC, NE	SE, NW	SW, NC
Number of buildings financed under the National program for energy efficiency of multifamily residential buildings, 30 June 2023	SW, SC	SE, NE	NC, NW
Expenditures for scientific research and development activities, 2021	SW, SC	SE, NE	NC, NW

Legend: NW – Nord Western; NC – North Central; NE – North Eastern; SE – South Eastern; SW – South Western; SC – South Central

Source: own research based on data analysis

The conclusion is that the South Central and South Western regions are the most active in terms of carrying out activities that lead to environmental protection, the South Eastern and North Eastern regions can be defined as moderately active, and the North Central and North Western regions as low active in terms of environmental protection activities.

In order to increase the engagement of the regions to carry out environmental protection activities, various initiatives can be taken, most often related to better understanding of ecological benefits, taking political actions and implementation of regulations in economic sectors related to the environment and natural resources, spreading of good practices. Increasing the amount of waste submitting for recycling can be achieved through complex actions aimed primarily at raising the awareness of both society and business, improving existing infrastructure and creating a new one. Increasing the benefits of TFA with ecological use requires undertaking

such business strategies through which the assets are used optimally and the environmental benefits are maximized. Activities related to the dissemination of information about the economic and environmental benefits (energy efficiency, cost savings, environmental protection, etc.) of TFA with an ecological use, the creation of events and demonstrations for the dissemination of good practices, government incentives and policies to promote the acquisition of TFA with ecological use could be a driver for business for increasing such type of assets. The increase of municipal wastewater treatment plants, installed RES, energy efficient building requires precise planning, financial support and opportunities to ensure financing, community engagement, adequate regulation and political focus on business sectors that could have a positive impact on the environment and natural resources.

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NSI, *Environment, Water statistic.*

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INNOVATIVE MARKETING SOLUTIONS AND VALUE CREATION IN AGRIBUSINESS: THE CASE OF SLOVAK WINERY

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Abstract

The creation of added value in the agro-sector is an essential part of the strategy of any business entity interested in a competitive position in the food market in a local, national, and international context. In the framework of the European Green Deal, the European food system known as the „Farm to Fork" strategy, must bring the benefits to the climate, biodiversity, and health of population. One way how to achieve is the way of innovations in terms of technological or marketing progress or value added. The value created in the product creation process can be supported by appropriate innovative practices, with the effective involvement of modern marketing tools and the application of market segmentation. Each market segment and each level of the food system need different added value and innovations are perceived differently. Consumer perception we consider as an important aspect in successful implementation of the „Farm to Fork" strategy at the level of consumer. Using the example of a Slovak wine producer, we point out the possibilities of using innovative marketing approaches to increase the value of a locally produced product (segmentation, marketing communication, event marketing and using social media). We used Google analytics to evaluate the quality of marketing communication. We chose the period from 01/04/2022 to 31/10/2022 as the monitored period because it is the period when the winery is most active from marketing point of view due to many wine tours and wine tasting that take place in observed period.

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Moreover, the observed winery, Frtus Winery, is trying to reach a very specific target group (searching for luxury products) within in market segmentation process, so marketing communication and social media must consider this aspect. To increase the value of using social media for marketing communication, we recommend to create a content plan, use of storytelling and story selling, and to create video content. Using video as a marketing tool can be significant to the marketing strategy. Email marketing is not very new, but still interesting tool of digital marketing. The goal of email marketing is to increase customer loyalty to the brand and encourage repeated purchases. The key is keeping emails relevant and interesting. Last, but not least, we mention the marketing position of ambassador as a person who represents company/brand and cooperates with brand continuously. Ambassador can be an expert in certain field or influential figure. They have significant impact on brand reputation and sales.

Sustainable food chains and value creation process friendly to the environment and nature around account crucial part of the new food strategy call also as „Farm to fork strategy." Intention of our research is to show how to use the criteria of segmentation, innovation processes and opportunities for marketing communication for supporting local businesses and bring the value to customers and local communities.

Introduction
The Farm to Fork Strategy is a new comprehensive approach to how Europeans value food sustainability. It is an opportunity to improve lifestyles, health, and the environment. People pay increasing attention to environmental, health, social and ethical issues and they seek value in food more than ever before. Even as societies become more urbanised, they want to feel closer to their food. They want food that is fresh, less processed and sustainably sourced. And the calls for shorter supply chains have intensified during the current outbreak. Consumers should be empowered to choose sustainable food and all actors in the food chain should see this as their responsibility and opportunity. Short food supply networks are more sustainable and socially feasible for small and medium-scale producers who have difficulty accessing long, conventional food chains (Malak-Rawlikowska, 2019).
Performics et al. (2021) says, online marketing is a actual topic these days. It is no longer just about promoting products and services through the media platform. Kuna et al. (2018) states, in recent years, the number of users which spent time on the Internet has significantly increased. Result is the increase the number of online advertising channels and their use. Online marketing involves many activities whose goals is to recognize and satisfy the needs of potential customers. Marketing

aims to reach consumers at the moments that most influence their decisions. It is very important to understand the consumer's purchase decision journey and direct all efforts to the moment of maximum impact. It follows that it is extremely important to reach consumers in the right place at the right time and with the right message. Online marketing has many benefits. It allows brands to effectively reach target audience with clearly measurable results. The main key to success is knowing brands target audience and know their problems, needs and desires. According to Puspita, (2022), psychology helps a marketer understand why and how consumers behave. Concepts of psychological factors include motivation, personality, perception, learning, values, beliefs and attitudes, and lifestyles.

Kotler, Keller (2016) notes, brands use social media and online marketing activities for communication with customers, or for direct and indirect improvement of awareness of products, services and brand, improvement of brand image and for support sales of products and services. These activities are carried out through e-mails, search engines, displaying advertising on social networks, company and company blogs, discussion forums and blogs. The most popular communication platforms are Facebook, Twitter, Instagram, and YouTube.

The list of wine-growing regions in Slovakia is divided into 6 wine-growing regions, which are subsequently divided into wine-growing districts (except the Tokai wine-growing region) and wine-growing villages. Závracký says, Slovak viticulture is not just a just a few dozen large or medium-sized producers, known from posters and supermarkets or from international competitions. There are also hundreds to thousands of small producers, professionals and amateurs organized in various unions and associations. Often unknown people produce beautiful and interesting wines to which they give a part of their heart. Mitchell, Chartes, Albrecht (2012) mentioned that vineyard management and the relation among wine production and the local territory are a relevant part of local tradition as physical and cultural landscape, and, therefore, could contribute to preserving and promoting cultural heritage, while attracting wine tourism and fostering communities' growth. We can observe also growing export of wine that demonstrate the intension of wine producers to add the value to wine production and bring high quality local product to the international market (Figure 1 and 2). Hope that Slovak wine producers will discover and recognize the quality of domestic wine producers.

In the wine industry, more and more groups of potential customers are increasing. There are different types of wine consumers. They have different behavior, needs, attitudes. For example, this group includes wine lovers, wine connoisseurs, someone who drink wine only occasionally. Author Bauer Ritz (2016) characterizes people who drink wine into six segments: Overwhelmed, Image Seekers, Enthusiast, Everyday Loyal, Price Driven, Engaged Newcomers. According to author, it is important knowing which of these is brands target wine consumer can take the guess

work out of what brand should look like and what wine marketing programs will succeed for brands business.
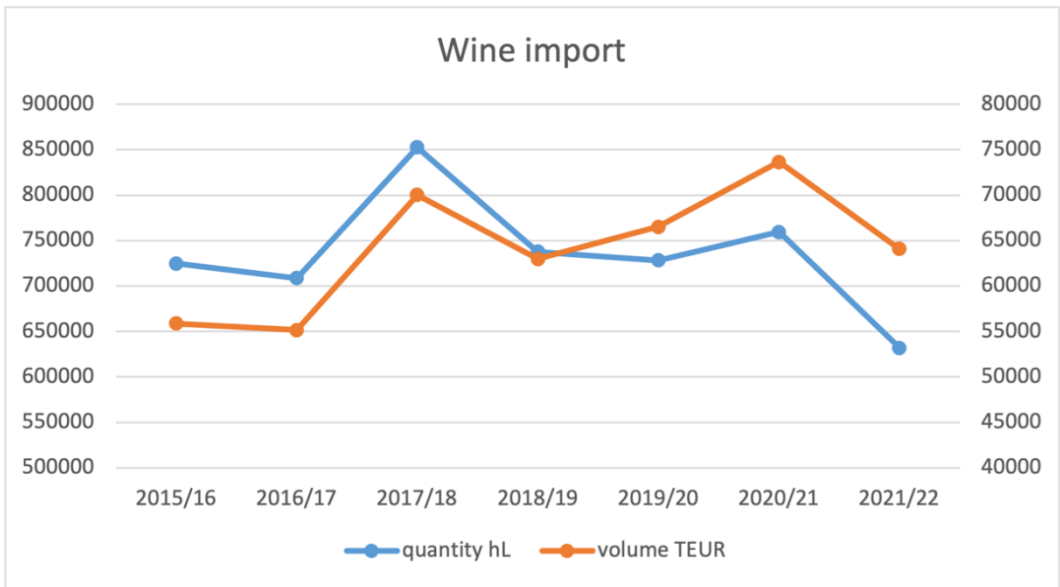
Figure 1. Import of wine and wine products to Slovakia
Own work based on https://www.vuepp.sk/04_komodity.htm
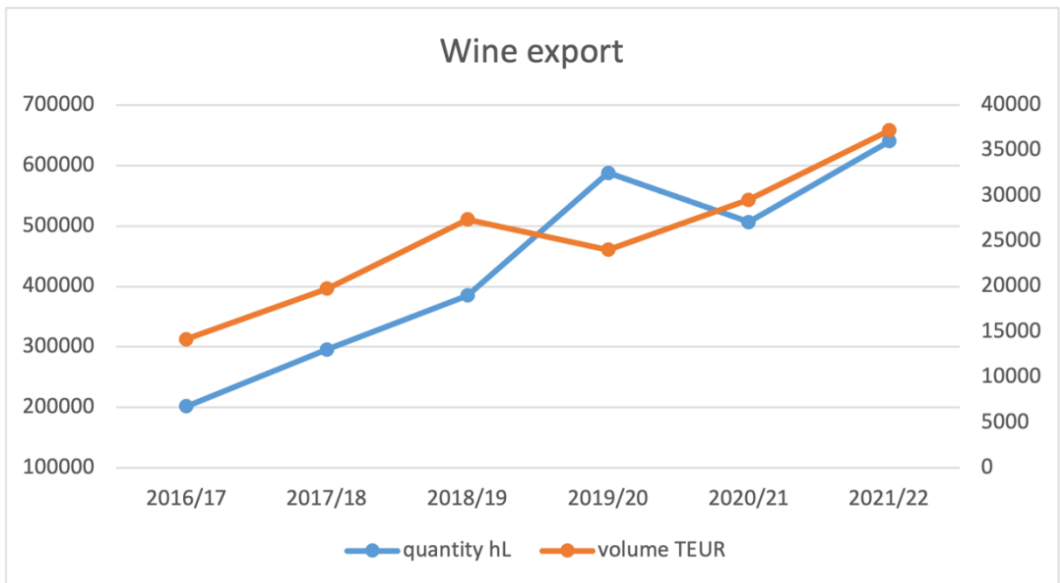
Figure 2. Export of wine and wine products from Slovakia
Own work based on https://www.vuepp.sk/04_komodity.htm

Methodological framework

The subject that we were focusing on, during our research was the Frtus Winery, a boutique winery that is a Slovak wine producer. Frtus Winery is a boutique winery and according to the main aim of the paper we try to identify the elements of innovative marketing and modern marketing communication using social media as an effective tool to bring high quality local product to the market. Besides using traditional methods of market research (questionnaire) that is not a part of this paper we try to use Google Analytics to evaluation the evaluate the quality of marketing communication. Google Analytics is a web analytics service that provides statistics and basic analytical tools for search engine optimization (SEO) and marketing purposes. Google Analytics is used to monitor website performance and collect visitor data. For our Google analytics analysis purposes, we chose the period from 01/04/2022 to 31/10/2022 as the monitored period. We chose this period precisely because it is the period when the winery is most active from the point of view of marketing. And this is because in this period the most wine tours and wine tastings take place, which results in the largest and most visible marketing activity. At the end of the paper there are defined the steps and processes to for active implementation of innovative marketing principles into practice of food producers and marketers.

Boutique wine and luxury marketing

Boutique wines are hand-made and are produced with the aim of creating a masterpiece in each bottle. A truly boutique wine is one that is personalized, from beginning to end. From vineyard management to bottling, every step in the creation of a boutique wine is purposeful and unique. Frtus Winery was officially founded as a limited liability company in 2012. The winery is trying to reach a very specific target group within in market segmentation process. The target group of the Frtus Winery consists of wine lovers who are willing to pay a higher price during purchasing the wines. The aim of the Frtus Winery brand is to reach a target group that will drink wines for 1000 Euro during the year. This policy is reflected through the wine club that the brand manages. The club represents a society of friends united by the love of wine, where everyone knows each other personally, respects each other and shares the same values. The brand is trying to reach people who like their wine enough to join the club, where the entry fee is 1000 Euro, which serves as an annual credit for the purchase of Frtus wine, which in practice means that when buying wine, members have the purchase amount deducted from their initial membership fee. For club members, there are of course other benefits that they can enjoy. Benefits for members include, for example: 25% discount on the purchase of wines in our e-shop, free initial tasting sample, once a year an exclusive tasting of Frtus Winery wines with a sommelier at your private party, services of a personal winemaker, private tastings, invitation on events organized by Frtus Winery and the free shipping and delivery to your door throughout Slovakia. Another unique form of

marketing communication and presentation of the company is cooperation with the JLR luxury car dealership. This cooperation is since when buying one of the vehicles of this brand, the buyer will receive a dragon seat from Frtus winery with an invitation to the club or a discount for the purchase of wine. This is the right way for winemaking to increase its awareness of its vascular group, which we have already defined. Additionally, the Frtus winery has a one-of-a-kind partnership with Miss Universe, so the attractiveness of Slovak females combined with fine wine cannot fail to impress and go unnoticed. The presentation of the story of the winery is a very important element when we talk about wine marketing. It forges emotional bonds and personifies the brand in the eyes of the consumer, who can therefore sympathize more and become so engrossed in the tale that he chooses to purchase the wine solely on the basis of the tale that lies behind his favorite bottle. The winery posts their story at its social media and also at their webpage or even in some newspaper publications. Another essential part of the life of a winery, and the Frtus winery is no exception, is participation during wine tours, where the winery presents itself and can attract new customers. According to marketing experts, all these activities are a good step in the world of marketing, but they will never work effectively if the company does not have a website. Frtus winery is aware of this fact and on its website: www.frtuswinery.sk. On the website, the customer can find basic information about the winery and its history, as well as an e-shop where the customer can order and buy his favorite wine. The purpose of the website is also to log in and register to the Frtus winery club, whether for new members or existing ones.

Google Analytics evaluation
Here are some indicators they show the power of Facebook communication:
- The average monthly traffic of the frtuswinery.sk website for the monitored period was 522 visits with a overall bounce rate of 27.56%. Bounce rate is the % of single-page sessions in which there was no interaction with the page. The average bounce rate for most websites is somewhere between 26% and 70%. So, its indicates that the bounce rate of the Frtus Winery website is normal and users interact with content and navigate to another page. This is considered as a positive and desirable effect.
- Thanks to Google Analytics we can say that the highest traffic on the website was in the months of April to June. Significant attendance was on June 16, 2022. The reason was Frtus Winery's participation in the „Víno Pod Hradom – Trenčín" wine tour. It was a planned event. „Víno Pod Hradom – Trenčín „ on 16.06. 2022 posted on its FB page an announcement about the event + presentation of the Frtus Winery, where there was also a direct reference to the Frtus website. Based on the findings, we can state that this type of participation of the Frtus Winery was a very successful step, as 639 people clicked on the Frtus Winery website, which is 94.2%, on this day and through the Facebook page. The

referral published by „Víno Pod Hradom – Trenčín" was very effective, because the 639 website visits came especially by using this referral. That the power of social media well-balanced cooperation. The next big peak (682 visits) in website traffic was 29.04.2022. We can attribute this phenomenon to the launch of a new product on the market, namely the red wine „Dunaj Sweet". This product was also presented on social networks. As we can see, the presentation of the product aroused interest among customers, which was significantly reflected in the increased number of visitors to the website in the coming days.

- When are talking about demographic structure of the frtuswinery.sk website traffic the majority comes from Slovakia, especially Western Slovakia. It is easily reasonable given that the Frtus Winery runs a private winery club and most of wine events are held in West Slovakia.

- It seems to make sense from this perspective that the majority of the clients should originate in this region. But, as Frtus Winery provides the option of an online store, it would be suitable to target Slovakia as a whole. This might be done by gradually developing informative and engaging content on social media or using the previously mentioned PPC advertising as well as by performing SEO optimization.

- The ratio of returning visitors to new visitors is also a very important indicator that Google analytics provide us. It can be assumed that the returning visitors already have an increased interest in the offered website content or brand products. This fact is also confirmed by data from Google analytics: Returning visitors, who make up 25.2%, which is admittedly a smaller % representation, but returning customers spend almost half as much time on the frtuswinery.sk website as new visitors, in ratio /2.48 vs 1.08/. When we look at new visitors, we can see that they account for a considerably bigger percentage of visits, which suggests that Frtus Winery is appealing to both returning customers and those who have just learned about the company and visited their website. We can see this as a very positive fact because it increases the chance that a new consumer will become a repeat one.

- From our observations, we found out that Frtus Winery either publishes separate posts or uses the so-called „reference". Which in simple words means resharing a post from the organizer of the event on your social network profile. It is therefore a referring post or link directly to a Facebook profile or to the frtuswinery.sk website.

Conclusions

To increase the value of using social media for marketing communication, we recommend the following:

1. Create a content plan – content plan is an important part of marketing strategy. It is a document that outline goals, target audience, topics and timelines for creating and publishing content. It is necesarry to focus on visual platforms such as Instagram, Tiktok, Youtube and Facebook. The more details the content plan includes, the better. Storytelling and storyselling are important part of it.

2. Short – video content –according to a 2022 report by Bretous (2020), any video under 60 seconds is considered short-form, with optimal lenght 30-60 seconds. Video is engaging and entertaining to watch. According to studies, people share videos twice more often than other forms of content. Using video as a marketing tool can be significant to the marketing strategy.

3. Email- marketing is one of the digital marketing channels through which marketer tries build a relationship with potencial or current customer by sending emails. The goal of email marketing is to increase customer loyality to the brand and encourage repeated purchases. The key is keeping emails relevant and interesting.

4. Ambassador – brand ambasador is person who represents company/brand and cooperates with brand continuously. Ambasssador can be an expert in certain field or influental figure. They have significant impact on brand reputation and sales.

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IMPACT OF DEMOGRAPHIC FACTORS ON ECONOMIC ACTIVITY IN BULGARIA'S RURAL TERRITORIES

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LAZAROVA, ELITSA[2]

Abstract

Bulgaria has one of the fastest rates of population decline in the EU and the world. In 2021, the value is observed to be 21.6% lower compared to the value recorded in 2001. Changes in rural areas are even more dynamic and have a negative impact on their development opportunities. This paper aims to examine and analyse the economic activity of the rural population using statistical data obtained from population censuses. The analysis is mainly focused on the interdependencies between economic activity, employment in agriculture and their implications for the rural economy. Correlation and regression analysis were applied to test the research hypotheses. The summary of the obtained results shows that the coefficient of economic activity rises until 2020, but activity is uneven and at different rates in different regions, with the coefficient being lower in villages at the expense of economic activity in cities; • The unemployment rate in Bulgaria has gone through three stages: until 2013, it was in double digits, then it dropped to 4.2 (in 2021), and in 2019, an increase began, which varied greatly by region. The unemployment rate is significantly higher in the villages, with the most significant differences in the younger age groups; • The correlation analysis revealed a weak, positive, and insignificant relationship between the rural population and the coefficient of economic activity, as well as the presence of a medium, positive, and significant relationship between the rural population and the agricultural labour force; According to the regression analysis, Annual work unit has a positive and significant influence on the population in rural areas, indicating that agricultural specialization and automation are still in their early stages in Bulgaria, and the workforce in the industry is structure-determining Demographic processes have a negative impact on rural development. A cyclical pattern emerges wherein a declining local economy and depopulation coexist and mutually reinforce one another. A decline in demographic potential and a lack of human capital may limit investment flow. For these reasons, investing in human capital is regarded as a critical means of reversing unfavourable trends in demographic structures and processes in all countries affected by accelerated aging and depopulation. This includes improving the health-care system, education, and other social services, as well as raising the living standards of rural inhabitants. To achieve this goal, regional demographic policies must be developed that take into account the demographic and socioeconomic characteristics of each region.

Key words: demographic processes, economic activity, rural territories.

JEL: *J11, J43*

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Introduction

Bulgaria is one of the European Union member states experiencing a decline in population size, placing it within the group of ten countries with such demographic trends. In 2021, the value is observed to be 21.6% lower compared to the value recorded in 2001. The rate of decline is notably stronger in rural territories of the country and is mainly due to the high level of low incomes, unemployment, and poverty within these areas. Based on the data provided by Eurostat (Eurostat regional yearbook, 2022), it is evident that four out of the five regions with the lowest economic status within the European Union (EU) are located in Bulgaria. These regions indicate a gross added value per capita ranging from 36% to 40% of the average value of this indicator across the EU (EPRS,2021). Along with the reduction of the population and its density, there is also a deterioration of its age structure, the coefficients of demographic replacement, demographic dependence, etc. (Mladenov, 2014; Tsekov 2018; Burdarov, Ilieva 2021; Tsekov, 2021; Doitchinova, Wrzochalska, 2022; Doitchinova, Lazarova, 2023).

Researchers studying demographic processes in rural areas (Brown, Stucksmith, 2016) emphasize that the negative effect is not only the loss of population but also the negative impact on the economy and society. The authors indicate various effects and significant negative effects associated with community transformation and the formation of regional identity. (Emery, Flora, 2006; Reynaud, Miccoli, 2018). The phenomenon of depopulation increases the challenges faced in rural development, as it leads to a shrinkage in local markets and a decline in the availability of skilled and talented workers, accordingly limiting the development of rural industries. (Wood, 2008; Carr, Kefalas, 2009). In practical terms, it is apparent that a cyclical pattern emerges wherein a declining local economy and depopulation coexist and mutually reinforce one another.

Researchers (Anderlik, Cofer, 2014) relate the spatial distribution of depopulation to the economy of rural areas. The decline in agricultural employment, as well as the impact of globalization and automation on rural production, are among the leading factors. Previous research findings indicate that regions with high employment shares in agriculture usually experience significant population declines due to the phenomenon of out-migration resulting from enhanced labour productivity (Brezzi, Piacentini, 2010). Furthermore, Johnson and Lichter (2019), establish a correlation between the decrease in population in rural areas of the United States and the diminishing presence of small-scale agricultural operations. On the other hand, specific production specialization within the agricultural sector has an impact on the dynamic nature of demographic processes in rural territories. (Doitchinova, Miteva, 2020; Doitchinova, Stoyanova, 2020; Doitchinova, Stoyanova, 2023).

The aim of this report is to evaluate the economic activity within rural regions of Bulgaria as well as identify the main factors that impact it.

Methodology

Information for the period 2011 – 2022 was used to study the economic activity of the population by region and by place of residence (cities and villages), the unemployment rate by year and by place of residence (cities and villages), as well as by age groups. A demographic analysis was conducted in this paper using data from the National Statistical Institute (NSI), the Agrostatistics Department of the Main Directorate Agriculture and Regional Policy of the Ministry of Agriculture, the results of the Census of Agricultural Holdings in the Republic of Bulgaria in 2020, and the Population Census and the housing stock in the Republic of Bulgaria in 2021. Correlation analysis was applied to identify the relationship between five indicators, namely economic activity of the population, labour force in agriculture (through two indicators: persons in agricultural holdings and annual work unit (AWU)), population in rural areas, and population in the country by district. Based on the literature review, hypotheses were formed regarding demographic changes in rural areas, which were proven in the analytical part.

Assessment of the economic activity of the population

Throughout the examined decade, there was a notable upward trend in the economic activity rate, which ends in 2020. Based on the data obtained from the 2021 Population and Housing Census, it has been determined that as of the beginning of the month of September in the same year, the total number of individuals within the country's population falling within the age range of 15 to 64 years and actively participating in economic activities amounts to 2,835,000. The overall economic activity rate for the nation stands at 69.7%, with a breakdown of 70.8% for males and 68.5% for females.

The region with the highest coefficient of economic activity is Sofia (capital), with 78.6%, followed by Gabrovo, with 73.5%, and Pernik, with 72.1%. The above-mentioned indicator has the lowest values in the districts of Kardzhali (54.1%), Silistra (60.6%), Sliven (61.1%), Lovech (62.2%), and Targovishte (63.4%) (see Figure 1).

Some researchers (Nenov, 2023) have appropriately classified the regions beyond Sofia and its environs into two distinct categories, taking into consideration the proportion of the working-age population in each area. The terms „regions characterized by low unemployment" and „regions characterized by high unemployment" refer to these categories. The authors draw a conclusion regarding the significant economic divergence observed over a period of two decades as well as the emergence of „three economies" progressing at different speeds. In the district of Sofia and its surroundings (in 2021), the relative share of the economically active population of working age is 81%, 72% for the group of districts with low unemployment, and 67% for the group of districts with high unemployment, compared to, respectively, 71%, 73%, and 75% (2001). These differences are also confirmed by the significant average GDP growth (of 6% per year for Sofia and the surrounding area) for the entire period from 2000 to 2019, while for the rest of the country, this annual growth is about twice as low.
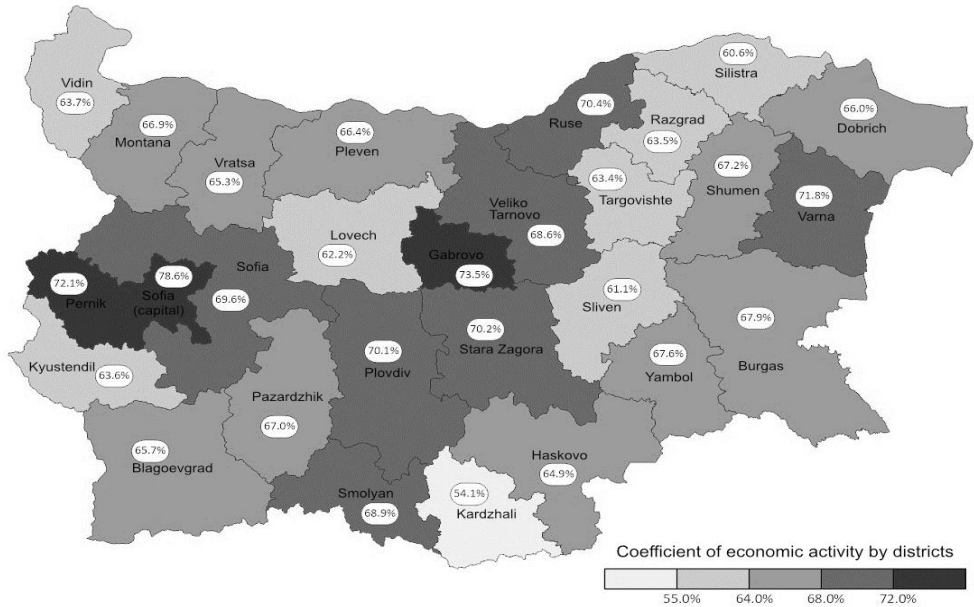
Figure 1. Coefficient of economic activity by districts
Source: NSI, Population and Housing Census, 2021.

The analysis of economic activity coefficients between urban and rural areas reveals a consistent trend of lower coefficients in villages across all age cohorts. The most significant differences are observed within the demographic of individuals aged 25 to 34 years (as depicted in figure 2), while the least significant differences are found among those aged 15 to 24 years.

The impact of regional differences in the unemployment rate on economic activity is noteworthy. During the time range from 2011 to 2021, our country experienced three separate phases of change in its unemployment rate. In the years before 2013, it was double-digit and has since decreased annually, reaching 4.2% in 2019. COVID-19 significantly changed the circumstances and caused the increase in the coefficient.

The data presented in Figure 3 regarding the unemployment rate in cities and villages indicates that the unemployment rate in villages is significantly higher. Regardless of the observed fluctuations during the specified timeframe, the disparities between the two coefficients indicate a decrease in unemployment rates in urban areas compared to rural areas by approximately 196% in 2017 and 243% in 2019. At the same time, the differences are most notable among individuals in the younger age groups. Within the demographic cohort encompassing individuals aged up to 29 years, it is observed that rural areas exhibit a higher unemployment rate of 53.7%, in contrast to the comparatively lower rate of 29.1% observed in urban areas. The differences are most minimal within the demographic of individuals aged 50 years and above.
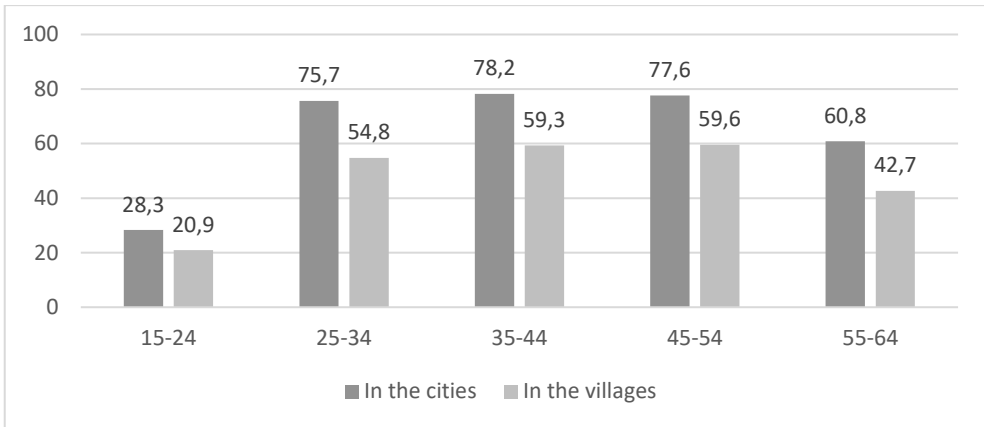
Figure 2. Employment rates by place of residence and by age (September 2021)
Source: NSI, Population and Housing Census, 2021.

Regardless of the overall national unemployment rate, there's significant district variation in employment levels. According to data from Census 2021, in three of the districts (Vidin, Silistra, and Targovishte), the unemployment rates are over 17%, respectively 20.1%, 18.1%, and 17.7%. On the next place (between 14% and 17%) are six districts (Razgrad, Shumen, Sliven, Pazardzhik, Montana, and Vratsa), and in eight, the coefficient is in the range of 11 to 14% (Pleven, Lovech, Blagoevgrad, Stara Zagora, Haskovo, Kardzhali, Yambol, and Dobrich).
The largest is the group of districts (9 districts), whose coefficient is between 8% and 11% (Sofia district, Pernik, Plovdiv, Varna, Burgas, Ruse, Veliko Tarnovo, Smolyan, and Kyustendil). Only two districts, Sofia Capital and Gabrovo, have an unemployment rate below 8%, respectively: Sofia, 4.6%, and Gabrovo, 7.4%.
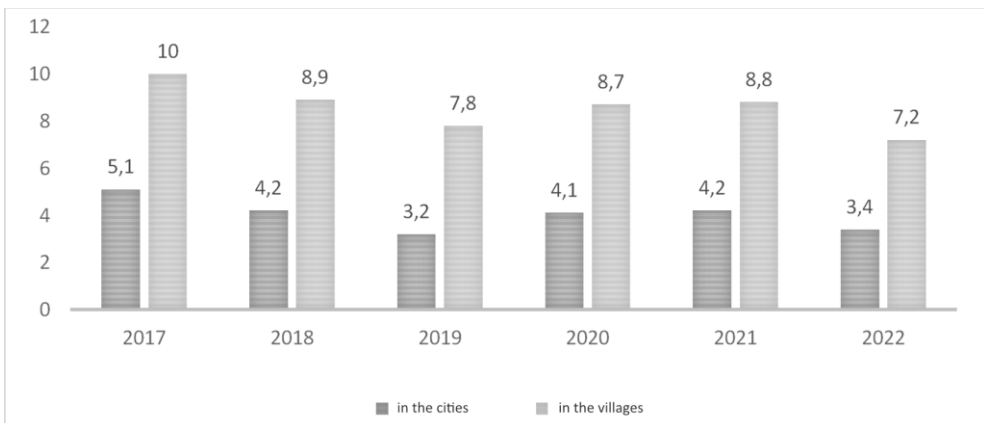
Figure 3. Unemployment rates for the period 2017–2022.
Source: NSI.

The analysis of youth employment in the specified regions reveals that, as of September 2021, the proportion of individuals aged 15–29 who are employed exceeds 30% in five districts, namely Sliven, Silistra, Lovech, Vidin, and Targovishte. There are a total of 18 districts that fall within the range of 20% to 30%, while only 5 districts, namely Varna, Gabrovo, Pernik, Smolyan, and Sofia Capital, have percentages below 20%.

The analyzed information, as well as the results of research by other authors (Tsekov, 2021), give grounds for the conclusion that in a large part of the municipalities in the country, the highly aged local population leads to a rapidly growing deficit of the population of working age in individual small municipalities and many villages. At the same time, there is a decline in the potential for economic growth (Doitchinova, Lazarova, 2023).

Correlation-regression analysis of economic activity in rural territories

Based on the comprehensive examination of existing literature, two hypotheses have been formulated related to the demographic transformations taking place in rural territories. These hypotheses specifically focus on the correlation between indicators such as the economic activity of the population and the labour force engaged in agricultural activities. Consequently, correlation analysis can be employed as a means to empirically evaluate the validity of these hypotheses:

H_1 – A negative correlation exists between the rural population and the coefficient of economic activity.

H_2 – A negative correlation exists between the rural population and the agricultural labour force.

In order to establish the existence of this relationship between these indicators, Table 1 presents data on economic activity in Bulgaria in 2021, the workforce in agriculture (Persons and AWU) in 2020, economic activity in agriculture (Gross value added in agriculture (GVA) in 2021), the country's population, and the population in rural territories in 2021 by district.

When examining the characteristics of the labor force employed in agriculture, two indicators were used: persons refers to the number of persons employed in agricultural holdings in 2020, and GRE represents the equivalence of persons employed in agriculture in 2020 within per year (1856 hours worked per year or 232 man-days). Table 1 shows that there are areas where the differences between the two indicators are small (Sofia, Gabrovo and Pernik) and areas where the two indicators diverge almost twice (Plovdiv, Blagoevgrad and Pazardzhik). In the first group of districts, the size of agricultural holdings allows higher employment of agricultural workers within the year. In the second group of districts, small family farms with part-time employment of their household members predominate.

Table 1. Distribution of Persons in Agriculture, Annual work unit in Agriculture, Gross Value Added in Agriculture, Population in Rural Territories, Total Population and Coefficients for Economic Activity (CEA) by Districts

NUTS 3 Districts	Persons 2020 (ppl)	AWU 2020 (ppl)	GVA 2021 (Agriculture) (mln. BGN)	Population in rural territories (PRT) 2021 (ppl)	Total Population (TP) 2021 (ppl)	CEA 2021 (%)
Vidin	4467	2325	148	27561	75408	69
Vratsa	7288	5271	192	91071	152813	65,2
Lovech	4778	2852	165	77695	116394	69
Montana	7114	4367	229	73679	119950	63,4
Pleven	8859	6334	265	112989	226120	69
Veliko Tarnovo	9077	6200	277	64602	207371	75
Gabrovo	2788	1518	93	37326	98387	72,5
Razgrad	7753	5759	246	59565	103223	**61,9**
Ruse	7535	4775	260	52127	193483	74,9
Silistra	9280	5081	253	56004	97770	65,4
Varna	8372	5059	270	112585	432198	75,1
Dobrich	12710	8211	390	76251	150146	68,5
Targovishte	7537	4875	204	49071	98144	62,4
Shumen	9308	5364	324	72298	151465	74,8
Burgas	15603	9400	281	183704	380286	68,2
Sliven	9613	4841	189	59800	172690	68,8
Stara Zagora	10564	7003	267	86573	296507	74,5
Yambol	8455	4888	207	47927	109693	67,7
Blagoevgrad	25185	14315	279	223149	292227	75,3
Kyustendil	8519	4042	115	24861	111736	74,5
Pernik	3644	2221	62	29815	114162	**76,9**
Sofia	1418	1017	191	231989	231989	75,8
Sofia (Capital)	9648	5683	79	0	1274290	**76,9**
Kardzhali	18046	9191	208	79172	141177	69
Pazardzhik	19423	9034	210	138446	229814	70,3
Plovdiv	27881	16237	367	257284	634497	68,5
Smoliyan	10351	2753	88	62596	96284	70,8
Haskovo	19090	9412	211	85591	211565	67,5

Source: Own calculation

On the other hand, the districts that increase the highest GVA in Agriculture, forestry, and fisheries in 2021 are the districts of Dobrich, Plovdiv, and Shumen, while districts such as Pernik, Smolyan, and Gabrovo realize the lowest GVA in agriculture. The largest rural population is in the districts of Plovdiv, Sofia, and Blagoevgrad, while the most populated regions in the country are Sofia-Capital, Plovdiv, and Varna. At the same time, the smallest rural population in 2021 is reported in Kyustendil, Vidin, and Pernik districts, and for the country, the smallest population is in Vidin, Smolyan, and Silistra. From the point of view of the Coefficient of Economic Activity (CEA), the weakest activity is in the districts of Razgrad, Targovishte, and Montana, and the most active are the districts of Sofia-Capital, Pernik, and Sofia.

It can be concluded that in certain districts, specifically Gabrovo and Pernik, there exists a minimal gap between the number of persons and the AWU. These districts also exhibit relatively low GVA in the agricultural sector. Additionally, Pernik stands out as a district with the smallest rural population. In those regions, despite the presence of high AWU values, which serve as indicators of increased agricultural employment, the sector's efficiency remains low and its development is insufficient. According to the other indicators, Sofia stands out with the smallest rural population but the most economically active population, while Sofia-Capital is the most economically active but also the most populated district in Bulgaria. Plovdiv, on the other hand, emerges as an area with the largest population, including a rural-type population, but also generates the highest GVA in agriculture, as those employed in this sector are seasonal and/or part-time. In the Plovdiv district, the share of agricultural production is increasing, and this branch is becoming more and more structurally decisive for the region.

As a result of the performed correlation analysis, the relationship of each indicator with the rest of the studied quantities is established. Table 2 presents the results of the analysis. Correlation is determined according to the scales for: 1) Strength of correlation – from 0.7 to 1 – strong correlation; from 0.3 to 0.7 – medium correlation and below 0.3 – weak correlation; 2) Nature of the correlation – positive or negative; 3) Significance of the correlation – P-value > 0.05 – insignificant correlation, P-value < 0.05 significant correlation.

Within the framework of the analysis, it is found that there is the strongest, positive, and significant correlation between indicators of the labour force in agriculture (Persons and AWU, 0.960), followed by a medium, positive, and significant correlation between AWU and GVA in agriculture (0.625), as well as between the AWU factors and the rural-type population by district (0.612). However, it is evident from Table 2 that the correlation between the CEA and the total population and the other indicators is weak.

Additionally, CEA has a weak positive correlation with the country's population and rural population but a weak negative correlation with the agricultural labour

force and agricultural GVA. On the basis of this, it is possible to draw the conclusion that the district's agricultural activity has a minor impact on the economic activity in the district.

The results of the correlation analysis indicate a rejection of the theoretical hypotheses and provide evidence in support of the following assertions:

- H_1 – Rejected because there is a weak, positive, and insignificant relationship between the population in rural areas and the coefficient of economic activity (0.053);
- H_2 – Rejected because there is a medium, positive, and significant relationship between the population in rural areas and the labour force in agriculture (Persons: 0.574 and AWU: 0.612).

The correlation analysis reveals a positive relationship between the indicators, with a particularly significant correlation observed between the population living in rural areas and the labour force engaged in agriculture. This finding highlights the need for further investigation and analysis in this specific direction.

Table 2. Correlation analysis of the indicators Persons in Agriculture, Annual work unit in Agriculture, Gross Value Added in Agriculture, Population in rural territories, Total population, and Economic Activity by districts

		Persons	AWU	GVA	PRT	TP	CEA
Persons	Pearson Correlation	1	**,960****	**,485****	**,574****	,296	–,068
	Sig. (2-tailed)		<,001	,009	,001	,126	,730
	N	28	28	28	28	28	28
AWU	Pearson Correlation	**,960****	1	**,625****	**,612****	,339	–,096
	Sig. (2-tailed)	<,001		<,001	<,001	,078	,628
	N	28	28	28	28	28	28
GVA	Pearson Correlation	**,485****	**,625****	1	**,513****	–,007	–,193
	Sig. (2-tailed)	,009	<,001		,005	,973	,326
	N	28	28	28	28	28	28
PRT	Pearson Correlation	**,574****	**,612****	**,513****	1	,157	,053
	Sig. (2-tailed)	,001	<,001	,005		,425	,790
	N	28	28	28	28	28	28
TP	Pearson Correlation	,296	,339	–,007	,157	1	,354
	Sig. (2-tailed)	,126	,078	,973	,425		,064
	N	28	28	28	28	28	28
CEA	Pearson Correlation	–,068	–,096	–,193	,053	,354	1
	Sig. (2-tailed)	,730	,628	,326	,790	,064	
	N	28	28	28	28	28	28

**. Correlation is significant at the 0.01 level (2-tailed).
Source: Own calculations in SPSS.

The following regression analysis investigates the influence of the labour force on the population in rural regions. The agricultural workforce in the present study is measured by two indicators that have a strong, positive, and significant relationship, as evidenced by the 0.960 correlation. That is why the AWU is used for the regression analysis, since the relationship between the AWU and the population in rural areas is more pronounced (0.612); moreover, the indicator takes into account the annual use of the labour force in agriculture equal to full annual employment and allows a clearer assessment of its impact.

Based on the literature review of the theory and the correlation analysis performed, the author team generated two additional hypotheses:

- H_1 – AWU has a negative impact on the population in rural areas (theoretical);
- H_2 – AWU has a positive impact on the population in rural areas (empirical).

To test the hypotheses and establish the relationship between the indicators, a regression analysis was conducted (see Table 3).

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,612[a]	,374	,350	51684,71666

a. Predictors: (Constant), AWU
Source: Own calculations in SPSS.

Even though only 37% of the AWU influences the rural population, the significance of the regression is one (0.001), and the model is fit for analysis (see table 4).

Table 4. Assess the statistical significance of the regression model and evaluate its suitability for analysis.

ANOVA[a]					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	41487025640,970	1	41487025640,970	15,531	<,001[b]
Residual	69454058353,994	26	2671309936,692		
Total	110941083994,964	27			

a. Dependent Variable: Population in Rural territories
b. Predictors: (Constant), AWU
Source: Own calculations in SPSS.

On Table 5, the regression coefficients are presented, which allow us to conclude that AWU has a positive (AWU is 11.206) and significant (Sig. 0.001) impact on

the population in rural areas, or in other words, if AWU increases by one unit, the population in rural areas will increase by 11,206 units.

As a result of the correlation-regression analysis, H_1 s rejected and H_2 is confirmed, and it can be summarized that AWU has a positive and significant impact on the population in rural areas. While in other countries, rural depopulation is caused by digitization and automation of production, in Bulgaria, agriculture specialization and automation are still insufficient, and labour force is a structure-determining factor for the agricultural sector.

Table 5

Coefficients[a]							
	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	21102,563	19661,228		1,073	,293		
AWU	11,206	2,843	,612	3,941	<,001	1,000	1,000

a. Dependent Variable: Population in Rural territories
Source: Own calculations in SPSS.

Conclusion

As a result of the analysis of the impact of economic activity on the population in rural areas, the following conclusions can be drawn:

- The coefficient of economic activity rises until 2020, but activity is uneven and at different rates in different regions, with the coefficient being lower in villages at the expense of economic activity in cities.
- The unemployment rate in Bulgaria has gone through three stages: until 2013, it was in double digits, then it dropped to 4.2 (in 2021), and in 2019, an increase began, which varied greatly by region. The unemployment rate is significantly higher in the villages, with the most significant differences in the younger age groups.
- The correlation analysis revealed a weak, positive, and insignificant relationship between the rural population and the coefficient of economic activity, as well as the presence of a medium, positive, and significant relationship between the rural population and the agricultural labour force.
- According to the regression analysis, AWU has a positive and significant influence on the population in rural areas, indicating that agriculture specialization and automation are still in their early stages in Bulgaria, and the workforce in the industry is structure-determining.

Demographic processes have a negative impact on rural development. A decline in demographic potential and a lack of human capital may limit investment flow. For

these reasons, investing in human capital is regarded as a critical means of reversing unfavourable trends in demographic structures and processes in all countries affected by accelerated aging and depopulation. (EC, 2020). This includes improving the health-care system, education, and other social services, as well as raising the living standards of rural inhabitants. (Nikolova et al., 2018; Lazarova et al., 2023; Wrzochalska, Łaba, 2022). To achieve this goal, regional demographic policies must be developed that take into account the demographic and socioeconomic characteristics of each region.

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TERRITORIAL APPROACHES FOR SUSTAINABLE DEVELOPMENT AND MANAGEMENT OF RURAL AREAS

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Abstract

Territorial approaches are of crucial importance for the sustainable development and management of rural areas. The trend towards consolidating all stakeholders into a comprehensive understanding to enhance the territory's sustainability, and the idea of finding optimal solutions in the pursuit of opportunities for balanced territorial development, is a task with diverse answers depending on the resource potential and activity of local communities. The rural territories in Bulgaria have untapped potential, both in the use and protection of the available resources and their social economic development, as well as in the generation of additional income. Their sustainable development would contribute to achieving a balance between economic, social and environmental growth, as well as significantly improve the quality of life of the local population. The aim of the present study is to identify the integrated territorial approach for sustainable management and development of rural territories in the Republic of Bulgaria. Main groups of activities for achieving balanced territorial development are identified as factors for sustainable development of rural areas. The opinion is defended that an important condition for the integrated approach is for all participants in the process to be interested and successfully combine specific measures suitable for the integration and development of the territory. The implementation of appropriate tools and correct approaches for sustainable rural territory development requires careful analysis and selection of effective measures, depending on the specific characteristics of the location and the initiative of the local community. Although agricultural activity occupies a significant portion of the business in most of these areas, it is imperative to have an adequate policy for the development of additional activities that ensure economic prosperity and a higher standard of living for the local population and their employment. Therefore, in order to achieve three-dimensional sustainability (economic, ecological, social), it is more than necessary to have better interaction and coordination among all participants in the process and a holistic approach to the development and management of each specific territory, in accordance with its specific needs, opportunities, and optimal solutions. Each community can contribute to achieving the goals of sustainable development by 2030, and not only in a narrow scope, but also by contributing to the global challenges that modern society as a whole is facing. The choice of a model for increasing sustainability in the specific territory should be aimed at optimal utilization of regional resources, diversification in the functional use of the territory, optimal diversification of production and economic activities, environmentally friendly business practices and above all at effective interaction between institutions, local administration, business and local communities.

Keywords: territorial approaches, rural areas, sustainable development and management
JEL code – O13, O18, R13

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Territorial approaches can provide an integrative framework that serves as a starting point for discussing challenges and seeking opportunities for optimal solutions in the management of each territory. This circumstance is entirely achievable through the participation of all stakeholders from each individual territory, and from there, it naturally reflects not only in enhancing the sustainability of the local economy but also in the overall territorial development of our country. For this purpose, the implementation of sustainable policies at every level –local, regional, and national – is necessary, along with dialogue and coordination with other sectors, contributing to the development of local economies. At the core of these approaches, in most cases, are innovative processes supported by the most promising activities in the specific region, depending on the resource potential of the territory. The nature of potential innovations is broad, including technological, social, organisational, and other aspects. An important component of territorial approaches also involves opportunities for diversification of economic and social activities. Last but not least, the implementation of ecological practices plays a significant role.

The sustainable development of a territory depends on the ability of its participants to define, plan, and finance actions that are part of a strategic vision, promoted by local authority and locally legitimised institutions (Boche M., J. Burte, M. Jouini, 2022). Initiating or implementing mechanisms for inclusive territorial development and management contributes to the full engagement of local participants in managing available resources, resolving existing conflicts, and seeking opportunities for investment planning. The existing mechanisms are a powerful toolkit for accumulating good practices, provided they are based on shared knowledge of the characteristics of the territory itself and the potential of the resources within its scope.

According to the national definition formulated for the purposes of rural development policy, rural areas cover 80% of the country's territory and nearly 40% of Bulgaria's population lives there (Bulgarian Rural Development Programme 2014-2020). Until recently, rural areas included municipalities where the largest settlement had a population of up to 30 000 people. The new national definition classifies 'rural areas' as municipalities where there is no settlement with a population exceeding 15 000 people (MAF, CAP Strategic Plan 2021 Report). According to this definition, 215 out of a total of 265 municipalities in Bulgaria are classified as rural areas (MAF, Strategic Plan for the Development of Agriculture and Rural Areas of the Republic of Bulgaria for the Period 2023-2027, 2022). It becomes evident that 50 of them fall outside the scope of municipalities classified as rural areas. Meanwhile, it is precisely in these regions that the main portion of land resources, settle-

ments, socio-economic, infrastructural, and other potentials of the country is concentrated. On the other hand, rural areas are characterised by deteriorated demographic, social, and economic indicators compared to the rest of the country's territories. All of this necessitates tracking the emerging opportunities within a transforming economy towards sustainability and seeking answers while investigating their development and management within a territorial scope. The requirement for a different perspective on definitions of rural areas becomes evident in the context of integrated territorial development (Nikolova, M., M. Linkova, P. Pavlov, E. Krasteva, 2022). According to some authors, development based on a combination of the three goals: economic, social, and ecological, should rely on the endogenous resources of rural areas. These resources include not only natural and cultural assets but also human capital qualifications, all while maintaining the interdependence between rural and urban areas (Martínez, 2001). Nevertheless, the Economic and Social Council (ESC) highlights that the new societal needs, along with the possibilities revealed by digital technologies and the expansion of remote work, lead to a renewed focus on rural areas as a place for environmentally-friendly living and new opportunities for social and economic revitalisation. The Economic and Social Council of the Republic of Bulgaria (ESC) believes that this period of renewed interest in rural areas should be maximally utilised to unfold the full potential of these territories (The Economic and Social Council, 2023). Our study has found that cluster analysis at the NUTS-3 level, focusing on the utilised agricultural area (UAA), can be applied for comparison with the urban-rural regional typology. The proposed research approach is applicable at the local administrative unit (LAU) level as well, where it can be used to seek correspondence with the classification for the degree of urbanisation (Nikolova, M., Nenova, R., 2022).

More than 5 years ago, the Organization for Economic Cooperation and Development (OECD) recognised that the concept of 'rural space' is multidimensional, with varying meanings for different purposes (OECD, 2016). Our opinion is based on the understanding that rural territory is a part of the area of each specific region where agricultural production takes place and is intricately linked to the sustainable development of the entire territory. The process of rural territory development and management is connected to and aimed at retaining and/or increasing the local population and preserving rural identity, values, culture, and way of life. This process has a regional character and does not solely entail the development of agriculture but also involves other economic activities to provide favourable conditions, income opportunities, and quality of life in accordance with the specific needs and characteristics of each rural area (Nikolova, M., M. Linkova, P. Pavlov, E. Krasteva, 2022). The territory of each country has diverse functional uses, with agriculture and forestry occupying a significant portion of it. The data for our country confirm this observation even in 2022 – 5 603 153 hectares are used by the agriculture and fisheries sector, followed by the portion occupied by forestry and environmental

protection (Figure 1). This trend has remained relatively stable over an extended period of time.
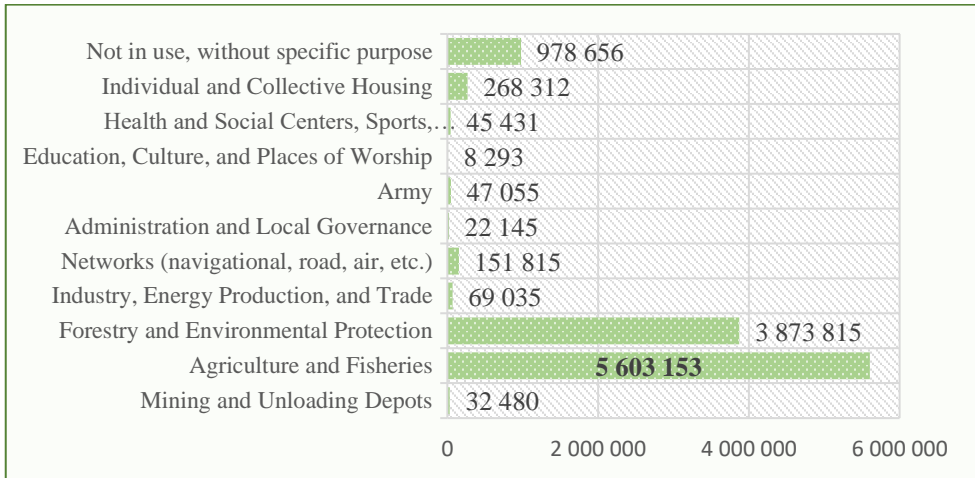
Figure 1. Functional Land Use, 2022

Source: Bulgarian Survey for Monitoring the Agricultural and Economic Conjuncture

When tracking the balance of territory by permanent land use categories in Bulgaria as of December 31, 2022, it is evident that the share of agricultural land is once again the highest – covering 60 781 square kilometres of the country's total area, which in relative terms constitutes 54.76%. Forest territory occupies 33.38%, while urbanised territory constitutes only 4.46% of the area of Bulgaria (Figure 2).
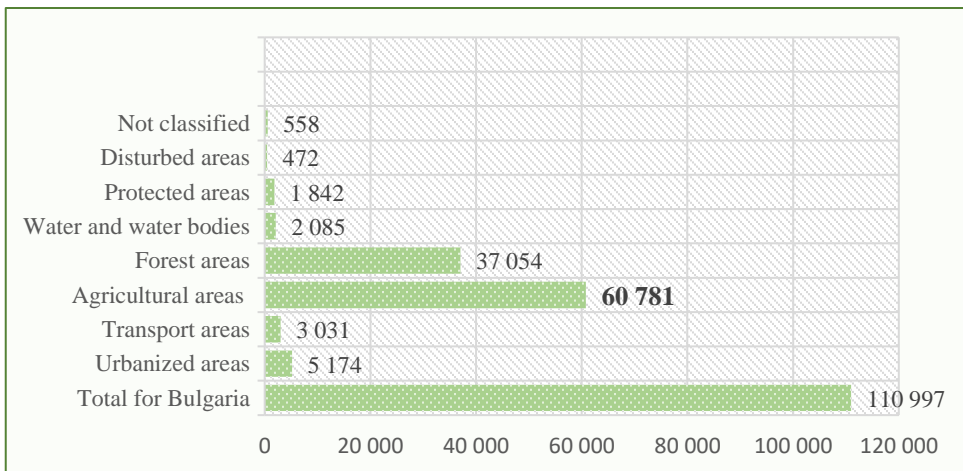
Figure 2. Balance of territory by permanent land use categories

Source: Bulgarian Survey for Monitoring the Agricultural and Economic Conjuncture

If we consider the relative share of agricultural land by statistical regions for the same year, it is evident that the highest share falls within the North Central Planning Region (66.83%), followed by the North West Region (66.48%). The lowest shares are observed in the South West and South Central Planning Regions, with 40% and 43.93%, respectively (Figure 3). Based on this, it is assumed that regions with a predominant share of agricultural land are expected to have a greater potential for the development of modern agricultural production compared to those with a lower relative share. In reality, this is not confirmed due to the reason that the socio-economic development of a given territory is not solely determined by available land, but by a multitude of factors – resource potential (human and financial capital), investment processes, natural capital, innovative solutions, incomes, etc. Furthermore, to achieve sustainability in the development and management of a specific territory, undoubtedly, other economic activities are necessary. These activities aim to achieve balanced territorial development and competitiveness, with sustainability being an essential component for attainment.
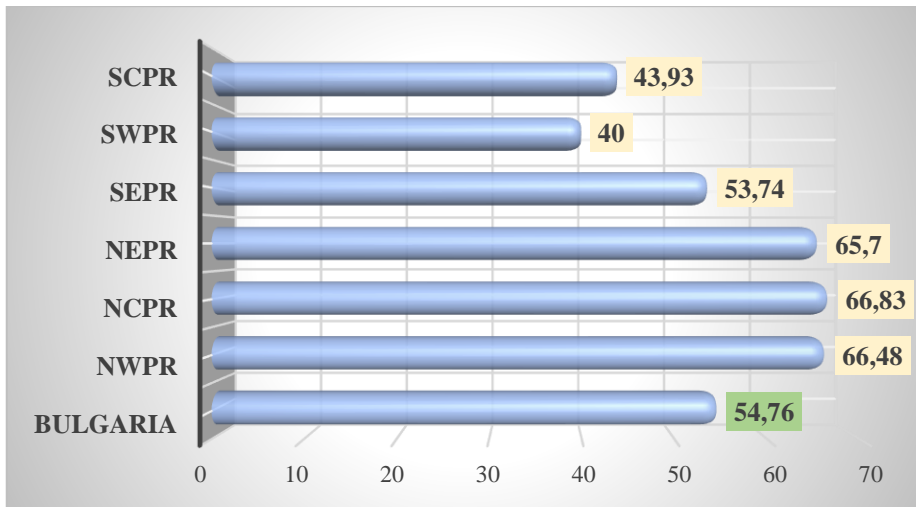
Figure 3. Relative Share of Agricultural Land by Planning Regions
Author's figure according to INFOSTAT data

Balanced territorial development is a significant aspect of sustainable rural development. In this sense, the EU policy is aimed at improving the quality of life in rural areas and supporting processes related to unlocking and utilising their full potential. The main objectives of *the EU's rural development policy are: improving the competitiveness of agriculture, achieving sustainable management of natural resources and actions in the field of climate, as well as balanced territorial development.* A team of researchers from the Agricultural University has reached the conclusion

that the support under Pillar II is limited and ineffectively targeted (Beluhova-Uzunova R., K. Hristov, 2020). In this context, the challenges are significant, considering the common issues they face: deteriorated business competitiveness, lower average personal incomes, underdeveloped infrastructure and services, depopulation, etc., as well as the fact that these regions supply important raw materials. Ecosystem services, for example, have the potential not only to generate income but also play a significant role in mitigating the consequences of climate change.

Rural areas in Bulgaria have untapped potential, both in the use and protection of available resources and their social economic development, as well as in the generation of additional income within these areas. Through sustainable development, a balance between economic, social, and environmental growth would be achieved, significantly improving the quality of life in these areas. It is a known fact that sustainable development seeks to meet the needs of the present generation without compromising the ability of future generations to meet and fulfil their own needs. This does not solely mean the rational use of natural resources and restoring ecological balance. Sustainable development encompasses other vital aspects, one of which is balanced territorial development. Furthermore, rural areas within the EU significantly differ in terms of their economic and social characteristics, which necessitates conducting differentiated studies in accordance with national specifics and those of Bulgarian rural regions. Based on the identified differences, priority areas for sustainable development, which will find their place in local development strategies, should be derived.

Sustainability, *as an important issue, affects all communities – from the village to the large urban regions.* A sustainable community focuses on improving quality of life without a constant increase in the consumption of energy and material products. A sustainable community does not consume resources faster than natural systems. Such a community maintains and enhances the characteristics of its economy, environment, and society within its territory, so that its members can lead a healthy, productive, and fulfilling life. In a sustainable community, solutions to problems should be sought in achieving a balance between: economy, ecology, society (Nikolova, M., M. Linkova, R. Nenova, 2021).

Balanced territorial development, as an element of sustainable territorial development, is achievable through the implementation of five main groups of activities, accompanied by appropriate measures (Figure 4). Particularly important in ***the integrated approach*** is the fact that all participants in the process must be interested and successfully combine specific measures suitable for the integration and development of the territory.

ACTIVITIES	SCOPE
INFRASTRUCTURE	technical energy-related ecological
ECONOMY	industry innovative technologies resource efficiency logistics sustainable production models integrated tourism products, etc.
SOCIAL SCOPE	public services social services healthcare education, etc.
ECOLOGICAL SCOPE	protected areas biodiversity landscape soil, water, air ecosystem services
CULTURAL ASPECTS	cultural heritage traditions customs way of life
MANAGEMENT ASPECTS	knowledge, skills and competencies collaboration local development strategies

Figure 4. Main groups of activities for balanced territorial development

(Author 's figure)

One of *the sustainability indicators is the distribution of income among the population* in Bulgaria. Of particular interest is the coefficient (income quintile share ratio S80/S20), which demonstrates the income disparities within a given society. It is calculated as the ratio of the total income received by the 20% of the population with the highest income (the top quintile) to that received by the 20% of the population with the lowest income (the bottom quintile). Equivalised disposable income is used as the basis for the analysis.

The data indicates that the income disparities between the top 20% wealthiest Bulgarians and the bottom 20% poorest Bulgarians were 8.01 times in 2020 and 7.3 times in 2023 (Figure 5). In the long-term plan for Bulgaria, the income quintile share ratio (S80/S20) reached its highest level of 8.23 in January 2018 and its lowest level of 5.12 in January 2007.
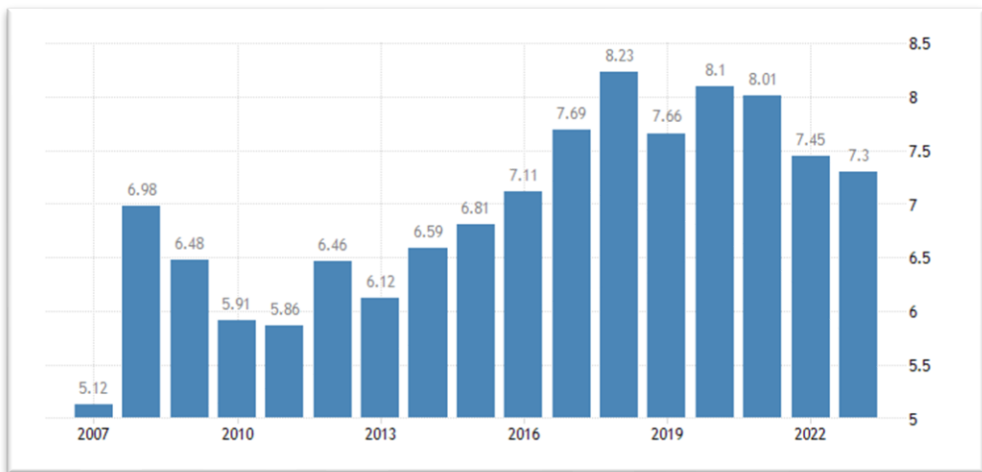
Figure 5. Dynamics of the income quintile share ratio S80/S20 (2007-2023)
Source: Eurostat

Increasing inequality is an indication that the incomes of the poor are growing at a slower rate compared to those of the wealthier individuals, and the likelihood of social pressure is rising (Gunov, T., Beluhova-Uzunova R., 2018). From the data presented in the following figure (Figure 6), it is evident that there is an increase in income inequality in our country, and there is no positive trend towards convergence. Unlike the EU, where fluctuations in the coefficient dynamics are insignificant, our country experiences more significant variations in the coefficient. Based on the analysis of the results, a conclusion can be drawn that in comparison to the EU, in Bulgaria, income growth is more directed towards the upper quintiles, i.e., towards the wealthier population. Therefore, the increase in social inequality appears to be a sustainable trend.

In rural areas, this circumstance is even more pronounced, especially in peripheral rural communities, despite the funding from European sources. Therefore, the economic orientation for rural area development demands a creative understanding of the essence of the desired business idea in depth and the utilisation of appropriate mechanisms to achieve long-term sustainable outcomes. For this purpose, real interaction between governmental bodies and economic structures is necessary, along with effective external influences, enhancing the degree of collaboration among stakeholders. In studying and assessing the regional socio-economic disparities of rural areas in Bulgaria, a team of authors from the Institute of Agrarian Economics, using Shift-Share analysis based on selected components for comparison between rural/urban and national averages, identifies significant interregional differences and imbalances that do not correspond to the goals of the unified regional policy in the country (Ivanov B., R. Popov, D. Mitova, etc., 2022).
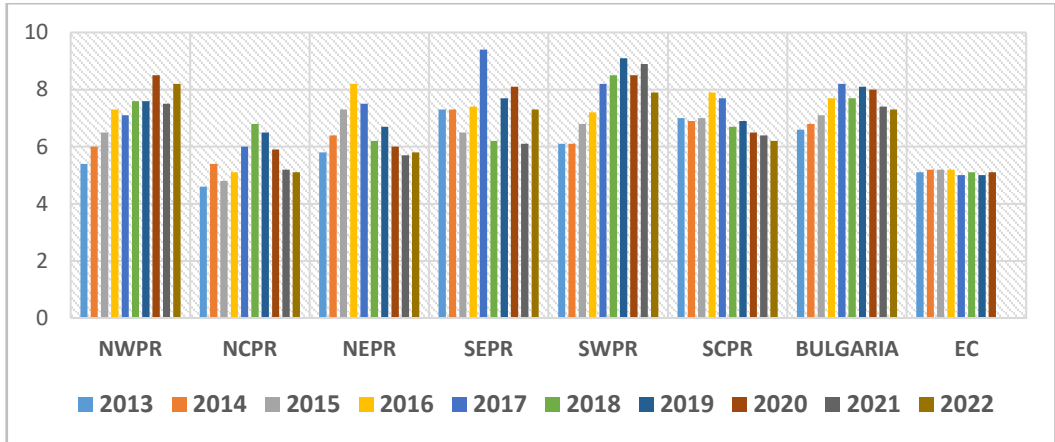
Figure 6. Dynamics of the income quintile share ratio S80/S20
Source: Eurostat

The implementation of suitable tools and correct approaches for sustainable rural development requires careful analysis and selection of effective measures, depending on the specific characteristics of the location and the initiative of the local community. Considering that the development of rural areas is influenced by a variety of factors with both positive and negative impacts, it is necessary to establish adequate policies for their sustainable development and management. In this context, the key instrument-factor that would contribute to increasing sustainability should be directed towards: optimal utilisation of regional resources; diversification in the functional use of the territory; optimal diversification of production and economic activities; ecologically sound business practices; effective interaction among institutions, local administration, businesses, and local communities (Figure 7).
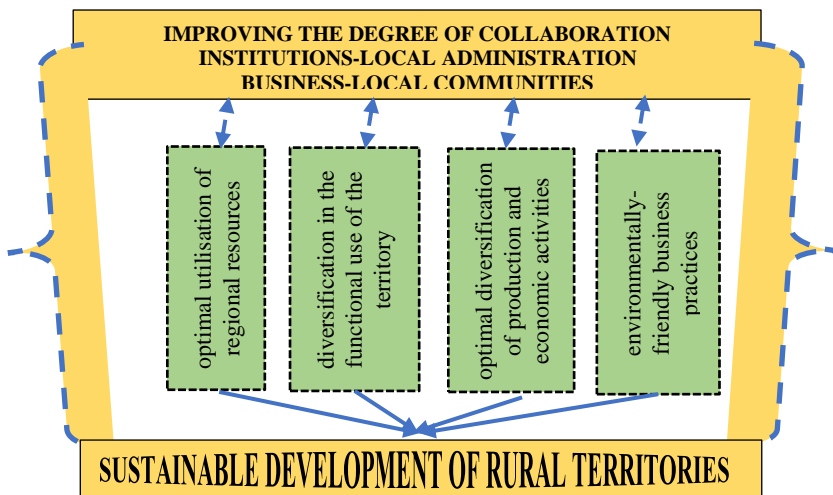
Figure 7. Interrelationships and dependencies between management approaches and tools for short-term and strategic development of rural areas (Author 's figure)

A key factor in ensuring sustainable development of rural territories is achieving a high level of collaboration, depending on the specific characteristics of the particular rural area. Optimal utilisation of regional resources is a prerequisite for their sustainable development, ensuring the conservation of the environment and biodiversity, as well as the health, right to work, and leisure of the local population. Optimal diversification of production and economic activities significantly influences the sustainability and competitiveness of the territory, while implementing environmentally friendly business practices is a prerequisite for enhancing the sustainability of rural areas. In recent years, a number of positive practices involving young people who have embraced the idea of returning to Bulgaria from abroad demonstrate a conscious need for introducing innovative practices and/or successfully combining different professions in a different calm business environment and the comfort of the rural identity. So, for example, the author's format of Nova Television shows inspiring stories about people with modern professions (IT specialists, bankers, graphic designers, etc.) who give up the comforts of the big city and invest funds and efforts in completely different activities (agriculture, rural tourism, animal husbandry, etc.) (Shtarbeva, 2023). In this direction, good practices in rural areas also include the development of a sustainable model of organic farming (Petrova, M., Nikolova, M., Pavlov, P., 2023), and this year a national campaign „Be organic!" has also been launched to promote it and encourage the consumption of clean food. There are numerous examples of good practices implemented by local voluntary initiative groups (Community-led local development (CLLD)). The expectations for the development of the concept of „smart villages", digital technologies, precision agriculture, creative tourism, and other suitable activities would expand the possibilities for enhancing sustainability and revealing the full potential of individual territories in rural areas. All of this is a slow and challenging process, but entirely realistic and achievable, given effective interaction and partnership among the participants during the entire process of implementing entrepreneurial ideas and innovative practices.

The sustainable development and management of any territory are determined by the active participation of all stakeholders interested in prosperity, including parties that must possess knowledge, skills, and competencies to initiate, plan, and finance activities that contribute to the holistic long-term development vision of the area. This is achieved through the application of local development strategies in line with the essential characteristics of the region. Figure 8 shows the key components of local development strategies in rural territories.

Ultimately, the implementation of rural development policies at the local level, through an integrated approach to achieving balanced territorial development, should take into account the local specifics and uniqueness of each individual region, making effective decisions based on the local potential, needs, opportunities,

and realistic expectations of the area. To achieve this, appropriate solutions are necessary for issues related to infrastructure, service improvement, local population employment, innovative practices, diversification, digitisation, circular economy, motivation for entrepreneurial ideas, etc. These solutions should aim to minimise depopulation processes and enhance the standard of living in rural areas.
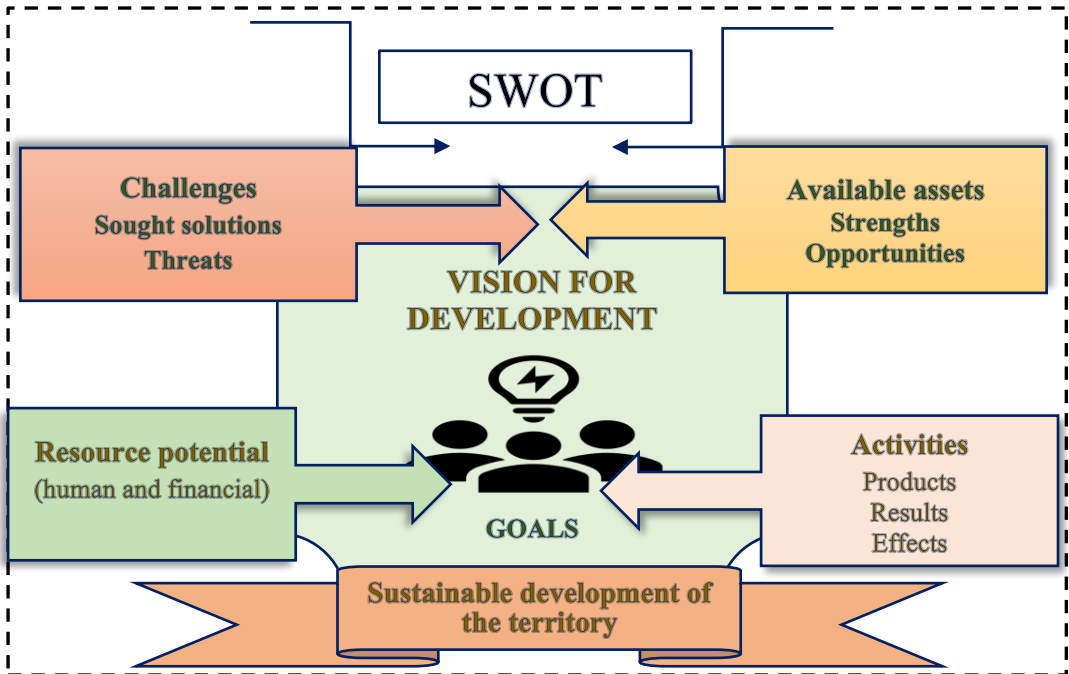
Figure 8. Key Components of the Local Development Strategy in Rural Territories
(Author 's figure)

In conclusion, it can be summarised that the priorities and measures regarding the policy for balanced regional development on a national scale have the potential to contribute to minimising the existing issues in rural areas. To enhance the effectiveness of support under the Rural Development Programmes (RDPs), it is necessary to undertake a review and redirection towards the specifics of the local territory and available assets, as well as the possibilities for introducing innovative practices. Although agricultural activity occupies a significant part of business in most of them, an adequate policy for the development of additional activities ensuring economic prosperity and a higher standard of living for local people and their employment is imperative. Therefore, it is more than necessary to establish improved interaction and coordination among all participants in the process of sustainable development and management of rural territories. This means the use of a holistic approach to the development of each territory, taken separately with its specific

needs, opportunities and solutions, in order to achieve economic, ecological and social stability of a local and regional character. Only in this way, regardless of the localisation parameters of the rural territory, it is possible for each community to contribute to achieving the goals of sustainable development by 2030, and not only in a narrow scope, but also by contributing to the global challenges facing contemporary society as a whole.

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THE ROLE OF AGRICULTURAL SUBSIDIES IN SHAPING YOUNG FARMERS' DECISION-MAKING IN THE GREEK AGRICULTURAL SECTOR

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Abstract

The Greek agricultural sector is grappling with a dynamic environment characterized by evolving policies, global market forces, and reduced protectionism. To effectively navigate these challenges, a paradigm shift toward a new development philosophy is imperative. This philosophy seeks to address structural issues, enhance technical and economic aspects, and strategically orient production towards crops that capitalize on the Mediterranean region's comparative advantages. This study explores Greek farmers' attitudes, expectations, and satisfaction levels in this evolving landscape, with a particular emphasis on assessing the impact of the Young Farmers 2021 program and demographic factors.

Utilizing a questionnaire of 18 closed-ended questions, data were collected from 144 respondents, comprising 76 participants in the Young Farmers 2021 program and 68 non-participants. The survey encompassed inquiries into demographic and social variables and delved into the assessment of attitudes, expectations, and satisfaction levels. The collected data underwent rigorous analysis involving Non-Linear Principal Component Analysis and categorical regression. The examination yielded two discernible factor axes: „Challenges and Diminished Satisfaction" and „Favorable Perceptions and Optimistic Prospects." Remarkably, Young Farmers 2021 program participants exhibited fewer hurdles, higher contentment, and a more sanguine outlook compared to non-participants. These disparities were statistically significant, underscoring the program's substantial influence. Furthermore, demographic attributes emerged as pivotal determinants. A higher level of educational attainment was correlated with diminished difficulties, augmented satisfaction, and more favorable perceptions and expectations. This underscores the pivotal role of educational initiatives in equipping farmers with the necessary acumen and skills to effectively surmount obstacles and cultivate optimism within the agricultural sector.

In summary, this study underscores the noteworthy impact of the Young Farmers 2021 program on Greek farmers' attitudes, expectations, and contentment levels. Program involvement was associated with reduced challenges, heightened satisfaction, and a more positive outlook regarding the future of agriculture. Additionally, educational attainment surfaced as a pivotal factor in molding farmers' experiences and outlooks. These insights offer valuable guidance to policymakers and agricultural organizations, facilitating the development of targeted interventions and policies aimed at encouraging program participation and delivering educational resources.

Keywords: agricultural subsidies, decision-making, financial considerations, policymaking.
JEL: Q12; Q14; O2

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Introduction

The new situation brought by the continuous revisions of CAP, the globalization of markets and the limitation of protectionism in the agricultural sector, brought the need for the Greek agriculture sector to adapt to the new order imperative (Markopoulos, 2019). This adaptation is now commonly accepted as requiring the implementation of a different development philosophy, which will aim at alleviating the existing structural problems, at addressing the technical and economic issues of the production branches and above all, at the gradual change of the production direction with crops that utilize the comparative advantages of the Mediterranean environment. Especially for Greece, the basic structural characteristics of the agricultural sector, such as the small lot and the soil morphology, make the application of the production system of agriculture problematic in many cases. Thus, it becomes clear from the facts, that Greek agriculture, in order to cope with these new challenges, should turn to the search for financial resources for the production of high-quality agricultural products (Kalogiannidis et al, 2023). Besides, the climatic conditions of the country, the topography of the land, the rich agricultural tradition and the proximity to the markets of Central Europe, are factors that differentiate the character of Greek agriculture from the northern countries of the EU, and advocate in this direction.

Unfortunately, in recent decades in Greece, as in many other sectors of the economy, the short-term management of problems, as opposed to long-term structural and development policies, has prevailed in the agricultural sector as well. Thus, the lack of a generalized systematic effort was evident, as a result of the lack of fruitful reflection and constructive dialogue, among the creative forces of the country to approach the perspective of Greek agriculture. Nowadays, it is becoming increasingly clear that in order to implement a new development model, it is necessary to draw up a national strategy with a multidimensional view (technical, economic, social and environmental), as well as the definition of guidelines that will help all the agencies involved. In any case, the content of rural development cannot be shaped one-dimensionally but must be adapted to the data of the time, redefining strategies, policies, practices, new roles and synergies in the Greek countryside. In this context, the effectiveness of the staff structures of the central administration, as well as the active role of the regional and local administrations in the planning and implementation of integrated interventions, appropriately adapted to the particularities and comparative advantages of each region (Chatzitheodoridis et al, 2012). Also, a special effort must be made to strengthen financial resources, but also the education and training of the rural population in the context of lifelong learning.

In particular today, in conditions of unprecedented economic uncertainty, in the new competitive environment that is taking shape in the primary sector, farmers will in some cases be called upon to adapt their holdings to other activities such as for example processing and agritourism, which makes the provision of financial aid

necessary. A positive and interesting development in recent times is the fact that several young people with a wide range of knowledge and abilities now choose to be actively involved in the agricultural sector, looking for professional opportunities. This element can be an important factor for the quality upgrade of rural human resources.

In this context, the Young Farmers 2021 subsidy program was developed, which aimed at the essential demographic renewal of the country's rural population and agricultural potential, the treatment of the phenomenon of fictitious young farmers, who are currently facing their entry into the agricultural sector and the increasing the efficiency of the agricultural sector by providing new incentives, such as the granting of sufficient support both to meet the costs of the first establishment in the agriculture sector and investment allocation. Aim of the present paper is the investigation of farmers' attitudes, expectations, and satisfaction levels related to the agricultural sector, specifically focusing on the influence of the Young Farmers 2021 program and demographic/social characteristics.

Methodology

The empirical research was carried out using a closed-ended questionnaire, as this specific type of research tool provides the possibility of collecting data from a relatively large number of people on the same subjects and therefore the comparability, the possibility of quantification and statistical analysis of the collected data, make it questionnaire the main tool of quantitative research in the social sciences (Nardi, 2018).

The questionnaire was divided into 2 thematic axes, including a total of 23 questions. The first thematic axis, with 5 questions, includes information about demographic, social and individual information of the respondents, such as whether they participated or not in the Young Farmers 2021 program, their age, their educational level, if they exercise other non-agricultural employment and if they participated in agricultural training and education process. In the second thematic axis, which includes 18 questions investigating attitudes, expectations and degree of satisfaction, respondents state either their degree of agreement, or the degree of importance regarding specific statements. In particular, the interviewed farmers state either their degree of agreement on a five-point Likert scale (1: not at all, 2: a little, 3: moderate, 4: a lot, 5: very much) and (1: much worse, 2: worse, 3: the same, 4: better, 5: much better), or assign a degree of importance on a five-point scale as well (1: not at all important, 2: a little important, 3: moderately important, 4: important, 5: very important).

Data collection was carried out using the method of personal interviews. In total, 144 questionnaires were collected, 76 from farmers who did join the and 68 from farmers who did not join the Young Farmers 2021 program. In order to reduce the number of original variables and bring out the structure of farmers attitudes in fewer

complex variables (factors-components), Non-Linear Principal Component Analysis with optimal scaling was used as a factor extraction method (Meulman et al, 2004). This specific analysis method was chosen because it can include qualitative-categorical variables, measured on a nominal and/or ordinal scale. More specifically, Non-Linear Principal Components Analysis was applied, with the aim of investigating the relationship between the structural system of farmers' attitudes, opinions and expectations and their financial support through the Young Farmers Program 2021. For a better description of the characteristics depicted in each question, they are renamed on corresponding items, as follows:

1. Satisfaction with agricultural income
2. Image of agricultural sector in the country today
3. Image of agricultural sector in the village today
4. Future of the agricultural sector in the country
5. Future of the agricultural sector in the village
6. Agreement with adoption of the agricultural profession by the child of the family
7. Problems due to lack of infrastructure
8. Problems due to insufficient marketing networks
9. Problems due to insufficient education
10. Problems due to insufficient training of farmers
11. Problems due to low selling prices of the products
12. Problems due to high taxation
13. Satisfaction with government agencies
14. Belief in the economic viability of agriculture
15. The special characteristics of the country as a favorable factor for agriculture
16. Causing environmental problems from the practice of agriculture
17. Expectation of farming in the same way in the future
18. Interest of domestic consumers in agricultural products

The results of the analysis showed that two factor axes-dimensions emerge (Table 1), whose values of Cronbach's internal consistency-reliability coefficient (Alpha) were above the acceptable limit of 0.60. Based on the estimated eigenvalues of each factor axis, the percentage of the total volatility explained by the first and second factor axis is 19.7% and 16.4% respectively. The total explained variance, from the two factor axes, is 36.1%, a percentage that is considered satisfactory (Naik, 2017), if it is taken into account that the information of the data table used in the statistical processing is analyzed in 72 (5 ratings × 18 questions = 90, 90 − 18 = 72) mathematical dimensions-axes.

Table 2 shows the loadings of the items in the two factor axes. The loadings that receive an absolute value greater than 0.20 are considered significant and essentially compose the formed factor axes (Peres-Neto, 2003). The first factorial axis expresses the farmers' problems which arise from various parameters of agricultural production as well as their low degree of satisfaction with the agricultural sector

(Problems and low degree of satisfaction), while the second factor axis includes positive perceptions of farmers as well as their expectations for the future of the agricultural sector (Positive perceptions and expectations).

Table 1. Reliability and variance explained by factor axes

Factor Axes	Cronbach's Alpha	Eigenvalues	% of total variance explained
1st	0.76	3.542	19.7%
2nd	0.70	2.959	16.4%

Source: own calculation

Table 2. Factor loadings

Items	1st factor loadings	2nd factor loadings
Satisfaction with agricultural income	**−0.484**	−0.002
Image of agricultural sector in the country today	−0.066	**0.603**
Image of agricultural sector in the village today	**−0.414**	**0.577**
Future of the agricultural sector in the country	**0.380**	**0.679**
Future of the agricultural sector in the village	0.120	**0.598**
Agreement with adoption of the agricultural profession by the child of the family	−0.168	**0.203**
Problems due to lack of infrastructure	**0.605**	−0.192
Problems due to insufficient marketing networks	**0.591**	−0.185
Problems due to insufficient education	**0.841**	−0.093
Problems due to insufficient training of farmers	**0.816**	−0.139
Problems due to low selling prices of the products	**0.333**	−0.160
Problems due to high taxation	0.015	**−0.428**
Satisfaction with government agencies	**−0.268**	0.168
Belief in the economic viability of agriculture	**−0.204**	−0.008
The special characteristics of the country as a favorable factor for agriculture	0.037	**0.594**
Causing environmental problems from the practice of agriculture	−0.116	**−0.468**
Expectation of farming in the same way in the future	**−0.652**	−0.199
Interest of domestic consumers in agricultural products	**0.438**	**0.675**

Source: own calculation

Regarding the results of the descriptive statistics of the mean scores of farmers in each factor, it is observed that the farmers who participated in the Young Farmers 2021 program, present a lower level of problems and low degree of satisfaction, compared to those who did not participate. On the contrary they show a higher degree of positive perceptions and expectations. At the same time, based on the results

of the corresponding Mann-Whitney tests these differences are considered statistically significant ($p < 0.001$ in each case).

Table 3. Mean scores an MU-tests based on whether the farmers participated in the Young Farmers 2021 program

	Problems and low degree of satisfaction	Positive perceptions and expectations
No participation in the Young Farmers 2021 program	4.33 (SD = 0.84)	3.09 (SD = 0.77)
Participation in the Young Farmers 2021 program	3.18 (SD = 1.10)	3.75 (SD = 0.96)
Z (p)	−7.108 (<0.001)	−4.776 (<0.001)

Source: own calculation

Subsequently, the simultaneous connection of each of the two factor axes that constitute the structural system of farmers' attitudes, with receiving financial support through the Young Farmers Program 2021 and their specific demographic and social characteristics is examined. For this purpose, the method of categorical regression with optimal scaling was used, which can simultaneously include quantitative and qualitative variables (Dunn-Rankin et al, 2014). In the categorical regression model, each of the factor axes was entered as a dependent variable and the rest (demographic and social characteristics) as independent. Through the Categorical Regression Analysis, the results of Table 4 are obtained.

Table 4. Categorical regressions results

Dependent variable	Problems and low degree of satisfaction				Positive perceptions and expectations			
	Beta	DF	F	p	Beta	DF	F	p
Participation or not in the Young Farmers 2021 (0: No, 1: Yes)	−0.254	1	5.973	0.016	0.452	1	18.351	<0.001
Age (0:≤40, 1:>40)	−0.059	1	0.405	0.526	0.116	1	1.536	0.218
Educational level (0: Primary, 1: Secondary, 2: Higher	−0.229	2	5.046	0.003	−0.216	2	4.430	0.005
Exercise of other non-agricultural employment (0: No, 1: Yes)	0.048	1	0.247	0.620	0.149	1	2.413	0.123
Participation in agricultural training and education process (0: No, 1: Yes)	0.002	1	0.000	0.986	0.079	1	0.723	0.397

$R^2 = 0,160$, F = 3,174 (P = 0,004)
Source: own calculation

As observed, the factors that statistically significantly affect the first factorial axis are the participation or not in the Young Farmers 2021 program (b = –0,254, p = 0.016) suggesting that participating in the Young Farmers 2021 program is associated with a decrease in problems and a low degree of satisfaction and the educational level of the respondents (b = –0,229, p = 0.003), showing that a higher educational level is associated with a decrease in problems and a low degree of satisfaction. Furthermore, the coefficient of determination is equal to 0.160 which demonstrates that the variability of the dependent variable is explained by the variability of the independent variables by 16.0% (Dodge, 2008).

Moreover, by setting as a dependent variable of the model the scores obtained based on the second factorial axis, it is observed that the variable Young Farmers 2021 program as well as the variable of the educational level of the participants, also become statistically significant with p < 0.001 and p = 0.005 respectively, signaling that participating in the Young Farmers 2021 program and lower educational level, is associated with advanced positive perceptions and expectations. At the same time, the value of the R^2 coefficient (equal to 0.138), reveals explanatory power of the dependent variable from the independent variables at a rate of 13.8%.

Conclusions

The present study sheds light on the significant impact of the Young Farmers 2021 program and demographic/social characteristics on farmers' attitudes, expectations, and satisfaction levels within the agricultural sector. The results indicate that participation in the Young Farmers 2021 program and higher educational attainment are associated with reduced challenges, increased satisfaction, and positive perceptions and expectations among farmers.

Farmers who were part of the Young Farmers 2021 program reported fewer difficulties and a lower degree of dissatisfaction compared to non-participants. This suggests that the program plays a crucial role in addressing challenges and improving overall satisfaction among farmers. Moreover, program participants demonstrated a more optimistic outlook regarding the future of the agricultural sector and held positive perceptions. These findings highlight the effectiveness of the program in shaping farmers' attitudes and instilling confidence in the sector's potential.

Additionally, the study highlights the significance of considering demographic and social characteristics in understanding farmers' experiences. Educational level emerged as a noteworthy factor, with higher education correlating with fewer problems, greater satisfaction, and positive perceptions. This underscores the importance of educational initiatives and support systems that empower farmers with the necessary knowledge and skills to effectively overcome challenges. The findings have important implications for policymakers and agricultural organizations. Understanding the positive influence of the Young Farmers 2021 program and the role of education can inform the development of targeted interventions and policies.

By promoting program participation and providing educational resources, policy-makers and organizations can better support farmers, enhance their experiences, and foster a positive perception of the agricultural sector. Ultimately, these efforts contribute to the sustainability and growth of the agricultural industry as a whole.

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BUILDING A SUSTAINABLE FUTURE BY IMPLEMENTING THE GREEN ECONOMY CONCEPT IN BULGARIA AND BULGARIAN AGRICULTURAL SECTOR

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Abstract

The concept of a green economy has gained significant traction as societies worldwide seek to balance economic growth with environmental preservation. Bulgaria, a country known for its rich cultural heritage and diverse natural landscapes, stands at a crucial juncture in its development journey. By capitalizing on the nation's strengths and addressing its challenges, Bulgaria can forge a path toward economic growth while preserving its natural heritage for generations to come. Through collective effort, informed policies, and innovative practices, Bulgaria can serve as a shining example of a country committed to harmonizing economic advancement with environmental stewardship. Embracing a green economy offers Bulgaria the opportunity to foster sustainable growth, reduce environmental degradation, and enhance overall well-being. The transition to a Green economy allows Bulgaria to transform its own economy – from a low-efficiency and resource-intensive one to an economy based on knowledge, digitalization and green growth, generating high added value and guaranteeing long-term sustainability. The green economy concept centers on the integration of economic development, environmental protection, and social well-being. It emphasizes resource efficiency, the minimization of waste, and the shift towards renewable energy sources. A green economy is characterized by sustainable and environmentally friendly practices that promote economic growth while minimizing negative impacts on the environment. A green economy is an economic system that aims to reduce environmental risks and ecological scarcities while promoting sustainable development. It focuses on creating a balance between economic growth, environmental protection, and social well-being. In the context of agriculture, a green economy involves implementing practices that minimize negative impacts on the environment, conserve natural resources, and promote sustainable food production. It encompasses sectors like energy, transportation, industry, and agriculture, among others. The concept revolves around the efficient use of resources, reduction of pollution, and conservation of biodiversity. This approach aims to decouple economic growth from environmental degradation, promoting sustainable practices that meet the needs of the present without compromising the ability of future generations to meet their own needs. The successful transition to a green economy requires collaboration among government, businesses, and civil society, along with strategic investments and supportive policies. This report delves into the theoretical basis of a green economy, explores its pros and cons, identifies obstacles to its implementation, discusses challenges in the agricultural sector, highlights promising sectors, provides examples of green initiatives in Bulgaria, and on this basis offers guidelines for a more efficient transition.

Keywords: green economy, good practices, sustainable development
JEL: *Q56*

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Introduction

The concept of a green economy has gained significant traction as societies world-wide seek to balance economic growth with environmental preservation. Bulgaria, a country known for its rich cultural heritage and diverse natural landscapes, stands at a crucial juncture in its development journey. Embracing a green economy offers Bulgaria the opportunity to foster sustainable growth, reduce environmental degradation, and enhance overall well-being. This report delves into the theoretical basis of a green economy, explores its pros and cons, identifies obstacles to its implementation, discusses challenges in the agricultural sector, highlights promising sectors, provides examples of green initiatives in Bulgaria, and on this basis offers guidelines for a more efficient transition.

General Considerations regarding Green Economy

The term „green economy" was introduced for the first time by D. Pearce in 1989 in his book „Blueprint for a Green economy", which formulated the characteristics and principles of the concept of sustainable development. A. Cameron (2012), E. Barbier (2009), K. Danaher (2007) contributed to the disclosure of the essential characteristics of the green economy. The global economic and financial crisis of 2008 helped to formulate the idea of the Global Green New Deal (GGND). The green economy is proposed as a policy approach to help solve the problems of slowing economic growth and job losses, as well as the continuing deterioration of the quality of the environment and the degradation of ecosystems. The green economy has become one of the pillars of major European and international strategies and can be seen as an approach leading to the achievement of a structural transformation of the economy. The EU has been a driving force behind the promotion of green economy concept. The European Green Deal sets ambitious targets for carbon neutrality, biodiversity preservation, and sustainable resource use. In Bulgaria, the legal framework aligns with EU directives and regulations to ensure a consistent approach. The Biodiversity Act, the Energy Efficiency Act, and the National Renewable Energy Action Plan are examples of Bulgaria's efforts to promote a green economy.

The green economy concept centers on the integration of economic development, environmental protection, and social well-being. It emphasizes resource efficiency, the minimization of waste, and the shift towards renewable energy sources. A green economy is characterized by sustainable and environmentally friendly practices that promote economic growth while minimizing negative impacts on the environment. A green economy is an economic system that aims to reduce environmental risks and ecological scarcities while promoting sustainable development. It focuses on creating a balance between economic growth, environmental protection, and social well-being. In the context of agriculture, a green economy involves implementing practices that minimize negative impacts on the environment, conserve natural re-

sources, and promote sustainable food production. It encompasses sectors like energy, transportation, industry, and agriculture, among others. The concept revolves around the efficient use of resources, reduction of pollution, and conservation of biodiversity. This approach aims to decouple economic growth from environmental degradation, promoting sustainable practices that meet the needs of the present without compromising the ability of future generations to meet their own needs. The successful transition to a green economy requires collaboration among government, businesses, and civil society, along with strategic investments and supportive policies.

Some authors (Danaher (2007), Allan (2021), Bowen (2010), Hardi (1997) consider that the green economy is ecologically sustainable, as it takes into account the limitation of resources and their limited possibilities for self-recovery, as well as the dependence of economic development on natural capital is recognized. The green economy is also socially just, as it aims to create access to resources for all people, improve human well-being at all levels of society and provide opportunities for personal and social development. It is also deeply connected to local conditions, traditions and communities, since a good knowledge of them and consideration of their particularities is a prerequisite for sustainability and justice. The green economy is seen as a global collection of individual communities that meet the needs of their citizens through responsible, local production and exchange of goods and services.

In our opinion, part of the international organizations (UN through the Global Panel on Sustainability (2012), UN Environment Program(2011, 2012)) best reveal the essence of the green economy, defining it as a potential engine for sustainable development and a stimulator of economic growth, necessary to eliminate poverty. It provides a comprehensive approach to sustainable development by taking into account the needs and characteristics of each community by ensuring social protection and stable development. It can be taken as a model for long-term development that allows crises to be overcome. It requires the application of measures of progress other than gross domestic product, as it sends accurate price signals for the social and environmental costs incurred and imposes strict accountability allowing accurate reporting of financial results, promotes employment, green business and the creation of green jobs. Its essential feature is the presence of innovations in all spheres, cooperation between institutions and all interested parties, the use of energy from low-carbon and renewable sources and the achievement of high efficiency in the use of resources. The goals are to improve the quality of ecosystems and natural resources, to protect biodiversity by improving environmental management methods.

The green economy model strives for a more balanced portfolio of investments in social, human, natural and financial capital, which also meets the objectives of the concept of sustainable development. This logically leads to the recognition of the importance of market mechanisms, but they are not seen as the only or the best

solution to all problems. The productive power of natural capital is taken into account and used, especially in the development of solutions for that segment of the population whose livelihoods are largely dependent on the access and quality of natural capital and who are often the poorest strata of society. As the poor are most dependent on the access and quality of natural resources for their livelihoods, the green economy is seen as a means of achieving equitable and inclusive growth.

The pros and cons of this concept can be summarized as follows:

Pros:

✓ Sustainability: A green economy ensures the long-term viability of economic activities by minimizing their ecological footprint.

✓ Job Creation: Investments in renewable energy, sustainable agriculture, and green technologies can create new employment opportunities.

✓ Innovation: Green economy practices encourage innovation and the development of eco-friendly technologies.

✓ Resilience: By reducing reliance on finite resources, economies become more resilient to supply shocks and price fluctuations.

✓ Environmental Benefits: Reduced pollution, improved air and water quality, and conservation of biodiversity contribute to healthier ecosystems.

Cons:

✓ Transition Costs: Transitioning to a green economy requires initial investments and changes in established practices.

✓ Job Disruption: Certain sectors may experience job losses as traditional industries evolve or decline.

✓ Technological Challenges: Developing and implementing green technologies can present technical and logistical challenges.

✓ Policy Complexity: Crafting effective policies to incentivize green practices while maintaining economic growth can be complex.

Several obstacles hinder the widespread adoption of green economy principles in Bulgaria and particularly in the agricultural sector:

✓ Lack of Awareness: Many farmers, citizens, businesses, and policymakers may not fully grasp the benefits and urgency of transitioning to a green economy and this could limit the understanding of green economy concepts among stakeholders and can hinder its adoption. Many farmers might not be fully aware of the benefits of green practices or might be resistant to change due to unfamiliarity.

✓ Financial Barriers: Insufficient funding and limited access to green financing options can impede the adoption of sustainable practices. Transitioning to greener practices often requires upfront investments in technology, training, and infrastructure, which can be a barrier for some farmers.

✓ Infrastructural Gaps: Outdated infrastructure may not support the requirements of renewable energy integration or resource-efficient practices. Some regions

might lack access to necessary resources, such as renewable energy infrastructure or advanced farming technologies.

✓ Policy Fragmentation: Inconsistent policies across different sectors can create confusion and hinder a cohesive transition.

✓ Resistance to Change: Industries reliant on conventional practices may resist adopting new, greener methods due to uncertainties or vested interests.

The following difficulties are very important for the agricultural sector and impede its transition to a green economy:

✓ Dependency on Conventional Practices: Traditional farming methods may rely heavily on agrochemicals and resource-intensive processes.

✓ Knowledge Gap: Farmers may lack information about sustainable practices and their benefits.

✓ Economic Pressures: Low-profit margins can discourage farmers from investing in costly sustainable technologies.

Good practices for the development of the Green economy activities in Bulgaria

Certain sectors in Bulgaria are well-suited for green economy implementation:

✓ Renewable Energy: Bulgaria's potential for solar, wind, and hydroelectric power makes renewable energy a promising sector, which could power both agricultural operations and local communities. Moreover expanding wind, solar, and hydropower capacity to reduce greenhouse gas emissions and promote energy independence.

✓ Tourism and Ecotourism: Leveraging Bulgaria's natural beauty can drive sustainable tourism growth. The country's diverse landscapes and natural beauty provide opportunities for sustainable tourism linked with agriculture, such as farm stays and agri-tourism. Developing sustainable ecotourism and promoting responsible travel can boost local economies while preserving natural resources.

✓ Waste Management: Developing efficient waste management systems can lead to resource recovery and reduced pollution and generated economic value. Developing innovative solutions particularly for agricultural waste management and recycling can have very high positive economic and environmental impacts.

✓ Circular Economy: Focusing on recycling, reusing, and reducing waste can drive economic growth while minimizing environmental impact. Establishing systems for reducing food waste and promoting local, sustainable supply chains.

✓ Sustainable Agriculture: Supporting organic farming, agroecological practices, and local food systems can enhance biodiversity and food security.

✓ Sustainable Forestry: Managed forestry practices that prioritize biodiversity and carbon sequestration can contribute to both the economy and the environment.

There are well defined possibilities for Green economy concept implementation in Agriculture, such as:

✓ Sustainable Farming Practices: Implementing techniques such as agroforestry, organic farming, crop rotation, and precision agriculture to reduce the use of chemicals and promote soil health.
- Shifting towards organic practices eliminates the use of synthetic pesticides and fertilizers, promoting healthier ecosystems and producing more nutritious food.
- Precision Agriculture implements technology to optimize the use of water, fertilizers, and pesticides, reducing waste and minimizing environmental impact.
- Agroforestry integrates trees with crops or livestock can provide multiple benefits such as carbon sequestration, improved soil quality, and diversified income sources
- Agroecology via application of ecological principles to agriculture can be reduced the reliance on synthetic inputs, enhanced biodiversity, and improved soil health.

✓ Renewable Energy Integration: Using renewable energy sources like solar panels and wind turbines to power farm operations, reducing reliance on fossil fuels.

✓ Water Conservation: Implementing efficient irrigation systems and water management practices to reduce water usage and minimize runoff.

✓ Biodiversity Conservation: Creating wildlife corridors, preserving natural habitats, and using native plants to support biodiversity on agricultural lands.

✓ Waste Reduction and Recycling: Properly managing farm waste through composting and recycling, and reducing plastic and chemical waste.

✓ Local Food Systems: Focusing on local production and distribution reduces the carbon footprint of food transportation and supports local economies.

The Green economy seeks the balance between economic growth, social development and environmental protection. The problem is in their implementation, because they face resistance from existing practices, and hence the need for systemic changes in management, the value system and consumption patterns. Bulgaria, like many countries, has been exploring ways to transition to a green economy. In the context of agriculture, the country has the potential to leverage its natural resources and biodiversity to promote sustainable practices. Here are some socially responsible strategies applied by Bulgarian companies in the agricultural and food sectors mainly:

Biomic is a biotech startup revolutionizing packaging. The company offers packaging inspired by natural processes. The company takes the green approach and use tobacco stems binds with mushroom mycelium or agricultural crop residue, to develop a composite material that rivals plastic foams from unused or waste resources. Creating products made from environmentally friendly ingredients without the addition of synthetic ones results in biodegradable products which reduce the harmful impact on the environment. They have developed two products – a sustainable transport packaging solution that looks like EPS (Expanded Polystyrene) but is entirely biodegradable and a furniture fiberboard that contains 70% less timber and no petroleum-based adhesives.

Nasekomo are another such example. The first biotech company in Eastern Europe to produce fodder from insect black fly (Hermetia illucens). The team has found a solution how to produce food again from organic food waste using a natural mechanism. Currently, Nasekomo's product is concentrated protein. Suitable for feeding aquatic crops and pets. Their goal is to build their first industrial factory because this is an industry with huge potential.

Zero Wave – a company that is involved in the production of biodegradable tableware, crackers and flour from a material that is thrown away and treated as garbage – the residual malt after the production of beer. And with each package you „save" 100 g of malt from being thrown away. They come in several flavors – sunflower seeds and sun-dried tomatoes, pumpkin seeds, white and black sesame.

Cupffee, a Bulgarian edible cup producer, produces cookie cups made from natural grain cereal and allow users to enjoy beverages with temperatures as high as 85 degrees Celsius. Cupffee already has its own production site.

The Harmonica company makes a beer with the wonderful name „From nothing – Something", because they produce craft beer from bread that has not reached the table. To make it, in addition to the familiar Bulgarian barley malt, German yeast and hops, they also use a special ingredient – unsold bread with which they replaced 20% of the malt in the recipe. In this way, new life is breathed into a completely edible food product that would otherwise end up in the trash. Beer is offered in 3 variants – light and dark ale, and wheat beer.

Pollenity (Bee Smart Technologies) has been developing lot of products for beekeepers helping to prevent bee extinction. Beebot – the main product of the company has a set of sensors that could be installed in hives and would allow beekeepers to remotely monitor the conditions in the hive. It measures and analyses key parameters from inside the hive and sends the beekeeper alerts when the interaction is needed.

Sea Harmony is creating farms designed to restore rather than deplete marine life. The company has developed a vertical reef mussel-farming technology and has installed its reefs on 13 locations already. The farms are made from durable materials that do not emit pollutants into the water. They can be placed in the open sea, so they do not disturb boat traffic. The mission of the team is to bring marine life back to the „Dead" zones, restoring the food chain and all of its participants: mussels, shrimps, and fish.

The company „Biopak" offers and distributes ecological packaging as a substitute for disposable packaging in the production of food and beverages. The materials that are used are completely biodegradable – paper, cardboard, bioplastic from corn and one that is resistant to high temperature.

Nordic Oral Care started with the production of degradable bamboo toothbrushes and evolved to a developer of diverse sustainable daily hygiene products such as toothpaste, dental floss made of corn starch, bamboo cotton buds, and recently – straws. Their mission is to present a new approach to everyday dental hygiene.

In order to successfully meet the EU's goals for efficient use of resources by 2030, the implementation of Green economy concept should become a state priority. It is not enough to increase energy efficiency or reduce emissions, although these are also significant steps. It is necessary to expand the concept, but also to increase consumer and producers awareness, to support innovations. There is significant potential to increase the awareness and ambition of SMEs to increase their resource efficiency and develop products and services for green markets.

In order successfully to implement the Green economy concept in Bulgaria the following guidelines for efficient Green Economy Development can be summarized:

1. Education and Awareness: Implement comprehensive public awareness campaigns to educate citizens, businesses, and policymakers about the benefits of a green economy.
2. Financial Support: Establish accessible green financing options and incentives to assist businesses and individuals in adopting sustainable practices.
3. Policy Integration: Develop cross-sectoral policies that align with green economy principles, promoting a cohesive transition.
4. Capacity Building: Provide training and resources to farmers and businesses to facilitate the adoption of sustainable practices.
5. Innovation and Research: Invest in research and development to spur innovation in green technologies and practices.

Conclusion

Implementing a green economy in Bulgaria holds the promise of a sustainable and prosperous future. By capitalizing on the nation's strengths and addressing its challenges, Bulgaria can forge a path toward economic growth while preserving its natural heritage for generations to come. Through collective effort, informed policies, and innovative practices, Bulgaria can serve as a shining example of a country committed to harmonizing economic advancement with environmental stewardship. The transition to a Green economy allows Bulgaria to transform its own economy – from a low-efficiency and resource-intensive one to an economy based on knowledge, digitalization and green growth, generating high added value and guaranteeing long-term sustainability. This will allow finding a balance between economic growth, the health of ecosystems and social development.

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CLUSTER ANALYSIS OF DISTRICTS IN BULGARIA ACCORDING TO THE DEVELOPMENT OF THE AGRARIAN SECTOR

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Abstract

The purpose of the study is to classify the districts in Bulgaria according to some indicators characterizing the development of the agrarian sector. A cluster analysis (K-means clustering) was performed using the statistical software **R** and the packages *„factoextra"* and *„cluster"*. The official statistical information of the NSI for 2021 was used for the following indicators: gross value added from Agriculture, Forestry and Fishery (GVA); employees under labour contract in Agriculture, Forestry and Fishery; average annual wages and salaries of the employees under labour contract in Agriculture, Forestry and Fishery. It was established that according to the development of the agrarian sector in 2021, the districts in Bulgaria can be classified into 4 clusters. The central point of the cluster with the most favorable values of the indicators in terms of agriculture has the following characteristics: GVA from agriculture – BGN 299 million; persons employed in agriculture – 3644 persons; average gross salary – BGN 15506. This cluster includes the districts Veliko Tarnovo, Ruse, Varna and Dobrich. The central point of the cluster, which ranks second in terms of realized development in the sector in 2021, can be described as follows: GVA – 278 million BGN; persons employed in the agricultural sector – 3857 persons; average annual gross salary – BGN 12032. The cluster unites the following districts: Pleven, Burgas, Stara Zagora, Pazardzhik and Plovdiv. The centroid of the cluster, ranked third in terms of development of the agrarian sector, is characterized by the following values of the considered indicators: GVA from agriculture – BGN 184 million; employed persons in the sector – 1789 persons; average annual salary – BGN 14206. This cluster includes the districts: Montana, Gabrovo, Razgrad, Targovishte, Shumen, Yambol, Sofia – grad and Smolyan. The central point of the cluster, ranked last in terms of realized development in the agrarian sector, has the following characteristics: GVA – BGN 183 million; employed persons – 1595 persons; average gross salary (annual) – BGN 11795. It includes the districts: Vidin, Vratsa, Lovech, Silistra, Sliven, Blagoevgrad, Kyustendil, Pernik, Sofia, Kardzhali and Haskovo. This is the cluster with the most unfavorable development of the agrarian sector during the considered period. Clusters unite districts, some of which are significantly distant from the central point of the cluster to which they belong. The explained variation in the clusters is 73,6%, which is relatively acceptable, but at the same time it also shows that 26,4% of the variation cannot be explained by the presented distribution of the districts by clusters. This also explains the relatively large distance between some districts and the corresponding centroid: these districts show significant differences from the central point, i.e. their classification cannot be considered successful. Such districts are Pernik, Plovdiv,

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Dobrich, Gabrovo, Smolyan and Shumen. In general, the first and third clusters appear to be the most homogeneous, and the second and fourth are the most heterogeneous.

Keywords: cluster analysis, districts, agriculture

Introduction

Numerous clustering methods are used in the research literature and a large part of them are applied in agriculture (Tiwari and Misra, 2011; Lubova et al., 2023; Hloušková and Lekešová, 2020; Tkachev et al., 2020) and in particular in animal husbandry (Zapryanova et al., 2018; Harizanova-Metodieva et al., 2016). The methods are well known and described by researchers deriving the need for unit grouping (Lee, 1981; Dubes and Jain, 1980). Clusters can be distinguished according to various signs and characteristics, such as differences in territorial, economic and social aspects, type of specialization, etc. The motivational factors through which the studied unit will belong to another group in a future period are also of interest among scientists (Lambovska and Yordanov, 2020). Some authors study the development of agriculture by grouping EU countries according to their economic indicators and thus manage to offer recommendations and guidelines for the development of the agricultural sector (Reiff et al., 2018). In recent years, cluster analysis has also been applied in the study of the circular economy (Petkov et al., 2023).

The purpose of the study is to classify the districts in Bulgaria according to some indicators characterizing the development of the agrarian sector.

Material and methods

The official statistical information of NSI (*www.nsi.bg*) for 2021 was used to conduct the study. For the purposes of the study, a cluster analysis (K-means clustering) was applied. The study was conducted using the ***R*** statistical software and *„factoextra"* and *„cluster"* packages. The cluster analysis is based on the following indicators for 2021: gross value added from Agriculture, Forestry and Fishery (GVA); employees under labour contract in Agriculture, Forestry and Fishery; average annual wages and salaries of the employees under labour contract in Agriculture, Forestry and Fishery. Districts are classified based on the similarity between them; the similarity is estimated based on the Euclidean distances between districts. The characteristics of the central point of each of the clusters are presented.

The number of clusters was derived based on *„factoextra"* package by graphical comparison of the total variation and the number of clusters, aiming that the variation does not decrease significantly when the number of clusters increases (*Kassambara, 2017*).

The indicator $\frac{\text{between\_SS}}{\text{total\_SS}}$ (in percentages) was calculated using *R*, showing the explained variation of the performed classification. The closer its value is to 100, the more successfully the districts are clustered.

Results and discussion

The statistical data for the districts in Bulgaria for 2021 are presented (Table 1). From table 1, it can be concluded that the districts with the largest gross added value from the agricultural sector for 2021 are Dobrich (BGN 390 million), Plovdiv (BGN 367 million) and Shumen (BGN 324 million), and the lowest are values of the indicator for the districts of Pernik (BGN 62 million), Sofia-grad (BGN 79 million) and Smolyan (BGN 88 million).

Table 1. Indicators for analysis of the agricultural sector at the district level

№	Indicator	GVA from Agriculture, Forestry and Fishery (Million Levs)	Employees under labour contract in Agriculture, Forestry and Fishery (Average annual number)	Average annual wages and salaries of the employees under labour contract in Agriculture, Forestry and Fishery (BGN)
1	2	3	4	5
1	Vidin	148	985	12701
2	Vratsa	192	1990	12289
3	Lovech	165	1423	10983
4	Montana	229	1615	14782
5	Pleven	265	3304	12236
6	Veliko Tarnovo	277	3584	14455
7	Gabrovo	93	588	15599
8	Razgrad	246	2499	14047
9	Ruse	260	2972	14797
10	Silistra	253	2417	12555
11	Varna	270	3372	16907
12	Dobrich	390	4648	15863
13	Targovishte	204	1905	13295
14	Shumen	324	2444	13288
15	Burgas	281	3993	11912
16	Sliven	189	2042	11282
17	Stara Zagora	267	3640	12733
18	Yambol	207	2325	13438
19	Blagoevgrad	279	1835	12610
20	Kyustendil	115	649	11724
21	Pernik	62	602	11395
22	Sofia	191	2238	12208

Continue

1	2	3	4	5
23	Sofia-grad	79	2072	13956
24	Kardzhali	208	803	11427
25	Pazardzhik	210	3013	12274
26	Plovdiv	367	5334	11006
27	Smolyan	88	866	15243
28	Haskovo	211	2559	10573

Source: NSI data

The largest number of persons are employed in agriculture in the districts of Plovdiv (5334 persons), Dobrich (4648 persons), Stara Zagora (3640 persons), and the smallest are numbers – in Gabrovo (588 persons), Pernik (602 persons) and Kyustendil (649 persons). The highest are wages for agricultural labour in the districts of Varna (BGN 16907), Dobrich (BGN 15863) and Gabrovo (BGN 15599), and the lowest – in the districts of Haskovo (BGN 10573), Lovech (BGN 10983) and Plovdiv (BGN 11006). The graph for determining the optimal number of clusters for 2021 according to the studied indicators is presented (Figure 1).

According to the conducted study, it is enough to divide the districts into four clusters, because when the number of clusters increases, the variation does not decrease significantly (Figure 1).
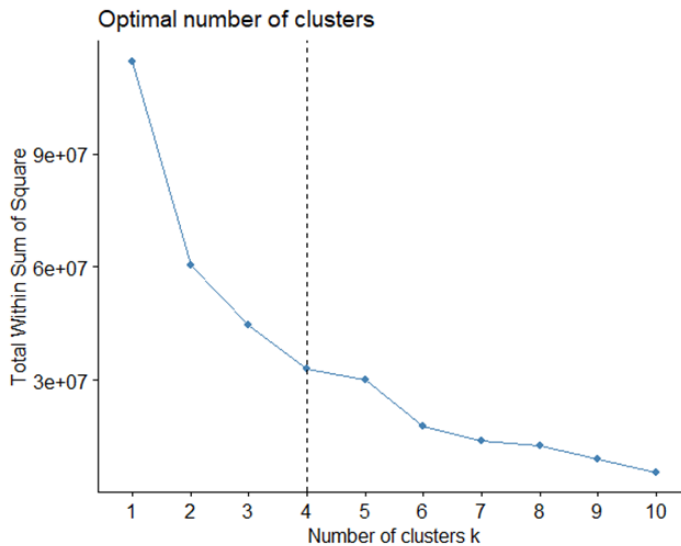
Figure 1. Optimal number of clusters according to the studied indicators

Source: Generated with R program, package „factoextra"

The centroids of the four clusters are presented in Table 2.

Table 2. Central points of the clusters according
to the investigated indicators for 2021

Indicator	First cluster	Second cluster	Third cluster	Fourth cluster
GVA from Agriculture, Forestry and Fishery (Million Levs)	183	278	299	184
Employees under labour contract in Agriculture, Forestry and Fishery (Average annual number)	1595	3857	3644	1789
Average annual wages and salaries of the employees under labour contract in Agriculture, Forestry and Fishery (BGN)	11795	12032	15506	14206

Source: Own analysis with statistical software R, package „cluster"

From the presented centroids, the characteristics related to the development of the agrarian sector of each of the four clusters can be summarized:

- First cluster: GVA – BGN 183 million; employed persons – 1595 persons; average gross salary (annual) for 2021 – BGN 11795. This is the cluster with the lowest GVA value, with the lowest salary and the smallest number of employed persons. In general, the most unfavorable values of the indicators characterizing the development of agriculture are present here. The cluster is ranked fourth (last) place according to the development of the agrarian sector.
- Second cluster: GVA – BGN 278 million; persons employed in the agricultural sector – 3857 persons; average annual salary – BGN 12032. This is the cluster that ranks second according to the development of agriculture.
- Third cluster: GVA – BGN 299 million; persons employed in agriculture – 3644 persons; average gross salary – BGN 15506. The best values of the considered indicators related to the development of the agricultural sector are presented here. This is the group of districts where the agricultural sector shows the highest potential.
- Fourth cluster: GVA amounts to BGN 184 million; persons employed in agriculture are 1789; the average annual salary in the sector is BGN 14206. It ranks penultimate (third) place in terms of development of the agrarian sector.

Table 3. Distribution of districts by clusters

Line number	First cluster		Second cluster		Third cluster		Fourth cluster	
	District number	District	District number	District	District number	District	District number	District
1	1	Vidin	5	Pleven	6	Veliko Tarnovo	4	Montana
2	2	Vratsa	15	Burgas	9	Ruse	7	Gabrovo
3	3	Lovech	17	Stara Zagora	11	Varna	8	Razgrad
4	10	Silistra	25	Pazar-dzhik	12	Dobrich	13	Targov-ishte
5	16	Sliven	26	Plovdiv			14	Shumen
6	19	Blagoevgrad					18	Yambol
7	20	Kyustendil					23	Sofia-grad
8	21	Pernik					27	Smolyan
9	22	Sofia						
10	24	Kardzhali						
11	28	Haskovo						

Source: Own analysis with statistical software R, package „cluster"

Table 3 presents the affiliation of each of the districts according to the formed clusters. The first cluster is the most numerous one and includes 11 districts: Vidin, Vratsa, Lovech, Silistra, Sliven, Blagoevgrad, Kyustendil, Pernik, Sofia, Kardzhali and Haskovo.

The second cluster covers five districts: Pleven, Burgas, Stara Zagora, Pazardzhik and Plovdiv.

The third cluster includes Veliko Tarnovo, Ruse, Varna and Dobrich. The districts of this cluster are located in Northern Bulgaria and are characterized by the presence of fertile chernozem soils, suitable for growing cereals, fruit trees and industrial crops. Varna and Dobrich districts are part of Dobruja. Due to the favorable condi-tions for forage production in the districts of this cluster, the livestock sectors de-pendent on concentrated fodder (dairy cattle breeding, pig breeding, poultry) are highly developed.

The fourth cluster covers 8 districts: Montana, Gabrovo, Razgrad, Targovishte, Shumen, Yambol, Sofia-grad and Smolyan.

Figure 2 shows the distribution of the districts by clusters based on the distances between the central point of each cluster and the corresponding district. Clusters unite districts, some of which are significantly distant from the central point of the cluster to which they belong. The heterogeneity of the clusters is also evidenced by the explained variation indicator, which takes a value of 73,6%, indicating that the

explained variation from the clusters is 73,6% of the total variation, which is relatively acceptable, but at the same time it also shows that 26,4% of the variation could not be explained by the distribution of the districts by clusters thus presented.
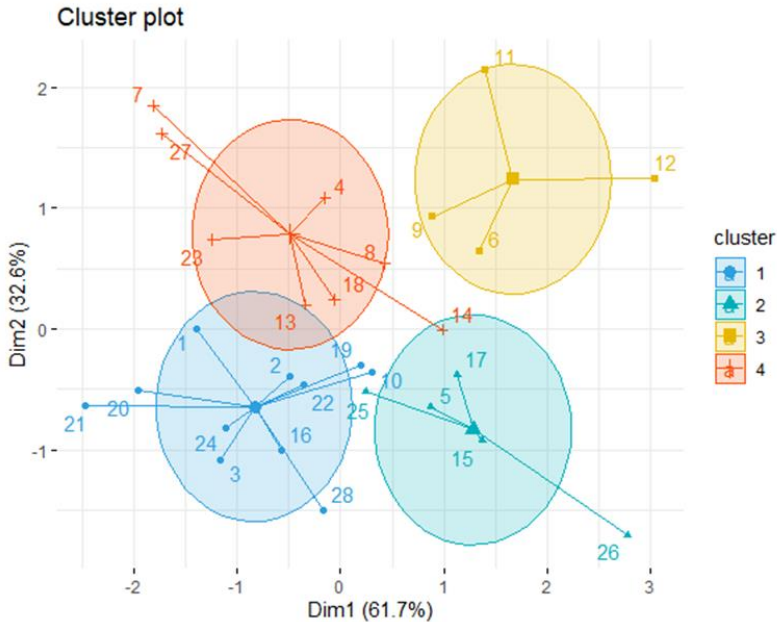
Figure 2. Distribution of districts by clusters

Source: Own analysis with statistical software R, package „cluster" and „factoextra"

This also explains the relatively large distance between some districts from the respective centroid, i.e. these districts have significant differences from the central point:

- In the first cluster (the cluster that ranks last in terms of development of the agrarian sector) it is Pernik district (21). Due to its proximity to Sofia, a significant part of the population of the Pernik district works in the capital, where salaries are among the highest in the country, which in turn reduces the motivation for the development of agrarian activities in the Pernik district. In this district, agriculture is not as developed as industry; GVA from agriculture and persons employed in the agrarian sector are significantly lower than those of the centroid of the cluster. Hence, the Pernik district is ranked one of the last among the districts of the country in terms of development of the agrarian sector.
- In the second cluster (the cluster ranks second in terms of the best development of the agrarian sector) this is the Plovdiv district (26). In the Plovdiv district, the GVA from the agrarian sector and the number of persons employed in agriculture are the highest, while at the same time the wage is the lowest when compared to the other districts

falling into the same cluster (Pazardzhik, Stara Zagora, Burgas and Pleven). The districts in this cluster are observed to have a large number of food-processing enterprises that require large quantities of raw materials, creating competition for labour among enterprises. In addition, some of these districts concentrate a significant amount of vegetable and fruit cultivation, which involves many manual processes.

- In the third cluster (a cluster with the best values of the indicators), Dobrich (12) is significantly different from the other districts, which could be explained by the combination of favorable natural conditions for the development of the agrarian sector and the presence of specialized grain farms. For this reason, the district is not only the best developed of the districts in this cluster, but the best developed in the entire country based on gross value added from the agrarian sector. In terms of the average gross salary of employed persons in the agrarian sector and the number of persons employed in agriculture, the district ranks second.

- In the fourth cluster (the cluster ranked penultimate (third) in terms of development of the agrarian sector), the districts of Gabrovo (7), Smolyan (27) and Shumen (14) differ significantly from the rest of the districts in the cluster. Shumen stands out significantly due to the high value of the indicator of gross value added from the agricultural sector and the high number of employed persons, which is why the district, although formally in the fourth cluster, does not share many common features with the centroid, i.e. the district is not successfully classified. According to Figure 2 Shumen district is closer to Stara Zagora district than to the centroid of the fourth cluster. Gabrovo district is characterized by the development of other economic activities, which lead to an outflow of interest for investments in agriculture. Gabrovo stands out from the rest of the districts due to the lowest values of the gross value added and the number of persons employed in agriculture when compared to the rest of the districts of the fourth cluster. A probable reason why Gabrovo fell into the fourth cluster and not into the first (the cluster with the most unfavorable development of the agrarian sector in 2021) is the realized average gross salary of employed persons in agriculture, which is not only the highest among the districts in this cluster, but also one of the highest in the country (higher salaries was reported only in the districts of Varna and Dobrich). Smolyan district, according to the Euclidean distance, ranks closest to Gabrovo district (Figure 2). Smolyan is also characterized by a low value of the indicators of gross value added and the number of persons employed in agriculture and the relatively high wage of labour in the agrarian sector. According to the average gross salary of employed persons in agriculture, it is ranked immediately after Gabrovo. Due to the arguments presented, it cannot be assumed that the classification of the Gabrovo and Smolyan districts are successful either.

The first and third clusters are generally the most homogeneous, and the second and fourth are the most heterogeneous.

Conclusion

It was established that according to the development of the agrarian sector in 2021, the districts in Bulgaria can be classified into 4 clusters.

The central point of the cluster with the most favorable values of the indicators in terms of agriculture has the following characteristics: GVA from agriculture – BGN 299 million; persons employed in agriculture – 3644 persons; average gross salary – BGN 15506. This cluster includes the districts Veliko Tarnovo, Ruse, Varna and Dobrich.

The central point of the cluster, which ranks second in terms of realized development in the sector in 2021, can be described as follows: GVA – 278 million BGN; persons employed in the agricultural sector – 3857 persons; average annual gross salary – BGN 12032. The cluster unites the following districts: Pleven, Burgas, Stara Zagora, Pazardzhik and Plovdiv.

The centroid of the cluster, ranked third in terms of development of the agrarian sector, is characterized by the following values of the considered indicators: GVA from agriculture – BGN 184 million; employed persons in the sector – 1789 persons; average annual salary – BGN 14206. This cluster includes the districts: Montana, Gabrovo, Razgrad, Targovishte, Shumen, Yambol, Sofia – grad and Smolyan.

The central point of the cluster, ranked last in terms of realized development in the agrarian sector, has the following characteristics: GVA – BGN 183 million; employed persons – 1595 persons; average gross salary (annual) – BGN 11795. It includes the districts: Vidin, Vratsa, Lovech, Silistra, Sliven, Blagoevgrad, Kyustendil, Pernik, Sofia, Kardzhali and Haskovo. This is the cluster with the most unfavorable development of the agrarian sector during the considered period.

Clusters unite districts, some of which are significantly distant from the central point of the cluster to which they belong. The explained variation in the clusters is 73,6%, which is relatively acceptable, but at the same time it also shows that 26,4% of the variation cannot be explained by the presented distribution of the districts by clusters. This also explains the relatively large distance between some districts and the corresponding centroid: these districts show significant differences from the central point, i.e. their classification cannot be considered successful. Such districts are Pernik, Plovdiv, Dobrich, Gabrovo, Smolyan and Shumen. In general, the first and third clusters appear to be the most homogeneous, and the second and fourth are the most heterogeneous.

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AGRICULTURAL IRRIGATION – INNOVATIVE SOLUTIONS

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Abstract

Bulgaria's good soil and weather conditions increase the potential of agriculture and provide good opportunities for quality and sustainable food production. These can be expanded and further improved through the use of innovation in all agricultural activities. Farm irrigation is essential for the food supply and economic development of many countries. Innovative solutions are needed to improve the efficiency and sustainability of agricultural practices. Innovations in agricultural irrigation are essential for sustainable farm development and reducing water stress in the world. They help farmers to improve their harvests and preserve water resources for future generations. Integrating different water sources such as groundwater, surface water, rainwater and wastewater can provide a more sustainable and reliable source of water for farms. Innovations in agricultural irrigation require training and education for farmers to understand how to use new technologies and methods. Governments and financial institutions can provide support and incentives to invest in innovative irrigation solutions. In recent years, aquaponics has become an innovative study of the aquaculture industry.

Aquaponics is an innovation in modern farming, a sustainable micro ecosystem with a controlled environment, combining aquaculture with hydroponics. It is developing at a rapid pace as the need for sustainable food production grows and freshwater and phosphorus supplies decline. Another innovative method to tackle the problem of farm irrigation is aeroponics. It is defined as an aerial water culture system or the science of growing plants without soil or substrate culture. The plant grows in the air with the help of artificial support and no soil or substrate is required to sustain the plant. The roots of the plant are suspended in a closed container in the dark and exposed to the open air to receive nutrient-rich water dispersed through atomizers. The modernisation, rehabilitation and renewal of irrigation systems provides an opportunity to reduce the use of pesticides and fertilisers in line with the Green Deal. It also provides an opportunity for Bulgarian farmers to be competitive with their counterparts in other countries. The effect could be strongest for permanent crops, fruit and vegetable production and livestock farming. The goal of the report is to focus on solutions to the problem of farm irrigation in the country by implementing innovative solutions.

Key words: technology, agriculture, environment, innovation, irrigating
JEL: *O3, Q1, Q5, Q16.*

Introduction

Agriculture is an extremely important economic sector for any country. The efficient and sustainable production of food products is a prerequisite for quality and balanced nutrition of society. At every stage of the supply chain (from the farm to the store) quality control and production of the produce is required. The growing

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trend for organic production on the territory of the country is a positive change, which is also a criterion for increasing the quality of food production. Bioproduction can also be considered as a type of innovation in agriculture, which, in addition to high quality food, also contributes to environmental protection. Innovations in agriculture in Bulgaria are not widespread enough, the main reasons for this are the lack of available information about the innovations offered on the market, the prevailing small size of farms in the territory of the country and the high cost of investment in innovations (Zjeleva V., Mutafov E., 2022). The problems that can arise in agriculture are many and of a different nature. In the present study, special attention is paid to the problem of irrigation of agricultural holdings on the territory of Bulgaria. Innovations successfully implemented in other countries are presented, options are given for solving the problem of agricultural irrigation, by applying innovative solutions. Statistical data from the National Statistical Institute, the Ministry of Agriculture and the State Agricultural Fund are used.

Analysis of agricultural irrigation problems
Water is an essential component of agricultural productivity and is critical to food security. Twenty percent of all agricultural land is used for irrigated agriculture, which generates forty percent of the total food produced globally. The productivity of irrigated agriculture is often at least twice that of rainfed agriculture per unit of land, allowing for greater crop diversification and intensification of production.
Competition for water resources is expected to increase as a result of population expansion, urbanization and climate change, with an emphasis on agriculture (Kirova, 2023). By 2050, the world's population is projected to reach over 10 billion, and whether they live in cities or in villages, they will all need food to meet their basic life needs. This, combined with the increased consumption of healthy and quality food that accompanies income growth in the developing world, it is estimated that agricultural production will need to expand by approximately 70% by 2050. Future water demand in all sectors will require redirecting up to 40% of water from lower to higher productivity and employment activities, especially in water-scarce areas. Due to the significant share of water demand in agriculture, such reallocation is generally expected to originate from this sector.
Today, agriculture uses 70% of all freshwater globally (on average) and much more than „consumptive water use" due to crop evaporation. Changes in the initial distribution of surface and groundwater resources, primarily from agricultural to urban, environmental, and industrial users, can lead to physical water movement (Totev, Mochurova, Kotseva-Tikova, 2021). In theory, water can also travel, as the production of food, goods and services that require a lot of water is concentrated in water-abundant regions and traded to water-scarce regions.
Improvements in water use efficiency and advances in water supply systems will also need to go hand in hand with cross-sectoral water reallocation and large water

transfers from agriculture. The efficiency of agricultural water use will also depend on how well basic (off-farm) system improvements are matched with appropriate on-farm spending incentives aimed at improving soil and water management. To implement such options, water delivery systems will need to be upgraded to provide adequate services on demand. It will also be necessary to use advanced technologies (such as soil moisture sensors and satellite measurements of evapotranspiration) to increase the productivity and efficiency of water use in agriculture (Kirechev, 2021).

Addressing the challenges of the future requires a thorough review of how water is managed in the agricultural sector and how it can be repositioned in the broader context of overall water management and water security. Furthermore, irrigation and drainage systems, whether large or small, are notable examples of spatially dispersed public works in rural areas. Thus, they represent a logical means of mobilizing employment opportunities in the population. Inadequate policies, severe institutional inefficiencies and financial constraints are often obstacles to improving water management in agriculture. Important governmental and private entities, such as basin directorates, irrigation agencies, water user and farmer associations, ministries of agriculture and environment and water, usually lack basic resources to fulfill their duties.

For example, basin directorates often lack sufficient authority to bring stakeholders together and enforce water allocation. Institutions tasked with irrigation development are often limited to capital-intensive and larger-scale schemes and tend to rely on public sector-based approaches rather than developing opportunities for small-scale private financing and irrigation management (Georgieva S., 2020). Farmers and their organizations also often respond to highly skewed incentive frameworks for water pricing and agricultural support policies, further hindering positive developments in the sector. Furthermore, most governments and water users fail to invest adequately in the maintenance of irrigation systems. Although insufficient management and operation can contribute to the adverse performance of irrigation systems, in particular the inability to maintain them adequately, this is the cause of their reduced productivity and the resulting requirement for rehabilitation. This failure to provide adequate funds to maintain irrigation systems has led to the cycle of „build-neglect-rehabilitate-neglect" commonly observed in the sector.

Given the existing constraints above, the agricultural water management sector is currently in the process of repositioning itself towards modern and sustainable service delivery. It offers a unique method of managing the risks associated with larger water-related social and economic consequences, while building sustainable water services and maintaining water supplies. This can be achieved by improving incentives for innovation, reform and accountability. It also supports watershed management and the greening of the sector.

**Innovative solutions for dealing with the problems of irrigation
of agricultural holdings**

Since the 1990s, sustainable development strategies have been a global trend, and the circular economy is the general trend of sustainable development and a good way of economic development (Aleksiev G., Doncheva D., 2022). In recent years, aquaponics has become an innovative study of the aquaculture industry.

Aquaponics is an innovation in modern farming, a sustainable micro-ecosystem with a controlled environment, combines aquaculture with hydroponics. It is developing at a rapid pace as the need for sustainable food production increases and freshwater and phosphorus supplies dwindle. As a sustainable, circular, efficient and intensive low-carbon way of production in the future, the aquaponics system realizes the conversion of waste into nutrients and effectively solves the problem of environmental pollution (Wei, Li, An, Li, Jiao, Wei, 2019).

In Aquaponics, more than 50% of the nutrients that support optimal plant growth come from waste from the feeding of aquatic organisms. Integrated aquaculture and aquaponics systems are classified as:

- open,
- homework,
- demonstration,
- commercial,
- projects.

Four scales of production are distinguished:

- under 50 m2,
- from 50 m2 to 100 m2,
- from 100 m2 to 500 m2,
- over 500 m2 (Palm, Knaus, Appelbaum et al., 2018).

By applying aquaponics, vegetable crops do not need fertilization and fish crops do not need frequent water changes. This change allows fish, cultivated crops and microorganisms to form a mutually beneficial symbiosis and harmonious coexistence of relationships of ecological balance. This is a working mode of sustainable healthy food production (Harizanova, Stoyanova, 2016). In the conditions of soil pollution, drought and climate change, aquaponic systems are attracting more and more attention due to the economy of resources, high efficiency and low consumption, and are becoming a trend and development direction of modern agriculture (Stoyanova, Koleva, 2020), (Blagoev, 2022). An example can be given with China, where the largest aquaculture industry is. Aquaculture production exceeds 50 million tonnes, accounting for more than 60% of global aquaculture production in 2018.

The principle of the aquaponic system is that the waste discarded by the farmed fish can be used to break down the ammonia nitrogen in the water into nitrites by mi-

croorganisms. Nitrifying bacteria break it down into nitrates so they can be absorbed as nutrients by the crops being grown and used for growth; thus, the aquatic environment of aquaculture is effectively improved. After the water containing ammonia nitrogen is purified, it can be reused as new aquaculture water through the circulation system, which saves water resources and makes the water exchange efficiency less than 2% per day. Water use efficiency is improved and an ecological cycle of water resources is created. Simultaneously with the growth of the world population and energy costs, the reduction of natural resources such as water and the demand for food contribute to the continuous development of aquaponics systems (Wei, Li, An, Li, Jiao, Wei, 2019).

- As a result of integrated freshwater aquaculture, a variety of methods and system designs have been developed that focus on fish or plant production. In recent years, public interest in aquaponics has grown significantly in line with the trend towards more integrated value chains, greater productivity and less harmful environmental impact compared to other production systems (Palm, Knaus, Appelbaum et al., 2018).

- Another innovative method to deal with the problem of farm irrigation is aeroponics. It is defined as the cultivation system of aerial water culture or the science of growing plants without soil or substrate culture. The plant grows in the air using artificial support and no soil or substrate is required to support the plant. The roots of the plant are suspended in a closed container in the dark and exposed to the open air to receive nutrient-rich water sprayed through sprayers. The upper part of the leaves and the crown of the plant extend above the wetland. The roots and crown of the plant are separated by an artificially created structure. The system uses nutrient-enriched aerial spraying using pressurized nozzles or foggers to maintain hypergrowth under controlled conditions (Lakhair, Gao, Nas Syed, Chandio, Buttar, 2018). The use of aeroponics has many advantages for agricultural production as a modern research tool. The concept of growing plants in the air by providing artificial support dates back to the early 20th century. In 1921 Barker first developed a primitive system for growing plants in the air and used it for laboratory work to study the structure of plant roots. He found that the air plant technique is a natural and simple practice for growing plants without the input of soil. The absence of soil greatly facilitates the study: the roots of plants hang in the air, and the stems are held in an artificial place. In the 1940s, the technique was widely used by many researchers as a modern research tool in plant root studies. Air culture reduces mechanical injury and significant growth disturbance compared to soil, sand or even aerated water culture. Atomizing spray provides a periodic supply of nutrients to plant roots at various periodic intervals for a specified duration, rather than constant misting. The first trials of steam fogging were done on citrus, avocados and apples to investigate plant root

diseases. In California, tomatoes and coffee are grown in a watertight container with a fine nutrient mist driven by a pressure atomizing injector, a method called an „aeroponic plant growing system"(Stoner, 1983). Researchers are of the opinion that the aeroponic system is currently the most effective system for growing plants without the intervention of soil compared to other soilless techniques. The nutrient mist system uses a minimal amount of water and provides an excellent environment for plant growth (Buer, Correll, Smith, Towler, Weathers, Nadler, Seaman, Walcerz, 1996). Scientists are investigating the utility of the aeroponic system for spaceflight and are finding that the system is contributing to advances in several areas of plant root research. Studies include:

- root microorganisms,
- root response to drought,
- impact of oxygen concentration on root growth;
- interaction between legumes and rhizobia;
- production of arbuscular mycorrhizal fungi;
- differences in root growth of plant varieties.

The technology saves water up to 99%, nutrients – 50% and 45% less time compared to growing in soil. Scientists from NASA (NASA, 2006) are of the opinion that in the aeroponics system, plant roots are quickly fed with available nutrients and grow under controlled conditions. Controlled conditions include:

- equal concentration of nutrients,
- EC and pH values,
- temperature,
- humidity,
- light intensity,
- spraying frequency,
- dispersion time,
- spray interval
- presence of oxygen.

The innovative technology is currently used to grow cultivated garden ornamentals, herb roots, and root-based medicinal plant production (Lakhair, Gao, Nas Syed, Chandio, Buttar, 2018).

Conclusion

The modernization, restoration and renewal of irrigation systems enables the reduction of the use of pesticides and fertilizers in line with the Green Deal. It also provides an opportunity for the Bulgarian agricultural producer to be competitive with his colleagues from other countries. The strongest effect could be in permanent plantations, fruit and vegetable production, as well as for animal husbandry. Through the modernization, restoration and renewal of the irrigation systems, the

possibility of supplying water to other industrial productions in the rural areas is also opened. Innovation in the sector is a prerequisite for the inclusion of more young people, through a combination of smart technologies, electronicization, robotics and improved marketing. The result would be an increase and addition of value to the production and catching up of the standard of living from the so-called „rural-type" municipalities to those of the so-called „urban".

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INTEGRATED REPORTING – INFORMATION BASE OF GREEN BUSINESS IN SERBIA

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Abstract

Green businesses operate according to green management principles, policies, and practices that improve the quality of life of their customers, employees, the communities in which they operate, and the environment. The path to green business is part of a long-term sustainability strategy. The sustainability of economic activity is identified with respect for the principle of moral justice, which implies the equal right of every person to an appropriate degree of freedom, which does not contradict the freedom of others. Accordingly, it could be stated that the right of the current generation to use resources and the environment must not jeopardize the rights of the next generations. The primary goal of business in today's dynamic environment is to create value for owners. However, the achievement of this goal depends on the achievement of the company's secondary goals, which include creating superior value for customers and ensuring full engagement and motivation of employees, suppliers, and distributors. The connection between the company and other stakeholders is made possible by the wider public, which also has an interest in the company's operations. Therefore, modern companies are focused on creating value for all stakeholders. The interdependence of the company and all stakeholders requires the integration of reports on the financial, environmental, and social performance of the company. In this way, integrated reporting, in addition to financial reporting, also includes a specific form of reporting on sustainable development. Accordingly, the essence of integrated reporting consists in the creation and presentation of financial and non-financial performances, to see the degree of involvement of the concept of sustainable development in the company's operations. International professional organizations and institutions significantly support the process of standardization of integrated reporting, with their framework proposals, guidelines, directives, regulations, protocols, and indicators. Integrated reporting aims to bring together financial reporting on the economic performance of companies with qualitative reports on environmental performance. The basic idea of integrated reporting is to provide an information base on the effects of social and environmental performance and their economic impact on the company. This involves identifying environmental and social costs, benefits, and risks, as well as incorporating their impact on the company's economic performance. According to the above, the paper aims to analyze the disclosure of environmental information within the framework of integrated reporting in the Republic of Serbia. The analysis refers to groups of companies in Serbia, that are included in the National Register of Pollution Sources, with special reference to companies from the sectors of agriculture,

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forestry, and fishing. The paper will also present the future legal framework in the field of agriculture in the Republic of Serbia, with the goals and activities of The European Green Deal. The bottom line is that it is necessary to support investments in sectors where the Republic of Serbia has comparative advantages (fruit, vegetable, livestock production sectors), improve business management, and provide adequate logistical support.

Introduction

Green business refers both to performance, in the form of green products (goods and services), and to processes (or production) within economic activities. Practically, green business applies the principles of ecological sustainability, strives to use renewable sources, and tries to minimize the negative impact of activities on the environment. In this regard, the „greening" of business is part of a long-term sustainability strategy, i.e. accomplishing business tasks in a way that does not generate threats – economic, social, or environmental – neither for current nor for future generations (Loknath, Azeem, 2017).

Environmental management is based on the concept of sustainable development, eco-efficiency, and cleaner production (Jovanović, Ljubisavljević, 2017). Sustainable development of the company and the environment is a concept according to which the achievement of current results and the satisfaction of the needs of the current generation should not jeopardize the satisfaction of the expected needs of future generations. Eco-efficiency is achieved by delivering products and services at competitive prices, which satisfy human needs and contribute to the quality of life, while gradually reducing the impact on the environment and the intensity of resource use during the life cycle, to a level that is consistent with the estimated bearing capacity of the soil (Schaltegger, Burritt, 2000). Cleaner production represents the application of a comprehensive environmental protection strategy to production processes, products, and services to increase overall efficiency and reduce risks to human health and the environment (Službeni glasnik RS, br. 55/05, 71/05-ispravka, 101/07, 65/08, 16/11). The goals of green business refer to the establishment of a balanced system that will balance economic development with responsible consumption of resources and better environmental protection. Green business, therefore, can refer to issues such as ecological preservation, preservation (of the planet and the living world), corporate social responsibility, humanitarian issues, fair trade, clean water, animal welfare, equality, and sustainability. Each of these questions is broad and complex in itself.

Today, the concept of green business has become generally accepted as a condition for the survival and progress of mankind. The reasons for such an understanding are found in the answer to the question of why economic activity must be sustainable. Such an answer is multiple. First, there are strong moral reasons for today's generation to bequeath to posterity opportunities for development no less than they have now. This means that the planet Earth and its potential must not be degraded by the existing generation. The second group of reasons for sustainable development is exclusively ecological. If nature is a value in itself, then any type of economic activity that disrupts the diversity of the living world or the richness of resources is unacceptable. Finally, the third reason justifying the concept of sustainable development is essentially of an economic nature: sustainable development is more efficient (Stevanović et al., 2016).

The quality of financial reporting is monitored by state institutions, public supervisory bodies, regulatory bodies, independent external auditing, professional organizations, managers, and accountants (Malinić, 2014). The independent institution Global Reporting Initiative – GRI, with its Framework, Guidelines, and Protocols for reporting on sustainable development, presented a specific classification and systematization of integrated reporting indicators. According to the GRI Framework, the disclosure of economic performance indicators is foreseen, from the aspects of key economic performance, market share performance, and indirect economic impact performance (Navarrete-Oyarce et al., 2021). Environmental performance indicators are systematized on: materials; energy; water, biodiversity; pollution, wastewater and waste; products and services; and compliance with regulations. Key social indicators are classified as performance indicators in the domain of labor relations and working conditions (recruitment, relationship between management and employees, training and education, equal wages between the sexes), performance indicators on human rights (investment and acquisition, discrimination, freedom of association and collective bargaining, child labor, forced and compulsory labor, security procedures, assessment, remediation) and key social performance indicators (local community, corruption, public policy, product responsibility) (Malinić, 2013).

Omran, Zaid, and Dwekat (2021) confirm that integrated reporting is positively associated with corporate environmental performance using panel data of 110 firms listed on the Johannesburg Stock Exchange for the years 2014–2018, where Integrated Reporting was first mandated.

Knežević et al. investigated the presentation of environmental problems in the annual reports and websites of companies operating in industries that greatly contribute to Serbia's pollution, such as energy, cement production, petrochemical industry, and iron production. The results show that there is no systematic approach of Serbian companies regarding environmental issues, environmental information is

rarely included in financial reports, and most often in a separate report or a separate section of the report (Knežević et al., 2008).

Knežević and Pavlović (2019) argue that the efforts of companies in Serbia to invest in Corporate social responsibility reporting (CSR) and communicate information to various stakeholders are still at a very low level compared with the developed countries. On a sample of companies comprising the list of all big investors in Serbia, authors concluded that companies that invest in CSR reporting put much more effort into integrating financial and non-financial information.

Sun et. al (2022) found that there are three drivers for companies to improve their integrated reporting disclosure practices: to mitigate information asymmetry between the organization and all stakeholders; to signal superior quality, legitimacy, and conformity to all stakeholders; and to discharge accountability to all stakeholders. Direct and indirect costs are the main factors that lead to poor integrated reporting disclosure practices.

Berber et al. explored the concept of corporate social responsibility, measurement capabilities, and the global reporting initiative's approach to that type of measurement (Berber et al., 2018). Hanić et al. aimed to analyze the practice of environmental disclosure in the banking sector of Serbia. The data was obtained by analyzing the annual sustainability reports of a total of 10 banks, five of which were classified as systemically significant banks for the period 2015-2019. The results show that the majority of banks in Serbia state their environmental policy (74%). Although the findings indicate that the practice of environmental disclosure among all banks in Serbia is increasing, the reports are not standardized (Hanić et al., 2021).

Mijoković et al. investigated the state of non-financial reporting in Serbian companies in the period before the adoption of EU directives, to give policymakers suggestions on how to establish and structure the implementation of the EU Directive. The current state of development of non-financial reporting is measured using the socially responsible business index of Serbian companies listed on the Belgrade Stock Exchange. Serbian companies, listed as large, have a higher quality of non-financial reporting (Mijoković et al., 2021).

In the continuation of the paper, we will focus on the disclosure of environmental information within the framework of integrated reporting in the Republic of Serbia, taking into account the results of the mentioned research, including the results reached by Marinković and Stevanović (2022).

Disclosure of environmental information within the framework of integrated reporting in the Republic of Serbia

Reporting on the company's financial performance supplemented by the publication of non-financial information by the information requirements of various stakeholders has become imperative in modern business conditions. Reporting not only on

the economic but also on the social and environmental aspects of business is a significant prerequisite for sustainable development and improvement of the company's credibility. More and more importance is attached to the social responsibility of companies, assessment of the impact of business activities on the environment, assessment of the level of environmental investments, and eco-innovations. For this reason, the paper analyzes the practice of reporting on the environmental aspects of the operations of a selected group of companies in the Republic of Serbia to reduce the negative impact of the company's operations on the environment.

By reviewing the financial reports of the selected group of companies for the period 2018-2020, companies representing significant polluters in the Republic of Serbia are included. To gain an idea of the business operations and the impacts that the company has on the environment and the social community, from 2021 there is a legal obligation to publish non-financial information that applies to large legal entities with over 500 employees (Službeni glasnik RS, br. 73/2019). In this way, the national legal accounting regulation is harmonized with the European Union Directive 2014/95/EU. In a non-financial report, whether it is in the form of a stand-alone document or is presented as part of an annual report on operations, obligees of non-financial reporting provide unbiased and objective information about policies, risks, and results of activities related to environmental protection, social and personnel issues, respect for human rights and the fight against corruption and bribery. In addition to the GRI standard, the Sustainability Accounting Standards Board – SASB standard and the International Framework for Integrated Reporting – IIFR are also represented. The SASB created and adopted 77 sector standards for various industries, while IIFR contains the concepts and principles of integrated reporting (Damnjanović, 2021). Also, Standard ISO 14001 Environmental Management System represents a systemic approach to environmental protection management, i.e. identification and monitoring of the impact of production and business activities of a certain company on the environment.

To evaluate the practice of national financial and non-financial reporting on environmental aspects of business, the paper considers the analysis of a selected group of companies in the Republic of Serbia that pollute the environment (Marinković, Stevanović, 2022). The analysis is based primarily on information from annual reports on operations and notes to financial statements that are kept in the Register of Financial Statements of the Agency for Economic Registers of the Republic of Serbia for the period 2018-2020 and a group of 40 companies that are major environmental polluters in the Republic of Serbia, as they are included in the National Register of Pollution Sources of the Environmental Protection Agency. In analysis covered 2 companies from Sector A – Agriculture, forestry, and fishing, 2 companies from Sector B – Mining, 28 companies operating in Sector C – Manufacturing industry, 4 companies belonging to Sector D – Supply of electricity, gas, steam, and air conditioning and 4 companies from sector E – Water supply. Out of the total

number of companies, 23 companies are classified as large companies, of which 14 have over 500 employees and are required to prepare non-financial reports according to the Accounting Law. Environmental aspects of business are reviewed in the notes to the financial statements, bearing in mind that there was no legal obligation for environmental reporting in the analyzed period. The analysis showed that the largest number of observed companies did not present information on environmental activities, that is, only 9 companies or 22.5% in 2020 (6 from sector C and one each from sectors A, B, and D) and 8 companies (20%) in 2018 and 2019 presented environmental positions in the form of environmental costs, provisions for environmental protection or various fees as part of short-term liabilities (Marinković, Stevanović, 2022). It can be concluded that the largest number of companies that publish information on environmental protection is from the processing industry sector. Also, one company out of the two analyzed companies from sectors A and B has incorporated environmental information in the notes in the observed period, one of four companies from sector D, while no company from sector E discloses environmental information in the notes.

The different reporting and treatment of environmental costs in the observed companies is noticeable. For example, three companies from sectors A, C, and D report the environmental aspects of their business within the costs of production services, such as waste disposal costs, air and water pollution testing costs, and environmental protection costs. Three companies from sector C show the costs of environmental protection and improvement, waste management costs, and environmental management fees as part of intangible costs, two companies from sectors A and B report different types of environmental benefits as part of short-term liabilities, while three companies from sectors B and C due to long-term provisions.

It can be concluded that the reporting obligation applies to large and medium-sized legal entities, as well as companies of public interest, regardless of size, so 5 companies are classified as small legal entities, and 11 of the remaining 35 analyzed companies (about 32%) did not submit a report on operations, even though they have a legal obligation. However, it should be borne in mind that international accounting standards prescribe the minimum amount of information to be published in financial statements, so that companies decide to what extent they will make this information transparent, and this does not mean that they do not act responsibly towards the environmental and social aspects of business.

The analysis showed that a small number of companies publish the specification of environmental costs and innovative activities in this area (Figure 1).

Out of a total of 40 companies, 22 (55%) present information on environmental protection in their annual business report, and only 11 companies (9 from the processing industry and one each from the mining and electricity supply sectors) report on innovative activities that contributed to the prevention or reduction of negative business impacts on the environment.

The company is not obliged to publish the report; 13%

The report contains information on environmental protection and eco-innovation; 5%

Report not available; 28%

The report contains information on environmental protection; 28%

The report does not contain information on environmental protection; 28%
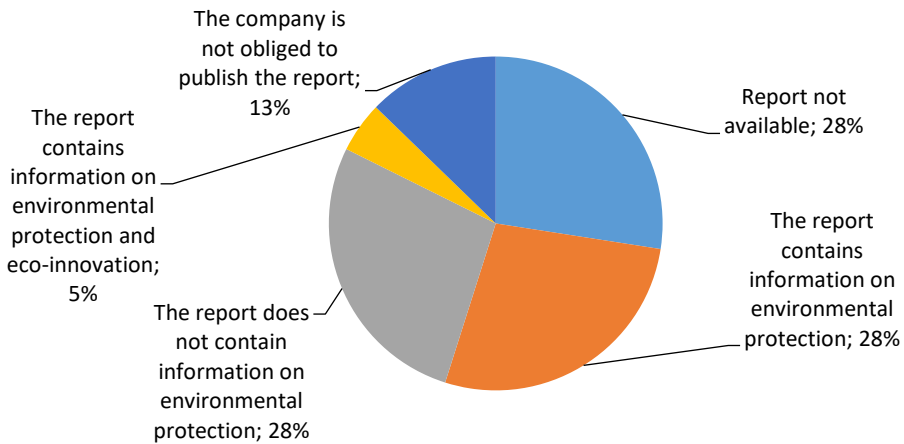
Figure 1. Environmental information in the annual business report for 2020
Source: Marinković, Stevanović, 2022, p. 83.

As examples of good business practice, we can cite companies from the processing industry, whose main activity is the production of beer, which in the business report listed investments in environmental protection and carried out innovative activities aimed at rationalizing water consumption and reducing carbon dioxide emissions by investing in industrial water treatment facilities and the creation of biogas as a renewable energy source. Annual reports on the operations of oil and fat processing companies contain information on continuous investment in the improvement of production processes and equipment, which achieves the reduction of particulate emissions in the air. Companies whose activity is the production of artificial ferti-lizers and nitrogen compounds have published information in their business reports that they monitor, measure, and reduce pollutant emissions, use renewable energy sources, and manage hazardous and non-hazardous waste streams. Also, these com-panies have made publicly available information about investments in the plant for the use of waste in the production of renewable energy, as well as the creation and implementation of innovative technological processes.

In general, companies in the Republic of Serbia have recognized the importance of sustainable development and, in addition to economic, included environmental and social performance in business reporting, but the self-initiated creation of non-fi-nancial reports, although it was not mandatory in the analyzed period, evident only in two analyzed companies from the processing industry (Marinković, Stevanović, 2022). Stubbs and Higgins (2018) found more support for voluntary approaches to integrated reporting and they suggested that it will become the reporting norm over time if left to market forces as more and more companies adopt the integrated re-porting practice.

Legal framework in the field of agriculture in the Republic of Serbia

The Government of the Republic of Serbia, based on Article 38, paragraph 1 of the Law on the Planning System of the Republic of Serbia (Službeni glasnik RS, br. 30/18), adopted the Program of Economic Reforms for the period from 2023 to 2025. Within the Program, the general framework and goals of public policy, ways of implementing recommendations, the macroeconomic and fiscal framework, and structural reforms in the period from 2023 to 2025, are presented, costs and financing of structural reforms and institutional issues and involvement of stakeholders. Structural reforms in the period from 2023 to 2025 are aimed at identifying key challenges for competitiveness, as well as at analyzing obstacles in various areas.

The analysis of the main challenges in the field of green transition is related to the sensitivity of the economy to climate change and a high degree of environmental pollution. While the global temperature increased by about 1°C, the average temperature in the Republic of Serbia increased by almost 2°C, and the increase is expected to reach a value of about 3°C by the middle of the 21st century. The Law on Climate Change created a legal framework for establishing a system for reducing greenhouse gas emissions in a cost-effective and economically efficient manner and minimizing the adverse effects of altered climate conditions. This law established the adoption of the Low-Carbon Development Strategy with the Action Plan and the Program for Adaptation to Changed Climate Conditions (drafting in progress), as well as monitoring and reporting on greenhouse gas emissions.

Concentrations of pollutants in the air in cities, especially suspended particles (PM), regularly exceed the levels recommended in the World Health Organization guidelines on air quality. Emissions of sulfur dioxide and carbon monoxide increased in 2020 (the household sector emits 84.8% of total CO, mainly due to heating), and nitrogen oxides. Low energy efficiency and outdated energy infrastructure in the electricity, gas, and steam supply sectors are the reasons why this sector contributes the most to air pollution.

Untreated sewage sludge and wastewater discharged directly into rivers throughout the country remain a major source of water pollution. Although the household sector emits 73.6% of wastewater, the industrial sector pollutes water courses the most (especially with phosphorus and nitrogen). With the project of collecting and purifying wastewater from the central sewage system of the city of Belgrade, the installation of interceptor networks for the reception of wastewater and storm sewers and the construction of a wastewater treatment plant is planned, which will reduce the number of outlets into the Sava and Danube by 80%. Also, the construction of more than 60 wastewater treatment plants is planned in the next four years.

Increasing the soil's resistance to changes in climate conditions requires, through the agricultural policy, further investment in the construction of new and modernization of existing infrastructure for irrigation, anti-hail networks, subsidizing insurance premiums, afforestation, etc. In the territory of the Republic of Serbia, only

4.6% of the used agricultural land is currently irrigated (7-8% in Europe). Through the initiated and planned investment projects, the conditions are created for the irrigation of close to 100,000 ha of additional agricultural land by 2025. About 25% of the territory of the Republic of Serbia (2.26 million ha) is covered by forests, which is significantly below the EU average (39%, source EUROSTAT), and the area of forested land increased by 3% in 2020 compared to 2017. The provisions of the European Green Deal should be implemented in the legal framework in the field of agriculture, through activities to reduce the use of pesticides, artificial fertilizers, and antibiotics, i.e. to reduce the risk of their use on the one hand and preserve biodiversity on the other.

A relatively high share of the GVA of the agriculture, forestry, and fishing sectors and the production of food products in the total GDP of the Republic of Serbia (6.3% and 2.4% in 2020 and 6.5% and 2.3% in 2021) it is partly a reflection of favorable natural conditions (geographical position, natural resources, climatic factor) and resources for agricultural production (used agricultural land makes up about 40% of the territory), but also a consequence of the low technological level of the rest of the economy. Agricultural potential has not been fully utilized due to insufficient technological development in all agricultural branches and the low population of rural areas. On the other hand, it can be seen that compared to five years ago, the income of foreign trade exchange in agriculture has increased several times, which directly contributed to the growth of GDP. About 12.3% of the total number of employees in 2021 work in agriculture.

The future legal framework in the field of agriculture in the Republic of Serbia will include the goals and activities of the European Green Deal, in terms of establishing a fair, healthy, and environmentally friendly market chain of food products, and through the activities of reducing the use of pesticides, artificial fertilizers and antibiotics, as well as reducing the risk of their use on the one hand, and improving environmental protection and preserving biodiversity, on the other hand. With this plan, the IPARD III program for the Republic of Serbia was adopted by the EC with Executive Decision No. C (2022) 1537 of March 9, 2022. All investments in machinery and equipment that are the subject of support must meet the standards regarding the emission of harmful gases.

Control in the process of managing plant protection products is insufficient, with a lack of specific knowledge and poor training of farmers for the application of plant protection products. Control of the presence of these agents in food products is carried out on an annual basis by the rulebook on the annual program of post-registration control of plant protection agents, based on the Law on Plant Protection Agents (Službeni glasnik RS, br. 41/09, 17/19).

Conclusion

The wide acceptance of the concept of green business within the corporate sector has been contributed by an increase in corporate awareness of the importance of its integration into business strategies, policies, and processes. Effective management of the strategy of green business and sustainable development requires appropriate information support. The accounting and information response to this challenge was the establishment of an integrated reporting system for the company. The essence of this approach is related to the integration of standardized financial reporting on the economic aspects of the company's operations, and non-standardized reporting on environmental, social, and wider economic aspects of the sustainable development of the company and the wider environment. In this way, the unification of financial and management accounting was established, and an information basis was provided for the management of the green business strategy and the establishment of a balance of economic development with responsible consumption of resources and better environmental protection.

Financial and non-financial reports on the company's operations contain information on the economic, social, and environmental performance of the company intended for stakeholders that indicate activities and risks in the field of the environment. The practice of companies in the Republic of Serbia showed a low level of reporting on investments in environmental protection and eco-innovations. Based on the results of the Marinković and Stevanović (2022) research, only 20% of observed polluting companies continuously disclose environmental information in the form of environmental costs, provisions for environmental protection, or various fees as part of short-term liabilities in the notes to the financial statements. Also, although there is a legal obligation, a significant number of analyzed large and medium-sized polluting companies do not publish annual reports on their operations (as many as 32%).

The existence of a legal obligation to publish non-financial information for certain legal entities from 2021 has increased the transparency of this data and positively influenced the socially and environmentally responsible business operations of companies. Due to the prescribed minimum amount of information published in the reports, it should not be concluded that the scope of the company's environmental and socially responsible activities is small, companies should be motivated to publish more detailed information about current and future investments in environmental protection, which will have a positive effect on the company's corporate image.

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INSTITUTIONS AND MANDATES FOR CLIMATE CHANGE ADAPTATION IN BULGARIAN RURAL AREAS

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Abstract

Climate change is undeniably the leading challenge in the 21st century (IPCC 2022). Agriculture is simultaneously a major driver of climate change and is seriously affected by it (EEA, 2019). The adaptation efforts and the level of readiness to adapt to climate change vary between regions, countries and sectors (e.g. agriculture and environment). The overall goal of the research is to assess the level of readiness for climate change adaptation of the agricultural and environmental institutions in Bulgaria. The specific objective of the paper is to analyse their institutional setups and mandates for adapting to climate change in the Bulgarian rural areas. The research findings and results will support the identification of enabling conditions and key barriers to stronger institutional adaptation capacities of the main agricultural and environmental institutions in the country. The assessment is based on documentary analysis of the national climate adaptation strategy and the legal acts, regulating the institutions' mandates and functions. The methodological approach is motivated by the conceptual model developed by Ford and King (2015) for assessing the climate adaptation readiness by governments at various scales. The focus is on three of their adaptation readiness factors – political leadership on adaptation, institutional organisation for adaptation and adaptation decision making. The results indicate a reactive rather than proactive political leadership on climate adaptation in Bulgaria. The institutional organisation for adaptation suffers serious understaffing in the Ministry of Environment and Water and in the relevance sectoral ministries. The Strategy on Climate Change and Adaptation stated the need for increased capacities and training in sectoral institutions and stakeholders in 2019. In 2023, there is only one environmental institution with an official mandate on climate change – the Climate Policy Department in the Ministry of Environment and Water. Its mandate is on policy development at the global, European and national level addressing both mitigation and adaptation needs; and it is the smallest unit in the ministry in terms of staff numbers. The other environmental institution with a mandate on climate change is the Executive Environmental Agency which monitors the greenhouse gas emissions and the related permits and registers, with no explicit mandate on climate adaptation. As regards the agriculture and rural development institutions, the Rural Development Directorate in the Ministry of Agriculture has a mandate to propose measures addressing climate change needs during the programming of the Common Agricultural Policy Strategic Plan 2023-2027. The identified needs (i.e. introduce climate adapted breeds and plant species) relate to the farming sector and not to the rural areas. Overall, the key weakness of the Bulgarian climate adaptation approach in rural areas is its reactive and ad-hoc basis. It either is driven by EU regulations and requirements or is implemented when project opportunities arise, without systemic planning and ownership of responsibility in the agriculture or environmental institutions.

Key words: climate change governance, adaptation readiness, agriculture
JEL *code: Q54, Q58, Q18*

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Introduction

Climate change is undeniably the leading challenge for the global community in the 21st century (IPCC, 2022). The efforts to limit the climate disrupting emissions (mitigation) while at the same time, prepare for the adverse effects from the ongoing weather extremes (adaptation) strain political and institutional capacities at different governance levels. Agriculture is an exemplar sector for both being a major driver of climate change and for being seriously affected by it (EEA, 2019).

Overall adaptation efforts have increased significantly but are still „unequally distributed across regions" and „fragmented, small in scale, incremental, sector-specific, designed to respond to current impacts or near-term risks, and focused more on planning rather than implementation" (IPCC, 2022). The largest adaptation gaps exist among lower income population groups, among which small-scale agriculture producers and rural inhabitants.

Both the scientific community and practitioners aim to contribute to the understanding of the adaptation needs and gaps of the enabling capacities and institutional readiness across sectors and governance levels, e.g. national adaptation capacity frameworks (Berrang-Ford et al., 2019; Dixit et al., 2012; Ford & King, 2015), local adaptation capacity framework (Aguiar et al., 2018; Jones et al., 2010;), agriculture and forestry adaptation (Ignaciuk, 2015; Vizinho et al., 2021; Zhao et al., 2022) and the interaction between them (Barr & Lemieux, 2021; Darjee et al., 2021; Ford et al., 2017; Huitema et al., 2016; Olazabal et al., 2019).

The overall objective of the research is to assess the level of readiness for climate change adaptation of the agricultural and environmental institutions in Bulgaria. The specific objective of the paper is to analyse their institutional setups and mandates for adapting to climate change in the Bulgarian rural areas. The research findings and results will support the identification of enabling conditions and key barriers to stronger institutional adaptation capacities of the main agricultural and environmental institutions in the country. This is the first step of assessing the level of readiness for climate adaptation in the rural areas in Bulgaria.

Methodological Approach

The study of climate adaptation mandates is motivated by the six adaptation readiness factors, developed by Ford and King (2015). They proposed a conceptual model „*to assess readiness with regard to planned adaptation by governments at various scales*" by six factors that were „*essential for adaptation to take place and without which adaptation was unlikely to occur*" (Table 1).

The assessment of the Bulgarian governance set up and mandates is based on documentary analysis of the national climate adaptation strategy and the legal acts, regulating the institutions' mandates and functions. The focus is on three of the adap-

tation readiness factors – political leadership on adaptation, institutional organisation for adaptation and adaptation decision making and stakeholder engagement. Thus, the scope of the analysis is at the national level.

Table 1. Factors relevant to adaptation readiness

Factor	Assessment options
Political leadership on adaptation	Statements from leaders on the importance of adaptation, creation of national adaptation strategies, development of legal mandates, including in departments and governmental plans.
Institutional organisation for adaptation	Existence of political and administrative structures that foster or limit adaptation.
Adaptation decision making and stakeholder engagement	Proactive inclusion of stakeholders and communities in decision-making about planning, implementation and monitoring.
Availability of usable science to inform decision-making	Quality, timely and reliable science available to inform decision-making and implementation of actions.
Funding for adaptation planning, implementation and evaluation	Specific funding and resources dedicated to adaptation efforts, including capital, maintenance and human resources for both research and actions.
Public support for adaptation	Public opinion and perception of risks as an influence on decision making and implementation
Interlinkages among factors	Factors that are contingent on other factors or reinforce each other. Tension between factors, limit or override each other.

Source: Adapted from Ford and King (2015), and Ford et al. (2017)

National adaptation governance set up and institution's mandates

1. Political leadership on adaptation

In Bulgaria, the ultimate responsibility for climate policy is with the Parliament, as stipulated in the Climate Change Mitigation Law. The Council of Ministers has the overall responsibility of any policy implementation. The climate policy is within the competences of the Ministry of Environment and Water (MoEW). The Bulgarian Climate Coalition[2] advocated for over a decade the need for recognising the high priority of climate policy and action. The first indication of the high level of political importance of climate change was given at the end of 2021, when a deputy prime minister on climate was appointed. However, the government was short-lived

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[2] https://climatebg.org/en/documents/stanovishta/

(13 December 2021 – 22 June 2022) and the next government did not renew either the priority or the position. Thus, climate remained one among equal policy topics in MoEW; the ministry not even (re)named as ministry of environment (water) and climate.

The Climate Change Mitigation Law, adopted in 2014 and amended several times after that, was the only legal act on climate. Its focus was on climate mitigation as its title indicated. Nevertheless, climate adaptation was referred to in several articles aiming to „*ensure the long-term planning of measures on climate change adaptation*".

The availability of national strategy and/or action plan, which is another indicator of political importance, was prompted by the European Union (EU) climate policy. Bulgaria was among the last EU states to adopt a National Climate Change and Adaptation Strategy and Action Plan in 2019. For comparison, 20 EU member states had adopted national climate adaptation strategies by 2015 (Aguiar et al., 2018). The Climate Change and Adaptation Strategy provided a baseline assessment and sectors' prioritization (agriculture among them).

In 2023, Bulgaria was one of the only four EU member states (the other three were Germany, Hungary and Slovenia) that provided only the mandatory reporting with no additional information on climate adaptation[3].

The delays in developing and adopting climate adaptation policies and the lack of high-level political positions on climate change indicate a reactive rather than pro-active political leadership on adaptation.

2. Institutional organisation for adaptation

MoEW established a Climate Policy Directorate with a broad climate mitigation and adaptation policy mandate. The responsibilities comprised developing legal acts, coordinating the development and implementation of the national climate policy as well as coordinating the work of other ministries and institutions in relation to the national climate policy (art.38, RCM 208/2023). However, it is the smallest specialised unit in the MoEW with only 11 staff members. In comparison, the Air Quality Directorate has 13 staff, the Water Management and Waste Management Directorates have respectively 24 and 23 staff, and the Nature Conservation Directorate – 32. At the same time, none of the subordinate MoEW institutions – the Regional Inspectorates, the River-Basin Management Directorates or the Executive Environmental Agency received an official climate adaptation mandate (Table 2).

The Climate Change Mitigation Law and the Third National Plan on Climate Change Mitigation 2013-2020 (3rdNPCCM) planned for the setting up of dedicated climate units in the related ministries, including in the Ministry of Agriculture (MoA). In 2022, the final implementation report of the 3rdNPCCM disclosed that the MoA declined the setting up of such unit. The justification provided was the

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[3] https://climate-adapt.eea.europa.eu/en/countries-regions/countries

„*cross cutting character of climate change affecting the work of multiple units in the MoA system*" (p. 32). The MoA stated that the „*existing structure was sufficient to ensure a good coordination of issues requiring a complex approach and complementarity*". The functional structure regulations of the agriculture institutions revealed that there was only one unit in the MoA with official climate related functions. This was the Rural Development Directorate, which was responsible for the programming of the Common Agriculture Policy (CAP) support. One of its over 15 other functions was to „*program appropriate measures and schemes <u>to combat climate change, to protect soils, biodiversity and water resources, through which to ensure the fulfilment of commitments related to the environment and climate, arising from the applicable European legislation for the European Structural and Investment Funds</u>*" (art. 38(1) p. 11), RCM 260/2019). Again, climate change was one of four environmental issues to be addressed.

The other MoA institution with climate related responsibilities was the Executive Forestry Agency. Its Forest Management Directorate had two functions related to climate change mitigation – to participate in intra-institutional meetings and working groups and to develop and implement projects on climate change mitigation in forests. None of the functions mentioned explicitly climate adaptation responsibilities.

Table 2. Climate mandates as regulated in the legal acts on the institutions' functioning

Institution	Climate	Mitigation	Adaptation	Directorate	Legal act
1	2	3	4	5	6
Environment institutions					
Ministry of Environment and Water	x	x	x	Climate Change Policy	RCM 208/2017, 2023*
Executive Environmental Agency	x	x	.	Environment Monitoring, Permits	RCM 331/17.10.2022
Regional Inspectorates Environment and Water	.	.	.	.	MoEW, SG 54/2020
River-basin Directorates	.	.	.	.	MoEW, SG 54/2020

Continue

1	2	3	4	5	6
Agriculture Institutions					
Ministry of Agriculture and Food	x	.	.	Rural Development	RCM 260/2019
State Fund Agriculture	.	.	.	.	RCM 151/2012, 2020*
District Directorates on Agriculture	x	.	.	Agriculture Development	MoA, SG 41/2022
National Agriculture Advisory Service	.	.	.	.	MoA, SG 25/2022
Exec Agency Fisheries & Aqua-culture	.	.	.	.	RCM 95/2010, 2020*
Food Risk Assessment Center	.	.	.	.	RCM 231/2016, 2020*
Bulgarian Agency on Food Safety	.	.	.	.	RCM 35/2011, 2020*
Executive Agency for Combating Hail	.	.	.	.	RCM 85/2000, 2021*
Agriculture Academy	.	.	.	.	RCM 151/2018, 2022*
Executive Forestry Agency	x	x	.	Forest Management	RCM 173/2011, 2022*

*Notes: Resolution of the Council of Ministers (RCM)/ Order of respective minister in State Gazette (SG); * year of latest change*
Source: Own compilation

The 2019 Climate Change and Adaptation Strategy assessed the institutional capacity on climate change adaption as needing improvement „*at all levels and in all sectors*". The proposed focus was on „*building expertise, training of the administration and stakeholders, the knowledge base, monitoring and research to enable and support adaptation actions*" (CCAS, 2019). The current review underlines that before building expertise there is an urgent need to build up the institutional mandates on climate adaptation and to strengthen the only existing institutional unit with a dedicated mandate on climate mitigation and adaptation policy as well as to establish the units in the relevant ministries and institutions.

3. Adaptation decision making and stakeholder engagement

The public bodies' decision-making on climate issues was regulated in the Climate Change Mitigation Law. It stipulated that a National Expert Council on Climate Change supported the Minister of Environment and Water. Thus, the Council was established as a consultative body. Its members comprised representatives of nine other ministries, the Executive Environmental Agency, the Bulgarian Academy of Science, the Association of Municipalities as well as other non-governmental bodies. The Ministry of Agriculture and Food was one of the members.

The operation of the Consultative Council was regulated by an Order of the Minister of Environment and Water. The draft text of the order (the only available version on the MoEW website) stipulated that its operating principles were transparency, publicity and equality among its members. An assessment by Climate Action Network in Europe stated that it „*does not function with transparency and accountability since neither its members not its decisions or protocols of meetings are available or accessible online*" (Peev, 2022). Indeed, not even the approved rules of procedure of the Council were published.

Conclusion

The institutions' approach to climate change positions adaptation secondary to mitigation – the law is focused on mitigation; there are already three action plans focused on mitigation, and only one on adaptation. There is a single institution with a mandate on climate change adaptation – the Climate Policy Department in the MoEW. Two other institutions have specific climate change mandates but they are focused on mitigation – the Executive Environmental Agency and Executive Forestry Agency. The Rural Development Directorate has a rather general mandate for developing climate change measures with no specific focus on adaptation.

Coordination on climate change adaptation seems to be one-sided. The 2019 Climate Change and Adaptation Strategy indicated the necessary actions in terms of institutional setting and capacity building, but the MoA declined the dedicated unit. Nevertheless, certain adaptation measures were planned and activities implemented. The CAP Strategic Plan 2023-2037, coordinated by the MoA and the Rural Development Directorate, identified needs of very high priority, some of which directly related to climate change adaptation such as the introduction of climate-adapted species and varieties and sustainable forestry, implementation of conservation, integrated and organic farming and soil carbon sequestration.

The National Agriculture Advisory Service trained several hundred farmers on certain aspects of climate adaptation actions in the framework of non-climate related projects.

The weakness in this approach is its ad-hoc basis – it is driven either by EU requirements or by opportunity projects and on the good will of the staff in the public

administration and not on clear official mandates. If it was not in the EU Regulation on CAP Strategic Plans or the project funding was not available, there would not have been either of the positive outcomes.

Research indicates, „*The most effective adaptation efforts usually happen where there is a single coordinating body leading the adaptation process*" (Ford et al., 2017). If the individual ministries decline the responsibility, then the higher-level decision-making should make sure that climate change adaptation in rural areas and agriculture is addressed properly.

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BIOECONOMY – PRESENT AND FUTURE

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Abstract

The pressure on ecosystems has intensified as a result of excessive pollution, overexploitation and depletion of natural resources. This imposes the need of a radical change in the existing methods of processing, storage, recycling and disposal of biological resources by establishing sustainable production and consumption models.

The need to step up the transition to both clean energy and sustainable, resilient and equitable food systems has never been stronger and clearer. Future implementation of the EU Bioeconomy Action Plan will need to take into account the implications for food and energy prices, as well as the prices of energy-intensive products and global supply chains, and address the resulting additional pressures on natural resources at ecosystem boundaries. Activities in the bioeconomy sectors are especially reliant on healthy ecosystems to ensure a sustained production of biomass, but at the same time activities along the bioeconomy supply chains generate environmental impacts which can damage local and global ecosystems.

The bioeconomy is directly related to 11 of all 17 Sustainable Development Goals but though the EU undertakes the steps necessary to achieve sustainability, there is still a wide range of actions to be taken in order to ensure the transition towards bioeconomy and to mitigate and eliminate the negative impacts on the environment.

In the study we have focused on three important indicators that give insight about current state and trends in EU and Bulgaria about bioeconomy, respectively employment in the bioeconomy, turnover in bioeconomy, and value added at factor cost in the bioeconomy. The trend in Bulgaria follows that of the EU for those indicators which indicates the continuity of the measures adopted at the EU level and the consistency of the actions at the supranational level.

The paper is based on a thorough review of available reports, analysis of official documents as action plans, communications, programs, strategies and data related to bioeconomy at EU level, reviewed in the context of global efforts for achieving sustainability.

The main objective of this research is to represent the international efforts aimed at the protection of natural resources and to evaluate the measures taken to stimulate the EU transition towards bioeconomy.

Keywords: Bioeconomy, European Union, Sustainability, Sustainable Development Goals
JEL: Q01; Q56; Q57

Introduction

Europe is confronted with an unprecedented and unsustainable exploitation of its natural resources, significant and potentially irreversible changes to its climate and a continued loss in biodiversity that threaten the stability of the living systems on

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which it depends (COM (2012) 60 final). The main cause of the biodiversity crisis is the highly extractive, wasteful, and polluting economy. Over the past decades, the level of this extraction has long since exceeded that which the earth can renew. Today's linear 'take-make-waste' economic system is therefore placing a huge burden on nature. Such pressures have been attributed mainly to major value chains such as food, the built environment, energy, and fashion (Ellen MacArthur Foundation, 2021).

The need to step up the transition to both clean energy and sustainable, resilient and equitable food systems has never been stronger and clearer. Future implementation of the EU Bioeconomy Action Plan will need to take into account the implications for food and energy prices, as well as the prices of energy-intensive products and global supply chains, and address the resulting additional pressures on natural resources at ecosystem boundaries (COM (2022) 283 final).

In order to cope with an increasing global population, rapid depletion of many resources, increasing environmental pressures and climate change, Europe needs to radically change its approach to production, consumption, processing, storage, recycling and disposal of biological resources (COM (2012) 60 final). The first steps towards stopping and reversing the biodiversity loss, should begin with transforming the production and consumption systems which issues can only be tackled through transformative economic, social, political, and technological changes. This means fundamentally transforming the way products and food are made, used, and reused and redesigning the economy to help achieve a nature-positive future (Ellen MacArthur Foundation, 2021).

The role of individual and societal values to mitigate the on-going ecological breakdown should also be taken into account. Defining a safe and just space for self-identity and values, could be the first step in addressing this crucial aspect. There is also a need for acting upon historically embedded and current injustices, as well as actively reducing the causes for the vulnerability, and reduction of over-consumption in the EU (Giuntoli et. al., 2023).

Since 1949 the United Nations and the European Economic Community (EEC), which was incorporated into the European Union, have been making significant efforts to improve living conditions, to protect nature and to adhere more strictly to the principles of sustainable development. However, the first official document to bring the bioeconomy to the fore is the Strategy on Innovating for Sustainable Growth: A Bioeconomy for Europe, accepted in 2012 and updated in 2018 (COM (2012) 60 final; COM (2018) 673/2), followed by the launching of the EU Bioeconomy Monitoring System in 2020.

The main objective of this research is to represent the international efforts aimed at the protection of natural resources and to evaluate the measures taken to stimulate the EU transition towards bioeconomy.

Materials and methods

The paper is based on a detailed review of reports, analysis and official documents as action plans, declarations, programs and statistical data related to bioeconomy, its implementation and the policies aimed at supporting the transition towards bio-economy at EU level in the context of global efforts for achieving sustainable development.

The analysis is based on the definition of bioeconomy adopted by the EC (COM(2018) 673/2), respectively that bioeconomy covers all sectors and systems that rely on biological resources, their functions and principles. It includes and interlinks: land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources; and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services.

One of the main limitations of the study is the availability of data for the period under consideration, and for the main indicators considered in the research, the available information refers to the 2008-2020 period.

Results and discussion

The EU Bioeconomy Strategy (COM (2018) 673/2)) defines five objectives to be achieved: (1) Ensuring food and nutrition security; (2) Managing natural resources sustainably; (3) Reducing dependence on nonrenewable, unsustainable resources, whether sourced domestically or from abroad; (4) Mitigating and adapting to climate change; and (5) Strengthening European competitiveness and creating jobs.

Activities in the bioeconomy sectors are especially reliant on healthy ecosystems to ensure a sustained production of biomass, but at the same time activities along the bioeconomy supply chains generate environmental impacts which can damage local and global ecosystems (Sinkko et. al., 2023).

By evaluating the capacity of existing bioeconomy models, Verkerk et. al. (2021) outline some important gaps: (1) Some bioeconomy sectors and products are not well covered and most of the existing models are focused on a given sector; (2) the sectoral scope of most models result in their limited ability of capturing the cross-cutting issues of the bioeconomy transition and addressing multiple bioeconomy objectives which interferes with the successful transition to a sustainable and circular bioeconomy; (3) the existing models are focused on products with established markets and not properly capture the emergence of new or innovative products; and (4) most of the models provide information on national level and a much smaller number of models provide such information at sub-national level while impacts typically occur at regional or local level.

A study of Mubareka et. al. (2023) shows that for the last decade some aspects of the EU bioeconomy are following positive trends, but others are not. While the trends at EU level show that the resource efficiency is improving, waste recovery

and value of raw biomass, the pressures on ecosystems from forestry and agriculture are in fact increasing, and in the case of forestry, this is impacting the carbon sink. In the study we have focused on three important indicators that give insight about current state and trends in EU and Bulgaria about bioeconomy, respectively employment in the bioeconomy, turnover in bioeconomy, and value added at factor cost in the bioeconomy.
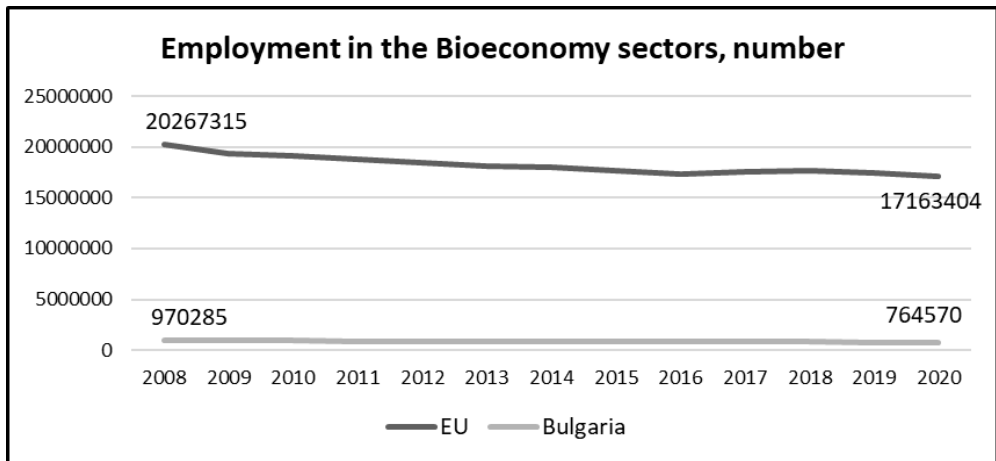
Figure 1. Employment in the Bioeconomy sectors in EU and Bulgaria,
number of persons employed
Source: Tamošiunas et. al, 2022

It is observed a negative trend in employment in last twelve years both in the EU and in Bulgaria (Fig.1). The decrease of employment at EU level is 15.32 % (or more than 3 million people), while in Bulgaria this drop is by 21.20% (or almost 206 thousand people). Unfortunately, there are no available data that can give deeper inside what are these negative trends due to. One hypothesis is that this is due to the implemented innovations. Another hypothesis is that at the beginning of the period inhenced bioeconomy research is observed, and multiple projects are implemented and finalized in all the bioeconomy sectors.

According to a third hypothesis, the level of employment in the bioeconomy sectors follows the general trend at the EU level, according to which from 2013 to 2018 there is a smooth growth, and between 2019 and 2020 there is a sharp decline in the number of employed, with unemployment reaching levels lower than those at the beginning of the period under consideration.
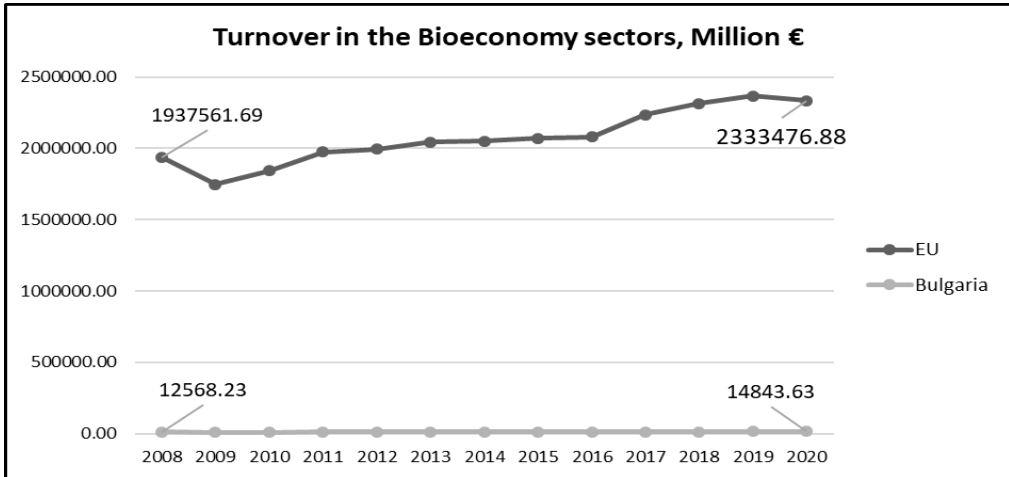
Figure 2. Turnover in the Bioeconomy sectors in EU and Bulgaria, € million
Source: Tamošiunas et. al, 2022

While employment is following negative trend, turnover in the bioeconomy is showing increase both in EU and Bulgaria for the last twelve years (Fig.2). At EU level increase is by 20.43 %, and in Bulgaria by 18.10%. We can firmly state that both paces are very similar and close.

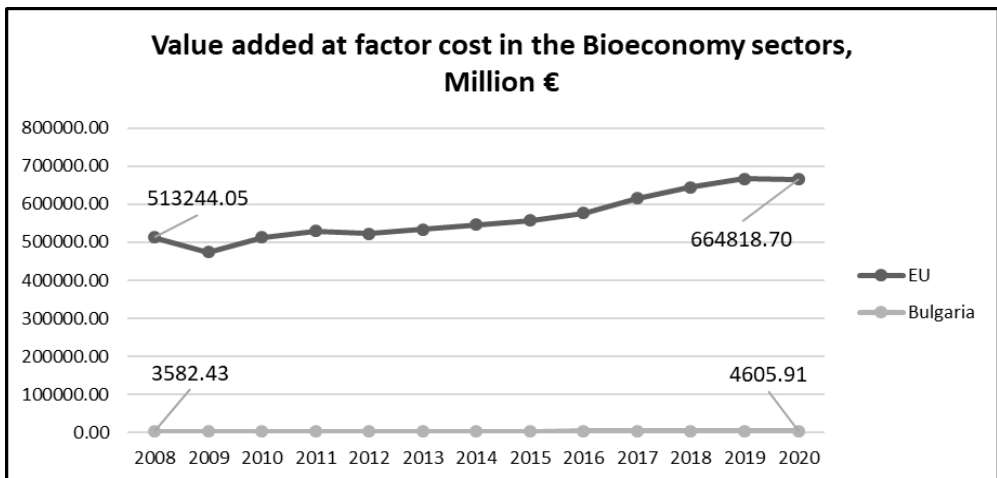*Figure 3. Value added at factor cost in the Bioeconomy sectors in EU and Bulgaria, € million*
Source: Tamošiunas et. al, 2022

The value added at factor costs in the bioeconomy sectors show increase with similar pace in last 12 years both at EU level and in Bulgaria (Fig.3). At EU level the increase is by 29.53%, close to it is those in Bulgaria it is 28.57%.

As it is visible from figures 1 to 3, the trend in Bulgaria follows that of the EU both for the employment, the turnover and the value added at factor cost. This indicates the continuity of the measures adopted at the EU level and the consistency of the actions at the supranational level.

Conclusion

Though the EU undertakes the steps necessary to achieve sustainability, there is still a wide range of actions to be taken in order to ensure the transition towards Bioeconomy and to mitigate and eliminate the negative impacts on the environment.

The ability to innovate has increasingly determined the success and competitive strength of industry. But even in a global economy where mainly high technological industries have been thriving, a large part of prosperity is still directly derived from basic natural, biological resources, as they are the raw materials for the majority of the products on which we depend on a day to day basis. Although they are the basis of the oldest economic activities, new technologies such as life sciences and biotechnology are now transforming them into one of the newest, at the frontier of the emerging knowledge-based economy.

The current state of development of the Bioeconomy is a result of significant long-term work at international level. The EU is taking the necessary steps to ensure the sustainable use of natural resources but still there is a great number of actions that should be taken on a global level so the transition towards Bioeconomy could become possible.

In 2008 it is estimated that the European bioeconomy has an annual turnover of almost € 2 trillion, value added of more than € 0.5 trillion and employs more than 20 million people. By 2020 there is an increase in the turnover to over € 2.3 trillion, and in value added to about € 0.67 trillion while there is a decrease in the number of people employed to a little over 17 million people. The same trend is observed in Bulgaria where the number of people employed in the bioeconomy sectors decreases from 0.97 million people in 2008 to 0.75 million people in 2020. For the same period there is an increase in the turnover from € 12.6 billion to €14.8 billion, and an increase in the value added from about € 3.6 billion to € 4.6 billion.

The EU economy is still very resource-dependent which outlines the need of accelerating the transition towards a regenerative growth model and accepting more sustainable production and consumption practices.

At the moment, many bioeconomy models have been developed and implemented, which cover separate sectors of the bioeconomy, but to better integrate the three dimensions of sustainable development and the goals outlined in the updated EU Bioeconomy Strategy and to achieve the United Nations' Sustainable Development

Goals, it is of great importance to develop and implement such models that cover all sectors of the bioeconomy, as well as innovative products and activities, but which at the same time can reflect the impacts at sub-national and local levels.

The shifting towards bioeconomy and achieving sustainability is a global challenge and so it requires the outlining and acceptance of common goals, followed by co-ordinated international policies and actions.

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LEVELS OF PROVISION OF AGROECOSYSTEM SERVICES

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Abstract

Rural areas are characterised by high biological diversity. Farmers are both direct users of ecosystem services, but on the other hand management of agricultural land affects not only the economic outcome but also has an impact on the condition of agroecosystems. Farm activities and agroecosystems are interlinked. The more conserved and protected the ecosystem functions are, the higher the positive feedback on the farm and the surrounding ecosystems is. The provision of ecosystem services can take different forms – through private contracts, collective contracts, government payments, etc. In Bulgaria at the moment, the most common form of provision is through public payments or through ecological certification of organic products. However, private arrangements can also enhance this provision and secure a win-win scenario for both provider and buyer of ecosystem services. This study shows several case-studies on private arrangements with comparative analysis on several contract features. These examples show different levels of provision of ecosystem services. In some cases, both the efforts and the actual benefit are at the same level, for example an agricultural plot (pollination contracts). In other cases, an actual effort in the form of agri-environmental measure can take place in a certain farm holding, but the actual benefit can be seen somewhere else, for example downstream of a watershed catchment. And in some instances, the actual effort is used to compensate for someone else's pollution activities (see carbon credit markets). Very often, a farm is a user of ecosystem services, both within and outside its physical boundaries. On the other hand, some ecosystem services require collective action to be effective and meaningful (most often this is the example of biodiversity conservation). There is still a controversy over what is the best form for providing ecosystem services from agriculture – through private contracting or through the traditionally used public provision. The answer is likely to be found in the nature of the ecosystem services themselves. If for an ecosystem service such as crop pollination it is easy to establish a buyer and seller of the service, there are clear benefits for both parties, and the price can be easily determined. For others such as biodiversity, all this is very difficult to be achieved. For this purpose, it is necessary to assess the most important features characterising a contract. The form of the contract is tightly connected with whether the environmental effort of the farmer is measurable or not. For some ecosystem services, like pollination the environmental result is easily monitored and measured. Where in other instances, like the watershed groundwater quality, monitoring is difficult or impossible. Therefore, different ecosystem services pose the need for different contract arrangements.

Keywords: agroecosystem services, private contracts

JEL code: Q15, Q57

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Agroecosystem services

Rural areas are characterised by high biological diversity, they cover various natural processes and they are associated with the provision of various ecosystem services (soil fertility, carbon storage, biodiversity, etc.). Therefore, management must take into account the dual role of agriculture – provision of food, and conservation of ecosystems, both of which are interconnected. Agroecosystems incorporate the traditional understanding of ecosystem services, as described in the Millennium Assessment Report in 2005, but with a focus on the role of human activity in altering natural functions.

Figure 1 shows the complex interrelationship within the agroecosystem. It is believed, that the supporting ecosystem services are the basis for all other. On one hand, the agricultural holding is a direct user of the agroecosystems, therefore the state of the services (enhanced or decreased) directly affect the economic activity of the farm. On the other hand, agricultural activities (decision-making, policy implications, etc.) can lead to disservices such as habitat loss, disturbance of soil health, nutrient runoff, water pollution, etc.

Even more key is the understanding that farms should not be seen as separate units (plot-based) but as ones that extend beyond their own boundaries in terms of ecosystem services.
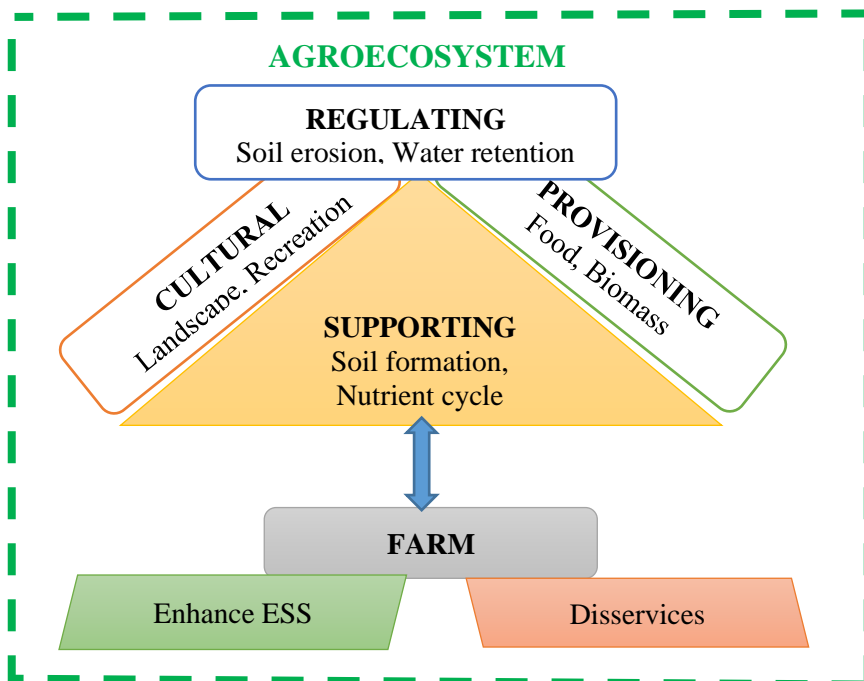

Figure 1. Agroecosystem services
Source: The author

For example, an agricultural holding is a user of the ecosystem services created within its phisical boundaries, but it can also be a user of ecosystem services outside its boundaries. On the other hand, activities within the farm can contribute to both positive and negative externalities that affect the agroecosystem whitin the farm, but outside of it.

Levels of provision of agroecosystem services
Ecosystem services can be provided at different levels – from a certain agricultural plot, to regional or national level. These levels can be a subject to a twofold understanding:
A) The level of actual efforts – where the efforts for provision take place
B) The level of benefit– where the efforts for provision lead to an actual benefit
Based on this understanding, in some cases both the efforts and the actual benefit are at the same level, for example an agricultural plot (*see case study 1 – pollination contracts*). In other cases, an actual effort in the form of agri-environmental measure can take place in a certain farm holding, but the actual benefit can be seen somewhere else, for example downstream of a watershed catchment (*see case-study 3 – watershed contracts*). And in some instances, the actual effort is used to compensate for someone else's pollution activities (*see case-study 2 – carbon markets*).
The provision of ecosystem services can take different forms – through private contracts, collective contracts, government payments, etc. In Bulgaria at the moment, the most common form of provision is through public payments or through ecological certification of organic products. These two types are polar opposites to the economic logic they imply. The public provision of ecosystem services is rooted in the idea of public goods and that their private provision is difficult or impossible. Unlike private goods, public goods are not easily provided through market mechanisms, mainly due to the fact that it is not possible to determine their supply and demand.
Although the two concepts –public goods and ecosystem services – are often considered separately, in some ways they overlap (Dwyer et al., 2015). If we consider the ecosystem service as a result of natural functions, and bearing in mind that it is a service from a human point of view, some of the ecosystem services can have the same market characteristics as public goods – non-excludability and non-rivalry. This means that once produced, the ecosystem service is used by all (non-excludability) and its use does not reduce the benefits for all users (non-rivalry). An example of this type of service is the preservation of biodiversity, or the rural landscape. Other ecosystem services, such as provisioning services, are more of a private good. For example, food and biomass production have the characteristics of excludability and competitiveness.

Therefore, if we return to the two forms of provision of ecosystem services – private and public – we can say that while the market mechanism can be used for provisional services, it is practically very difficult for the other groups, like regulatory or supporting. Organic agriculture is a very good example of the provision of various ecosystem services (increased biodiversity, soil fertility, etc.) that are jointly produced to a private good. Thus, buying organic vegetables, for example, the consumer pays not only for the provisioning ecosystem service, but also for others (for example, biodiversity).
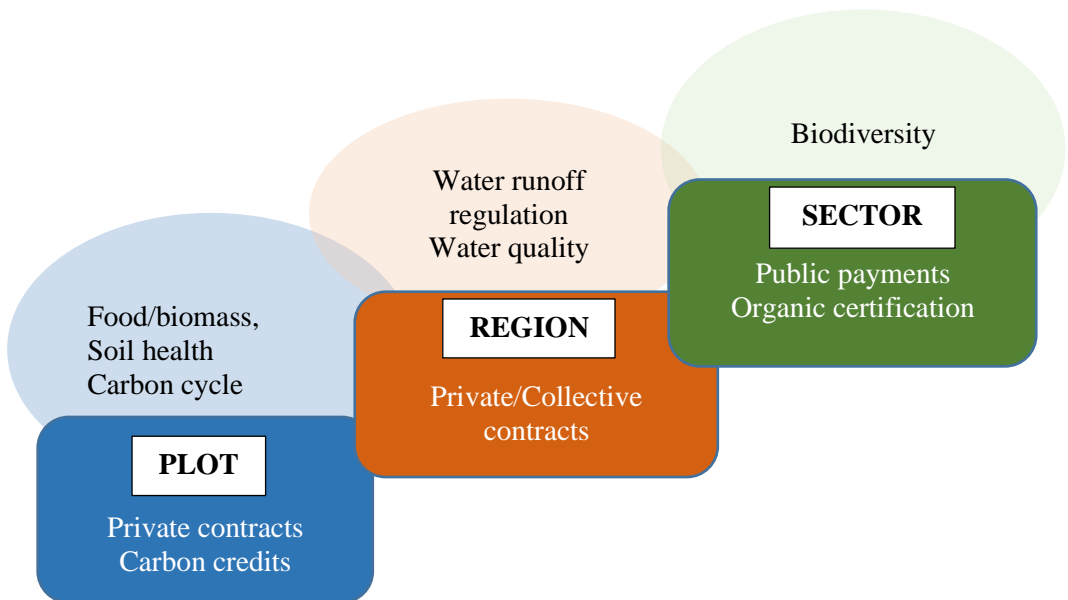
Figure 2. Levels and forms of provision of ESS
Source: The author

In Figure 2 different forms of provision of ecosystem services are presented. They may relate to a specific plot/holding, may cover a catchment area, or cover the entire sector. Although ecosystem services often go beyond the boundaries of a specific farm, some types of services are more associated with those provided within the farm itself (such as food, soil fertility), others at the regional level (regulation of water quality and quantity at a watershed level), or at sector level (biodiversity).

Private vs. public provision of ESS
In the next paragraphs three different case-studies of private contracts for ESS will be examined, followed by a comparative table – private contracts vs. public.
Case – study 1: Pollination contracts

This type of contracts originated from the US, where it is still very common for almond growers (the buyer of the pollination service). The contract can be verbal or written, with research showing (Goodrich, 2019a) that beekeepers with more years of experience prefer a written contract. In many cases, an intermediary (broker) also participates in the transaction, which provides security for both parties – securing the correct payment for the service provider, and securing actual service for the buyer. The intermediary is responsible for routine inspections (monitoring) of the strength of the beehive (previously stated in the contract). Payments are per beehive with variation in bee colony strength (depending on how many active bee frames the hive contains) (Goodrich, 2019b). Other requirements for the provision of the pollination service are included in the written contracts, some of which are: 1) the beekeeper's right of access to the hives during the duration of the service, and 2) forbidden use of insecticides during the stay of the beehives (Goodrich, 2019c). This type of ecosystem services contract is one of the oldest examples that has proven its effectiveness. Unlike other ecosystem services (such as flood regulation, for example), here the quality of the service and the actual result can be clearly tracked.

Case-study 2: Carbon markets

Another example of private negotiation, which is gaining more and more attention not only in the US, where it has started, but also in the EU, is the carbon credits from agriculture.

Essentially, carbon markets were created to put a price on pollution. Although pollution of land, water and air has long been treated as „free", it still has a price that society pays in the form of depleted and degraded natural resources. Carbon credits and markets started as a way for the governments to regulate (via a cap) carbon emissions. The idea of including agricultural land in „capturing" carbon arose as another attempt to combat CO_2 emissions.

In this arrangement, farmers should implement certain agro-environmental measures that are considered to possess high potential for capturing and storing carbon in soils (carbon sequestration). Most often such practices are zero tillage (no-till) and cover crops. The involved stakeholders are:

❖ **Farmers** as 'carbon capture and storage' service providers;

❖ **Certifying intermediaries** (brokers), the connecting link between the buyer and the seller of the service

❖ **Private companies** which are willing to voluntarily neutralize their emissions.

The carbon markets for agriculture are at the moment a voluntary mechanism, and the participation of the government is limited to the establishment of unified protocols and certification mechanisms. This is necessary because at the moment in the US there are several intermediary companies that use different mechanisms and conditions for farmers' participation. Some pay per unit of area, others per ton of carbon dioxide.

Case-study 3: Watershed contract

Another example of private contracting is the provision of ecosystem services at the watershed level. One of the first case-studies is the bottling company 'Vittel' in France, which initiated a program to reduce water pollution in the catchment area feeding the springs that are the source of bottled mineral water. Contracts were signed with farmers for a period of 18-30 years. The contracts are individual and tailored to the location of the farm. Payments do not depend on changes in nitrate levels, but on the costs of implementing new practices and the necessary investments to decrease the use of nitrate fertilizer and therefore to reduce the contamination of groundwater. An intermediary party ('Agrivair') was created as company, part of 'Vittel', which negotiates and implements the pollution abatement program, as well as monitors the implementation of the practices (Depres et al., 2005). Prior to the start of the initiative, pilot studies and testing were initiated to ensure an appropriate link between the provision of ecosystem services and conservation practices (Perrot-Maitre, 2006). By its essence this case-study represents a classical allocation of property rights in order to solve environmental problem. Where 'Vittel' has the right to exploit the underground aquifers, the farmers influence the underground water passing by their land with the practices they implement (Depres et al., 2005). Going beyond the original creation of the 'Agrivair', up to these days the company continues in creating partnerships in the region with the aim of water protection.

Table 1 presents the three private arrangements for provision of ecosystem services and the most common public one. There are many comparative features that can be used to distinguish different forms of ecosystem services provision. Some of the most common ones are listed in the table: 1) form of the contract; 2) negotiation costs; 3) if an intermediary (broker) is needed; 4) longevity – duration of the contract, which in some case like carbon credits is immensely important; 5) monitoring costs; 6) payment mechanism; 7) if due to the efforts there is a measurable outcome (effect).

Regarding the form of contract, in some cases like the watershed contract it is possible for the buyer of the ESS to contract a collective organization (farmers' association). In this way negotiation efforts will be facilitated in an easier manner. However, in the case-study with 'Vittel' there was no possibility for this kind of collective initiative and therefore the negotiation costs were very high.

The intermediary party can be mandatory in some private contracts like it is the case with the carbon credit markets. The broker is an irreplaceable link between the buyer and seller of ESS. On one hand, the broker is the one creating the framework and rules for how the carbon credit system works, since at this moment carbon credits from agriculture are not included in the national carbon emission trading system.

Table 1. Comparative table of feature regarding private vs. public provision of ecosystem services (ESS)

	PRIVATE			PUBLIC
Comparative features	**Pollination contracts**	**Watershed contract**	**Carbon markets**	**AEM**
Form of contract	Private between two private agents	Private between one buyer and more than one seller of ESS	Private between two private agents	Public funding
Negotiation costs	Low	Very high	Low	None
Intermediary service	Non-obligatory, but used in many contracts	Mandatory	Mandatory	Not mandatory
Longevity	From an yearly contract to more	Long-term (18-30 years)	Depends on the broker	Long-term (5 years)
Monitoring costs	Moderate	Moderate	Very high (soil testing)	High
Payment mechanism	Per beehive	Per adopted practice	Per ton CO2	Per ha (areas under AEM)
Measurable outcome	Yes (harvested production)	To some extent (not measurable by individual plots, but overall improved water quality)	Yes (increased carbon in soil)	No

Source: The author

The broker is also responsible for negotiating and contacting farmers willing to participate in the initiative, also undertaking necessary monitoring activates, and ensuring payments for the farmers. For the other private case-studies the intermediary service is non-obligatory, but can be used for easing the process.

Longevity is one of the most important features of ESS contracts. In some cases, like the watershed quality in order to receive the desired result the practices should be implemented for a long time. The same is with the carbon markets, where the real offsetting of carbon emissions can be secured only be long-term engagement. However, some authors believe (Lewandrowski et al., 2004) that shorter contract period is better for reflecting the change in farmers 'opportunity costs for implementing the measures.

Monitoring costs can be a stumbling-block for private contracts. In cases like the carbon markets they can be so high as to diminish the benefit of participation for

the farmers. In both carbon markets and pollination contracts monitoring can be based on real testing (soil samples, beehive strength), but in the case of the watershed contract it is not possible. Finally, the payment mechanism is a crucial aspect of the private ESS contracts. When possible to monitor and test a physical feature like soil sample or a beehive strength, payment can be calculated quite easy. With the watershed case-study, payments depend on the individual costs incurred by each farmer for adopting a certain measure. In the same way, the outcome of the effort is measurable – in the quantity/quality of the harvested production (pollination contracts), or the level of captured carbon (carbon credits).

Concluding remarks

In conclusion, the provision of ecosystem services is one of the main ways to achieve ecological sustainability in agrarian management. Given the characteristics of ecosystems, their complexity and interdependence, it is necessary to consider the levels and forms of management. Very often, a farm is a user of ecosystem services, both within and outside its physical boundaries. On the other hand, some ecosystem services require collective action to be effective and meaningful (most often this is the example of biodiversity conservation). There is still a controversy over what is the best form for providing ecosystem services from agriculture – through private contracting or through the traditionally used public provision. The answer is likely to be found in the nature of the ecosystem services themselves. If for an ecosystem service such as crop pollination it is easy to establish a buyer and seller of the service, there are clear benefits for both parties, and the price can be easily determined. For others such as biodiversity, all this is very difficult to be achieved. Therefore, different ecosystem services pose the need for different contract arrangements. In Bulgaria, agroecosystem services are mostly under public provision, where both understanding and motivation of farmers is starting to grow. However, with the public support under the national agricultural policy, environmental stewardship will only be increasing in the years to come and it should be expected that some of the private forms pointed out in this report might be accepted by Bulgarian farmers as well.

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PERSONALITY-RELATED DETERMINANTS OF ENTREPRENEURSHIP IN THE LIGHT OF OWN RESEARCH IN THE AGRIBUSINESS SECTOR

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Abstract

The aim of this article is to identify the personality traits that can characterise entrepreneurial people and to determine what they believe to be important in achieving success. Entrepreneurship is defined very broadly in the literature and researchers consider different approaches to this issue. Certainly, being entrepreneurial is a combination of knowledge, passion, hard work and active learning. What is more, in many studies there are hypotheses indicating a correlation between the possession of certain character traits, or even temperament, and the propensity to start a business. In this article, an analysis of the behavioural and attitude approach to entrepreneurship is undertaken, which means that some personal traits and behaviour of the entrepreneurial person are analysed, as well as their perceptions of the issue. A descriptive-inductive method was used, using simple statistical methods. A survey method was used to obtain empirical data. An online survey form was sent to agribusiness entrepreneurs from Poland, the entrepreneurs were randomly selected. The respondents were primarily active in industries such as fruit, vegetable processing, as well as meat. A total of 57 returns were received between January and March 2023. The questionnaire included questions on personality traits that may be conducive to an entrepreneurial attitude, as well as identifying attitudes towards certain management situations. The respondents rated themselves as extroverted and open-minded, confident in their abilities. Most respondents described themselves as sanguines. A number of scientific studies confirm that sanguines and extroverts are the people who are most successful as entrepreneurs. Considering the statements of the respondents, there was a significant difference in the inconsistency of the responses from those labelled choleric and phlegmatic. The most consistent statements were obtained from sanguinis. Sanguinis were the most likely of all respondents to believe in the strength of their predispositions and character traits. Cholerics, due to their explosive nature and not always good decisions, felt that it was appropriate to monotone external factors, as this was the basis for decision-making. As a result of the survey and the literature review, it can be confirmed that entrepreneurial personality traits play an important role when setting up one's own business and also when continuing to manage it, but also an external situation and business environment play an important role in decision-making process. All these factors should be correlated and a good entrepreneur should be able to use his/her strengths to exploit market opportunities. According to the authors of this article, it is necessary to integrate one's personality traits and aptitudes with market information and ongoing monitoring of the industry to achieve success.

Key words: personal traits, entrepreneurship, business motives
JEL code: *Q13, L26*

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Introduction

Entrepreneurship can be defined as a certain way of thinking and acting. The starting point is a thought process and the result is a concrete idea put into practice (Praag, Versloot 2007). Entrepreneurship can be considered on many levels. Nevertheless, each time it is referred to new, creative, imaginative activities that are the result of a person's exploration, curiosity, ingenuity and courage (Manager's Handbook... 2017). As early as the 18th century, Adam Smith and Jean-Baptise Say, and later, e.g. Torsten Veblen and Joseph Schumpeter, pointed to certain human qualities that determine success in business (Heilbroner 1993). Alan Jacobowitz and Vidler (1982) even claim in their research in the 20th century that entrepreneurship is an innate trait. However, contemporary researchers (e.g. Kreuger and Brazeal 1994) conclude that an important element of entrepreneurship is not only personal traits, but also factors flowing from the environment (surroundings), i.e. the market situation, upcoming 'opportunities', emerging opportunities from the environment, etc. Contemporary research therefore focuses on a slightly different view of the theories concerning the traits of an entrepreneurial person, treating them as something that can be acquired and learned. Hence, there is now an increasing focus on education and training towards entrepreneurship, creativity and proactivity (Kiełbasa, Kalinowski 2018).

Entrepreneurship, in addition to possessing knowledge and communicative competence, is linked to many other human traits that define a person's personality, attitudes, character traits and even temperament (Kielbasa, Okrajni 2023). These traits can be divided into innate and acquired, hence different people have different levels of personal entrepreneurship (Stokes, Wilson, Mador 2010). For a person with innate entrepreneurial traits, success may come more easily. However, it is important to remember that many traits and skills can be successfully acquired and shaped. According to Miner (1990), among others, every entrepreneur is driven by different motives for action, but five key drivers can be identified: i) the desire to achieve something through one's own efforts, ii) maintaining control to minimise risk, iii) the drive to innovate, iv) thinking about the future.

In a broader sense, an entrepreneur can be called not only a person who owns a business, but also one who implements and manages innovative solutions in various spheres of life (Makarski 2000). Risk-taking associated with running one's own business sometimes arises out of necessity or is the result of an opportunity. Very often it is a resultant of many factors, including above all having a so-called vision of one's own company (idea). A vision is a certain dream, an idea of yourself and your business (Fillion 1991).

In order to realise any vision and to achieve success, certain conditions and factors are needed, such as (Niedzielski 2000): motivation, idea, skills and resources. On the other hand, according to Makarski (2000), for success one needs primarily: (1) an innovative idea, (2) motivation and (3) resources to implement the idea. All these

factors are interrelated and dependent on each other to varying degrees. According to Bieniok (2007), a condition that largely influences the shape of all the above-mentioned factors and their realisation is the possession of so-called personal entrepreneurship. According to this author, this is a psychological and sociological category, referring not only to the sphere of economic activities, but to the entire conduct of a person.

Methods and results

This article addresses the personality-related determinants of entrepreneurship, which influence the decisions and behaviours of self-employed individuals. The results presented in the article are an extract from a larger study covering the determinants of entrepreneurial attitudes in the agribusiness sector. The aim of the paper was to explore the views of self-employed entrepreneurs on the influence of personality on entrepreneurial attitudes using their own example. The study was conducted among entrepreneurs in the agribusiness sector (purposive selection), mainly from the fruit and vegetable and meat processing industries. An online survey was used to obtain data. The survey included questions about personality traits, as well as perception of selected situations and motivation. The research was conducted using inductive-deductive methods, and correlation analysis and simple statistics (mean, deviation, quartiles) were used to determine relationships between variables (personality types and answers given). The results are presented in descriptive and graphical form (tables and figures).

To define personality traits, the systematics of Hippocrates was used, who divided people into different types due to certain personality traits. Thus, he distinguished between four types of people: sanguine, melancholic, choleric and phlegmatic. This concept was developed by many researchers, including Carl G. Jung, who in 1987 (Sharp 1987) developed this theory by introducing as many as 16 different personalities based on Hippocrates' theory. This article considers 4 basic personality types that will undoubtedly play an important role in business decision-making (Pacholski 1990):

- Sanguine (S) – extrovert and optimist, full of energy to act, likes people, establishes relationships quickly, does not hide his emotions, makes decisions quickly,
- Melancholic (M) – thinker, introvert, sometimes emotionally unstable, prefers listening to speaking, acts slowly, unhurried but effective,
- Choleric (Ch) – is active, has a lot of energy but can be impulsive, expresses feelings and opinions without hesitation, has leadership qualities and usually makes decisions quickly, likes to act and dominate, but is easily upset,

- Phlegmatic (P) – slow, introverted and pessimistic, has trouble expressing feelings, lacks self-confidence, does not trust people, but is kind, loyal and conscientious.

The study resulted in 57 questionnaires from entrepreneurs operating in the agribusiness sector. Analysing the personality types indicated by the respondents (Figure 1), it can be seen that more than half (58.0%) described themselves as sanguine, 17.5% of respondents were choleric, 14.0% phlegmatic and 10.5% melancholic. Given the results, the respondents can be considered extroverts and optimists, with strong democratic attitudes and the confidence to make decisions quickly. Such people like to be active, not only in business, and prefer cooperation with people to individual work.
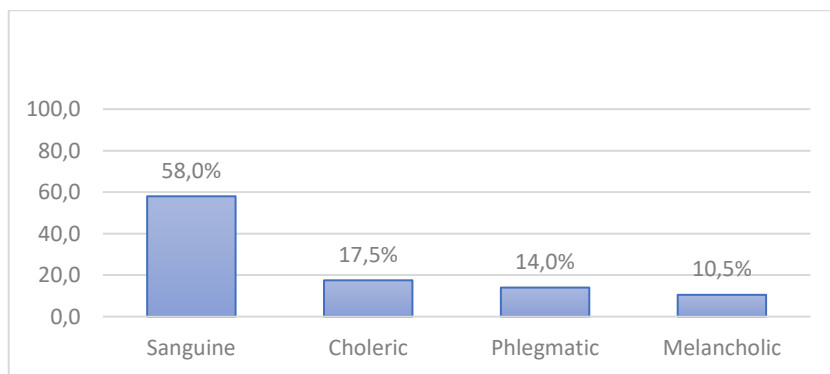
Figure 1. Respondents' personality types based on self-assessment
Source: own elaboration (N = 57)

The opinions obtained regarding the personality type presented were then contrasted with the respondents' answers regarding their specific motivation or behaviour in specific situations (four statements: S1, S2, S3, S4). Concepts from Miner's (1990) and Brandstätter's (1997) research were used and four statements were formulated:

S1. *I am able to make decisions on my own, spot opportunities and take advantage of them quickly.*
S2. *I am aware of the risks and uncertainties inherent in the activity, I accept this with full responsibility.*
S3. *I am more active and motivated to succeed than most people.*
S4. *I want to develop all the time, learn new things and I enjoy it.*

The questions were developed on a Likert scale, from 1 to 5 where 1 meant no trait and 5 meant having a strong trait. The results of this analysis are included in Figure

2 as a box plot, which shows the distribution of the data across quartiles, highlighting the mean and outliers (whiskers). The lines (whiskers) indicate the variability outside the upper and lower quartiles, and the points that are outside the boxes, represent outliers. As can be seen in the figure below, the highest number of outliers was given by people considering themselves to be melancholic. However, there were only six such individuals in the sample. Similarly, the answers given by those with a phlegmatic type appear to be inconsistent and uncertain. The level of dispersion in the answers given by the cholerics also seems quite significant. In both cases, uncertainty in decision-making and less activity and self-motivation are evident. Considering the other personality types, greater decisiveness is clearly evident. In the group of people with the choleric type, more chaos and scattered answers are noticeable (Figure 2). However, it can be seen that all respondents were aware of the risks inherent in being self-employed, and showed a desire to further develop and gain knowledge. In this case, the respondents' statements were consistent in each group regardless of personality type.
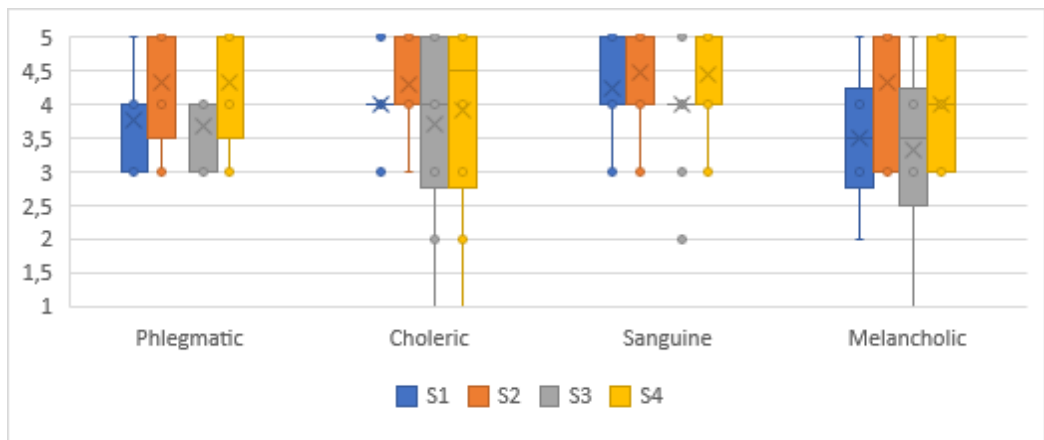
Figure 2. Box-and-whisker plot showing the distribution of respondents' answers to the four statements made (S1, S2, S3, S4) by their personality types
Source: own elaboration (N = 57)

Personality types were then contrasted with success factors based on the experience and opinions of the respondents. Three statements were listed which identify the most important success factors in business:

(A) *In my opinion, success is determined by both motivation and the current market situation.*
(B) *Success is determined by one's own determination and character traits.*
(C) *Business success depends solely on the market situation and the macroeconomic environment.*

Overall, 59.6% of respondents agreed with statement (A), 21.0% of respondents agreed with statement (B) and 15.7% agreed with statement (C).

In the last figure, opinions relating to the above three statements (A, B and C), characterising entrepreneurial action, are included, taking into account the personality types of the respondents. As can be seen in the figure below (Figure 3), sanguinarians strongly opined that the personality traits possessed by the entrepreneur determine success. It is clear that they see this as a factor in their success (motivation, determination, courage, self-confidence). They are calm, composed, optimistic and pursue their goals with persistence but also reason. The cholerics, on the other hand, pointed more often to factors from the market environment as those that significantly contribute to business success or failure. It seems surprising that no respondent describing themselves as a choleric indicated statement (B) as the most important. This statement referred to personal success factors, i.e. intrapersonal factors originating from intrinsic motivation and determination. The cholerics in the study group were far more likely to point to factors from the market environment as those that influence the success of business activities. They saw less potential in themselves, perhaps due to their explosive nature or impulsiveness, which can sometimes lead to ill-considered decisions.
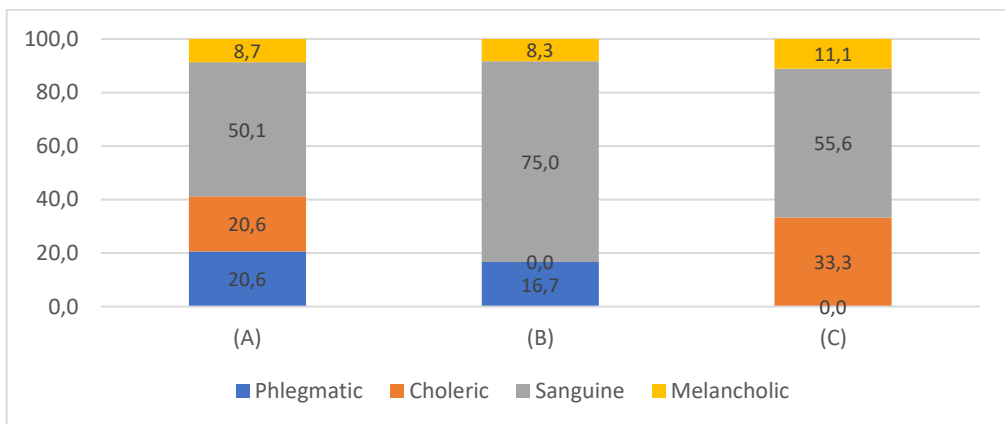
Figure 3. Business success factors as perceived by respondents (by personality type)
Source: own elaboration (N = 57)

The results presented above make it possible to point to some characteristics that may favour entrepreneurial activities. These are mainly: extroversion, optimism, activity and energy, having leadership qualities, striving for independence and autonomy, ability to overcome fears, success and achievement orientation, decisiveness and consistency. Among the respondents, it is also possible to speak of self-confident and decisive people who like to act pragmatically and often use intuition

supported by their own experience. Confidence in people is also evident, as is confidence in one's own abilities. Sanguinarians see the success factors largely in their personality traits. Nevertheless, they keep a close eye on market trends and take them into account. Traits that can inhibit entrepreneurial attitudes and hinder them include a pessimistic and melancholic temperament and phlegmatic action. Lack of energy, contact with people, avoidance of risks and decision-making, can significantly hinder becoming an entrepreneur and managing a business. On the other hand, an explosive character, decision-making under the influence of the moment or an authoritarian approach to management – in the case of cholerics – can also cause barriers to success in the market.

Conclusions

Based on the research conducted, it can be concluded that the aim of the study has been fulfilled. Moreover, the results of the study coincide with the results of other researchers, e.g. Antoncic et al. (2015), who in their work identify several key personality traits that an entrepreneurial person must possess. Identifying such traits can help to educate future entrepreneurs. The most important traits include: creativity, knowledge and courage. Considering the group surveyed, similar traits can be identified. However, some people felt that they lacked the self-confidence needed in business, which can significantly affect the success of business strategies. It should be noted, however, that the vast majority of respondents rated themselves as optimistic and extrovert and identified qualities such as decisiveness, courage and creativity as key qualities they possessed. The vast majority of respondents are hard-headed people who believe that determination and a strong character alone are not enough to succeed in business. What is also important is the market situation, i.e. conditions conducive to decision-making in establishing and developing a business, not only in the agribusiness sector (although here it is particularly important). The market situation for agricultural and food products and the current economic climate are of colossal importance in agribusiness activities. As emphasised by the respondents, in addition to personal qualities, knowledge and familiarity with the sector, as well as constant monitoring of the situation in a given market, are extremely important.

In conclusion, it can be stated that success in business is to a large extent based on the psycho-physical predispositions of the individual. It is much easier for open-minded, creative and flexible people to become entrepreneurs than for shy people who have problems communicating with others. But even the latter have the chance to become entrepreneurs and realise their dreams of owning and running their own business. However, they need to know that it will be more difficult for them to succeed, as they will have to make the extra effort of working on themselves.

On the basis of the research carried out, several conclusions can be drawn. Firstly, the decision to start one's own business results from an individual choice, however,

the process of building one's own company and the successes achieved are a result-ant of the psychological characteristics of the entrepreneur and the economic and social situation in the environment. Importantly, the starting point for the decision to set up one's own business should be getting to know oneself (strengths, but also weaknesses), followed by learning about the market and the field in which they plan to operate.

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THE COOPERATIVES IN BULGARIA – PAST AND PRESENT

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Abstract

In Bulgaria, the emergence of modern cooperatives as a social business model dates back to the end of the 19th century. Cooperatives develop over time a variety of specific models based on their different subject of activity.

Given the wide scope of the researched topic, we limit the purpose of the scientific development to the study of the spread of cooperatives in the economic life of Bulgaria, analyzing their characteristics manifested in the current century, looking for a connection with the period of their emergence, in order to explain certain trends in their development. The methodological approach used is based on statistical groupings of a large array of official data on cooperatives registered in the Commercial Register of Bulgaria from 2005 to the current year. Selected indicators reflecting in the development of cooperatives by planning areas, economic sectors, annual revenues, etc. are established. Through the historical analysis, individual moments of the birth of the first Bulgarian cooperatives are revealed. *Results*: In Bulgaria, cooperatives were first born in the villages to meet the needs of the local population, and then cooperatives appeared in the cities. This process in our country is the opposite of other countries in Europe with a more developed market economy.; Due to the agrarian direction of development of the Bulgarian economy at the end of the 19th century, the first type of cooperatives built were agricultural credit cooperatives in the villages. Years after them, at the beginning of the 20th century, consumer cooperatives appeared, followed by the popular urban banks, as well as some professional cooperatives/associations.; In Bulgaria, the cooperative as a legal organizational form is widespread in almost all economic sectors of the national economy. Its role is dominant, however, in two sectors: A. „Agriculture, forestry and fisheries" and G. „Trade, repair of cars and motorcycles"; The activity of the Bulgarian cooperatives is low-profit; In regional terms, the largest number of functioning cooperatives is in the South Central region, with a dominant location in the Plovdiv and Haskovo areas for almost all economic sectors, followed by the Southeast region, where the Stara Zagora area has a leading position. In the conditions of modern challenges and heterogeneous problems, the study of cooperatives in Bulgaria must continue and be upgraded in order to find answers to many questions related to their past and future development. Finding an answer to the problematic aspects in their development is important not only to enrich the theory, but also above all to support the cooperative practice in our country.

Key words: cooperatives, development, regional distribution, sector, income.

JEL code: *D22; R12*

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Introduction

Modern cooperatives arose in Bulgaria in response to specific socio-economic features at the end of the 19th century. They develop over time specific models based on the different subject of activity – agricultural, consumer, credit, all-round, etc. Over the years of their development, they have had periods of considerable growth, but also of limitations and stagnation.

This is also the reason for the interest in them both from the theory and business practice. Universally acknowledged the contribution of a number of our and foreign researchers who over the years have studied the peculiarities of the cooperative and have given definitions for it, such as Pashev, (1936); Kanev, (1943); Palazov, (1946); Kanchev, (2000); Kanchev and Doitchinova, (2006); Yovkova, (2007); Alexandrov, (2007); Boevski, (1997, 2016, 2020); Kaufmann, (1907); Sombart, (1919); Baranovsky, (1921); Draheim, (1952); Botcher, (1980); Aschoff, (1995); Wilson, (2017) and many others.

The legislations in many European countries (Germany, Switzerland, Austria, Spain, Portugal, etc.), where the cooperative has traditions and is widespread in various economic sectors, consider it as a social model for doing business. (González, 2018).

From the analyzed literary and normative sources, it can be summarized that the definitions and opinions about the cooperative almost overlap. It is defined as a voluntary association of persons for mutual assistance and cooperation, assuming equal responsibilities and rights. Member-cooperators, through the establishment of a cooperative enterprise, delegate part of their functions to democratically elected governing bodies that represent them. The main purpose of the cooperative enterprise is to satisfy the needs of its members, not profit. As a result, Shaarz and Casselman (1980) refer to it as an „economic system with social content".

The European Economic and Social Committee in 2012 – the international year of cooperatives, complements the nature of the cooperative:; „manages changes in an economically efficient and socially responsible manner, contributes to social and territorial cohesion and creates innovative business models to increase its competitiveness; „Hat there is general consensus that cooperatives are part of the social economy"[3].

Proceeding from the multifacetedness of the researched topic, we limit the purpose of the scientific development to the study of the spread/applicability of cooperatives in the economic life of Bulgaria.

In order to achieve the set goal, the following tasks are solved: to study and analyze the main moments in the birth of the first cooperatives in Bulgaria; to study and

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[3] The Social Economy in the European Union, 2012, European Economic and Social Committee, p. 31-32.

analyze manifested characteristics of cooperatives in the last two decades in Bulgaria; going back to the period of their emergence, to look for a connection and try to explain some trends in their development at the present time.

The methodological approach used is based on statistical groupings of a large array of official data on cooperatives registered in the Commercial Register of Bulgaria from 2005 to the current year. Selected indicators reflecting trends in the development of cooperatives by planning areas, economic sectors, annual revenues, etc. are established Microsoft Office and a licensed version of Statistics Grad Pack under Windows are used to process the information. Through the historical analysis, individual moments of the birth of the first Bulgarian cooperatives are revealed.

The first cooperatives in bulgaria – moments from their creation

On June 11, 1890, two school leaders T. Yonchev and T. Vlaikov founded the first agricultural credit cooperative in the village of Mirkovo, Pirdop district. The second is the agricultural credit association „Zashchita" in the village of Lyubenova Mahala, Novozagorsko. Seven years later (1897), the agronomist N. Kardzhiev and N. Bachvarov (director of a homestead near Ruse), assisted by A. Gradev (a teacher in the village of Shtraklevo), conducted an active campaign among the population to create cooperatives. Thus, in November, the first credit union in the region appeared, and a few days later, they founded a cooperative in the village of Chervena Voda.

The Bulgarian Agricultural Bank (BZB) played a major role in the emergence of the first cooperatives in Bulgaria. A. Ivanov, head of the bank's credit department, is promoting a policy in the country for building cooperatives, on this basis „cores" of employees are formed to popularize cooperative ideas. Due to the obstacles in the provisions of the first Commercial Law in Bulgaria and the opposition of moneylenders, the process is going slowly.

Gradually, after the appearance of the first cooperatives in the villages, such cooperatives were also built in the cities. The first urban cooperative was a consumer (bakery), established in 1899 in Plovdiv. After that, in May 1900, a consumer cooperative „Saglasie" was established in Samokov, and in January 1901, „Bratstvo" was established in Kazanlak. In November 1902, a consumer cooperative „Brotherhood" was registered in Yambol. In Sofia in 1903, P. Cholakov founded a consumer cooperative „Brotherly Labor". In the same year, a teacher's savings insurance cooperative was registered, and in November, under the leadership of A. Ivanov, the first Sofia popular bank in the country was established. In Bulgaria, 2 years later, the Official Cooperative Savings Insurance Company was registered. Thus, for ten years (1899 – 1910), according to the BZB report, information was published on 238 cooperatives established and functioning in Bulgaria (table 1).

Table 1. Number and membership an the first cooperatives in Bulgaria by years

Year	Number of cooperatives	Change in the number of cooperatives compared to 1899	Member-cooperators	Change in membership compared to 1899
1899	4		236	
1900	2	–2	234	–2
1901	2	–2	140	–126
1902	17	+ 13	683	+ 447
1903	77	+ 73	739	+ 503
1904	24	+ 20	1447	+ 1211
1905	91	+ 87	5458	+ 5222
1906	147	+ 143	11224	+ 10988
1907	238	+ 234	19422	+ 19186

Source: BZB, 1900-1910.

After the participation of A. Ivanov and H. Chakalov in the International Congress of Cooperatives in Budapest (1904), the leaders of the established cooperatives are convinced that a special law should be adopted. Thus, in 1907, the first Law on cooperatives in Bulgaria was adopted. It regulates their device and organization. Thus, a „green street" is given for the development of the cooperative work in the country.

In summary, several conclusions can be drawn:

- In Bulgaria, cooperatives were first born in the villages to meet the needs of the local population, and then cooperatives appeared in the cities. This process in our country is the opposite of other countries in Europe with a more developed market economy.;
- At the end of the 19th century, the Bulgarian intelligentsia was a staunch supporter of cooperative ideas, but the population in our country needed time and purposeful agitations to be convinced of the positivism of these ideas. The initiative to create the first Bulgarian cooperatives did not come from the population, but from progressive-minded Bulgarians (teachers, agronomists, bank employees, etc.) and the assistance of the BZB, who saw an opportunity to help and support the poor Bulgarians.;
- Due to the agrarian direction of development of the Bulgarian economy at the end of the 19th century, the first type of cooperatives built were agricultural credit cooperatives in the villages. Years after them, at the beginning of the 20th century, consumer cooperatives appeared, followed by the popular urban banks, as well as some professional cooperatives/associations.;

- A century away in time, the process of the birth of the first cooperatives in Bulgaria leaves its mark and to a certain extent has an impact on the current development of cooperatives in the country.

The cooperatives in Bulgaria – aspects of their current development

The definition given by Art. 1[4] of the first law on cooperatives in our country is very similar to the current one in Art. 1 of the latest Law on Cooperatives (adopted December 1999, amended and supplemented fourteen times so far): „A cooperative is an association of natural persons with variable capital and with a variable number of members, which, through mutual aid and cooperation, carries out commercial activity to satisfy their economic, social and cultural interests.“

During the research period 2005 – 2023, a total of 9,037 cooperatives were registered in Bulgaria. There is a significant change in their number with a clear tendency towards an annual decrease (Fig. 1). The largest number of functioning cooperatives was in 2005 – 5,274 and the smallest in 2021 – 3,833.

The tendency to decrease the number of cooperatives, both in Bulgaria in general and by economic sectors, is largely explained by a change in their status (tables 2 and 3). As of the beginning of June 2023, there are only 2,818 cooperatives with an „active/active“ status, while 4,747 have an „inactive/inactive“ status. The relative share of the former is 31.2% of the total, and 52.5% of the latter. The number of „deleted“ cooperatives is significant – 871 (9.6%) in the Commercial Register.
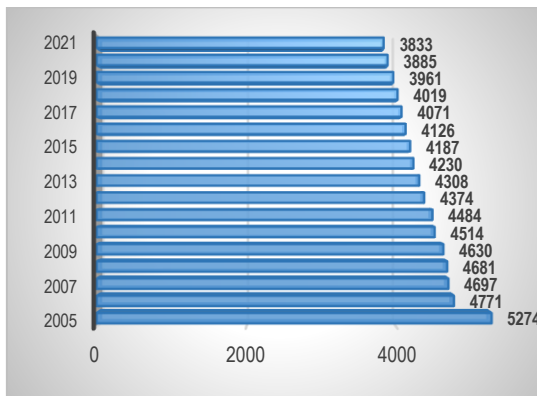
Figure 1. Number of cooperatives in Bulgaria, operating2005 – 2021

Source: Ciela Norma and own calculations

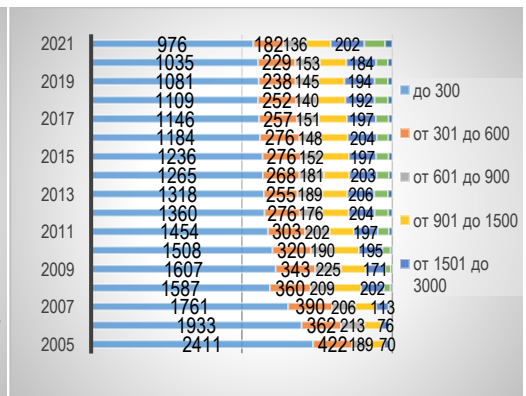*Figure 2. Grouping by annual revenues of the cooperatives in Bulgaria in thousand BGN:2005 – 2021*

Source: Ciela Norma and own calculations

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[4] „…any society composed of an indefinite number of members, which is incorporated for the purpose of developing the economic interests of its members and of promoting credit, agriculture, industry and trades by cooperative performance of works or by mutuality“.

„Those who have ceased economic activity" are 443 (4.9%). 104 (1.2%) cooperatives are in liquidation proceedings. Only 33 cooperatives have the status „reorganization, form – merger and separation".

Table 2. Status of the cooperatives in Bulgaria: 2005 – 2023

Cooperative status according to the Commercial Register	Number	Relative share, in %
Active	2818	*31,2*
Inactive	4747	*52,5*
Deleted	871	*9,6*
Termination of economic activity	443	*4,9*
In liquidation proceedings	104	*1,2*
Termination of liquidation proceedings	3	*0,0*
Continuation of business	8	*0,1*
Redevelopment of cooperative, form: infusion	30	*0,3*
Reorganization of cooperative, form: separation	3	*0,03*
Bankruptcy proceedings	8	*0,1*
Declared insolvent	1	*0,01*
Bankruptcy proceedings terminated	1	*0,01*
TOTAL	**9037**	***100,0***

Source: Ciela Norma and own calculations.

The change in the status of the cooperatives in Bulgaria reflects on the annual income from their activity (Fig. 2). It is found that the group of cooperatives with annual revenues up to BGN 300 thousand is the most numerous, followed by that with BGN 301-600 thousand. There is a tendency to decrease their number towards the end of the studied period, compared to the beginning. At the same time, the groups of cooperatives with annual revenues above BGN 6 million and from BGN 3-6 million are the smallest in number. There is a negative trend towards a gradual increase in their number at the end of the period compared to the beginning. The latter to a certain extent can be explained by the established status of „cooperative reconstruction, form: merger" for 30 cooperatives.

Regarding the distribution of cooperatives by planning regions in the country (fig. 3), it is found that the largest number is in the South Central region – 1,609 or 17.8% of all, with the largest number in Plovdiv and Haskovska area. The Sout-heast region follows – 1,578 units or 17.5% of all, with the leading place in the number of cooperatives being the Stara Zagora area. Third is the Southwest region, with 1,543 units registered or 17.1% of all with the largest number of cooperatives in the city of Sofia. The number of cooperatives in the Northwest and North Central regions

is almost the same, 1502 (16.6% of all) and 1494 (16.5%), respectively. Pleven area has the largest number of cooperatives, followed by Ruse area. The number of co-operatives distributed in the Northeast region is the smallest – 1311 or 14.5% of all, with the largest number of cooperatives in the Varna area. From the whole country for the period under study, the number of registered and functioning cooperatives is the smallest in Kardzhali and Smolen areas – only 98 and 129, respectively. The current regional distribution of cooperatives follows the course of the economic development of the regions in the country. Considering that in some regions, the existing traditions of cooperativism from a century ago have an influence, as a similar example is the Stara Zagora and Ruse areas.

For the researched period, cooperatives developed activity in almost all economic sectors according to KID-2008 (table 3), with the exception of O. „State administration“ and T. „Activities of households as employers“ (fig. 4 and table 3). The largest number of cooperatives – 4534 (agricultural, productive) in sector A. „Agriculture, forestry and fisheries“ – 50.2% of the total number. The number is smaller – 1443 of cooperatives (consumer) in sector G. „Trade, repair of cars and motorcycles“, which are 16% of all. Third in number – 771 pcs. are the cooperatives (consumer, TPK, productive, etc.) in sector L. „Operations with real estate or 8.5% of all.

Next are the registered cooperatives – 701 units (TPK) in sector C. „Processing industry“ or 7.8% of all. It is important that cooperatives (credit) with a share of 2.4% (213 units) of all develop activity in sector K. „Financial and insurance activities“, and some of them correspond to existing popular banks in the country since the beginning of last century. The relative share – 2.5% (228 units) of the cooperatives (TPK, consumer, comprehensive, etc.) that register and carry out activity in sector N. „Administrative and auxiliary activities“ is noticeable, as their main role is to support certain disadvantaged groups of the population and some producers (beekeepers, etc.).

A smaller relative share – 2.2% or 197 cooperatives – are registered and operating in sector M. „Professional activities and scientific research“. This sector includes regional cooperative unions, as well as youth, war disabled, design and other types of cooperatives.
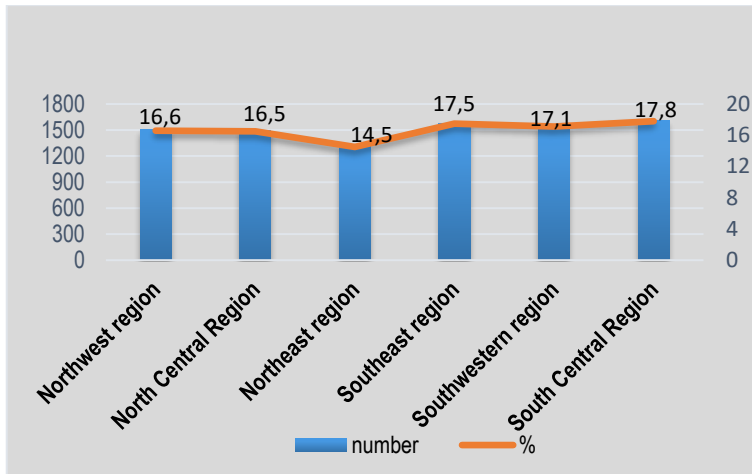
Figure 3. Regional distribution of the cooperatives in Bulgaria: 2005 – 2021
Source: Ciela Norma and own calculations
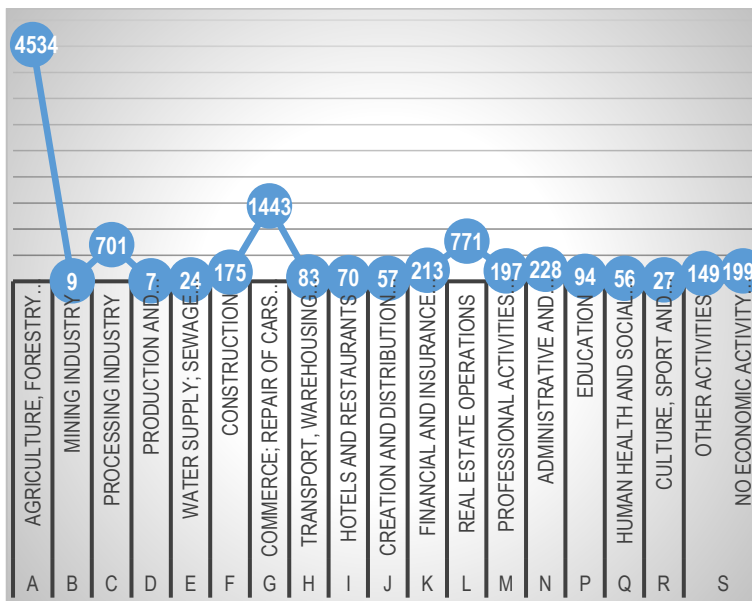
Figure 4. *Grouping of cooperatives by economic activities according to KID-2008*
for 2005 – 2021 (number)
Source: Ciela Norma and own calculations

There are cooperatives registered and operating in sector F. „Construction" – 175 units or 1.9% of all; P. „Education" – 94 items or 1% of all; Q. „Human health care and social work" – 56 items or 0.6%; R. „Culture, sports and entertainment" – 27

items or 0.3%. With the exception of construction in the other three sectors, cooperatives are mainly professional associations built by intellectuals (teachers, doctors, musicians, athletes, etc.), which are very similar to the ones that existed in our country, more than a century ago.

As a preferred organizational form for association, the cooperative (consumer, production, supply type, etc.) is also applied in the following sectors: H. „Transport, storage and post" – 83 units or 0.9%; I. „Hotel and restaurant industry" – 70 pcs. or 0.8%; J. „Creation and distribution of information and creative products; Telecommunications" – 57 pcs. or 0.6%; B. „Extractive industry – 9 or 0.1% and S. „Other activities" – 149 or 1.6%.

It is established that for the period under study there is a group of cooperatives (199 units or 2.2% of all) in our country that do not indicate the type of economic activity, but they cannot be referred to sector S. „Other activities".

Based on the analysis, several main conclusions can be drawn:

- In Bulgaria, the cooperative as a legal organizational form is widespread in almost all economic sectors of the national economy. Its role is dominant, however, in two sectors: A. „Agriculture, forestry and fisheries" and G. „Trade, repair of cars and motorcycles". To a large extent, this is the result of the specifics of the sectors, but also of the existing cooperative traditions.;
- The number of operating/active cooperatives in all economic sectors in the country is gradually decreasing. The most significant decrease is more than four times in sector A. „Agriculture, forestry and fisheries". By the middle of the current year, more than ½ of the cooperatives registered during the research period have the status „inactive";
- The activity of the Bulgarian cooperatives is low-profit. The group with annual revenues of up to BGN 300,000 is significant in terms of numbers compared to the others, although there is a tendency towards a decrease in their number at the end of the period, compared to 2005, and a slight increase in the number of higher income groups of cooperatives.;
- In regional terms, the largest number of functioning cooperatives is in the South Central region with a dominant location in the Plovdiv and Haskovo areas for almost all economic sectors, followed by the Southeast region, where the Stara Zagora area has a leading position.

Table 3. Grouping of the cooperatives in Bulgaria by type of activity according to the KID-2008 for the period 2005 – 2021

Code	Economic sector	Total number	Share of the total	Number of active	Share of the number of active
A	Agriculture, forestry and fisheries	4534	*50,2*	1074	*38,1*
B	Mining industry	9	*0,1*	2	*0,1*
C	Processing industry	701	*7,8*	201	*7,1*
D	Production and distribution of electrical and thermal energy and gaseous fuels	7	*0,1*	2	*0,1*
E	Water supply; Sewage Services, Waste Management and Remediation	24	*0,3*	8	*0,3*
F	Construction	175	*1,9*	34	*1,2*
G	Trade, repair of cars and motorcycles	1443	*16,0*	473	*16,8*
H	Transport, warehousing and mail	83	*0,9*	20	*0,7*
I	Hotels and restaurants	70	*0,8*	17	*0,6*
J	Creation and distribution of information and creative products; Telecommunications	57	*0,6*	17	*0,6*
K	Financial and insurance activities	213	*2,4*	79	*2,8*
L	real estate operations	771	*8,5*	509	*18,1*
M	Professional activities and scientific research	197	*2,2*	68	*2,4*
N	Administrative and auxiliary activities	228	*2,5*	45	*1,6*
P	Education	94	*1,0*	14	*0,5*
Q	Human health and social work	56	*0,6*	16	*0,6*
R	Culture, sport and entertainment	27	*0,3*	6	*0,2*
S	Other activities	149	*1,6*	53	*1,9*
	The economic activity is not specified	199	*2,2*	180	*6,4*
	TOTAL	**9037**	*100,0*	**2818**	*100,0*

Source: Ciela Norma and own calculations

Conclusion

In the conditions of modern challenges and heterogeneous problems, the study of cooperatives in Bulgaria must continue and be upgraded in order to find answers to many questions related to their past and future development. As an organizational form of association, they have had and continue to have a major role in the production, processing and trade of many products in the country. Finding an answer to

the problematic aspects in their development is important not only to enrich the theory, but above all to support the cooperative practice in our country.

Combining in the study of cooperatives, their past – from the appearance of the first ones in our country to their current state – is a complex scientific approach. However, it allows to clarify the influence of main factors (social, economic, political, etc.), which explain the presence of some and the absence of other characteristics and problems of modern Bulgarian cooperatives.

In unison with what was presented above, we conclude with the thought of Ilia Pavlov – one of the researchers of the cooperative theory and the Bulgarian cooperative practice, expressed about eight decades earlier, but still relevant today:

„*The modern cooperative is a product of the economic and social conditions of more recent times, so, look at it, connecting them with the history of the cooperative movement, and we will arrive at the most correct conclusion*"

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SCENARIOS FOR THE DEVELOPMENT OF AGRICULTURAL COOPERATIVES IN BULGARIA UNTIL 2027

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Abstract

After Bulgaria's integration into the European Union (EU) in 2007, restructuring processes in agricultural cooperatives continue. One of the main statistical categories, providing information on how cooperative structures are changing and what will be the future direction of development, is the production structure. Despite measures to support farmers' incomes under the Common Agricultural Policy (CAP) of the EU, the number of agricultural cooperatives is decreasing. The purpose of this article is to forecast the main trends in the development of agricultural cooperatives in Bulgaria until 2027. A linear scenario model is applied and the sensitivity of the selected indicators is identified under certain assumptions about changes in the independent variables. The selection of indicators is based on available statistical information. They are proposed with a view to finding the optimal opportunity provided by the data for their inclusion in the established econometric model and the calculation of forecasts (prospective forecasts of the change in cultivated land and the number of cooperatives). According to the model's estimate, agricultural cooperatives will continue to decline until 2027, despite expectations of an overall increase in the utilized agricultural area, arable land and permanent crops in general. When developing the realistic scenario, the experts assume that at the end of 2027, the land structure and the number of agricultural cooperatives existing until 2020 will be preserved. When constructing the pessimistic and optimistic scenario, it is noticeable that the index's range of variation is within 0.35 to 0.76 compared to the base period. The pessimistic scenario for the future of the vineyards has the highest rating. The average ratings of the three scenarios are average (moderate performance) as follows – pessimistic with 0.50, moderate – 0.46, and the highest rating is the optimistic scenario – 0.54. The forecast is to limit permanently grassed areas. With one of the highest ratings is the pessimistic scenario of the lands with vine plantations, which indicates an expectation to continue the existing trend of decreasing vines.

Keywords: scenarios, agricultural cooperatives, Bulgaria

JEL*: Q13; Q18; R15*

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Introduction

After Bulgaria's integration into the European Union in 2007, restructuring processes in agriculture continue to this day (Bachev and Koteva, 2021; Doitchinova, 2019; Doitchinova et al., 2018, Doitchinova and Stoyanova, 2023; Kopeva et al., 2012, 2021; Popov, 2019). Despite measures to support farmers' incomes under the Common Agricultural Policy (CAP) of the EU, the number of agricultural cooperatives is decreasing. At the same time, there are fluctuations in their confirmation and development in Bulgaria. As a result, according to statistics, cooperatives engaged in agriculture out of 1156 units. in 2007, only 714 units remain. in 2020, which is a real drop of over 62%. During this period, the total number of agricultural holdings in the country also reported a drop of over 250%, or in a fourteen-year period, about 350,000 farms ceased to operate.

The utilized agricultural area (UAA) in the cooperative structures for the period 2007-2020 also decreased proportionally (decrease by 64%), from 726,305 ha in 2007, shrinking to 471,903 ha in 2020. Under the same conditions during the period, the area of the rest of the farms increased by 50%, increasing by more than 768,600 ha in just four years (2016-2020). Subsidies under the 1st pillar of the CAP can be considered as a major factor from the point of view of the motivation of farmers to increase the size of cultivated agricultural land. Agricultural cooperatives are also beneficiaries of the support from the group of large farms. Despite the financial support, a negative trend is reported. Throughout the so-called „transitional" period in Bulgaria, which began after 1990, a negative trend was permanently followed, leading to the destruction of the cooperative model, most often due to ideological and political opposition. Another reason for this is the ignorance of the cooperative identity (in the part of disrespecting the cooperative values and principles not only by the member-cooperators, but also by the authorized officers for management and control) in the agricultural cooperatives.

Questions arise: Can disregard of values and principles cause „degeneration" of cooperative enterprise? Does the legal framework contribute to or limit the sustainable development of cooperatives? Do the cooperatives preserve their autonomy and independence, autonomy in determining the strategy, governance structure, production structure and defense of the cooperative identity and interests of the member-cooperators? The negative trends and deepening challenges, stopping the processes of establishing „modern" cooperatives in the country, are deepening. In 2007, agricultural cooperatives managed about 25% of the arable land in the country, but in 2020 it is already limited to ten percent.

The purpose of this article is to forecast the main trends in the development of agricultural cooperatives in Bulgaria until 2027.

Materials and methods

A methodology is applied (Ivanov, B. 2023, p. 14-18), based on relative comparative assessment (RCA); probabilistic study of covariance (PROCOV); descriptive analysis; indicator method; expert evaluation; statistical methods for determining trends.

The selection of indicators is based on available statistical information. They are proposed with a view to finding the optimal opportunity provided by the data for their inclusion in the established econometric model and the calculation of forecasts (prospective forecasts of the change in cultivated land and the number of cooperatives). These assumptions are made on the condition that certain assumptions are made about the natural change of permanent plantings, permanently grassed areas, vineyards, and the future development of agricultural cooperatives with a perspective to 2027. When choosing them, the condition must be met that they correspond to the three groups of indicators: result, derivative; and impact. Data from „Astrostatistics" (2019-2020) of the Ministry of Agriculture were used:

The selected indicators are the following:

1. Agricultural cooperatives (resultative);
2. Used agricultural area (of impact);
3. Arable land (of impact);
4. Permanently grassed areas (derived);
5. Perennial plantations (derived).

The positive attitudes among the public regarding the proposals of the Ministry of Agriculture and the Strategic Plan adopted by the EC for the new program period 2023-2027 are taken into account. The scenarios reflect the last year of the period, 2027, and are built on the basis of criteria (NSI methodology), as follows:

- Scenario I – defined as realistic. It complies with the norms of the European Union regarding the socio-economic development of the member countries;
- II scenario – defined as optimistic. It provides that favorable socio-economic processes in the country with positive socio-economic indicators will be taken into account;
- III scenario – is defined as pessimistic: A variant is set for unfavorable demographic and socio-economic processes in the country.

After determining the indicators and forecasting their future value levels, the scenarios are evaluated. To perform this task, the method of relative comparative assessment (Relative Comparative Assessment) is applied.

The assessment is obtained for each indicator and for each scenario, according to the formulas (Ivanov, B. 2023, pp. 14-18):

$$ISA_{Sk} = \frac{SIV_k}{AVR_S + AVR_S * CV} * (0{,}5 + 0{,}5 * CV^2) \tag{1}$$

Where:

ISA – indicator score assessment;

MS – median of the score scale;

ARV – Average reference value;

CV – coefficient of variation.

To measure the probability of occurrence of each scenario, the method of probability measurement with covariance (PROCOV) is applied:

$$PRPROB_{SK} = 0,5 * CORCV_S - \frac{|ISA_S - 0,5|}{\mu_S * (1-\alpha) * 0,5 * CORCV^2} \tag{2}$$

The comparison between the individual scenarios, which will be made on the principle of the strength of the changes and the probability that they will occur:

$$CoVAR_{PROSK} = \frac{\sum \frac{(ISA_{SK} - \overline{ISA_S})}{\overline{ISA_S}} * \frac{(SIV_K - AVR_S)}{AVR_S}}{n_k} \tag{3}$$

Where:

CoVAR – covariation showing the difference between indicators score and the indicators real values;

$AVISA_{Sk}$ – Average indicator score assessment, which is drawn on each elaborated scenario k.

Based on the proposed scenarios, the model's algorithm gives a certain coefficient in the solution, which is practically accepted as an evaluation scale. It can be represented from 0 to 1. When in a range:

- From 0 – 0.19 – unsatisfactory assessment (deteriorated scenarios);
- From 0.2-0.44 – satisfactory assessment (mediocre performance);
- From 0.45 – 0.64 – average grade (moderate performance);
- From 0.65 – 0.79 – good rating (high performance);
- 0.8- 1.0 – excellent rating.

The last group of coefficients) in the matrix gives information about how likely the scenario is to (not) happen.

Results

When developing the realistic scenario, the experts assume that at the end of 2027, the land structure and the number of agricultural cooperatives existing until 2020 will be preserved. When constructing the pessimistic and optimistic scenario, it is noticeable that the index's range of variation is within 0.35 to 0.76 compared to the base period (Table 1). Experts are quite moderate and „shrunken" in their forecasts. Only in the case of permanently grassed areas is there a certain „bold" optimistic

assumption that the areas will decrease. The pessimistic scenario for the future of the vineyards has the highest rating. The average ratings of the three scenarios are average (moderate performance) as follows – pessimistic with 0.50, moderate – 0.46, and the highest rating is the optimistic scenario – 0.54. The close estimates (ISA-P: 0.52; ISA-N: 0.51; ISA-O: 0.50) for the number of agricultural cooperatives present that a simultaneous decrease, preservation, or increase in their number can be expected until 2027.

Source: own calculations based on data from the Ministry of Agriculture „Agrostatistics", NSI and FADN Database and according to the methodology of Ivanov, B. (2022). „Working Paper on the Application of Evaluation Methodology in Benchmarking and Probability Calculation

In the last three columns (Table 1) the results of the model calculations can be followed. The coefficients fall in the range of 0.35 – 0.76, which falls into the two groups of scenario performance (satisfactory score with mediocre performance and average score with moderate scenario performance). The highest coefficient of 0.76 is the optimistic scenario of the vineyard area. The lowest indicator is the pessimistic scenario of Perennial plantations – 0.35. Consolidated by indicators, the optimistic scenario has the smallest amplitude – between 0.44 and 0.65. The widest range of assessment is the pessimistic scenario according to the various selected indicators – from 0.35 to 0.76.

Table 1. Indicators included in the scenarios and scenario assessments for agricultural cooperatives in Bulgaria

Indicators	Base period 2019/2020	Scenarios			ISA-P	ISA-N	ISA-O
		Pessimistic	Realistic	Optimistic			
Used agricultural area, ha	471 903	450 000	471 903	480 000	0,41	0,43	0,44
Arable land, ha	455 089	435 000	455 089	460 000	0,47	0,49	0,50
Permanently grassed areas, ha	13 049	15 000	13 049	11 000	0,49	0,56	0,63
Perennial plantations, ha	3744	3000	3744	4500	0,35	0,43	0,52
Vineyards, ha	2177	1500	2177	4000	0,76	0,35	0,65
Agricultural cooperatives, No	714	700	714	730	0,52	0,51	0,50
		450 000	471 903	480 000	0,50	0,46	0,54
					Scenario Likelihood		Av-0,5

The standard error is 0.028, which means that the average score of each scenario is formed in the range (Table 2). It is assumed that the optimistic scenario will vary in the range 0.51-0.57. It should be noted that the estimated range of 0.43-0.57 is covered by the scenarios, which is why the total probability of the three selected scenarios is about 50%. The obtained results show that the selected scenarios are at the border of the possible prospects for the development of agricultural cooperatives, and the probability of having a better result is equal to having a lower evaluation than the one obtained in the realistic scenario. The highest probability of happening is the moderate scenario – 15%, respectively, the other two have a 12% probability of the forecast. This means that the forecast to maintain the trend in the development of agricultural cooperatives from 2020 is most likely.

Table 2. The likelihood ratio of scenarios estimates

Indicators	Confidence interval	Scenarios		
		Pessimistic	**Realistic**	**Optimistic**
Limits of the average scenario score – ISASK	0,95	0,47 – 0,53	0,43 – 0,49	0,51– 0,57
The likelihood ratio of the scenarios – SLSK	0,95	0,12	0,12	0,15

Source: Own calculations based on data from the Ministry of Agriculture „Agrostatistics", NSI and FADN Database

Conclusions
According to the model's estimate, agricultural cooperatives will continue to decline until 2027, despite expectations of an overall increase in the utilized agricultural area, arable land and permanent crops in general. The forecast is to limit permanently grassed areas. With one of the highest ratings is the pessimistic scenario of the lands with vine plantations, which indicates an expectation to continue the existing trend of decreasing vines.

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CONSUMER PERCEPTIONS TOWARDS LOCAL PRODUCTS: THE CASE OF KOSOVO

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Abstract

Kosovo's agricultural development is influenced by favorable policies and attributes relevant to consumer demand. The more we know about the important attributes of the local consumer towards agricultural products, the better policies are designed to support farmers and value chains to adapt to changes in consumer preferences. Empirical insights gleaned from research on consumer preferences for both agricultural products and locally sourced goods offer invaluable evidence. This empirical foundation equips policymakers with the knowledge required to strategize improvements within the national and local food and agricultural systems. It also lays the groundwork for the conceptualization of a forward-thinking, consumer-centric agricultural model that is characterized by innovation, productivity, and responsiveness to consumer expectations. These expectations encompass various facets, such as food availability, ease of access, safety, high quality, taste, and other locally pertinent consumer attributes. The primary aim of this study lies in the comprehensive analysis of consumer preferences concerning local food products. It seeks to delineate the pivotal attributes that guide consumers in their decision-making processes. Additionally, the study aims to identify the informational and institutional gaps that must be addressed to bolster consumer confidence in locally produced food items. In doing so, it aims to provide policymakers with a robust foundation upon which they can construct a visionary concept for a consumer-driven agriculture framework. This framework should stand as an essence of innovation, productivity, and adaptability, aligning closely with consumer expectations regarding food accessibility and simultaneously addressing the unique consumer attributes that hold national relevance. Kosovo's agricultural development is involvedly tied to the interplay of conducive policies and attributes resonating with consumer demands. The study comprehensively explores these essential attributes, and its findings set the stage for crafting policies that offer substantial support to farmers and value chains. This support is vital for their ability to navigate evolving consumer preferences. By conducting research into consumer preferences, we offer empirical evidence that serves as a guiding compass for policymakers in their mission to enhance national and local food and agricultural systems. Furthermore, it ignites the spark of innovation, productivity, and responsiveness in the realm of consumer-driven agriculture. Ultimately, this pursuit aligns the agricultural sector with consumer expectations, ensuring that it thrives in an environment defined by accessibility, safety, quality, taste, and other locally relevant attributes.

Keywords: agricultural products, consumer perceptions, rural development, Kosovo

JEL Code: Q10, Q13

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Introduction

The consumer research data opens the floor for discussions on how to better design export-promotion and local-food promotion policies, are there any unfulfilled demands on the local market and how to address them, how the redefined support may induce sustainable rural development Wongprawms, R. et al., 2018. Kosovo agricultural development is influenced by favourable policies and attributes relevant to consumer demand Gjokaj, E., et al., 2018. The more we know about the attributes important to the local consumer towards agricultural products, the better policies are designed to support farmers and value chains to adapt to changes in consumer preferences (Kerolli-Mustafa, M. Gjokaj, E., 2016). The knowledge obtained through research of consumer preferences for agricultural products and locally produced agricultural products, provides empirical evidence for policy makers to decide on how to improve national, local food and agricultural systems, design a concept for consumer-driven agriculture that is innovative, productive, responsive to consumer expectations on food availability and easy-accessibility, safety and high quality, taste and other nationally relevant local consumer characteristics Imami et al., 2021. Because of the perceived benefits of freshness, better flavour, and superior quality, many consumers are interested in local goods (Pirog, R., 2004); (Bodini, A., 2004). Local goods appear to include greater „emotional quality" than goods from other countries or unknown origins. Products are positioned emotionally like brands by bearing their place of origin. The provenance can occasionally be more significant than any other quality cue when consumers judge regional quality labels (Alvensleben von, R. , 2000).

Local production also fosters a sense of security and attachment to the community and its traditions (Bodini, A., 2004). Short distances allow consumers to satisfy not just their physiological nutritional demands (at the base of the pyramid), but also their hierarchically higher wants, including their nutritional worries. Different scholars in their research show that consumers are generally positive about locally produced food because they believe that by buying local products, they buy more authentic and more quality products (Boyle, D., 2003); (Lee, R., 2000), as well as fresh (La Trobe, H., 2001), more nutritious, more delicious and safer (Seyfang, G., 2004). Rural sociologists like Hinrichs et al. , 1998; (Hinrichs, C., 2000) identify that local food seeks relationships with farmers and food manufacturers, based on reciprocity, trust, and sharing values. Depending on them, certain main dimensions will characterize local food systems, such as it is ecologically and economically sustainable. In many studies, the term „local" can be associated with these priority dimensions of the food system and when „local" necessarily connects with them like Ahmadi Kaliji, S. et al., 2022, Miftari, I. et al., 2022, Pakseresht, A. et al., 2022.

Material and Methods

The research undertaking encompassed several key components and activities:

Literature Review: A comprehensive review of prior market and consumer studies pertaining to Kosovo was undertaken. In certain instances, this desk research was expanded beyond Kosovo's borders to facilitate comparisons with other countries.
Desk Research: This phase involved the examination of previous scientific publications, project reports, international database data collection, and subsequent analysis.
Farmer Interviews: In-depth interviews were conducted with more than 1250 stakeholders within the food chain, including wholesalers, retailers, and experts. These interviews aimed to gain a deeper understanding of issues related to consumer behaviour, market dynamics, and the development of the food supply chain.
Consumer Interviews / Random Citizens Interviews: A total of 1167 consumer interviews were conducted, with each focus group comprising participants from various socio-economic backgrounds.
Trader Interviews: A set of 50 interviews with traders was also conducted as part of the research effort.

The purpose of the research
The objective of this study is to evaluate the effects of the financial support program administered by the Ministry of Agriculture, Forestry, and Rural Development, and executed by the Agency for Agricultural Development, across various sectors within the scope of our investigation. In addition to assessing the influence of financial aid in the form of grants and subsidies, our aim was to shed light on other pertinent factors, including farm structure, daily operations, sales practices, distribution channels, and more. The questionnaire was designed to comprehensively cover a wide range of activities within the sectors under investigation. Its primary purpose was to collect a substantial volume of information that could be utilized for statistical analysis and in-depth analytical purposes.

Sample plan
The research occupies a stratified sampling approach, wherein data collection is segregated into distinct categories representing components of the sample. These four segments or sectors constitute integral elements of the sampling strategy, and the table below illustrates the number of surveys allocated to each respective segment or sector.

Table 1. Sample Distribution

No.	Segments	Number of surveys
1	Farmers	1,250
2	Citizens (buyers)	1,150
3	Dealers/vendors	50
4	Agri processors	50
	Total	2,500

Source: own compilation

Data collection

Out of the initially planned 1250 surveys targeted for farmers, a total of 1253 surveys were successfully completed, resulting in an excess of 3 questionnaires. These additional surveys have not been excluded from the overall count. On the other hand, 1167 surveys were conducted with citizens (buyers/consumers), exceeding the planned number by 17. This surplus in surveys was introduced to maintain the total survey count as initially intended, compensating for the inability to complete the surveys with agricultural processing companies. The plan had outlined the execution of 50 surveys with agricultural processors. However, the full quota was not achievable due to a combination of factors, including a relatively short list provided by Kosovo's Agriculture Development Agency and some instances of rejection where replacements were not feasible. Consequently, a total of 33 surveys were conducted with agricultural processors. In contrast, the surveys conducted within the trader's segment were successfully completed as planned, totalling 50 surveys. Table 2 provides a breakdown of the completed questionnaires distributed across different segments and regions.

Table 2. Completed questionnaires by regions

Regions	Completed questionnaires with farmers	Completed questionnaires with citizens/buyers	Completed questionnaires with dealers/traders/vendors	Completed questionnaires with agri-processors
Prishtina	327	336	13	5
Mitrovica	176	135	7	5
Gjakova	250	145	6	4
Ferizaj	100	125	6	2
Peja	154	145	7	4
Gjilan	112	121	5	4
Prizren	134	160	6	9
Total	1,253	1,167	50	33

Source: own compilation

Farmers

The questionnaire administered to farmers featured an extensive set of inquiries designed to comprehensively gather information regarding various aspects of their farming endeavours, including farm operations, financial standing, and the challenges they encounter in the course of their agricultural activities. Presented below are select findings derived from the variables contained within the Farmers Questionnaire.

Discussions

Consumer perceptions toward local products are summarized as follows: generally, there is a strong inclination toward domestic food products. Consumers tend to trust domestically produced food more than imports, with the exception of products originating from the EU. The specific region within Kosovo where a product is produced holds significance for consumers. For fresh fruits and vegetables, consumers prefer purchasing from large farmers' markets or green markets over supermarkets. These markets are perceived as offering more affordable and fresher produce. When it comes to fruits and vegetables, consumers favor uniformity in size, shape, and specific varieties. Buyers of fruit often base their purchase decisions on seller information and brand reputation. Key attributes for fruit buyers include freshness and the cleanliness of the sales outlets. Consumer concerns are raised about the use of pesticides on fruits and the residue left on them. Additionally, consumers express worries about soil contamination affecting their fresh produce. These concerns about pesticides and soil contamination are linked to a preference for organic food. A separate survey addressing organic food yielded the following findings: Many consumers are familiar with the terms „bio" or „organic" but lack a clear understanding of their meaning. Most consumers are aware that organic production involves limitations on common agricultural practices, such as abstaining from the use of agro-chemicals and hormones. Consumers generally hold positive opinions regarding organic food, particularly in terms of its environmental friendliness, safety, taste, and freshness (for fruits and vegetables). The primary reason for preferring organic food products is the perception of their safety for human consumption. However, various significant barriers hinder consumers from purchasing organic food, including limited availability in stores and the perception of high prices. Although many consumers express willingness to pay a premium, the average premium falls below 20%, with considerable variation among consumers, potentially indicating an overestimation. Table 3 provides an overview of the gender distribution among farm owners/managers in the sample. It presents the frequency, percentage, valid percentage, and cumulative percentage for each gender category. The majority of farm owners/managers in the sample are male, accounting for 86.9% of the total respondents. Female farm owners/managers make up a smaller proportion, comprising 13.1% of the total. The total sample size consists of 1,253 respondents, with 100% representation in the table, indicating no missing data. This table effectively summarizes the gender demographics within the context of farm ownership/management, providing valuable insights into the gender composition of the surveyed population.

Table 3. Gender of the Farm Owner / Manager

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	1,089	86.9	86.9	86.9
	Female	164	13.1	13.1	13.1
	Total	1,253	100	100	100

Source: own compilation

Table 4 provides a detailed breakdown of the study sectors under investigation, showcasing the frequency, percentage, valid percentage, and cumulative percentage for each sector. The most prevalent sector among the study participants is „Mixed farms (arable crops and livestock),“ accounting for a substantial 33% of the total responses. Following closely are „Cereals“ at 17.9% and „Vegetables“ at 13.4%, representing significant proportions of the surveyed sectors. „Fruits“ and „Livestock“ sectors contribute 10.5% and 11.4% to the total, respectively. Other sectors, such as „Vineyards,“ „Bees,“ and „Poultry,“ make up smaller fractions of the study, with „Specialized farms“ and „Others (specify)“ being the least represented at 0.2% and 0.1%, respectively. The table encompasses a total of 1,253 respondents, reflecting a comprehensive representation of the various sectors explored in the study. This table effectively delineates the distribution of study sectors, shedding light on the relative prevalence of each within the surveyed population.

Table 4. Study Sectors

In which sector is this study / interview conducted?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cereals	224	17.9	17.9	17.9
	Fruits	132	10.5	10.5	28.4
	Vegetables	168	13.4	13.4	41.8
	Vineyards	126	10.1	10.1	51.9
	Livestock	143	11.4	11.4	63.3
	Mixed farms (arable crops and livestock)	414	33	33	96.3
	Specialized farms	2	.2	.2	96.5
	Others (specify)	1	.1	.1	96.6
	Bees	35	2.8	2.8	99.4
	Poultry	8	.6	.6	100
	Total	1,253	100	100	

Source: own compilation

Table 5, titled „Selling Place," provides an insightful breakdown of responses regarding the sale of products produced on the respondents' farms over the past decade. Among the 1,253 respondents, a majority of 73.0% have indeed sold products that were cultivated or produced on their farms within the last 10 years. Conversely, 27.0% of respondents reported that they had not engaged in selling products from their farms during this period. This table effectively presents the distribution of responses, offering a clear view of the extent to which farm-produced goods have been commercialized among the surveyed population.

Table 5. Selling Place

Have you sold products that have been produced on your farm over the last 10 years?		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	915	73.0	73.0	73.0
	No	338	27.0	27.0	100.0
	Total	1253	100.0	100.0	

Source: own compilation

Table 6, titled „The Amount of Products Sold," presents data pertaining to whether the quantity of products sold has experienced an increase due to financial support received through grants or subsidies. Among the 50 respondents surveyed, a minority of 36.0% reported that the amount of products sold had indeed increased as a direct result of financial support in the form of grants or subsidies. In contrast, the majority of 64.0% indicated that the amount of products sold had not seen an increase due to such financial support. It is worth noting that no data were missing for this particular question, with all 1,253 respondents providing responses. This table effectively conveys the distribution of responses, shedding light on the impact of financial support on the quantity of products sold within the surveyed population.

Table 6. The amount of products sold

Has the amount of products sold increased as a result of financial support through grants or subsidies?		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	1.4	36.0	36.0
	No	32	2.6	64.0	100.0
	Total	50	4.0	100.0	
Missing	0	1203	96.0		
Total		1253	100.0		

Source: own compilation

Table 7, titled „Contractual Form," provides valuable insights into the contractual arrangements between respondents and their primary buyers. Among the 915 respondents included in this analysis, a notable proportion (20.2%) reported having written contracts as the basis for their transactions with main buyers. A substantial majority (73.8%) of respondents indicated that their contractual agreements were of a verbal nature, with no formal written documentation. A smaller fraction (6.0%) mentioned „Other" forms of contractual arrangements. Importantly, there were no instances of missing data, with all 1,253 respondents providing responses. This table effectively delineates the distribution of contractual forms used in transactions between respondents and their primary buyers, offering valuable insights into the prevalence of written and verbal contracts within the surveyed population. Furthermore, contract farming increases chances for better financial management Hoxha, A. et al., 202.

Table 7. Contractual form

What is the contractual basis with the main buyers?		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Written contract	185	14.8	20.2	20.2
	Verbal contract	675	53.9	73.8	94.0
	Other	55	4.4	6.0	100.0
	Total	915	73.0	100.0	
Missing	0	338	27.0		
Total		1253	100.0		

Source: own compilation

Table 8, titled „Contract Termination," presents data related to instances in which buyers cancelled shipments in 2018 due to insufficient product quality. Among the 915 respondents included in this analysis, a very small fraction (.8%) reported that buyers had indeed cancelled shipments during 2018 due to quality concerns. The overwhelming majority (99.2%) indicated that such cancellations did not occur within their business transactions during that year. It's important to note that there were no missing data points, with all 1,253 respondents providing responses. This table effectively communicates the distribution of responses regarding contract terminations due to insufficient product quality. It illustrates that such cancellations were infrequent within the surveyed population during the specified time frame.

Table 8. Contract terminations

		Frequency	Percent	Valid Percent	Cumulative Percent
Has it ever happened to you during 2018 that the buyer canceled the shipment due to insufficient quality?					
Valid	Yes	7	.6	.8	.8
	No	908	72.5	99.2	100.0
	Total	915	73.0	100.0	
Missing	0	338	27.0		
Total		1253	100.0		

Source: own compilation

Conclusions

The increasing domestic demand for food presents both opportunities and challenges. The heightened emphasis on food quality and safety serves as a clear signal for local food companies to adapt. Failure to do so may result in continued imports, negatively impacting the agricultural sector's sustainability. Market intelligence information plays a crucial role in connecting farmers and their produce with the appropriate market segments. The concept of utilizing market information for production decisions is relatively novel to farmers and supply chain actors transitioning from centrally planned economies. While private businesses must leverage this market information for success, it is not sufficient on its own. Policymakers bear the responsibility of creating conditions that ensure the sustainability of farms and agribusinesses, facilitating a mutually beneficial outcome for consumers and producers. It's worth noting that in Kosovo and other Balkan countries, direct relationships between consumers and producers persist due to historical trust developed over generations. However, with the emergence of modern retail stores and supermarkets, these close relationships are likely to erode. Consequently, alternative mechanisms must be established to install trust in consumers who have migrated to urban areas or have urban upbringings. The key to fostering a competitive and innovation-driven agro-food sector in emerging economies lies in building human capacity capable of generating science-based knowledge related to food supply determinants. Government intervention is crucial in funding institutions and public goods and services, including agricultural extension services, to transform Kosovo and other Balkan countries into exporters while effectively competing with imports. Furthermore, there is a pressing need to develop and widely disseminate soft infrastructure, such as quality management principles, approaches, and procedures. National Minimum Standards (NMS) should be established in the horticulture sector, aligning with European Union (EU) standards. Institutional coordination and inter-

organizational communication must also be enhanced to provide valuable information and support to farmers, particularly for the implementation of national minimum standards and Good Agricultural Practices (GAPs).

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BENEFITS OF MANAGING FOOD LOSS AND WASTE FOR SUSTAINABLE RURAL DEVELOPMENT IN INDONESIA

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Abstract

The reduction of food loss and waste (FLW) has become a global priority under the Sustainable Development Goals (SDG). Reports from the United Nations and FAO reveal alarming statistics, with 13.3 percent of the world's food lost post-harvest and 17 percent wasted at the consumer level. FLW is a problem found in both industrialized nations like the EU and emerging countries like Indonesia. While EU nations have committed to reducing per capita food waste by 2030, Indonesia has only begun addressing FLW. This paper explores the awareness and management of FLW in Indonesia, focusing on food recovery and redistribution strategies and their potential impact on rural sustainability development. It addresses FLW management through literature review with the aim of raising awareness to the urgency of FLW management and to support the circular economy in Indonesia. FLW is closely associated with consumer behaviour, and lessons from the EU suggests that supporting local farmers and improving the supply chain can help reduce FLW. The role of food recovery and redistribution in reducing FLW in Indonesia highlights the successful practices, emphasizing the transformation of „ugly food" and the redistribution of excess edibles to combat FLW. Non-profit organizations in Indonesia have emerged to combat FLW by redistributing edible leftovers to those in need. Additionally, FLW recovery practices extend to agriculture, involving the reprocessing of unharvested agricultural products onto animal feed or organic fertilizers. These initiatives not only reduce waste, but also contribute to food security and poverty alleviation, especially in rural areas. The study concludes that addressing FLW in Indonesia can lead to increased food availability and sustainability. It recommends the development of national policies, programs, and partnerships to promote FLW management and the well-being of Indonesian communities. Further research is needed to identify specific challenges and opportunities for implementing food recovery and redistribution initiatives effectively. By taking concrete steps to reduce FLW, Indonesia can enhance food security and simultaneously align itself with the global sustainability agenda.

Keywords: Food loss and waste (FLW), food recovery, redistribution, sustainable rural development

JEL: O31, Q53, R11

Introduction

The Sustainable Development Goals (SDGs) have recently made the reduction of food loss and waste (FLW) a top global priority. Climate change, pollution, and the loss of biodiversity, according to the United Nations Global Sustainable Development Report (2023), are the results of unsustainable production and consumption.

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In addition, the FAO report (2022) also mentioned on how much food is lost or squandered every day in every nation, where 13.3 percent of the world's food is lost after harvest but before it reaches the retail market, and 17 percent of food is wasted at the consumer level. FLW is present in both industrialized and emerging nations, including the EU and developing nations like Indonesia. Nonetheless, EU countries have already made a pledge to decrease individual food waste at the retail and consumer stages by 2030. Concurrently, the EU aims to reduce food losses throughout the entire supply chain (European Commission, 2023). In contrast, Indonesia has only recently made a commitment to manage FLW following the publication of a report by the National Development Planning Agency (Bappenas) in 2021. Therefore, this paper aims to address the awareness of FLW management in Indonesia notably through food recovery and redistribution, and how these strategies could help rural sustainability development.

The urgency of food waste in Indonesia has impacts on food security, economic development, and sustainability, particularly in rural areas. According to a report by the National Development Planning Agency in Indonesia (Bappenas) in their 2021 report, food loss and waste in Indonesia have amounted to 115-184 kilograms per person annually, with the most substantial portion of waste taking place during the consumption phase over the past two decades. This issue is also noted by the FAO (2022). The food waste covers food loss from production to wholesale and food waste from retail to households. The most significant loss in production has been observed in crops, particularly cereals. At the same time, the least efficient sector and food type in terms of waste are fruits and vegetables. Moreover, the economic losses resulting from food loss and waste in Indonesia amount to approximately Rp213 trillion to Rp551 trillion (equivalent to US$14.3 million up to US$36.99 million) annually, constituting about four to five percent of Indonesia's gross domestic product (Bappenas, 2021).

The waste in Indonesia is composed into two types, based on the type of waste and the source of waste. The diagrams are presented below for the year 2022, taken from the information system of waste management from the Ministry of Environment in Indonesia.

From *fig. 1*, the based on the type of waste, food waste is the biggest contributor of waste (40.8%), followed by plastic (18.6%), and garden waste (13.3%).

Based on the source of waste, *fig. 2* shows that households are the biggest contributor of waste (39.3%), followed by commercial centres (21.3%) and traditional markets (16.0%).

Regarding the amount of FLW in Indonesia, it is important to explore the potential of food recovery and redistribution as an approach to build resilient and sustainable food systems in rural communities. This paper examines the advantages and difficulties of conducting food recovery and redistribution programs in rural regions, as well as the institutional and policy frameworks that can support and scale up these

initiatives, using case studies and best practices from throughout the world. As a result, the exploration of the paper would offer insights and suggestions for policy-makers, practitioners, and researchers interested in promoting sustainable food systems and lowering food waste in rural areas by showcasing successful cases of food recovery and redistribution in rural development.
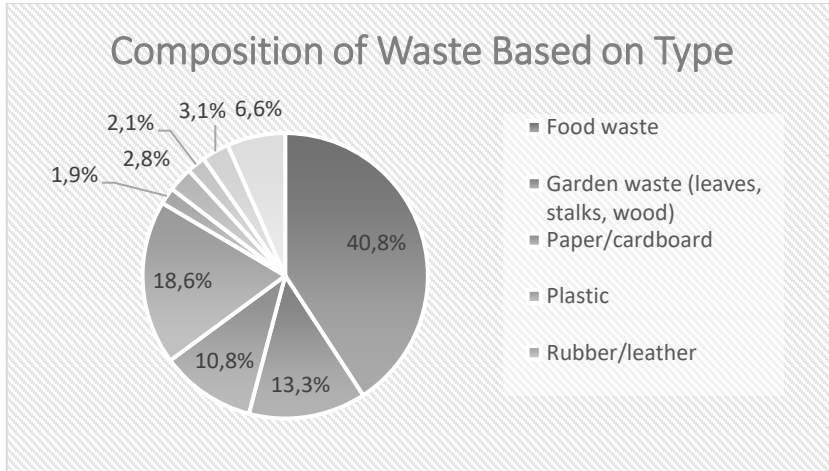

Figure 1. Composition of Waste in Indonesia Based on Type
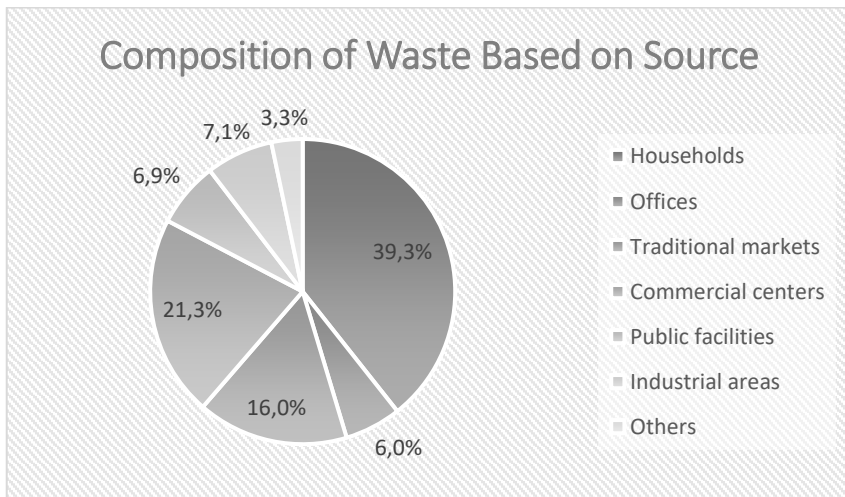*Source: Indonesian Ministry of Environment and Forestry (MoE), (2022)*

Figure 2. Composition of Waste in Indonesia Based on Source
Source: Indonesian Ministry of Environment and Forestry (MoE), (2022)

Literature Review

According to the Sustainable Development Goals (SDG), the issue of FLW is related to SDG target 12, indicator 12.3.1, on global food loss and waste (FAO, 2022). FAO defines food loss and waste as „the decrease of the quantity or quality of food resulting from decisions and actions by retailers, food services and consumers." Food losses refer to the stages from harvest/slaughter/catch until just before retail, while food waste occurs during the point of sale and consumption. FLW is a global issue that has significant economic, environmental, and social implications. It contributes to resource depletion, greenhouse gas emissions, and wasted economic value. Roughly 25 percent of the food provided for people to consume is discarded throughout the entire process of food production and distribution (Stancu et al., 2016). In developed nations, the main contributor of food waste occurs at the consumer stage, while in developing countries, food waste is primarily concentrated in the agricultural and production phases (Cahyani et al., 2022). Additionally, in most cases, FLW is closely associated with consumer behaviour.

Using the EU as a benchmark, the EU Commission organized a Citizens' Panel between December 2022 and January 2023 to ask about citizens' recommendations toward EU food waste reduction targets. The key points of the recommendations include: (1) promoting nutritional awareness within schools, (2) emphasizing the connection between local farmers and satisfied customers for reduced waste and increased sustainability, and (3) encouraging both public and private backing for local farming as means to reduce food waste (European Commission, 2023). From these highlights, it could be said that rural development, particularly focusing on support for local farmers, would improve the supply chain of food from the producers to consumers. Rural development encompasses various strategies and initiatives aimed at improving living conditions, infrastructure, and socio-economic well-being in rural areas. It typically focuses on enhancing agricultural productivity, creating employment opportunities, reducing poverty, and addressing social-economic disparities between rural and urban areas.

According to Bappenas (2021), the generation of Food Loss and Waste (FLW) in Indonesia between 2000 and 2019 ranged from 115 to 184 kg per capita per year. The consumption stage is identified as the primary contributor to FLW. Among different food sectors and types, crops, particularly cereals, were found to generate the largest amount of FLW. Horticulture plants, specifically fruits and vegetables, were identified as the most inefficient sector and category in terms of FLW (Gustavsson et al., 2011). Over the course of 20 years (2000-2019), FLW-associated emissions in Indonesia were estimated to be 1,702.9 Mt CO_2 equivalent, with an average annual contribution of 7.29% to the country's greenhouse gas emissions. The financial impact from the generation of FLW during this timeframe stood at roughly IDR 213-551 trillion annually, equivalent to 4-5% of Indonesia's GDP. The nutrition (energy) losses resulting from FLW could have provided sustenance for

approximately 61-125 million people, which accounts for 29-47% of Indonesia's population. Additionally, FLW constitutes 44% of the materials in landfills (MoE, 2023). In 2021, Bappenas also outlined the five primary factors and motivators behind FLW in Indonesia, which encompass: (1) inadequate enforcement of Good Handling Practices (GHP), (2) insufficient storage conditions, (3) market quality requirements and customer preferences, (4) lack of information and education for food workers and consumers, and (5) excess portions and consumer habits.

Managing food waste can play a role in rural development in Indonesia, and it can be achieved through two ways: (1) food recovery and (2) food redistribution. The implementation of food recovery programs in rural areas can help minimize food waste. Food recovery involves collecting surplus or unsold food from farms, markets, and other sources that would otherwise be wasted (Bilska et al., 2016). By promoting food recovery in rural development efforts, valuable food resources can be saved and redirected towards addressing food insecurity, improving nutrition, and supporting local communities. Food redistribution, on the other hand, is another way to tackle food waste. In the context of rural development in Indonesia, redistributing recovered food can have several benefits. It can support local food systems, enhance food security in rural communities, and reduce the reliance on external food sources (Andiwijaya, 2020). By ensuring that surplus food reaches vulnerable populations, such as low-income households or marginalized groups, rural development initiatives can contribute to poverty alleviation and social welfare.

Methods

In order to investigate the FLW problem in Indonesia, literature research was done for this paper. According to Snyder (2019), when the goal is to present an overview of a particular issue or research challenge, a literature review can also be a methodological tool to provide answers. This type of literature assessment is usually conducted to assess the extent of knowledge available on a particular topic. It can serve various purposes, such as shaping research priorities, identifying areas where further research is needed, or engaging in a comprehensive discussion of a specific subject (Snyder, 2019). This paper was intended as a preliminary stage for a larger study about FLW in Indonesia which includes comparative analyses of successful food recovery and redistribution initiatives in other countries or regions with similar contexts to Indonesia. The paper only concentrated on relevant studies that offer proof of the causes of FLW and discuss solutions regarding the FLW issues in Indonesia. The report from Bappenas (2021) provides a starting point and reference about the FLW situation in Indonesia. Previous studies from Cahyani et al. (2022) and Meidiana & Gamse (2010), with a 12-year gap between the two studies, both mentioned the lack of regulations concerning FLW management in Indonesia. Gustavsson et al. (2011), Bliska et al. (2016), and Kinanti et al. (2021) stated that FLW is related to the food supply chain and consumers' behaviours. Kinanti et al. (2021)

especially highlights the severity of FLW in Indonesia and the efforts made by individuals, organizations, and the government to raise awareness and address the problem. Raising awareness requires the need for policies and strategies to reduce FLW in Indonesia, recommending the formulation of a national policy and the use of technology in the food supply chain (Saliem et al., 2021). Lastly, studies from Stancu et al. (2016) and Schmidt (2016), pointed out psychological factors that affect the behaviour of FLW management.

Results and Discussion

As waste in Indonesia is mainly generated from food waste with households as the main contributor. A significant issue in waste management in Indonesia stems from the limited availability of data regarding the waste produced at its origins, gathered at transfer points, and ultimately transported to the final disposal sites, mainly landfills, given that a substantial portion of food waste ends up there. The lack of information made it difficult for the municipalities in Indonesia to plan for waste management. However, in most cases, neither the transfer point nor the final disposal location has a weighing system to estimate the rate of trash formation and collection. If such a system exists, the local authority can use it to estimate the size of the landfill. The number of overloaded landfills, which are now present in many Indonesian cities, can be reduced with an accurate calculation of the landfill area (Meidiana & Gamse, 2010).

In Indonesia, various effective practices from other countries have been implemented to address FLW. Despite significant differences between Indonesia and countries like Germany and New Zealand, lessons can still be drawn from their experiences. For instance, in Germany, studies have shown that people can benefit from setting goals and utilizing grocery shopping planning as a strategy to reduce food waste (Kinanti et al., 2021; Schmidt, 2016). In Indonesia, there are two ways to manage food recovery: (1) food consumed personally by farmers or communities near the farm, and (2) processed into other processed food (Bappenas, 2021).

Food loss frequently arises when items fail to meet food quality criteria, such as those pertaining to weight, appearance, or shape. Items that fall short of aesthetic standards but remain nutritious are often classified as „ugly food", even though they are perfectly edible. As a part of the effort to reduce FLW, these „ugly food" items are not discarded; instead, during the production phase, they are either consumed by the farmers themselves or distributed to communities residing in close proximity to the farm (Bappenas, 2021). Examples of „ugly food" are cracked chicken eggs, overripe chillies, or very small tomatoes.

Alternatively, „ugly food" can be further treated as part of the food recovery to keep them edible. processed further to make them still edible. In various stages of the food supply chain, there is a common practice of processing „ugly food" or rejected food items into alternative products to prevent FLW, although this practice often

remains under the radar. Agricultural products that do not meet quality standards are typically consumed directly by farmers or local communities before reaching consumers. This food can be consumed in its natural state or undergo transformation into various forms. For example, bananas can be turned into fried banana snacks, cassava into cassava crisps, and tomatoes can be processed into jam or sauce (Bappenas, 2021). The same principle applies when it comes to consumption. It is essential to disregard the initial appearance of food that does not meet the established standards once there are edible leftovers that may not look appealing in their original form. Instead, such food should be transformed into other food items that remain suitable for consumption while retaining their nutritional value. For instance, an organization called Tunas Nusa in Bandung, Indonesia, specializes in converting surplus rice into crackers (Bappenas, 2021).

In addition to the waste of „ugly" but edible food, there is a prevalent practice of discarding leftover food from businesses or event activities, including restaurants, hotels, and catering services. Food redistribution can involve giving away „ugly food" and excess edibles to individuals facing food insecurity. Numerous organizations have arisen in Indonesia, such as Foodbank of Indonesia (FOI), Garda Pangan, and Food Bank Bandung (FBB), to address the issue of edible leftovers going to waste. These entities actively gather and distribute „ugly food" and surplus edibles to those in need. The sources of these food donations to FOI, FBB, or Garda Pangan can originate from any point along the food supply chain. Foodbanks also perform quality control by evaluating the food's condition before distribution. Foodbanks carefully select appropriate recipients to ensure the food is distributed to the right target audience. Typically, food donations are provided to less fortunate communities, including the poor, orphans, refugees, and street children (Bappenas, 2021).

Meanwhile, FLW recovery in rural areas, particularly in agriculture, should involve the handling of production, post-harvest, and storage, in addition to processing and packaging stages (Bappenas, 2021). For example, to provide animals with the nourishment they need, rotten and unharvested agricultural products are reprocessed and combined with cereal and other ingredients to create animal feed. Plants and other substances, such as crop residues, livestock manure, food waste, and others, can be combined to form organic fertilizers. Farmers can profit from turning food waste into compost by saving money on fertilizer and preventing garbage from accumulating on farmland, rather than discarding into landfills. These practices enhance responsible handling of FLW as a part of rural development.

In summary, a decrease in FLW can increase food availability. The strategies that can be implemented include the importance of providing national FLW data and developing a national program for FLW reduction (Saliem et al., 2021). According to Bappenas (2021), Indonesia has established five policy directions for managing FLW on a national scale, which encompass: (1) promoting behavioral change, (2)

enhancing the food support system, (3) reinforcing regulations and optimizing financial resources, (4) leveraging FLW utilization, and (5) advancing FLW research and data collection. In this context, utilizing FLW management through food recovery and redistribution are simple ways to achieve FLW management that can be implemented in rural areas and for consumers. Bappenas has stated a guidance for the development of policies, programs, and partnerships that address FLW, promote rural sustainability, and contribute to the overall well-being of Indonesian communities.

Conclusion

Addressing FLW in the context of rural development in Indonesia can have multiple positive outcomes. Food recovery and redistribution have the potential to address the issue of FLW and promote sustainable rural development in Indonesia. These approaches provide economic opportunities for local farmers and businesses by creating a market for surplus food. They also promote social cohesion and community development by encouraging sustainable food systems. Further research is needed to better understand the specific challenges and opportunities related to food recovery and redistribution. One possibility is to conduct comparative analyses of successful food recovery and redistribution initiatives in other countries or regions with similar contexts to Indonesia. The best practices in other countries can help identify practical strategies, implementation models, and policy measures that can be adapted and applied effectively in the Indonesian context.

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SOCIAL NETWORKS – A TOOL FOR COOPERATION OF BULGARIAN AGRICULTURAL PRODUCERS

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Abstract

Bulgarian agriculture has gone through many transformations in the last two decades. The concentration of production and the difficult access of smaller farms to forms of public support led to their unequal competitive position. Some owners of such small farms began to seek support and advice from other producers, exchange experiences and organize joint actions. Social networks are also used for these new forms of cooperation, as a popular tool for building groups and communication between their members.

The purpose of the present study is to evaluate the models for the application of social networks as a tool for the cooperation of agricultural producers in Bulgaria. In order to achieve this goal, it is necessary to solve the following tasks: to assess the need for producers to cooperate; to analyze the implemented traditional forms of cooperation in the country, revealing their deficiencies; to consider specific examples of the application of social networks, as a tool for cooperation of producers from the agriculture sector in Bulgaria.

Social networks, or social media platforms have been a focus of analysis since their launch and in later years some meta studies and literature reviews have attempted to organize and structure most of the previously done research on the topic (Ali, et al. 2023; Ibrahim, 2022). In these studies, the five main topics of discussion have been: social media, social collaboration, social marketing, social media and crowdfunding, and social media and crowdsourcing. Social media as a tool for crowdsourcing can be used by different stakeholders to share crucial information (Clark, et al., 2023) and in those cases a cooperation among social actors can be built.

The negative effects of social media on traditional network-building have also been explored by some authors, that put forward concerns about the differentiation of goals between social media platforms and their userbase, that can lead to degradation of social cohesion (González-Bailón, et al., 2023). Although being critical, those researchers can't deny that social media platforms are granting opportunities that would be absent without them. Furthermore, if academics have access to social media analytics tools a more in-depth analysis of information sharing and social impact can be developed (Horng, et al., 2023). The lack of access to such tools for the current research has led to the selection of included observation for the analysis of the application of social networks as a tool for the cooperation of agricultural producers in Bulgaria. Social media interactions remain an understudied topic in the country and its relevance as a cooperation building tool remains to be proven.

Key words: agriculture, competitiveness, cooperatives, Internet
JEL*: J54, D71, D91*

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Introduction

The agricultural sector in Bulgaria has adapted to the new economic and social conditions after the accession of the country to the European union. This adaptation has several shortcomings underlined by Bulgarian researchers, such as the production focused of materials with low value (Nikolova, 2013), the levels of sustainability of the sector (Bachev, et al., 2019), its financial stability (Stoyancheva, et al., 2023) and ecological viability (Georgieva, et al., 2022). A number of these issues can be solved by cooperation among producers that can promote the introduction of a longer value chain leading to better economic results for all participants and the sector as a whole. Bulgarian agriculture has a long history of cooperative actions (Marinova, et al., 2020), but after the transformation of the country's economy from planned to market state the role of cooperatives has rapidly decreased, as well as the participation in them. In the current environment the introduction of new forms of cooperation, that have no direct relations to the soured history of agricultural cooperatives in Bulgaria have the potential to increase the added value for participating producers.

Methodology

In order to analyze the participation of producers in these new models for cooperative actions this research is focused on one of them – cooperation through social networks, and specifically the cooperation of apicultural producers in a group of their own making, facilitated by the Facebook social network. This group has 18 093 participants as of 24th of September 2023. This research is based on included observation of communications for period of 30 days, during which 195 post ware made by group participants, divided in to six categories: sharing of information (and discussing the information being shared); seeking information by asking direct questions to other participants; offering inventory, chemicals or apicultural colonies for sale; seeking to purchase inventory, chemicals or apicultural colonies; offering finished products for sale and seeking to purchase finished products. Cooperation of economic agents through social networks is a growing field of study and discussion among researchers worldwide (Abatayo, et al., 2018; Buskens, et al., 2000, Grozdeva, 2012, Danchev 2010; Hanaki et al., 2007; Melamed, et al., 2022). The framework of each study is specific to the topic and level of development of social networks during the period. The rapid development of digital technologies and dynamics of social network's participation can have an impact on the results and effect of studies.

This research is focused on the period between 23rd of August and 23rd of September 2023, selected for its importance for the apicultural sector in Bulgaria regarding the activities characteristic for it. During this period most of the production is winding down, the natural honey produced is already collected and the preparation for winter hibernation has not yet started. The production results are assessed and decisions for the next production cycle are also made by the owners.

Results

Bulgarian apiculture has been developing since the accession of the country to the European union, under the improved social support framework and local production traditions. The number of apicultural colonies has continuously increased as shown in Table 1, reaching a peak in 2019 with over 867 thousand colonies in the country. The production of natural honey has thus increased, as well as its efficiency. This is a result from its's concentration and specialization.

Table 1. Natural honey production in Bulgaria

	2016	2017	2018	2019	2020	2021	2022
Apiculture colonies	754105	765772	783348	867561	863283	837955	823250
Natural honey produced (t)	10218	11807	10338	11518	9066	11638	11944

*Source: Agrostatistics of the Ministry of Agriculture and food*

This process has led to decrease in efficiency at first, with some productions growing too fast and being unable to tend to all colonies, but during the last CAP planning period (after 2017) the efficiency has increased, and the process of concentration increased in speed. As shown on Table 2 by 2022 the smallest holdings have dropped down to under 1/3 of their numbers in 2016, while the largest holdings have doubled during the same period.

Bulgarian produced natural honey is export oriented, and in some years (2014, 2017, 2018 etc.) exports exceed production. The increase in imports of natural honey has led to the decrease of the levels of competitiveness of Bulgarian production, as shown on Graph 1. The competitiveness calculated by the Balassa index, corrected to consider imports as well, is still positive. Bulgarian natural honey is still positioned well on international markets, with a higher-than-average sales price. This trend can change if the levels of imports continue to increase, and the level of competitiveness continues to decline. Bulgarian producers have started to feel the pressure of these imports, as they fear that products with lower quality from other countries are combined with local higher quality ones, which can lead to the degradation of Bulgarian natural honey image on international markets.

Table 2. Number of apicultural farms in Bulgaria by size

	2016	2017	2018	2019	2020	2021	2022
1 to 9	3858	2804	2510	2440	1968	1188	1238
10 to 49	6196	5239	4584	5678	3689	3945	3455
50 to 149	4172	4188	3526	4093	4273	3819	3383
above 150	1080	1200	1640	1560	1696	1849	2148
Overall	15306	13431	12260	13771	11626	10801	10224

Source: Agrostatistics of the Ministry of Agriculture and food
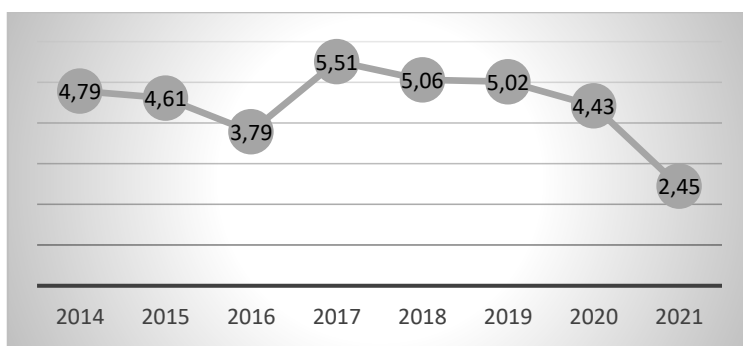
Graph 1. Competitiveness of Bulgarian natural honey

The concentration of production has led to an increasing amount of natural honey being produced by a significantly lower number of holdings. The information requirements of these larger, modernized producers have increased, and they are seeking new data sources, different from the number of apicultural associations that failed to consolidate their activities. These changes require an analysis of these new informational virtual venues attended by the new generation of producers. It is in this context that the current research is focusing on one such venue – the apicultural Facebook group named „Apiculture" with 18 093 participants, a number higher than the number of producers in the country.

The collected data on member participation in the form of 195 posts is separated into six main groups, as shown in Table 3. The largest of the groups is information sharing. In this group of publications participants are sharing knowledge, providing relevant news, sharing experiences, information on calls for action and policy changes. For each of the groups an average of active and passive participation is calculated. Active participation is based on replies from community members, adding to the discussion or providing rebuttals. Passive participation represents the reaction available to group members, which provides less information and does not add much to the discussion. In the largest group of posts the ratio of active to passive

participation is almost 1 to 10. This low average number of just over 53 passive participants and 5 active participants in information acquisition among over 18 thousand group members proves that they are not stimulated by simple data provision.

Table 3. Participation in the Bulgarian „Apiculture" Facebook group
form 23rd of August to 23rd of September 2023

	Information sharing	Inventory purchase	Inventory sales	Product purchase	Questions	Sales	Overall
Cases	72	10	54	2	33	24	195
Avg. active participation	5,4	7,6	1,8	1,5	24,6	8,7	8,1
Avg. passive participation	53,3	8,4	9,7	10	27,4	28,0	31,0

Source: Own calculations based on data collected by included observation of Bulgarian „Apiculture" Facebook group form 23rd of August to 23rd of September 2023

The other main form of information acquisition is through posts raising questions to the community. In these cases, the active participation is a lot higher than the previous group. Raising a specific question has proven to have significantly better results with information being shared by almost five times more members of the community. These posts create a space for discussion and information sharing among producers from all parts of the country and have proven their results by the significantly higher average activity. The cooperation build by such active participation in group communication can have positive results for the development of the sector, by increasing the participants knowledge base and improve their abilities as other authors have also discussed (Abatayo, et al., 2018).

The posts by group members that seek to purchase inventory, has led to a higher level of active participation than the posts offering inventory, but most active suppliers keep creating sales posts regularly (usually on every other week, to not irritate and to comply with the group's ruleset and norms).

The posts seeking to purchase finished products during this very active period are very low – just two of such nature were created. What was even more interesting was the low active participation of producers on such posts. During the same period the posts offering finished products for sale numbered 24 with significantly higher levels of participation. The gathered data shows that there was a high amount of products seeking a market, but producers did not want to openly communicate with buyers and most likely chose to do so privately. These decisions are an important indicator for the analysis of the readiness for cooperation among producers. There

is a significant deficit of trust among producers regarding sales of finished products. Members of the group choose to offer their products on the market separately, without seeking any form of cooperation. They prefer to negotiate prices in private and not share information regarding them. Most posts that offer to sell finished products have a stated price per kilogram, in ranges that are socially approved by the group (10 – 12 lv. for average quality during the studied period). The sales post with most active participation (63 replies) has an offering price of half of the socially accepted average, just 5 lv. per kilogram. The offering producer was openly and actively ridiculed for creating such a precedent for the group. The other post with a high number of active participation (53 replies) and the most passive participation (115 reactions) was a sales offer turned in to a price discussion that took place in the beginning of the research period when the products ware starting to go on sale. This case can be interpreted by cooperation among producers to settle an average sales price for the product.

Another edge case of importance is an information providing post of an unhappy customer sharing their experience of the purchase of products from one of the members of the group. This was the information post with the highest active participation (55 replies). The community was divided in their participation, some raising questions about high levels of consumer quality demands, and some focusing on proving that this bad example does not represent the group. In this case the lack of participants with high amount of social capital, that can represent or provide direction for the group was evident. The high number of participants in this Facebook group and the low average participation (active participation in the 30-day period on average was 8,1 replies per post) is an indication of the low level of engagement of actors. The results of the analysis of these cases in correlation with the low levels of social capital of participants can challenge the creation of cooperative action among producers in this digital space. This result of the analysis is further supported be the last two edge cases – the two posts with most passive participation (271 and 232 reactions) ware providing well wishes for the producers and evidence of a colony being captured by one of the group's members, thus providing little to no useful information.

Conclusions

The accession of Bulgaria to the European Union and the development of the agricultural sector under the Common agricultural policy led to significant changes. Local producers are facing competitive pressure not just from European producers, but also from larger actors on international markets. Raising the level of cooperation among local farmers can help relieve some of the pressure, by creating a supportive structure and longer value chains. In these cooperative efforts new digital tools can play a significant role, but only if the levels of social capital can be raised.

This study focused on just one sub sector – apiculture, and thus cannot provide a decisive framework for the development of cooperative actions threw social media networks among Bulgarian agricultural producers as a whole, but still some useful conclusion can be drawn. The highest incentive for participation in information sharing and discussion among group participants was the determining of a common balanced price level. The lowest participation was evident with inventory offers by suppliers. This allows for the conclusion that cooperative action can be reached through collective price negotiation action, but such is impossible at scale at this time due to lack of trust among group members. Efforts should be made to raise the levels of social capital among agricultural producers, that will allow network building, and can lead to cooperative actions.

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DIGITAL SOLUTIONS FOR THE ADMINISTRATION OF LAND MANAGEMENT PROCESSES IN THE REPUBLIC OF BULGARIA

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Abstract

Due to errors in the administration of processes and delayed digitalization of management processes related to land, as well as a subsidy policy based on outdated data, the confrontation of individual subsectors in the Bulgarian agricultural business is constantly growing. A large part of the information systems, and especially the information, were available at different times to individual economic entities. For the most part, large farmers started the digitalization of their business long before the state administration. The possession of information has created serious advantages. The consolidation of agriculture, and hence all the negative consequences, is also due to this fact. Late implementation of digital solutions for management of agricultural business leads to a decrease in its efficiency. The digitalization of land administration processes by the state has been implemented in slower timeframes, with untimely implementation of effective solutions. Making management decisions „piecemeal", without connection between individual applications and data, leads to the collection of incomplete and unreliable information, as a result, the agricultural business in Bulgaria has a relatively slow development. It is necessary to build a comprehensive management vision based on information systems and a secure mechanism for control of deviations, and the institutional framework and digital solutions to be synchronized before their design and timely implemented after a thorough analysis, including forecasting the financial economic results of their implementation.

At this stage in Bulgaria, digital solutions for control and management by the state are characterized by catch-up, not anticipatory development. The role of the state as an administrator of the relations between owners and users of agricultural land and owning the overall information about the state of the land resource should be a leading one to achieve effective support for access to information and digital solutions. The digitalization of land administration processes by the state is successful and timely when there is a connection between the individual applications and data, and the information collected is complete and reliable.

Keywords: digital solutions, land management, process administration, problems, solutions

***JEL code** – Q01, Q15, Q13*

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Introduction

Today, in the context of an increasingly intensive transformation of economic systems and an increasing need for sustainable development of the agricultural sector, the driving forces and real expectations are aimed at meeting the objectives set in the reformed Common Agricultural Policy for the period 2023-2027. The task of sustainable development is, through the joint use of innovative technological solutions and public policies, to ensure the economic viability of environmentally friendly, natural resources and the environment, agriculture.   (Nikolova, 2022) (Башев, Х., Н. Котева, Д. Митова и др., 2019). Investments in the agricultural sector for the acquisition of tangible fixed assets are mainly aimed at modernization of farms; environmental protection; animal welfare; renovation of equipment and introduction of new technologies, etc. . Effective management of land resources is an important condition for the economic prosperity of any company unit associated with ownership of agricultural assets. (МЗХ, www.mzh.government.bg, 2023)(Николова, 2019).

In order to administer the processes of land management, it is an indisputable necessity for the accelerated development of an important and priority sector, such as the agricultural sector. They are a prerequisite for slowing down the negative economic and social processes, the demographic structure and the trend of rural depopulation (Николова М. , 2021). In most cases, the areas with the least usable agricultural area operate with the relatively largest number of farms that cultivate mainly their own land. This requires digital technologies to be tailored to the scale of the business. In small areas, the use of expensive software solutions is unprofitable and the information is insufficient to make informed decisions. In the Bulgarian scientific literature there are a number of publications on the state and challenges in the development of land relations, on the agricultural land market, but there are no in-depth studies on the problems of restoring land ownership and administering the relationship between: ***owner-user-state and the introduction of optimal digital management solutions.***

In view of the above, **the object of study** in this paper is the state and potential for applicability of digital solutions in land management relationships. **The main research objective is the main research objective for the implementation of digital solutions for agricultural land management and the role of the state for their selection and timely implementation**. The main **research goal** on the potential of digital solutions is outlined by studying negative practices in land management and formulating conclusions and recommendations for improving the administration of processes.

The specific **tasks** for the implementation of the research objective are:
- ✓ a survey on the process of 'land restoration' and substantial deviations in establishing ownership;
- ✓ analyzing the digital solutions used for different types of land – (urbanized, forest and agricultural), the terms of their implementation in order to establish the degree of deviations from the actual ones.

The study is based on two types of data: official institutional data and own, collected through face-to-face interviews, site visits and archival records from a consulting organization. The research methods used include general scientific research methods, empirical-theoretical and logical-theoretical methods, as well as analytical tools: analysis and summary of specialized literature and a schematic method for presenting characteristics and trends.

Analysis of the problems in restoring land ownership in Bulgaria

Sustainable land management in the Bulgarian economy is undoubtedly an important factor for the implementation of innovative digital solutions. For this purpose, a clear vision of ownership is needed, as well as optimization of the state tools for the introduction of existing mechanisms. In the dynamic conditions of the Bulgarian economy and the search for opportunities to increase sustainability in land resource management, the *main problems They find expression in two directions*:
- how digital technologies are used to restore ownership;
- determining the terms, methodology and scope for the implementation of technical solutions for agricultural and urbanized areas and forestry.

Digital technologies in the restoration of property in chronological order

The restoration of property in Bulgaria begins with the law Ownership and Use of Agricultural Land (M3, 1991). In the recovery procedures are created *Land Separation Plans* and *Property Maps* in existing or recoverable old real boundaries with the relevant registers. Their content was subsequently transferred in digital form and was called *Map of restored property* (KBC) for agricultural and forest areas. The first discrepancy between the need and the actions of the process management policy is that the Bulgarian coordinate system KS70, based on the Russian KC63, which were previously used for military purposes (scheme 1), is used for land mapping.
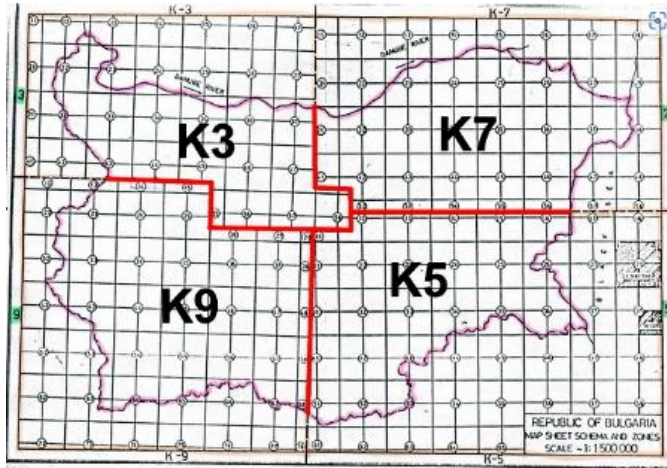
Scheme 1. Map of Bulgarian coordinate system KS70
Source: (Йовев, 2013)

The problem is that the KS1970, **represents a planar coordinate system** and the country is divided into 4 zones: K3, K5, K7 and K9. The coordinates are in millions of meters, as *In the north-south direction there is an overlap of about 40 km.* The basis of the KC70 is the „XC50 old" instead of the updated one. Besides the planar coordinate system, overlapping and erroneous data in the delineation of properties above 50 cm, the mapping was carried out by poorly qualified employees. Apart from this, there are geographical data for parts of Bulgaria that are in other coordinate systems (1930, 1950, Sofia, etc.). CC 70 is used in the issuance of sketches and other documents by municipal administrations, cadastre offices and municipal agricultural offices (OCD) and despite the shortcomings it has been used for over 20 years. Meanwhile, the Ministry of Territorial Development and Construction in 1995 issued *Instruction for determining the coordinates of geodetic points by GPS* (MTPC, 1995). Since 1999, the use of the WGS84 planar coordinate system (UTM) began to be imposed in practice, in whose zone 35 the whole country can be collected with minimal errors.

After the entry of our country into the European Union (EU) was introduced *Bulgarian Geodetic System 2005* (BGS 2005) . Unlike WGS84, the base ellipsoid is GRS-80. A standard UTM projection is applied to it. Unfortunately, the digital solutions used were not quickly changed enough to use this standard and a year later the Ministry of Regional Development and Public Works (MRDPW) issued (МРРБ, 2010)*Instruction, for the determination of geodetic points using GNSS* and declares „all geodetic systems other than BGS 2005 and WGS84" to be local .(МРРБ, 2011)

The restoration of the ownership of the land **leads to the creation of** *the Map of Restored Property (KBC)* – tabular and graphical data for all agricultural properties

in Bulgaria. The defining components are: Ekate, property identifier, area, land category, area, bordering properties, method of permanent use, owner. After the restoration of ownership, the Ministry of Agriculture (MoH) assigns the updating of the maps and part of the registers to them to private geodetic „maintenance companies" in GIS (cartographic) format. Full information and documents about the land are serviced by the OSZ, but in tabular form (with software product IMCO-3, under DOS). The problem in this period is the lack of synchronization between the „maintenance company" and the OSZ (graphic and tabular **part),** offline work on deadlines inconsistent with agrotechnical activities. Statutory division or correction of information about an agricultural property goes through a long procedure and sometimes the data in the OCD are not updated. As a result, there is **a discrepancy between the data in the OSZ and KBC in terms of ownership, merger and division of properties**. By 2015, the OSZ was working with technologically obsolete programs under DOS. For the graphic part for the needs of the OSZ, in the period (2002-2004) was assigned the development of a graphical module under Windows, as the software product CadiS remains the property of the developer and the Ministry of Health has the right of use for a certain period. Accordingly, information about agricultural properties and owners is held by a private company that dictates the terms and sets the rules.

Upon Bulgaria's accession to the EU, an Integrated System of Administration and Control (IACS) was created, based on another Geographic Information System (GIS) of Technologica. (https://technologica.com/, 1990)**This allows for the same official information at the level of state administration to exist 3 different systems, which not only have no connection with each other, but also have a discrepancy in the maintained data.** The reason is that the data is updated between different systems, through intermediate files and often at the discretion of a specific employee of the OSZ, a system operator. The data is on local computers and **Their inconsistency can be** caused even by a damaged computer. **Typical for this period is that the systems are local, each service maintains certain lands, with a different update period and often even with non-matching data from nomenclatures.** A typical example is the term „locality", which, in addition to being written on the territory of two neighboring lands in different ways, is often written in the database of 1 and also land in several ways. In a period of about 5 years there is another problem – CadiS the area of the properties is calculated on the basis of graphic data, which differ from the official figure for area in the documents and tabular information about the property in the register (the error is from 0.05% i.e. up to 2 m^2 of a property, but with over 3.6 million properties could be substantial).

Agricultural land in Bulgaria is categorized into 10 bonite categories according to Ordinance 261 of the Council of Ministers of 1996, updated in 2018. (МЗХГ, 2018). The expertise of the category is carried out by the Institute of Soil Science „Nikola Pushkarov", Agricultural Academy – Sofia. In our opinion, the primary

assessment of the category was carried out in too short a time, which leads to numerous errors. For example, in the hilly regions it is almost unlikely that there is a 2nd category of land, but according to statistical documents such a category exists. The methodology also includes old crops that are no longer grown in our country. Moreover, under different climatic conditions and varying degrees of human intervention, a change in the category of land may occur. However, subsequent reassessment is carried out at the request of the owner and after payment. All this leads to substantial discrepancies between the land data in the registers and the actual state.

Problems in determining the deadlines for implementation of technical solutions for agricultural, urbanized areas and forestry

The first Cadastre Act in Bulgaria was established in 1908 and has been repeatedly amended. The Unified Cadastre Act was adopted in 1979. A new Cadastre Act complying with the restoration of ownership entered into force in 2001 with a changed name. (Закон за кадастъра и имотния регистър, 2023)

The Geodesy, Cartography and Cadastre Agency, 2000, plays **an important role in determining the possible deadlines for the implementation of technical solutions**. According to the planned plans, all **agricultural land should be covered by the Cadastre by 2012. This deadline is not only not met, but the process of transferring the management of agricultural land to the Cadastre only then begins.** *After 2018, over 90% of the agricultural land has already been transferred to the Cadastre.* While the properties in KBC are identified by 6 digits, in the Cadastre they are 8. Due to the fact that a different technical solution is used to create the cadastral map, when converting from old to new numbers for *10% of the properties there is no correspondence between the numbers.*

The mapping and inclusion in Cadastre **of the urbanized territories** began almost simultaneously with KBC, as early as the 1990s, but was carried out according to different rules and procedures, with different technical means. This leads to *a discrepancy between the boundaries of settlements and agricultural lands, there is overlapping of maps, a significant discrepancy in information between them, etc. It turns out like this, that the information about agricultural land is reflected in KBC, at a later time cadastral maps of the settlement are created, in a subsequent period the KBC is drawn with another technical solution, after which the Cadastre of the settlement is updated again, etc.* (diagrams 3 and 4). Given that the process is controlled by different ministries, teams and different procedures, the information between the urbanized and agricultural territories does not correspond to each other. For example, different digital solutions are used for coverage in the Cadastre: in Ruse – MCad, for Sofia – MCad, CadiS, ArcGIS. *In fact, the transfer from paper to digital media is done piecemeal, through various digitization systems, with a serious time difference, on the basis of which multiple overlaps and discrepancies of information occur.*
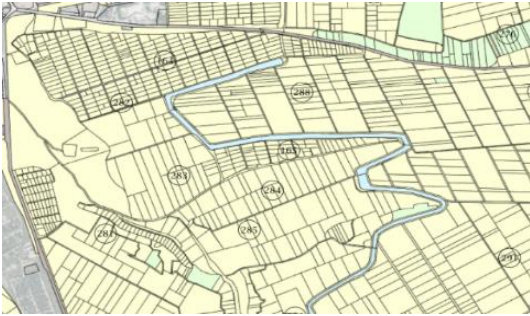
Figure 3. PIC Map by CadiS
Source: CadiS Annex (БСТ, 2008)

Figure 4. PIC Map with Google Maps
Source: Appendix Bank Properties
(http://propertybank.eu/, 2011)

With the Ordinance on the Structure of **forests and forest land** and the hunting and economic regions shall determine the conditions, order, ways, methods and mechanism for conducting the inventory of forests and lands of the forest fund, the development of forestry and hunting projects, plans and programs under the Forests Act and the Hunting and Game Protection Act. In Art. 2. of the Ordinance says that „Forestry and hunting projects, plans and programs shall be prepared on the basis of adopted nomenclature, structure and format of the database operating in the environment of Relatifndl Datadase Management Systems ((МЗГ, 2004)RDBMS), respectively – geographic information systems and allowing combined analyzes and random reports, as well as visualization and printing of thematic maps at the request of the user. „ Accordingly, when mapping the forest fund, there is overlapping of boundaries and discrepancies with maps and registers for agricultural land and this is typical at the level of administrative management.

Users are the next entity to influence the **blurring of boundaries between agricultural land and forestry**. In some places, users leave some of the agricultural territories to become afforested, usually because of the mismanagement of unattractive properties. In order to prevent erosion, for environmental and other reasons, it is administratively planned to create tree belts in agricultural land. In other cases, unscrupulous users, for financial gain, unregulated cut down the tree belts and sow them with agricultural crops. And this changes the general structure of the soil, ecosystem characteristics, leads to adverse climatic changes and others. Unfortunately, this is a common practice.

Summarizing the gaps in the technical solutions in the delineation of property boundaries, they are: use of insufficiently perfect coordinate system in mapping agricultural land; lack of a unified vision for the implementation of GIS systems and various solutions for mapping agricultural land, forest and urban area, which leads to overlaps and inaccuracies; The change of the regulatory framework and the technical solutions are not considered in depth and connectivity.

Administration of the relationship between owners and users and existing digital management solutions

The land restoration process creates two main entities – owners and users. Relationships are established between them that directly affect the way the land is managed. Administering these relationships without digital technology is virtually impossible. Therefore, the evolutionary development of relationships and digital technologies need to go hand in hand.

Retrospective analysis of the first digital solutions for property management, rent relationships and administrative documentation in Bulgarian agricultural companies

The study on the development and implementation of digital solutions includes the opinion of experts and developers of software solutions, as well as direct interviews with tenants, chairmen of cooperatives. Data was collected through visits to specialized exhibitions related to agribusiness (AGRA Plovdiv, Dobrich Fair, BATA Agro) for the period 2002-2022.

The first digital solutions for process management in agricultural companies emerged in the period **1995-2000**. There are software applications that maintain electronic registers of lessors, properties with their characteristics and rent calculations. These programs are under DOS, usually on assignment of a particular tenant or agricultural cooperative and calculate the rent with regional scope – the software program „Rent" of a Silistra company, software solutions with partial functionality in Haskovo and Plovdiv, software product „Cooperative 21" with regional coverage Ruse and Svishtov.

In **2004** the Bulgarian market includes the software system *AGROSYSTEMS* (successor of „Cooperative 21"). Unlike the above described software applications, it not only calculates possible variants of rents, works simultaneously in several agricultural periods, serves all administrative reports. In the following years, it became a specialized ERP for agribusiness, with server installations, the ability to work remotely through VPN, multiple users and access rights. In 2012, it manages the processing processes of over 10% of Bulgaria's arable land.

The third period (2007-2012) is characterized by a shift in the focus of digital solutions for agribusiness management more in generating administrative documents than in servicing the business itself. Some of the software applications are dropped because they are not updated as software and fail to serve their users in a timely manner. Of the above software applications, in the long run only AGROSYSTEMS „survives", and in 2008 the team offers the software product *Tenant-bg* – simpler, designed for the „smaller", type „family businesses". In the same period, the unfair competition of *AgroOffice began,* by imitation of foreign brands and products.

Bulgaria's accession to the EU is the beginning of the first mass measures to support the introduction of innovations in agribusiness. Unfortunately, due to the lack of purely administrative capacity to assess innovation, many good solutions were rejected for funding

from the State Fund Agriculture (SFA) and the opinion was imposed that *digitalization was only to "serve the connection with the state administration"*. Meanwhile, tenants, cooperatives and small LPs use information for identification of properties and their technical characteristics on paper or electronic carrier, without a real idea of where they are located. This necessitates the emergence of graphic modules to the information systems serving tenants and the VP.

In 2009 a module „Maps" at AGROSYSTEMS *was developed for comparison between the graphic delineation of the properties, physical location and rents (% of average yield). The graphic module works in symbiosis with the other modules of Agrosystems, and in 2010 a similar solution was sold under the brand Tenantar BG and Agromanager BG* (scheme 5). Characteristic of them is the fact that the „graphical information" is used from the zem file, which is transformed on the map, but the documentary (tabular data) is used as data. The information about the owners of the property is separated so as not to misuse the personal data.

Due to the fact that the CAD uses the software product *CadiS, a large number of tenants and VP's prefer to purchase it in order to match their cards with those in the OCD. Logically, later (in 2015)* the module „Rents" of CadiS *appeared.*

At the same time (2012) „orthophoto shooting" is already applied for the needs of IACS, but the linking of information cannot be used by ordinary users, but is available only to the MAF (MAF). Due to their monopoly position for access to information, „selling information" practices are emerging.
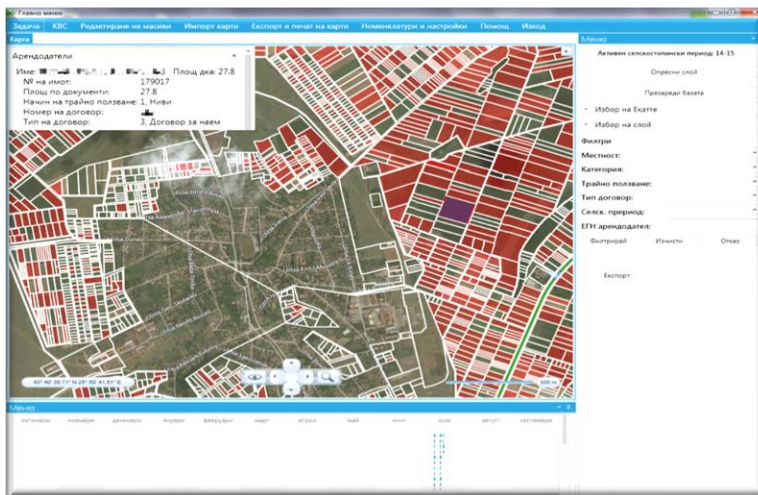

Figure 5. Map of KWS várhu BingMaps with contracts for rent/lease and selected property
Source: software product (Агросистеми, 2009)

In 2012, the Agrooffice Maps module **appeared, but due to the wrong methodology, the errors in the conversion of graphic outlines are greater than CadiS,**

Agrosystems and Tenant Farm. Another problem is the use of „import" of data from Usage Contracts. In 2016, the rights to Agrooffice were acquired by Yara Bulgaria.

The fourth stage (after 2012) includes a „new awakening" for digital solutions:

✓ **Helios Soft Ltd.** with the product *„Evrozem "* – a „hybrid" copy of Leased Contracts BG and Agrooffice, and later a module „outlines" and mobile solutions, including the prohibited practice of selling information about owners;

✓ Technofarm Company, 2014 – a system for creating agreements for agricultural land (GIS), but also related to the ownership and use of agricultural land;

✓ *NIK* offers navigation for agricultural machinery. The navigation systems, complete with the „Agrotasker" of VA Consult Ltd. and the „Agronomist Module" (part of Agrosystems), allow for two-way transfer of information from the software to navigation and vice versa. In 2022, NIK buys the entire hardware and software business for Bulgaria and Romania of YARA. At the moment, A large part of the software and hardware solutions for agricultural property management in Bulgaria is owned by NIK.

✓ *Farmnet365,* with representative Universal NVG since 2016, offers a version in Bulgarian. The solution is based on GIS, but has no access to information about properties in Bulgaria.

✓ *„MCAD"* is the best mapping software developed specifically for land separationand compatible with the system used by MAF for „tabular data" by IMCO 3. The latter has its customers so far – mainly geodetic companies and „maintenance companies".

Consolidation by use against consolidation by ownership

After the land reform, our country is among those with the lowest average amount of land ownership – **86% of the properties are under 10 acres** (http://propertybank.eu/, 2011). At the same time, the land is cultivated in large blocks of tens – up to thousands of acres. **The consolidation** is a redistribution of agricultural land in order for owners or users to obtain consolidated properties in one or more places.

✓ **Consolidation by use.** The first attempt to regulate the consolidation in Bulgaria was the bill on land grouping introduced in 1908, which remained unconsidered. The first practical experiments were in 1911 in the village of Madan (Montana region). The current current law law on on **Usage consolidations** is under art. 37 of (LFA). By law, tenants are required to make (МЗ, Закон за собствеността и ползването на земеделските земи, 2015) **Land Use Agreement** On all lands in which they work, but initially have no technical ability, partial agreements are made and separately the areas are calculated. This necessitates the emergence of software for carrying out voluntary agreements based on graphical information and electronic registers (scheme 6).

Scheme 6. Cards by use (consolidations)
Source: (https://www.bgfermer.bg/Article/4242368, 2023)

Property information, along with the owners' data, is stored and processed in ZEM files. In order to prepare an agreement, the boundaries of the property properties are compared with the created „arrays by use", which requires software solutions to look for a way to work, observing the law. Due to the inconsistency of the data exchange formats of the state administration and the companies preparing the agreements, in some lands it is impossible to carry out voluntary agreements with any other technical means than CadiS. Initially, the OSD must control the process, but the digital agreement must load the official property data with their arable parts for the specific agricultural year, as well as the data of the users. The OSC is not allowed to provide some of this information. As a result, software applications are technically workable, but can not get up-to-date data to work with, which leads to many errors in the period 2012-2016. The problem forces the Ministry of Health to create a structure for data exchange based on SHP format – agreements in electronic form.

Unfortunately, in the rules for the drafting of the agreements are added additional „restrictions" by the state, which distort the market of agricultural land and the determination of rents. For example, the term „uncultivated part of the property" is introduced, which is not actually maintained by the OSZ, but is relied on to be recalculated on the basis of the created „legitimate layer" and „permanent grass layer" for the needs of the IACS. Since these „layers" are constantly changing, and by 2022 they are determined for the most part manually by an operator, the possibility of making mistakes is relatively large. This benefits both unscrupulous users indicating cultivation of unused areas and owners (funds) who buy land at very low prices on the grounds that it is uncultivated. The second known scheme are the so-called „draughtsmen" – companies that „take advantage" of the information and the errors in the system and declare that they cultivate land that they do not actually cultivate, but receive subsidies for it.

Digital solutions for creating voluntary usage agreements. For this purpose, a technical tool is needed, such as specialized modules to existing digital solutions – **Agrosystems, Imoti Bank**, CadiS. Logically, in the coming years both **Techno Farm** and **Agro Office** offer software products for voluntary agreements. Since 2012, the OSD has been carrying out service agreements with CadiS, which allows discrepancies in the data. In addition, due to the need to convert from one coordinate system to another, for specific lands, technical errors are obtained, which in some places lead to a 15% „increase" of the cultivated area. After the rework of CadiS in 2012-13, this problem was fixed. Currently, the process of creating voluntary use agreements is regulated with the mandatory use of **CadiS**.

- ✓ **Ownership consolidations.** It is mainly carried out by large funds, such as Special Investment Purpose Joint Stock Company (REIT). Similar are: ELANA (ELARG), RosAgroFund, Staven and others. These funds invest in the purchase of land and respectively their management is different from other landowners. They have much greater financial and managerial resources and in order to satisfy the requirements of their shareholders they must use high-end digital solutions – **Xerox,** Microsoft **Vision,** or own improvements of Agrosystems, Agro Office, Imoti Bank. In the period 2000-2015 there is a serious *conflict between Funds and Tenants, as the funds actually destroy small businesses – small tenants and agricultural cooperatives that are not flexible enough in the use of digital solutions.* On the other hand, the intertwining of capital and interests leads to a symbiosis between large tenants and funds. Often, large companies artificially create unrelated companies in order to be able to receive maximum subsidies. This requires everyone to modern digital solutions for management of agricultural processes to create modules type „Holding Management".

Legal and technical prerequisites for „land theft" (white spots)

The so-called „White spots" is regulated in the Agricultural Land Ownership and Use Act (LEAPA). **In cases where the owner is not interested in his land, it is allocated ex officio to farmers who profit from it.** The basis on which the regime is based is laid in 2002 in the Agricultural Land Use Act. The regime was introduced immediately after our accession to the EU, with an official goal being to reduce uncultivated land. A disguised goal is to find a mechanism by which to entitle persons who are not owners or tenants to receive a document from the state, that they can process it and receive subsidies. **The problem is that even if the owner wants to cultivate the land or does not want to distribute it ex officio, he must annually submit a declaration to the General Insurance and Geodesy at the location of the property.** This regime has no equivalent in another EU Member State, it is the result of lobbying by large farmers. There are risks for the owners of „white spots" who are entitled to receive rent („average rent payment for the respective land"), but after a complex procedure in the OCD at the location of the property; tenants can deliberately not conclude contracts with the owners and „twist their hands" for the price of rent; „trading" with information; concluding „fictitious contracts"

in „unclaimed properties". In any case, the regime is to the detriment of the small owner, who is even likely to lose his land. The property law entitles anyone who has „in good faith" 10 years of someone else's property to acquire it as an owner (this does not apply to properties held as white spots on the basis of orders under Art. 37c, para. 4).

Conclusion

At this stage in Bulgaria, digital solutions for control and management by the state are characterized by catch-up, not anticipatory development. The role of the state as an administrator of the relations between owners and users of agricultural land and owning the overall information about the state of the land resource should be a leading one to achieve effective support for access to information and digital solutions. The digitalization of land administration processes by the state is successful and timely when there is a connection between the individual applications and data, and the information collected is complete and reliable. To minimize negative practices, a comprehensive management vision based on information systems and a secure mechanism for control of deviations should be built. It is imperative that the institutional framework and digital solutions be synchronized before their design and timely implementation after a thorough analysis, including forecasting the financial economic results of their implementation.

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CONDITION, PROBLEMS AND PERSPECTIVES OF THE LABOR FORCE IN RURAL AREAS OF BULGARIA

MIKOVA, ROSIZA[1]

Abstract

The specific features in the socio-economic development of rural areas in Bulgaria are the basis of non-uniform processes and trends in the formation of local labor force contingents. Based on data from the population and housing censuses conducted in 2011 and 2021, the dynamics of the labor force in rural areas of Bulgaria, as well as its structure by age, gender and education, are analyzed in this study. The research aims to outline the regions with the most serious problems with the reproduction of the labor force through a comparative analysis of the potential of the labor force in rural areas, urban areas and the average level for the country. Emphasis is placed on the impact of changes in the age structure of the working-age population (aging) on the general level of activity, as well as the degree of demographic and economic burden on the labor force throughout the study period. The changes in the structure of the labor force in rural areas are examined in detail and the prospects for the reproduction of the labor force in the short term are outlined. Based on the conclusions, some of the problems facing the effective use of the available labor force in rural areas were analyzed and recommendations were formulated regarding the necessary and adequate changes in the demographic policy, to promote the birth rate and retain a young labor force in the local labor markets.

Keywords: Labor force, aging, unemployment, demographic reproduction, rural areas
JEL: *J20; J21; E24*

Introduction

Trends in the development and formation of the labor force in villages are largely in line with the demographic processes in rural areas (Chopeva, 2019). The lack of economic efficiency in the villages affects migration processes and accelerates the emigration of young people. Negative demographic trends lead to the deterioration and aging of the labor force and the limitation of labor supply in rural areas. The periods of the global financial crisis (2009-2011) and 2020-2021 (COVID-19) also contributed to a significant decrease in employment, an increase in unemployment, significant regional differences in labor supply and demand, and several other challenges facing the labor market. This determines the relevance of the present study, namely to highlight the factors determining the changes in the formation of the labor force in rural areas.

The topic related to the study of the factors affecting the state and development of the labor force in Bulgaria has been covered in the works of several publications (Zlatinov, 2010; Atanasova and Malamova, 2011; Moraliiska-Nikolova and

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Borisova-Marinova, 2011; Borisova-Marinova, 2016; Chopeva, 2019; M. Atanasova, I. Beleva and al. 2018; Ravnachka, 2021; Shopov, Mishev and Bogdanov, 2006 and other).

The object of research is the labor force in the rural areas of Bulgaria during the period 2011-2021.

The subject of the study is the dynamics of the number and structure of the labor force in the rural areas of Bulgaria.

The purpose of the article is to examine the dynamics of the labor force through statistical analysis of the indicators for characterizing its number and structure in connection with establishing the trends and regularities of the economically active population in the rural areas of Bulgaria during the period 2011-2021.

Research methodology

In the present study, based on available information, the labor force in the rural areas of the country is examined. The definition of rural areas was used according to Ordinance № 14/01.04.2003 of the MAF and MRDPW. According to this regulation, 232 municipalities are designated for rural areas. The term labor force refers to the current economically active population of rural areas in the country, which consists of two subgroups – employed and unemployed persons during the observed period, i.e. persons who invest or offer their labor for the production of goods and services (www.nsi.bg, 2023).

The limiting conditions of the study in terms of the time range are reduced to the period 2011-2021, for which comparability and comparability have been established in the data used. It is necessary to note that in the characterization of the age structure of the labor force, the age of 15 years was adopted as the lower age limit of the economically active population in connection with the alignment of the methodology for monitoring the labor force with that of EUROSTAT, which was used in the census in 2011 and 2021. From the beginning of 2021, the current monitoring of the labor force, which is carried out by the NSI, is carried out by the requirements of Regulation (EU) 2019/1700, which requires changes in the methodology of the monitoring, and the results of the monitoring of the labor force are not fully comparable to those of the last two censuses.

The scope of the present study includes data on the number of the labor force and its constituent components – employed and unemployed persons, as well as indicators of the composition of the labor force according to the characteristics of „gender", „age" and „education".

To achieve the purpose, the present study used the method of analysis and synthesis, statistical methods, for the analysis of structural changes, the tabular method, graphic images, etc. For the calculations related to the application of the statistical methods, the program product MS Excel was used, and the map was prepared with the software ArcMap (ArcGIS ESRI), version 10.6.

Results and discussion

The dynamics in the labor force are indicative of the direction of development of socio-economic processes, both in the country and in rural areas. The general trend of reduction in the absolute number of the labor force as a whole for the country is more pronounced in rural areas. Between 2011 and 2021, the number of the labor force decreased by 13.3%, or 2 percentage points more than the national average (Table 1). The reasons are the negative natural growth of the population due to the decrease in the birth rate and the migrations of the working-age population.

The trend in the change in the number of employed persons in rural areas for the study period 2011-2021 shows a decrease and is similar to that of urban areas and the country (Table 1). In 2021, the number of employed persons in urban areas is 1,835,877 people or 69%, and in rural areas, it is 825,414 people or 31%. There is also a significant decrease in the number of unemployed persons in rural areas by 31.3% in the period 2011-2021. Compared to urban areas, the number of unemployed persons in rural municipalities is higher (14.1%). The reason for higher unemployment is the strong dependence of some municipalities on agriculture, as the agricultural sector and rural residents still face structural problems in terms of production, low productivity and product quality, and difficulties in competing with imported products. The results are low incomes, poverty and lack of jobs (Moneva, 2014).

Table 1. Changes in the labor force aged 15 to 64 and persons outside the labor force in rural areas of Bulgaria, 2011 – 2021

Years		Bulgaria	Rural areas	Urban areas
2011	Labor force	3329683	1133404	2196279
	Busy faces	2834834	904378	1930456
	Unemployed persons	494849	229026	265823
	Persons outside the labor force	3059615	1369852	1689763
2021	Labor force	2953937	982834	1971103
	Busy faces	2661292	825415	1835877
	Unemployed persons	292645	157419	135226
	Persons outside the labor force	1234012	547019	686993

Source: Based on NSI

At the regional level, the dynamics of the labor force show a decreasing trend in 190 rural municipalities (Figure 1). During the entire period 2011-2021, 42 municipalities made an exception, which noted an increase in the number of the labor force. These municipalities are located along the Black Sea Coast (Nesebar, Dolni

Chiflik, Aksakovo, Suvorovo), Stara Zagora region (Gurkovo, Maglizh and Niko-laevo); Upper Thracian Lowland (Kaloyanovo, Bratya Daskalovi, Saedinenie, Rakov-ski, Maritsa, Rodopi, Kuklen), Sofia agglomeration (Kostinbrod, Bozhurishte, Gorna Malina and Elin Pelin); Pleven region (Dolna Mitropolia, Knezha and Dolni Dabnik). The growth of the labor force in these municipalities is largely due to several socio-economic characteristics of the labor resources, especially in the municipalities with a predominant share of ethnic minorities (such as Gurkovo, Nikolaevo and Muglizh with a predominantly Roma population). The influence on the formation of the la-bor force has its economic profile and economic activity in the respective munici-palities. The opening of new jobs in the „Industry" and „Services" sectors, as well as the policy of subsidized employment carried out by the state, is one of the reasons for the increase in the number of the labor force in these municipalities.

In the period 2011-2021, the largest reduction in the labor force (over – 25%) was reported in 35 rural municipalities located partly in the Western Danube Plain (Boinitsa, Kula, Makresh), Kyustendil region (Trekliano, Nevestino and Bobov dol), Western Rhodopes (Dospat, Borino, Devin, Chepelare, Laki, Banite) and East-ern Rhodopes (Momchilgrad, Stambolovo and Ivaylovgrad). The main reason for the large outflow of labor in these municipalities is the lack of alternative economic activities that would create new job opportunities.
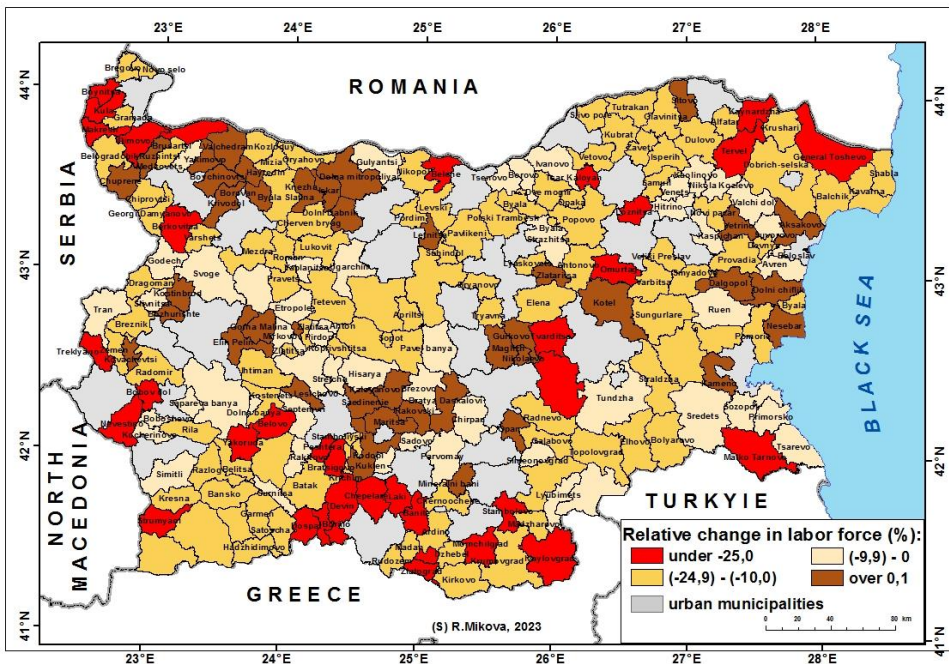

Figure 1. Relative change in the number of the labor force aged 15-64 in rural areas of Bulgaria, 2011 – 2021 (in %)
Source: author

In addition to the quantitative characteristics of the labor force, relevant changes also mark the qualitative composition of the economically active population of rural areas. Gender, age and education are the structural characteristics that have a direct bearing on the size of the labor force. During the studied period 2011-2021, a strong reduction in the number of active persons took place with the same force in both genders (Figure 2). There is a significant decrease in the labor force in both genders. The global financial crisis of 2009-2011 and (COVID-19) led to several socio-economic changes and generated many profound changes in the structure and quality of the labor force. A larger share of the labor force is men, and in 2021 their share is 53.3% against 46.7% for women, due to the existing legislative differences in the retirement age of the two genders. Early retirement, which is a possibility for some categories of work, and the regular retirement age (62 years for women and 64 years and 6 months for men) is one of the main reasons for the higher proportion of men.
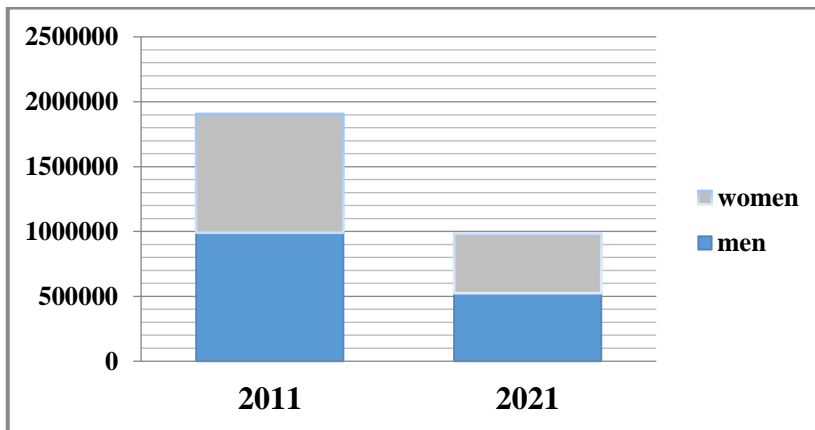

Figure 2. Economically active population (in thousands) in rural areas of Bulgaria by gender, 2011 – 2021 (in %)
Source: Based on NSI

The gender structure of the labor force is also a factor in the development of certain economic activities in rural municipalities. Men have a significant preponderance in relatively low-skilled occupations, and women in services, administration and specialized activities.

In the study of the labor market, the demographic processes show a deterioration of the age structure of the labor force in the rural areas of Bulgaria. The aging of the working-age population is an important indicator for determining the potential of the labor force (Ravnachka, 2021). Rural areas in the country are characterized by a small relative share of the labor force under the age of 24 (Figure 3). Compared to urban areas and the national average in them, the share of the labor force in the

age group 20-44 years (48.5%) is smaller compared to the share of persons aged between 45 and 64 years (50.7%). This difference is a result of some rural municipalities being heavily dependent on agriculture and low incomes, which largely explains the labor drain. Other reasons for the reduction of the young labor force in rural areas are the limited supply of jobs, lower wages for skilled labor, unfavorable working conditions, as well as living conditions that are far from satisfying the understanding and needs of young people. Depopulation and the outflow of young people from these areas, as well as the aging population in agriculture, are serious challenges to the socioeconomic and demographic development of the country.

The trends outlined are expected to continue in the coming decades, with the working-age population in rural areas declining significantly as large numbers of people retire and are replaced by a smaller labor force. According to the newspaper FINANCEBG on 02.10.2014, the economic consequences of the aging of the population on the labor market and its functioning are multidirectional: the quantity and quality of labor are expected to decrease; the impact will also be unfavorable on its price, and hence on the competitiveness of business and the economy, the quality and productivity of labor; expected changes in the educational level of the labor force, professional competencies and adaptability to changes; impacts on the stability of social systems are expected, etc.
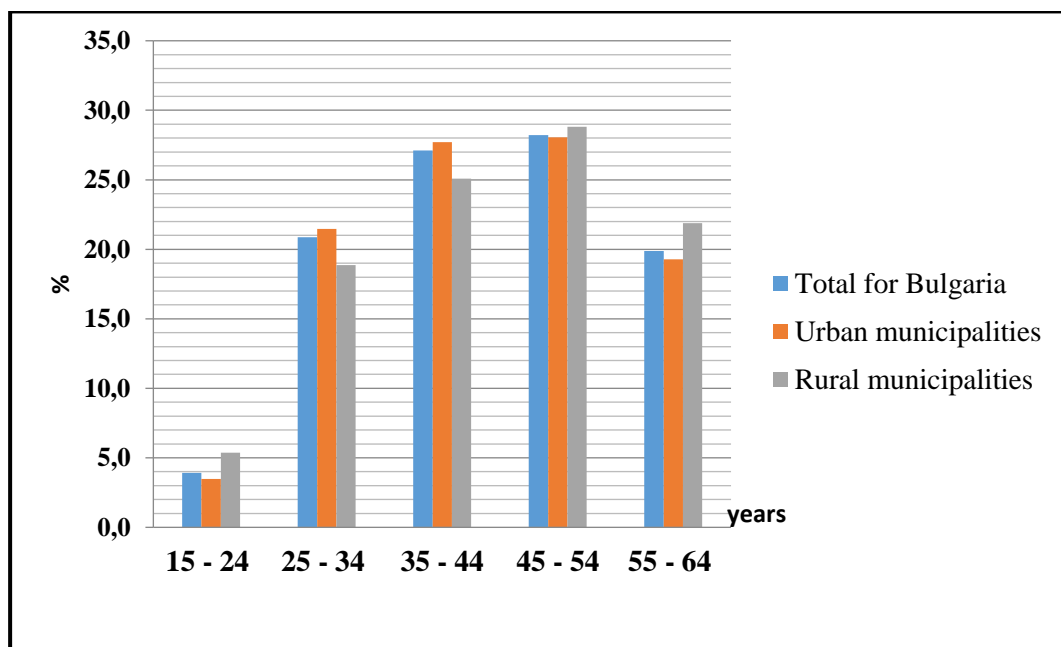

Figure 3. Distribution of the labor force by age group in 2021 (in %)
Source: Based on NSI

Education plays a key role in the life of every person and it is considered the most important capital because it creates opportunities to increase well-being not only through expanded opportunities for professional realization but also has non-market benefits such as improvements in health care, cultivation and upbringing of children, the development of individual abilities, spiritual enrichment. The acquired knowledge and skills and the duration of education determine its economic effect on the labor market.

According to official data from the last population census in Bulgaria conducted in 2021, the relative share of the labor force with secondary and higher education in rural areas is 75.3%, and this share is 13.9 percentage points lower than the country average (Figure 4). The largest differences in the educational level of the labor force are reported between rural and urban municipalities of the country, with the share of the economically active population with secondary and higher education being significantly higher in urban areas (93%). The share of the labor force in rural areas with a lower educational level is above the national average (Figure 4). In 2021, 25.6% of the labor force in rural areas has primary and lower education, while the indicator value for urban areas is 8.9% and 11.2% for the country.

The main factors forming these differences are related, on the one hand, to the process of internal migration, in which the young population with higher education moves to cities due to better job opportunities. On the other hand, rural areas have a significant share of the elderly population (especially in villages), which generally have a lower level of education. The third, no less important aspect is related to the peculiarities of the educational structure among the various ethnic groups, especially among the Roma, whose inclusion in the educational system is a serious challenge for the various national institutions.

The reason for the concentration of the higher number of educated economically active persons in urban areas is that young people are motivated to choose a higher education institution given their prospects for professional realization and this in turn leads to the depopulation of less developed regions and deepening economic differentiation in the long term. Other reasons for the increased interest in higher education are the desire of the active population for better competitiveness in the labor market, job retention or retraining in conditions of high structural unemployment. These are all prerequisites for short-term predictions that the choice for employment of the young labor force in the future will be in urban areas.
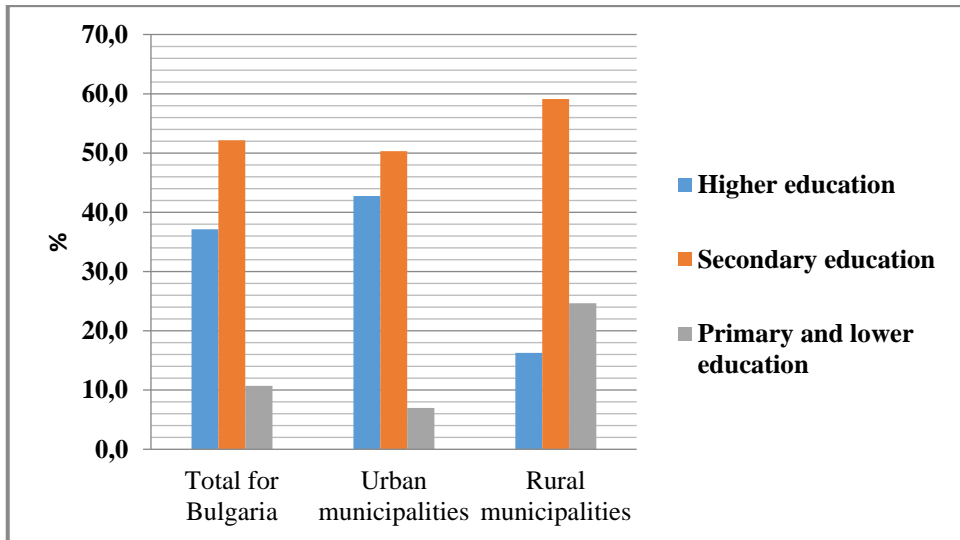
Figure 4. Educational structure of the labor force in 2021 (in %),
Source: Based on NSI

Conclusion

The brief analysis of the state of the labor force in the rural areas of Bulgaria, as well as its structure by age, gender and education, shows some characteristic features: in the first place is the problem with the low share of the labor force under the age of 24, which speaks of serious problems, related to the attraction and long-term retention of young people. Having a high proportion of an aging labor force in rural areas will put pressure on the pension system and government budgets. The problem with the lower level of education of the labor force in general is largely related to the strong ethnicization of part of the rural municipalities, as well as to the highly outdated age structure in other cases.

In conclusion, it can be summarized that the attraction and retention of young able-bodied people are extremely complicated, therefore complex approaches, methods and specific means must be applied to their successful solution. Lack of connectivity, underdeveloped infrastructure, lack of diverse employment opportunities and limited access to services make rural areas less attractive to live and work. Therefore, to successfully solve the problems related to the attraction and retention of a young labor force, there must be changes in the overall demographic and social policy of the state, aimed at creating incentives for high birth rates and full upbringing of children.

Active policy aimed at integrating young people into education and training into the labor market is necessary as a priority. Also, in terms of business support, it is necessary to carry out initiatives and activities aimed at ensuring employment and the

possibility of increasing the qualification and retraining of young people to retain them in rural municipalities. To retain a quality labor force in rural areas, it is necessary to find ways to improve the quality of life in rural areas and stimulate economic growth to achieve balanced territorial development.

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POTENTIAL OF NO-TILL TECHNOLOGY FOR ENVIRONMENTAL PROTECTION

BLAGOEV, ANTON[1]

Abstract

Reducing the negative impact of agricultural practices on the environment is essential. There is a growing need for the use and adoption of environmentally friendly and environmentally sound technologies in agriculture. Encouraging the adoption of agri-environmental practices will increase crop productivity, minimise labour time, improve biological control, reduce erosion, improve soil structure, increase infiltration and water retention properties and achieve environmental sustainability. The wide range of conditions under which the minimum tillage system works successfully worldwide are its economic, social and environmental advantages. No-till technology is often characterised as a means of tilling the soil and growing different crop species with positive environmental externalities. The purpose of this paper is to describe the importance of using the agroecological practice of no-till and its impact on land resources as well as its secondary environmental impacts. A literature review of the author's views related to the definitions of No-till technology is conducted. It is most commonly defined as no-till, minimum tillage or a technology such as planting in soil without prior preparation. The palette of benefits that agroecological practice brings to the soil, the environment, agriculture and farmers is rich, namely:

➢ does not disturb soil composition;
➢ improves the functions that occur in ecosystems;
➢ increases the availability of crop residues. Increased availability of crop residues and cover crops on cropland increases biomass production, with the maximized yield serving to store more C in the soil;
➢ improves water conveyance functions, moisture retention, and reduction of surface runoff and erosion, increases heat throughout the soil world;
➢ production quantities obtained are comparable to those of intensive tillage;
➢ reduces both labor time and the use of fuels and pesticides;
➢ minimizes depreciation of the equipment used;
➢ reduce investment in purchasing attachments;
➢ smaller capacity of the machinery and equipment used;
➢ reduce and simplify labour requirements;
➢ easy matching with crop rotation and improved nutrient cycling.

Key words:
JEL: *Q00, Q01, O13*

Introduction

Tillage is a major cause of farmland degradation – one of the world's most serious environmental problems – posing a threat to food production and rural livelihoods. The purpose of this development is to outline major issues of no-till technology and

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its potential for environmental protection, making recommendations for the development of this technology. The content of the paper is structured as follows: 1) Introduction 2) Literature review of the notion of No-till technology; 3) Methodological framework of the study; 4) Benefits and problems for the application of No-till technology and potential for achieving sustainable agriculture. In the reportoutlines the main problems facing the implementation of No-till technology and analyses its effects and benefits. The benefits are more than significant and are a prerequisite for stimulating the development of these agri-environmental practices and linking them to strategic plans for sustainable agricultural development. On the basis of the last part of the report, recommendations and opportunities for the development of no-till technology are summarised, which not only corresponds to the concept of sustainable agricultural development, but contributes to its real implementation.

Literature review of the concept of no-till technology
According (Griffith, D., Parsons, S., Mannering, J., 1990) No-till is a technology that minimizes or completely excludes any pre-sowing tillage and can reduce erosion by 80 to 90% compared to intensive tillage. The agroecological practice simultaneously reduces both labour requirements and machinery costs compared to other commonly used tillage methods.

In their scientific work, the researchers show that the yields obtained using no-till technology are fully comparable to intensive tillage. Although no-till technology, or also called zero-tillage, usually increases the cost of herbicide use, research in the field has shown that the technology considered in the report provides higher net returns.

In the literature, there are quite a few definitions related to what No-till technology is. (Baker, C., Saxton, K., Ritchie, W., Chamen, W., Reicosky, D., Ribeiro., F., Justice, S., Hobbs, P., 2007) considers it as conservation agriculture. This approach is mainly associated with the management of agroecosystems for improved and sustainable productivity, increased profit and food security, while preserving and improving the resource base and the environment. Using three basic principles, no-till technology and conservation agriculture are in sync and interchangeable, namely:

• minimum mechanical tillage;
• permanent coverage of the soil with organic matter;
• diversification of crops grown in sequence.

Positive impacts of the use of no-till technology are also evidenced by the study of (Commoner, 1972). Reducing the frequency or intensity of tillage allows the soil to retain more organic matter, which stores or „sinks" carbon that does not contribute to global warming in the form of carbon dioxide (CO_2), a greenhouse gas. The adoption of less intensive tillage practices on a large number of farms can result in

significant amounts of carbon being sequestered, allowing agriculture to contribute to efforts to reduce and control greenhouse gas emissions.

Activities beneficial to climate and environmental protection include encouraging farmers and other landowners to reduce tillage intensity, reducing the amount of nitrogen applied to crops, switching to lower-emission fertilizer application methods, changing livestock or manure management practices to reduce methane emissions, and changing crop rotations to include a greater proportion of perennial crops (Johnson, J., Franzluebbers, A., Weyers, S.,, 2007).

No-tillage technologies have great potential to increase soil organic matter content and sequester carbon while growing and maintaining good soil structure and health compared to intensive tillage systems.

Important amongst these are erosion control, water, environmental protection, nutrient cycling, time-saving, reduced fossil fuel use, less wear and tear on machinery, stable and sustainable crop yields, and soil carbon, along with an additional source of income for farmers through carbon (C) credit trading.

Such beneficial impacts of switching to no-till technology have been documented since the 1960s in the USA and the 1970s in West Africa, South America and Australia. The agro-ecological technology is practised on less than 100 million hectares (Mha) worldwide, or on only 6% of the world's cultivated area. Monoculture cultivation of maize, wheat, soybean, etc. is typical in these areas (Wolters, I., Pismennaya, E., Vlasova, O., Perederieva, V., 2021)

The most complete definition of what no-till technology is is given by the author (Lucien, L., Chabanne, A., 2005). For him, no-till farming practices were developed to protect the soil surface from being sealed by rainfall, to achieve and maintain an open internal soil structure, and to improve soil biological processes. No-till farming practices encompass four interrelated soil and crop management techniques:

- minimal soil disturbance – limited to planting/sowing, i.e. no ploughing, disking or other forms of tillage;
- permanent vegetative ground cover – crop residues, cover crops and weeds are kept on the surface and not burnt;
- direct seeding – specialised equipment introduces seed and fertiliser (chemical, organic) through/under the residue, with non-nitrogenous fertiliser mainly applied at the surface;
- reasonable crop rotation- use and application of crop rotation (e.g. cereals and legumes), generation of suitable biomass and continuous use of arable land.

Methodological framework of the study

The aim of this paper is to analyze the impact of agroecological practice in particular no-tillage on environmental protection. The methodological framework of the

study includes : 1) Literature review of the concept of No-till technology 2) Investigation of the effects of No-till technology application on agriculture 3) Determination of the perspectives of No-till technology on environmental protection.
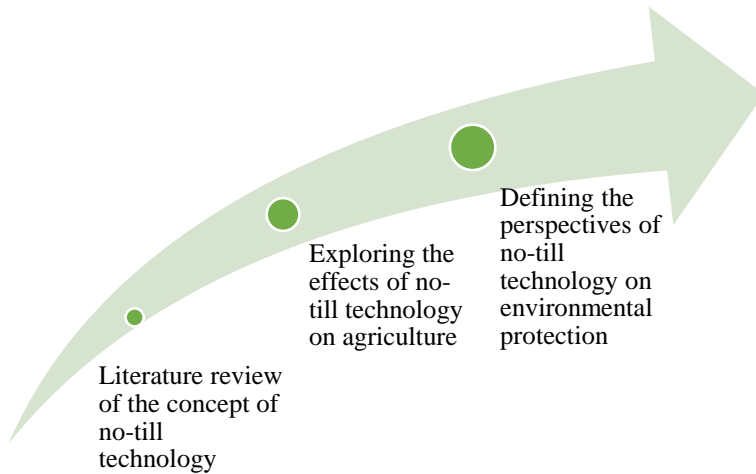
Defining the perspectives of no-till technology on environmental protection

Exploring the effects of no-till technology on agriculture

Literature review of the concept of no-till technology

Figure 1. Methodological framework of the study
Source: Author study

Benefits and challenges for the application of no-till technologies and potential for achieving sustainable agriculture

Agricultural practices affect soil characteristics and functions, and therefore have the potential to enhance environmental benefits or minimise negative impacts on the environment. The wide range of conditions under which the minimum tillage system works successfully worldwide are its economic, social and environmental advantages (Branzova, 2022). One of the evolving agroecological practices being implemented by farmers is the adoption of no-till technology, which contributes to positive agroecological effects. Undisturbed soil that is protected by vegetative cover enhances the functions that occur in ecosystems including maintenance of loose and soft soil layers through waste accumulation, intense biological activity, movement of soil fauna and root growth. These functions enhance the efficient transport of water, heat throughout the soil world. Such nutrient recycling system and improved water use efficiency resembles the natural forest environment.

The application and development of no-till technologies is driven by multiple factors. Some of these factors stem from the external environment – politics, markets, financing, others are related to the specifics and characteristics of the used technology – climatic factor, small-scale production, need for land and water resources,

others from the inclusion of the concept of sustainable development (Dimitrova. A., 2022). Some of these factors have a partial or total impact on the implementation of this technology in farms, society, quality of life and, to a large extent, the environment.

The economic advantages of no-till technology are also numerous.

The quantities of agricultural production obtained can be compared with intensive tillage, with the main difference being that a more sustainable method is obtained when applying no-till technology (Sorokina, S., Sorokin, N., Sychev, S., Okorokova, F., 2021).

It is among the main operations in which minimum tillage can save between 30-40% of both labour time and the execution of the different technological processes, but at the same time will reduce the use of fuels and pesticides compared to intensive agriculture.

Other economic benefits of zero tillage are:
- minimising depreciation of the machinery used;
- reduction of investment in the purchase of implements;
- lower capacity of the machinery and equipment used;
- reduction and simplification of labour requirements (Baker, C., Saxton, K., Ritchie, W., Chamen, W., Reicosky, D., Ribeiro., F., Justice, S., Hobbs, P., 2007).

Implementation of no-till technology would lead to multiple environmental benefits for the environmental impact.

The combination of no-till technology and crop rotation results in a high improvement of biological control of weeds, insects, pests and diseases.

The use of agro-ecological technology leads to the preservation of the habitats of beneficial micro-organisms and animals in the underground world. These beneficial animals feed on plant residues left on the soil. They introduce the residues into the soil without the need to carry out various techno-logical processes (Kutovaya, O., Nikitin, D., Geraskina, A., 2020).

Figure 2 presents the main environmental benefits of the application of no-till technology. Soil cover reduces erosion and favours water infiltration, reducing the likelihood of landslides in hilly areas and reducing groundwater pollution. Soil has a high water-holding capacity, which means it can better absorb and retain water during periods of heavy rainfall and drought, making farms more resilient to extreme weather conditions.
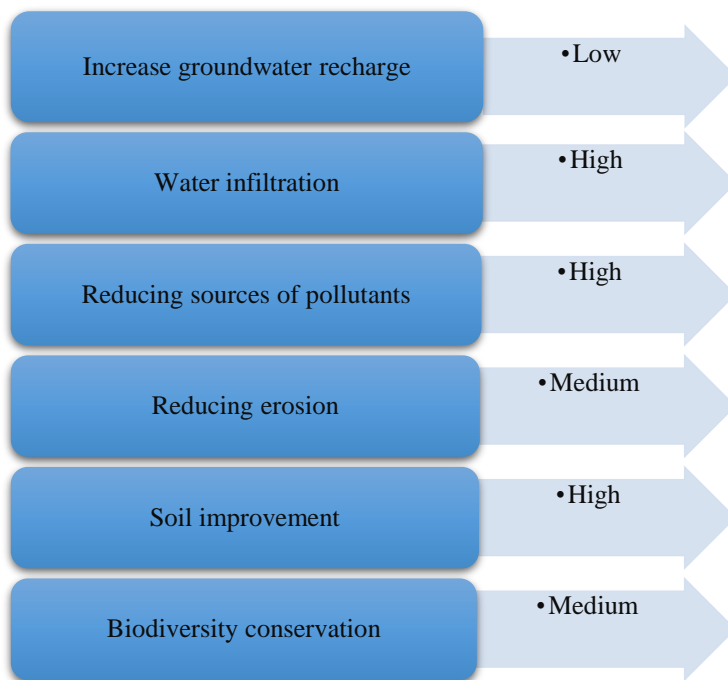
Increase groundwater recharge	• Low
Water infiltration	• High
Reducing sources of pollutants	• High
Reducing erosion	• Medium
Soil improvement	• High
Biodiversity conservation	• Medium

Figure 2. Main effects of no-till technology and its level on environmental protection
Source: adapted from (Krause, M., Black, J., 1995)

The greatest impact is also the reduction of greenhouse gas emissions, lower consumption of fossil fuels, less co-liquids of organic matter that are transformed into carbon dioxide and its absorption. The sequestration of carbon in the soil is crucial, given that climate change is caused by the release of greenhouse gases. The technology used creates favourable conditions for seed germination due to the effect contributed by other plant remains on the soil surface. The abrupt changes in the seasons result in an increasing need to maintain the necessary temperature for the development of the plant root system in the soil. One of the main effects of technology is the prevention and control of soil erosion. The main negative features due to erosion are:

- loss of soil horizon;
- loss of humus and organic matter;
- soil susceptibility to crusting;
- impaired infiltration of air and water (Belobrov, V., Yudin, S., Yaroslavtseva, N., Yudina, A., Dridiger, V., Stukalov, R., 2020).

Soil erosion is caused by two factors. The first has to do with the timing and method of tillage itself; soil loss due to wind erosion occurs because of soil disturbance.

The second factor is due to the amount of rainfall, due to the washing away of nutrients and the alteration of the soil structure (Dridiger, V., Gadzhiumarov, R., 2021).

The reduced quality of the used farmland is also due to the lack of plant residues on the surface topsoil, intensive cultivation, climatic changes, (Blanco-Canqui, H., Francis, C., 2016). By switching to no-till technology, the natural structure of the soil is restored and its strength and organic matter content is increased.

One of the common objectives of no-till technology is to reduce soil compaction. Difficult water infiltration and root development can lead to lower yields.

Conclusion

The fulfilment and development of the potential of no-till technology is among the main prerequisites for the emergence of a number of economic, social, environmental and other effects that influence the sustainable development of agriculture. Zero tillage leads to the creation of prerequisites for sustainable development through the production of environmentally friendly food products, minimal use of natural resources, saving of working time, reduction of depreciation of the machinery used.

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THE EFFECT OF GRANT STATE FUNDING ON PRODUCTIVITY ON THE EXAMPLE OF COOPERATIVES IN THE SOUTH-EAST REGION OF BULGARIA

STOYANOVA, DARINA[1]

Abstract

The need for state intervention in the agricultural sector is partially explained by the predominantly low incomes realized by agricultural producers. The resources available to them are not sufficient for their full functioning in the market. This leads to the cooperation of individual agricultural producers. Cooperatives are one of the most widely applicable forms of business organization in the agricultural sector. It is believed that their participation in agriculture improves the well-being of a large part of the agricultural producers, and this leads to the overall improvement of the state of the sector. For this, the present study is aimed at investigating the influence of the state on agricultural cooperatives. And more specifically, the purpose of this report is to prove the positive effect of state grant funding on productivity, using the example of agricultural cooperatives in the the South-east region of Bulgaria. In this report, the empirical research is carried out on the basis of panel data for a five-year period (2017-2021). The number of investigated agricultural cooperatives is 79. The applied model in the empirical study is the regression model with fixed effects. Based on the obtained results, this report also proves the positive effect of innovation activity. The more financial resources the agricultural cooperatives allocate for innovation, the higher productivity they realize. Investing in the purchase of fixed tangible assets is proven to have an impact on the productivity of agricultural cooperatives. Also, on the basis of the obtained results, it can be argued that the larger agricultural cooperatives invest more financial resources compared to the smaller ones, therefore their realized productivity is lower.

Key words: state grant funding, productivity, cooperatives, agricultural sector.
JEL*: Q12, Q13, Q14.*

Introduction

With the development of the economy over the years, the economic market in agriculture also develops, this necessitates improvement and progress in the instruments of state intervention. To this day, discussions continue on the topic of the effect that

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non-reimbursed state grant funding has on the main economic indicators of enterprises – innovation (Bachev, 2023) and investment activity, the efficiency and productivity of enterprises and the transformation of agriculture towards digitalization. Scientific evidence is found in the scientific literature (Bernini and Pellegrini, 2011; Bergstrom, 2000; David, Dore, 2015; Vozarova and Kotulic, 2016; Coca, 2017) that financed enterprises show higher productivity growth and are more – high profitability and efficiency than the enterprises that did not receive. On the other hand, cooperatives are a widely applicable form of economic organization in the agricultural sector. Their significant participation in agriculture leads to an improvement in the well-being of part of the agricultural producers (Petkov et al., 2003). Unfortunately, however, cooperatives do not receive sufficient adequate support from the state for their development (Petkov, 2016).This also leads to the goal set in this report – to study specifically whether there is, and if so, what is the effect of non-reimbursed state grant funding on productivity, based on the example of cooperatives in the South-east region of Bulgaria.

Methodology
The research in this report was conducted with a database for a five-year period (2017 – 2021). In the first year of implementation, 79 agricultural cooperatives were included, which by the end of the research period, namely in 2021, had decreased to 74. For the purposes of research and analysis when conducting the empirical study, the cooperatives were grouped according to several characteristics – type of activity, size and according to the presence/absence of state grant funding. According to the activity they carry out, the agricultural cooperatives are represented in three groups by sector – Crop production, Livestock Breeding and Mixed.
According to the Law on Small and Medium Enterprises, cooperatives are grouped into micro, small, medium and large cooperatives, respectively, with a number of employees up to 9 including for micro enterprises, 10-49 for small, 50-249 for medium and over 250 for large cooperatives (figure 1). Based on state grant funding, agricultural cooperatives are presented as a dichotomous variable depending on whether or not they received state financial support.
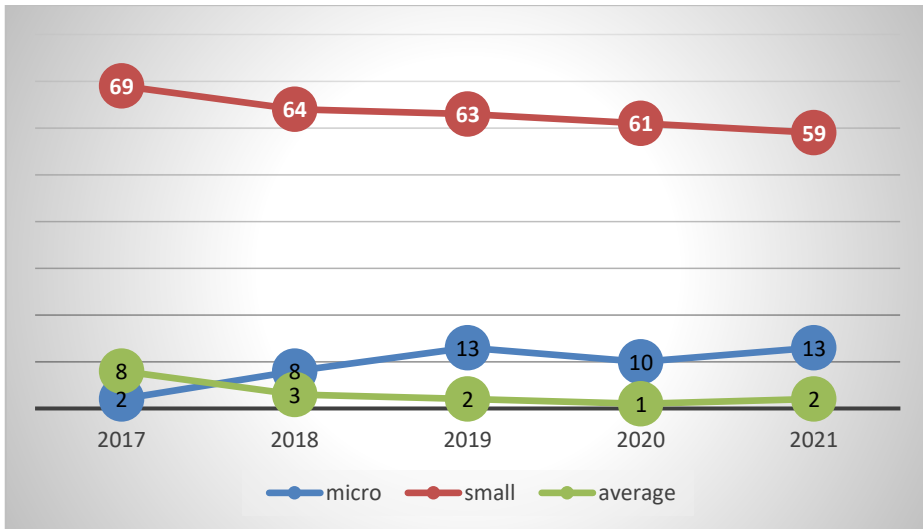
Figure 1. Distribution of agricultural cooperatives by size for the studied period

Basic principles in the formation of the present sample for conducting empirical research are, first of all, that it should be large enough to be representative and that the individual cooperatives fall into it randomly. In order to present representatives of all groups of cooperatives (micro, small, medium and large) to ensure represent-ativeness of the sample and better opportunities for analysis, the method of stratified random sampling was used.

In this report, the empirical study is based on panel data, which is a set of data presented most often in a two-dimensional matrix. In the specific case, one dimension is temporal and presents data for the studied agricultural cooperatives at a certain time period T, and the other is spatial and includes data for the various cooperatives (tangible fixed assets, fixed intangible assets, equity, average annual staff, etc.) at the same moment N, i.e. in the two-dimensional matrix there are N.T observations. In theory, data panels are of two types: micro (a large number of objects and a relatively small number of time periods) and macro (a relatively large number of time periods and a small number of objects) (Pellizzari, 2012).

Panel data have several advantages over time series and spatial data, which is why they were chosen for the present empirical study (Baltagi, 2005; Hsiao, 2003). Unlike time series, panel data are less likely to exhibit multicollinearity due to the fact that spatial data add a new dimension and lead to a higher level of awareness of the independent variables. Panel data suggest that observations are heterogeneous because they control for within-individual heterogeneity variables that are unaffected by time and observation. While time series and spatial data do not control for the heterogeneity of observations and have a higher risk of bias and systematic influences on the data. Panel data combine dynamic series of several cross-sections of

data, so they are more suitable for studying dynamic events. The database is formed from regular observations on permanent units (Radev, 2011). Panel data are used to account for specific effects of observations and time periods that cannot be explored using time series and spatial data. Multivariate regressions with dummy variables and robust standard errors were applied to control for error variance (heteroskedasticity) and serial correlation of the data (Wooldridge, 2010).

When using panel data, regression models with fixed and random effects are the most appropriate and most often applied for tracking dependencies (Bell, Jones, 2015). Applying the regression model with fixed effects reduces the variance in state grant funding (respectively also in the control variables) and narrows the scope of the study to a subset of the overall change in the enterprises from the database (Mummolo, Peterson, 2018). When using the fixed-effects model, it is assumed that there are additional factor variables within the study subject that may affect or bias the predictor or outcome variables, so it must be controlled for. The fixed-effects regression model removes the influence of these characteristics over time so that the net effect of the forecasts on the productivity of agricultural cooperatives can be estimated.

In order to make the right choice about which model is appropriate for a given set of data, it is necessary to conduct a statistical test (Green, 2008; Wooldridge, 2010). In this particular case, the Hausman test is applied.

The applied regression equation of the fixed effects model in this report has the following form:

$$Y(P) = \beta_0 + \beta_1.\log\_grants + \beta_2.RD\_activity + \beta_3.FTA\_activity + +\beta_4.\log\_assets + \beta_5.leverage + \gamma + \varepsilon$$

where:

Y is the dependent variable, for the purposes of the study it is assumed that these are the values of the financial results of the enterprises' activities (profitability – ROA);

$\beta 0$ is a constant;

log_grants – logarithm of the state grant received;

RD_activity – the ratio of the amount of funds that cooperatives have invested in long-term intangible assets for the current year (includes development products, concessions, patents, licenses, trademarks, software) on the total amount of assets of cooperatives for the same period of time;

FTA_activity – the ratio of FTA to the total amount of assets in enterprises;

log_assets – size of cooperatives expressed as logarithm of total assets;

leverage – the ratio of liabilities (short-term and long-term) of cooperatives to their equity;

$\beta 1, \beta 2, \beta 3, \beta 4, \beta 5$ – the model parameters;

γ – fixed effects term;

ε – random component.

Results

Based on the selected regression model with fixed effects, the present report analyzes and evaluates the dependence between the state grant funding of the cooperatives in the South-East region of Bulgaria and their productivity. As previously described in the methodology, when building the model, it is necessary to introduce control variables, which help to analyze the regression model. Only a part of the economic results realized by cooperatives is explained by the provided free state financing, therefore the control variables are essential factors, they have an important impact on productivity.

The first thing to do when working with the regression model is to check which (fixed or random effects model) is more appropriate for the application regarding the database being worked with. After conducting the Hausman statistical test, it is strongly established that this is the fixed-effects model (Table 1).

Table 1. Hausman test for the productivity model

| | —— Coefficients —— | | | |
| | (b) | (B) | (b-B) | sqrt(diag(V_b-V_B)) |
	fixed	random	Difference	S.E.
log_grants	-13.67755	-3.556142	-10.12141	3.583738
RD_activity	86.773	32.611	37.8376	90.7123
log_assets	10.13176	11.7114	-1.579643	2.189285
leverage	.0484177	-.013418	.0618357	.0523002

```
                    b = consistent under Ho and Ha; obtained from xtreg
        B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

            chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                    =          8.79
        Prob>chi2 =         0.0001
```

Based on the results of Table 1, it can be seen that the Chi-square values are less than 0.05 (P – Prob>chi2=0.0001), i.e. proved to be statistically significant and for the present study the fixed-effects regression model is more appropriate. It reflects the random magnitude of the financial results of the activity of agricultural cooperatives in the South-east region of Bulgaria (Y), whose distributions are influenced by the state grant funding and selected characteristics of the cooperatives.

Through the conducted regression model with fixed effects, with dependent variable productivity (P), it is proved the presence of dependence, both between the realized productivity of the agricultural cooperatives and the state grant funding, as

well as with the innovation and investment activity and the size of the studied agricultural cooperatives (table 2).

Table 2. Results of a Fixed-Effects Regression Model with the Dependent Variable ROA

```
Fixed-effects (within) regression          Number of obs      =        373
Group variable: id                         Number of groups   =         79

R-sq:                                      Obs per group:
     within  = 0.0534                                     min =          1
     between = 0.0163                                     avg =        4.7
     overall = 0.0310                                     max =          5

                                           F(4,290)           =       4.09
corr(u_i, Xb)  = -0.0805                    Prob > F           =     0.0031
```

P	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
log_grants	13.67755	5.493964	-2.49	0.013	-24.49065	22.864451
RD_activity	28.773	78.791	-2.09	0.037	-56.479	173.0675
FTA_activity	30.131	3.0031	2.79	0.004	2.717	37.0864
log_assets	10.13176	3.522059	2.88	0.004	3.199717	17.0638
leverage	.0484177	.3518213	0.14	0.891	-.6440293	.7408647
_cons	78.3369	33.37685	2.35	0.020	12.64532	144.0285

sigma_u	33.011568	
sigma_e	24.151253	
rho	.65136475	(fraction of variance due to u_i)

```
F test that all u_i=0: F(78, 290) = 7.20                    Prob > F = 0.0000
```

The results of the conducted research prove that the effect of the state intervention in the agricultural sector, expressed through the *state grant funding*, on the productivity of the agricultural cooperatives in the South-east region of Bulgaria is positive.

The next indicator, which is also statistically significant and positively affects the productivity of agricultural cooperatives, is *innovation activity* (28,773). The more financial means the cooperatives in the South-east region of Bulgaria allocate for innovation, the higher productivity they realize for the studied period of time.

The investment activity of agricultural cooperatives is also a statistically significant indicator. Investing in the purchase of fixed tangible assets affects the productivity of cooperatives (30,131).

In the current model, the *size* of agricultural cooperatives is expressed as a logarithm of total assets. It is also a statistically significant indicator and although it has the lowest impact (10.13176) on productivity it still has a positive effect. On the basis

of the obtained results, it can be argued that the cooperatives in the South-east region of Bulgaria, which are of a larger size, make larger investments compared to the small ones, and therefore realize a lower productivity.

The last control variable examined in the current fixed-effects regression model is the *capital structure/leverage* of agricultural cooperatives. The results realized by the model prove that it is not a statistically significant indicator and does not affect their performance.

Conclusions

By conducting the present empirical research, it was proved what the effect of the state grant funding on productivity is on the example of the cooperatives in the South-east region of Bulgaria. Namely, that state intervention, expressed in the form of state grant funding, positively affects the productivity of agricultural cooperatives. Statistically significant indicators – size, innovation and investment activity of cooperatives in the agricultural sector of the South-east region of the country – also have a positive effect on the realized productivity. It has been proven that as the size of agricultural cooperatives increases, productivity increases. Also, the more financial resources are invested in the purchase of fixed intangible assets, the higher the productivity of the cooperatives. And finally, on the basis of the obtained results, it can be argued that the investment of funds in the purchase of durable tangible fixed assets has a positive effect on the productivity of agricultural cooperatives in the South-east region of Bulgaria.

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THE SIGNIFICANCE OF THE EUROPEAN FUNDING PROGRAMS FOR THE REGION OF THE PELOPONNESE

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Abstract

Many national economies rely on the manufacturing industry to improve their productive and their public finance. Moreover, manufacturing companies employ too many human capital, which plays vital role for the sector and the local communities as well. Many studies show that the manufacturing industry is a sector with significant cyclical behaviour. The region of the Peloponnese in Greece received adequate funding during the last years from different European programs. The result was to boost productivity of some sectors in the region, especially the manufacturing, while the infrastructure was improved and new technologies were adapted. The aim of this paper is to provide a thorough analysis of the manufacturing sector in Greece and especially the Peloponnese, and to research the contribution of European funding. Although Greece' s manufacturing industry has a smaller share in the economy, comparing to the overall european level, it still has a great significance. Especially for the local communities, which find employment in the industry or even boost their public finance via indirect taxes. The significance of the region makes it very attractive for investments in this field. Results showed that not only did the percentage of the manufacturing sector in the Peloponnese increase, but also businesses in the region found significant funding in a turbulent period. The contribution of the European programs is very important, as companies in the region found important funding, when Greece's public spending was being decrease as part of the public finance collapse. Moreover, they contributed in the increase of the exports, which was also a very important aspect and overall target of the European programs as a whole. The industry was totally modernised, as companies had increased their investments in crucial infrastructure, human expertise and lands to expand their business activities as well. Furthermore, the adoption of the latest technologies, artificial intelligence, big data and new high speed technological infrastructure modernised the manufacturing industry as a whole in the region of the Peloponnese. It was very crucial as many years of underinvestment and cutting in spendings and decrease in public support had left the manufacturing industry at a very immature level. Today, companies are more competitive, they reach the European levels of investments and expenditure, as well as increase their exports to neighbouring countries firstly, and then to other continents of the world as well. On this level, manufacturing industry in the Peloponnese dos reach European standards.

Keywords: Peloponnese, European Programs, manufacturing sector

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Introduction

The manufacturing industry is a key sector in many national economies and participates in creating sustainable economic growth. At the same time, it is a sector sensitive to domestic and external impacts that lead to fluctuations in the economic cycle. Empirical study from 22 countries of the European Union (Behun et al., 2018) identifies the relationship between manufacturing and Gross Domestic Product (GDP), using time series of selected indicators of the manufacturing sector and GDP from the Eurostat database for the years 2000-2016. The results of the analyses show that the manufacturing industry is a sector with significant cyclical behaviour. In most countries, production and sales in the manufacturing industry behaved as simultaneous indicators, while changes in production and sales are reflected almost directly in the increase or decrease in GDP. In addition, changes in the economic development of countries have a strong impact on employment, workers' wages and the number of hours worked in the manufacturing industry. In the last years this industry has been exporting to more countries, while it is among the country's largest direct employers, after trade and agriculture and about on a par with hotels and catering (Hellenic Statistical Authority, 2023). Manufacturing requires more specialized human capital while offering more stable labour relations (Foundation for economic & industrial research, 2017). In this paper the manufacturing industry in the region of the Peloponnese is examined in terms of the European funding programs, in order to estimate their importance.

The manufacturing sector in Greece and in Peloponnese

Greece's manufacturing sector has a smaller share in the GDP than the European average, however, it still has a vital economic and social role, due to strong multiplier effects. Figure 1 shows the percentage of the manufacturing sector as part of the GDP both in Greece and in European Union.
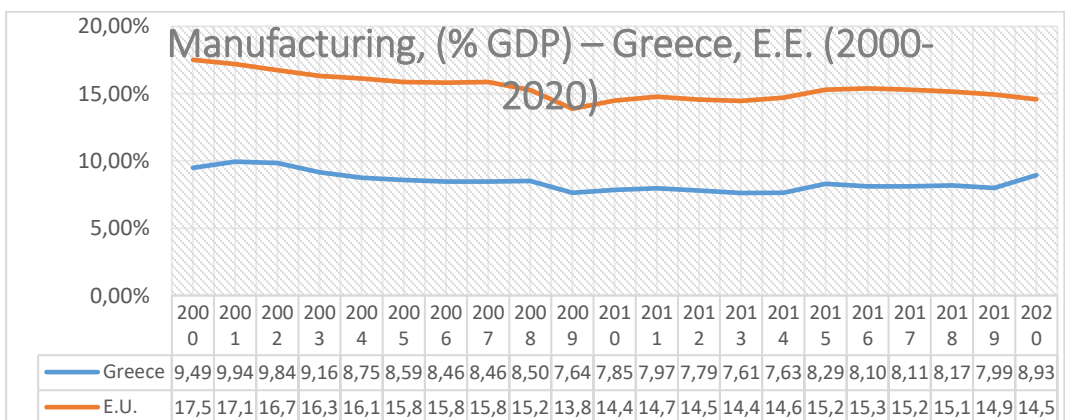

Manufacturing, (% GDP) – Greece, E.E. (2000-2020)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Greece	9,49	9,94	9,84	9,16	8,75	8,59	8,46	8,46	8,50	7,64	7,85	7,97	7,79	7,61	7,63	8,29	8,10	8,11	8,17	7,99	8,93
E.U.	17,5	17,1	16,7	16,3	16,1	15,8	15,8	15,8	15,2	13,8	14,4	14,7	14,5	14,4	14,6	15,2	15,3	15,2	15,1	14,9	14,5

Figure 1. Manufacturing sector in Greece and in EU countries
Source: World Bank (2022)

The Peloponnese is characterized by a varied landscape of mountains and fertile plains that make it one of the leading producers and exporters of agricultural products in Greece. The region grows selected food products that have gained international recognition, while it is an important producer of fresh and processed fruits, especially citrus fruits (Greece Investor Guide, 2022). The Peloponnese Region does have significant advantages, which make it a good investment destination for FDI (32% of Greek Foreign Direct Investment) mainly because of its location, its advanced infrastructure and natural resources. Therefore, for example the prefecture of Corinth is the place of large businesses in petroleum and metal products industries, because the region is very close to Athens. Other businesses in the region are in the food industry or in the non-metallic mineral products. In addition, Megalopolis is the second most important electricity production center in Greece (Invest in Greece Agency, 2010). During the period 2000-2019, the share of manufacturing sector in the Peloponnese Region varied from 7.26% to 7.80% of the total Greek manufacturing sector, as shown in Table 1.

Table 1. Manufacturing sector in Greece (in million euros) ant the Peloponnese

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Greece	17.601	16.205	14.680	13.696	13.529	14.628	14.133	14.343	14.674	21.845
% of Peloponnese	6,27%	6,45%	6,31%	6,33%	6,29%	6,26%	6,26%	6,17%	6,18%	7,80%

Source: Hellenic Statistical Authority (2022)

The contribution of the European Programs

In the Corporate Development Framework (CDF) 2014 – 2020 the following thematic objectives are 11. Objectives 1-3 contribute to smart development, objectives 4-7 to sustainable development and objectives 8-11 to inclusive development (Delitheou, Podimatas & Michalaki, 2018). Thus, the great importance of sustainable development is reflected, as well as the opportunity for the manufacturing industry as a whole, because they would gather more than 70% of the total funding programs. Moreover, as the region of the Peloponnese is listed as a developing region in Greece, there is priority for businesses in the area to be granted funding.

As a result, the purpose was twofold. First of all, the modernization of the manufacturing sector in the Peloponnese in order to become more competitive and export oriented, while focusing in developing the appropriate supply chain infrastructure as well. As a result, the modernization of the production and distribution of manufacturing products, as well as functional and productive interconnection of businesses and sectors to create positive external economies and economies of scale was the main purpose.

Table 2 illustrates the purposes of the funding of manufacturing businesses in the region of the Peloponnese. As mentioned, funding was heading towards two broader directions, first to improve the infrastructure and secondly to boost the efficiency of these businesses through technological developments.

Table 2. Funding of manufacturing businesses in the Peloponnese

Manufacturing Sector	
Improving infrastructure / supply chain	**Enhance productiveness**
• Construction, expansion, modernization of building facilities	• Artificial intelligence and Big Data analysis/management equipment for the benefit of the production process (Artificial intelligence – AI and Big Data Analysis).
• Purchase of all or part of the existing fixed assets	• 5G high-speed network infrastructure, laboratory and quality control equipment, ICT & software equipment, software licenses, IT security services.
• Purchase and installation of new modern machinery and other equipment	• Smart Manufacturing Technologies, Machine to Machine (M2M) learning, Manufacturing Execution Systems (MES)
• Modernization of special facilities (not related to buildings) and mechanical facilities.	• Robotics, to upgrade and automate existing production lines
• Quality assurance and control systems, certifications, supply and installation of software and business organization systems.	
• Wage costs of new jobs	

Source: Edited by the author

Conclusion

The importance of the European Programs for the manufacturing sector lies in the development of the sector and is proven by the slight increase of its share in the Greek economy. Through new technological developments the competitiveness of these businesses was boosted, while the maintenance of existing jobs and creation of new other positions helped the sector develop. The subsidized European Programs in the manufacturing sector succeeded in helping Greek companies to increase their competitiveness and their exports, while at the same time many companies were founded in this sector, therefore unemployment in the region dropped significantly, while young people found new employment opportunities. Moreover,

there was development of new products or differentiation of products towards sectors of high added value with a focus on the upgrading, standardization, and certification of Greek products, which means that overall production in the region was increased, contributing to the overall increase of the economic activity of the Peloponnese. European funds also boosted innovation in the industry as there were more investment opportunities for high added value products with a focus on the upgrading, standardization, and certification of Greek products. For the coming years there will be many more programs and funds available to businesses in the manufacturing industry in order to promote sustainable development and growth and as there is enough expertise in the field now, it will be an important opportunity for businesses in the region.

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SOME SPECIFICITIES IN THE REGISTRATION MECHANISM FOR FARMERS IN THE REPUBLIC OF BULGARIA

VELKOVSKI, VALERI[1]

Abstract

Pursuant to the norm of Article 7, Paragraph 1 of the Law on Assistance to Agricultural Producers (www.lex.bg) [1], the Ministry of Agriculture, Food and Forestry creates and maintains a register of farmers. The registration mechanism is regulated in Ordinance No. 3 of 01.29.1999. [2] to create and maintain a register of farmers (www.lex.bg). Through this registration mechanism, each farmer and each agricultural producer is given the opportunity to obtain the status of a registered agricultural entity, subject to the fulfillment and presence of specific legal conditions. Pursuant to paragraph 1, item 1 of the additional provisions of the Law on Support for Agricultural Producers [1], „Farmers" are natural and legal persons who produce unprocessed and/or processed plant and/or animal products, and in the sense of point 23 of the additional provisions cited above, „Farmer" is a farmer within the meaning of Art. 4, paragraph 1, letter „a" of Regulation (EU) No. 1307/2013 [3]. According to the text of the mentioned Article 4, paragraph 1, item „a" of Regulation (EU) No. 1307/2013 – Definitions and related provisions, „Farmer" means a natural or legal person, or a group of natural or legal persons , regardless of the legal status of that group and its members under national law whose holding is within the territorial scope of the treaties. The regulated registration mechanism is characterized by a number of specifics, reflecting both the functions of farmers and agricultural producers according to the cited definitions, as well as the provision in this way of a number of necessary privileges that derive from their registration status.

Key words: register, registration mechanism, farmer, farmer, regulation, status

JEL=======

Introduction

According to data from the census of agricultural holdings in the Republic of Bulgaria, which in 2020 are 132,742 pieces. (www.mzh.government.bg), 91% of farms are owned by individuals. The tendency to increase the relative share of commercial companies is maintained and they reach 6.5%.

The registration of agricultural producers and their presence in a special register is a condition for applying for direct payments, aid from the state budget, receiving specialized information from the Ministry of Health and its structures, etc.

In order to acquire the status of an agricultural producer in the Republic of Bulgaria, it is necessary for each applicant, respectively the owner of an agricultural holding, to be registered according to the current agrarian legislation (www.lex.bg).

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In this regard, the registration mechanism has a number of specifics that are related to the acquisition of the specified status. In this regard, the aim of the development is to indicate and analyze these specifics, including some problems accompanying the registration of agricultural producers.

Materials and methods

For the purposes of the study, the following were used:

- Literary sources of Bulgarian authors;
- Normative sources (accents from the current legislation);
- Analytical toolkit (normative and analytical methodological apparatus) and survey.

Results and discussion

Pursuant to paragraph 1, item 1 of the additional provisions of the Law on Support for Agricultural Producers [1], „Farmers" are natural and legal persons who produce unprocessed and/or processed plant and/or animal products, and in the sense of point 23 of the additional provisions cited above, „Farmer" is a farmer within the meaning of Art. 4, paragraph 1, letter „a" of Regulation (EU) No. 1307/2013 [3]. According to the text of the mentioned Article 4, paragraph 1, item „a" of Regulation (EU) No. 1307/2013 – Definitions and related provisions, „Farmer" means a natural or legal person, or a group of natural or legal persons , regardless of the legal status of that group and its members under national law whose holding is within the territorial scope of the treaties.

Since the subject of research are the specifics of the registration mechanism for farmers in the Republic of Bulgaria, as a factor and condition for the application of the aforementioned Law on Support for Agricultural Producers (www.lex.bg) and the norms in Ordinance No. 5 of 27.02.2009. (www.lex.bg) for the terms and conditions for submitting applications under schemes and measures for direct payments (www.lex.bg), from the positions of the normative analysis, the functions of the register of farmers should be highlighted. In order to have access to state aid and to participate in the direct payment schemes, the owners of agricultural holdings with the above-mentioned status must be registered in accordance with the above-cited Ordinance No. 3 (www.lex.bg). These functions are regulated in the text of Article 2 of Ordinance No. 3 (www.lex.bg), namely: control over the use of agricultural lands; collection of information on the crops grown during the relevant economic year and the areas occupied by them, as well as on the animals raised; supporting farmers and rural development and implementing direct payment schemes. An important emphasis in the registration mechanism is which agricultural entity is granted the legal opportunity to apply for registration, respectively to be registered. According to the text of Article 3 of Ordinance No. 3 (www.lex.bg), registration is

subject to legal entities, sole traders and natural persons over 18 years of age who manage agricultural land and/or produce agricultural products.

Through registration, farmers, in their capacity as registered subjects, become bearers of a number of rights, regulated in the text of Article 6, Paragraph 2 of Regulation No. 3 (www.lex.bg), namely: to receive free advice from the National Advice Service in agriculture; to receive free information, analyzes and forecasts from Regional Directorate „Agriculture"; to receive information on prices and markets of agricultural products from the National Agricultural Advisory Service; to carry out trade with the agricultural products produced by them.

For the purposes of the research, an author's survey was conducted on the topic „Problems arising from the legal mechanisms for registration and re-registration of farmers in the Republic of Bulgaria" among 78 people – farmers from the South-West planning region.

The summary results of the survey are presented below in the presentation.

The survey covers two sections, namely:

I. Profile of the respondent:

1. Statut:

a) natural person – 48 people or 61.54%

b) sole trader – 26 people or 33.33%
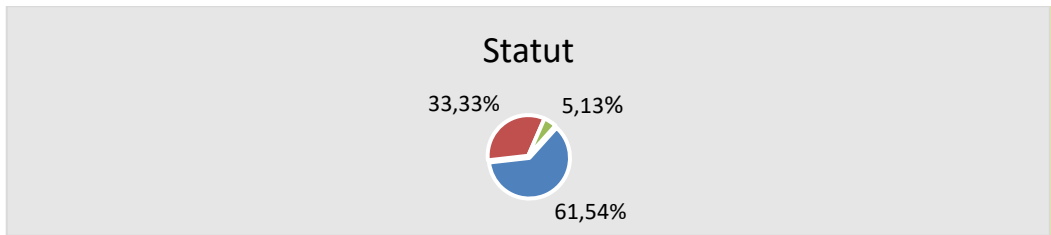
c) non-profit legal entity – 4 people or 5.13%

Figure 1. Statut

2. Age:

a) 18 – 30 years – 32 people or 41.03%

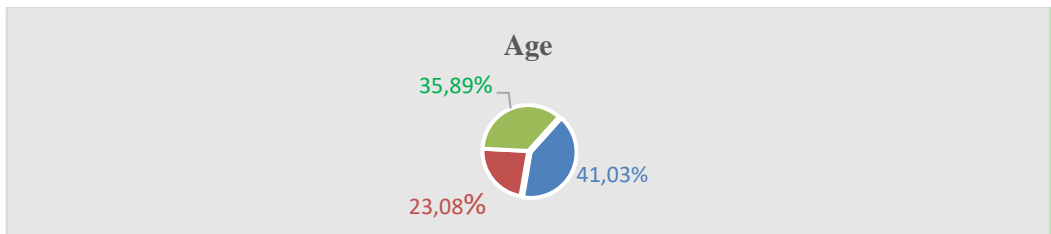b) 31 – 40 years old – 18 people or 23.08%

c) 4+ – 28 people or 35.89%

Figure 2. Age

3. Type of activities (more than one answer is possible):
a) agricultural land management – 64 people or 82.05%
b) carrying out production of agricultural products – 41 people or 52.56%
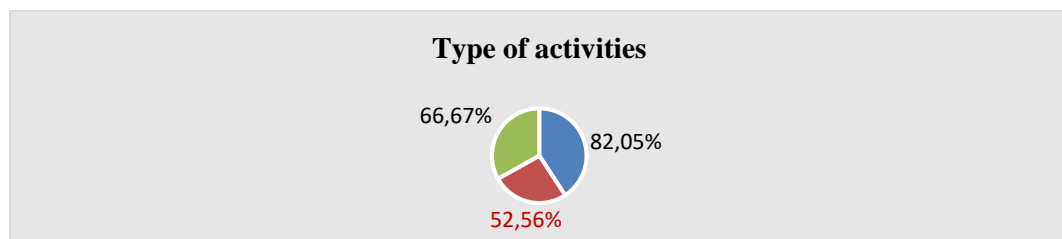c) both – 52 people or 66.67%

Figure 3. Type of activities

4. Registered as a farmer:
a) from 1 year – 22 people or 28.21%
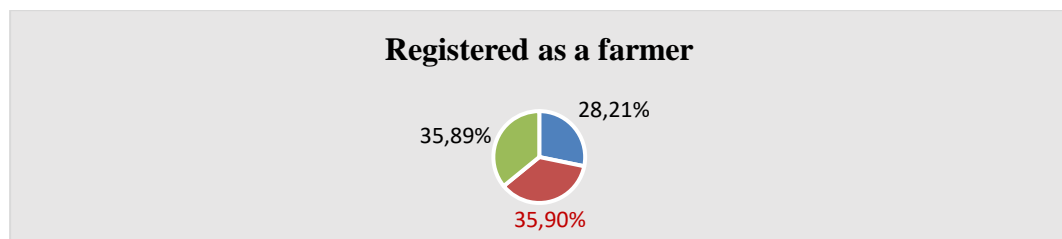b) from 5 years – 28 people or 35.90%
c) over 5 years – 28 people or 35.89%

Figure 4. Registered as a farmer

II. Specialized questions

Methodologically, the formulation and selection of questions from the specialized section of the survey aim to reflect in a synthesized form the problems resulting from some imperfections of the registration mechanism, regardless of the privileges that this mechanism gives.

1. Received financial support:
a) from European funds – 43 people or 55.13%
b) from the state budget – 34 people or 43.59%
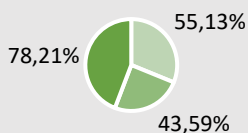c) from both – 61 people or 78.21%

Received financial support

Figure 5. Received financial support

2. Get free:
a) advice from the National Service for Advice in Agriculture – 36 people or 46.15%
b) information from Regional Directorate „Agriculture" – 17 people or 21.79%
c) information on agricultural production – 21 people or 26.92%
d) right to trade in agricultural products – 49 people or 62.82%
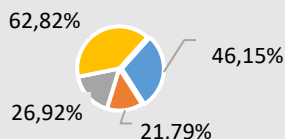
Get free

Figure 6. Get free

3. Are the legal rights explained by Regional Directorate „Agriculture":
a) yes – 31 people or 39.74%
b) no – 33 people or 42.31%
c) rarely – 14 people or 17.95%

Are the legal rights explained by Regional Directorate „Agriculture"
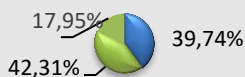

Figure 7. Are the legal rights explained by Regional Directorate „Agriculture"

4. Have they been informed about the terms and circumstances of the annual re-registration:
a) yes – 32 people or 41.03%
b) no – 28 people or 35.90%
c) rarely – 18 people or 23.07%

Nave they been informed about the terms and circumstances of the annual re-registration
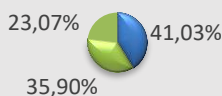
23,07%   41,03%

35,90%

Figure 8. Have they been informed about the terms and circumstances of the annual re-registration

5. Informedness for requesting current changes within a one-month period:
a) yes – 36 people or 46.15%
b) no – 29 people or 37.18%
c) rarely – 13 people or 16.67%

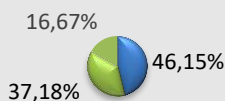**Informedness for reguesting current changes within a one-month peiod**

16,67%

46,15%

37,18%

Figure 9. Informedness for requesting current changes within a one-month period

Conclusions

The summary results from section two of the survey, shown in the presentation, give grounds for forming the following conclusions:

1. The status of a registered farmer is a prerequisite and an opportunity to apply for financial support in the State Fund „Agriculture", which act was carried out by a large part of the respondents (79.49%);

2. 64.38% of the respondents applied for state aid;

3. 55.13% of the respondents received financial support from the European structural funds, and 43.59% from the state budget;

4. Regardless of the rights they have as registered farmers, these rights are not actively consumed, with the exception of applying for financial assistance;

5. One of the problems that hinders the consumption of rights is the lack of awareness on the part of the Regional Directorates „Agriculture" as the main state entity in the registration mechanism;

6. The lack of information and explanatory measures on the part of the Regional Directorates „Agriculture" regarding the terms and conditions for registration and

re-registration, as well as insufficient control regarding the correctness of the submitted data, leads to the deprivation of rights of farmers.

It must be concluded that the legislation relating to the registration mechanism for farmers suffers from some vices that need to be remedied in order for this mechanism to support the common agricultural policy.

As some authors point out, „after the reform of the common agricultural policy in 2013 new measures were implemented to support agricultural producers" (Penov, Ivan., Elena Zapryanova, p.115, 2020), including state aid, as a subject of a specific regime (Kirechev, Damyan, p.132, 2021).

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FARMERS' ATTITUDES TOWARDS THE ADOPTION OF SUSTAINABLE AGRICULTURAL PRACTICES (LITERATURE ANALYSIS)

ANANIEVA-ZLATEVA, LILIA[1]

Abstract

Increasing farmer acceptance and adoption of environmentally friendly agricultural practices is essential to mitigate the negative impacts of agriculture. However, farmers are not a homogeneous group, and their behavior is subject to a complex set of structural, socio-economic, and socio-psychological influences.

Human behavior is one of the driving forces for successful agribusiness management. However, it can be the basis of many resource management problems at the same time and is often the component that is not given enough attention when developing management plans. Moreover, the implementation of agricultural strategies relies on the individual behavior.

Individual behavior is based on a variety of social, psychological, institutional, and economic factors that must be understood for successful implementation of farm management strategies.

This paper reviews a highly specialized literature in the area of farmers' attitudes and intentions to adopt pro-environmental behavior. The aim of this paper is to analyze the application of some of the social psychology theories in the area of adoption of sustainable agricultural practices and to summarize the factors that influence farmers' attitudes towards adoption. This in turn would help to better understand the agricultural unit and the agricultural sector as a whole.

The report examines qualitative and quantitative summaries of highly specialized literature studies published in scientific databases such as Ebsco, Science Direct and others. The literature summarizes analyses over the last few decades of farmers' attitudes and intentions towards adopting pro-environmental behaviors, and the factors by which they are influenced.

In order to fulfill its objective, the report is based on two main points, which are discussed in detail separately, namely „Theoretical approaches and models for adopting sustainable agricultural practices", and „Factors influencing attitudes towards the adoption of sustainable agricultural practices".

Key words: attitudes, sustainable agricultural practices, conservation practices, pro-environmental behavior, farming

JEL code: Q12, Q15, Q19

Environmental pollution as a result of human activity has been one of the main topics of discussion over the last few decades. Among the global challenges in this area is the simultaneous improvement of food security and minimisation of envi-

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ronmental impacts caused by agricultural production systems. Given this, it is important that farmers adopt innovative practices that increase productivity and reduce environmental damage (Guerin T.F., 2001; Delaroche M., 2020; Foguesatto C., 2020).

Farmers are often encouraged to change their farming practices to more sustainable ones in the hope that this will mitigate the negative impacts of their activities on soil, water, greenhouse gas emissions and biodiversity. The adoption of sustainable agricultural practices (SAPs), also known as a set of conservation practices (CPs) (Hobbs P.R., 2007), has emerged as an important alternative in meeting these challenges. CoPs are integral to maintaining the long-term viability of agroecological systems. They typically refer to production and management practices of the farm unit, and are often presented as a solution to the impacts of intensive farming systems. SFM includes activities that integrate ecological, societal and economic dimensions (Zeweld W., 2017). According to the Food and Agriculture Organization of the United Nations (FAO, 1989), SFM includes five main components: 1. Resource conservation; 2. Environmental protection; 3. technical feasibility; 4. economic relevance; and 5. social acceptability. It is important to mention that CPs are differentiated according to the purpose for which they are applied (soil, water, etc.) and the type of benefit they provide (on-farm or off-farm) (Delaroche M., 2020; Foguesatto C., 2020; Lu J., 2022).

Despite the need to take adequate action to address environmental problems, CPs are rarely implemented by farmers. This is most likely driven by the fact that they are not a homogeneous group and their behavior is subject to a complex set of structural, socio-economic and sociopsychological influences (Leonhardt H., 2021).

Governments and public agencies in developed countries set up agri-environment schemes (AES) to subsidize farmers who voluntarily adopt CS – practices also promoted by the private sector through certification schemes through which farmers receive monetary compensation in the form of a price premium for their product in exchange for implementing sustainable practices. In Europe, AECs are seen as a key policy measure to address the negative impacts of agriculture on the natural environment (see Ronchi S., 2019; Zimmermann A., Britz W., 2016). In order to increase the uptake of AES, research on farmers' motivation and behavior is essential. Therefore, understanding and/or adherence to AES requires taking into account both the structural and socio-economic aspects of the farm as well as the farmer's sociopsychological factors (see Dessart F.J., 2019; Lovejoy S.B.,Napier T.L., 1986). Typologies, archetypes, or so-called farming styles are useful tools for understanding the motivations that provoke the adoption of sustainable farming practices. Each style can be defined as a multifaceted concept that captures a particular combination of factors and contributes to a better understanding of farmer behavior. In terms of agriculture, factors may encompass individual practices, size, intensity, marketing of produce, relationship to the environment, etc. (Doichinova Y.,

(2008)). The farmers styles found in previous studies include, but are not limited to: 1. business oriented and environmentally focused; 2. production-minded; 3. tradition-focused and family farming; 4. disengaged; 5. independence-focused type; 6. farm-as-hobby type; and 7. A combination of different types (see Davies B.B., Hodge I.D.,2007; Emtage N., 2006; Guillem E.E., 2012; Walder P., Kantelhardt J., 2018; McGuire J.M., 2015; O'Rourke E., 2012; Hammes V., 2016; Maybery D., 2005). This multiplicity of types is highly dependent on both time and space (van der Ploeg, 1992; Fairweather J.R., Klonsky K., 2009; Leonhardt H., 2021).

Yet, given the short-term nature of some AECs (e.g. 5-10 years) and the risk of losing political and financial support, call into question their ability to fundamentally change farmers' values and attitudes and sustain pro-environmental behavior in the long term. In addition, changes in already established farming practices are often seen as a risk by the individual farmer (Delaroche M., 2020; Lu J., 2022).

One thing is for sure, human behavior is crucial for successful agribusiness management. It is one of the driving forces, but at the same time it can be the basis of many resource management problems, and is often the component that is not given enough attention when developing management plans (Floress K., 2015). It is no coincidence that the implementation of strategies that rely on individual behavior change raise the question: what needs to be done to encourage farmers to adopt long term sustainable farming practices (Delaroche M., 2020; Floress K., 2015).

The aim of this paper is to review and analyse the application of some of the theories of social psychology in the field of implementing sustainable agricultural practices, summarising the factors influencing farmers' attitudes towards adoption.

The report examines qualitative and quantitative summaries of highly specialised literature studies published in scientific databases such as Ebsco, Science Direct and others. The literature summarises analyses over the last few decades of farmers' attitudes and intentions towards adopting pro-environmental behaviors, and the factors by which they are influenced.

Theoretical approaches and models for adopting sustainable agricultural practices

The main influence on farm policy, culture and activities is the farmer. Decision-making takes place at the individual level, and the attitudes of the farmer, who performs the position of a managerial figure, determine the development of the agricultural unit.

Fundamental findings related to attitudes toward performing certain behaviors are represented in theories developed in the 1950s-1960s. A number of researchers assumed the existence of a relationship between an individual's intention and the actual performance of his or her behavior. Ajzen I., (1985) in the Theory of Planned Behavior (TPB), for example, examined the relationship between an individual's attitudes and his or her actions. TPP defines attitude towards a particular behavior

as „the degree to which the performance of the behavior is evaluated positively or negatively". After more than twenty years of application and refinement, TPP has been established as one of the most important contemporary approaches for studying individuals' decision making (Yuzhanin S., Fisher D., 2016). It has been widely used in the environmental sciences to explain, predict, and promote environmentally friendly (proenvironmental) behaviors (Klöckner C.A., 2013; Foguesatto C., 2020). In addition, a behavior can be studied through a single action or a set of actions (Ajzen I., 2001; Cooper J., 2015; (8) Expected utility theory (EOT) (Jara-Rojas R., 2012; Kassie M., 2013-2015) assumes that the decision maker chooses between risky or uncertain prospects by comparing their expected utility values in order to maximize that utility. In other words, TO suggests that people make decisions based on the expected change in their level of welfare (Edwards-Jones G., 2006; Foguesatto C., 2020).

The benefits associated with adopting CP have been identified as a driver of conservation behavior (Ranjan P., 2019). According to the Theory of Collective Action (TCA), for example, farmers' adoption of practices that primarily provide off-farm benefits may be indicative of their ecological type of farming identity, associated with higher levels of environmental concern and perceived collective efficacy (Luther Z.R., 2020), (Pradhananga A.K., Davenport M.A., 2017; Ostrom E., 2007).

The Diffusion of Innovations (DI) theory (Rogers E.M., 1995) supports the findings that the presence of ecological self consciousness, positive attitudes and specific knowledge towards certain programmes and/or practices, and previous or current experience of related or unrelated CPs influence continuity. TRI states that awareness of the innovation, knowledge of it and understanding of how it works are important precursors for an individual to form an attitude towards it, which can lead to behaviors of acceptance or rejection of the innovation itself. It should also be borne in mind that the role of institutions is central to the impact and maintenance of behavior change towards natural resources (Ostrom E., 2007; Heberlein T.A., 2012).

Factors influencing attitudes towards the adoption of sustainable agricultural practices

A large number of empirical studies have focused on understanding the factors and analysing which of them influence, positively or negatively, the adoption of SLM. Based on the literature review, factors can be categorized into: farmer characteristics; farm characteristics; financial/management; exogenous; psychological; economic; categories of CSA; information; and environmental awareness (Foguesatto C., 2020; Lu J., 2022).

The group of factors characterizing the farmer includes the personal characteristics of the farm decision maker and his household. Factors include: age, level of education, ethnicity, experience, family, gender, health, economically inactive household

members, and presence/absence of skills. Among these factors, age can have a positive or negative influence on the uptake of SSA. On the positive side, older farmers often have more experience, which may influence their propensity to adopt a new practice (Amsalu A., Graaff J., 2007). Similarly, for younger farmers, where there is a long-term planning perspective, the uptake of SLM is positively influenced (Amsalu A., Graaff J., 2007). In his study, Anley Y., (2007) found that educational level has a positive influence on adoption of SFM. Higher level of profiled education is positively associated with the adoption of CPs that provide both on-farm and offfarm benefits (Lu J., 2022). The size of the farmer's family and of the firm, taking into account the amount of labour, also has an impact (Amsalu A., Graaff J., 2007; Kassie M., 2013). In addition, the positive health status of the farmer can influence the adoption of CSA in direct proportion (Jin J., 2015; Foguesatto C., 2020).

The group of general farm characteristics mainly refers to the geographical characteristics of the farmland and the physical and chemical characteristics of the soil, including: distance to the administrative office of the farm; to the district centre; to the main market, to the main residence; position and condition of the plot; soil type, colour, quality, depth and fertility, erosive power. Among geographic characteristics, some studies have shown that distance is a factor influencing the adoption of SLM. Shorter distances would help farmers to have better access to information (Kassie M., 2013-2015), which positively affects adoption of CSA. Conversely increasing transport costs and travel time, longer distances can have a negative impact. Soil physical and chemical characteristics, soil type and soil fertility deserve special attention as they are determinants of agricultural production (Kassie M., 2013). Farmers reporting low fertility levels and increased erosion are more likely to adopt SFM (Tesfaye A., 2014; Foguesatto C., 2020).

Financial and management variables include financial characteristics (i.e., method of obtaining income and farm assets) and production management. Among these factors, farm size can be considered as a measure of economic condition (Tey Y.S., Brindal M., 2012) and positively influences the perception of CSA (Amsalu A., Graaff J., 2007). In addition, other factors such as ownership of assets (machinery, tools, land) are considered as a proxy for economic status in the context of adoption of CSA. It is expected that a farmer with more financial support has a greater capacity to adopt new farming practices. The literature analysis shows that there is a relationship between land tenure and the implementation of SLM. For example, farmers who work on their own properties are more likely to adopt CSA (Kassie M., 2013; Kpadonou R.A.B., 2017). Off-farm income can also affect continuity. Additional income unrelated to farmland may provide additional resources for continuity or, conversely, reduce the priority of farm work, lowering interest in adopting certain practices (Knowler D., 2007; Foguesatto C., 2020).

In terms of farm management, a key categorization of CPs is whether they are operational or structural in nature. This, in turn, determines the frequency of management decisions, i.e., whether they are characterised by their temporary or permanent nature, and hence influences the level of costs associated with them. Operational practices have an annual implementation cycle and may result in moderate recurring annual costs, whereas structural practices may result in large initial adoption costs (Rogers E.M., 1995). For example, a larger farm size could prompt farmers to try a new practice on a small plot in advance before fully adopting it, thus encouraging trial (Rogers E.M., 1995; Lu J., 2022).

The group of exogenous factors mainly refers to climate issues and farmers' relationships with external agents on the farm. The increasing frequency and severity of extreme weather events leading to climate change have the potential to cause serious damage to agricultural production. Assessing these losses and engaging in climate change adaptation trainings are positively associated with the adoption of SFM (Zhang L.,2018; Kpadonou R.A.B.,2017). Farmers who belong to different associations, maintain good community relations, etc., can be positively influenced in adopting CSA (Foguesatto C., 2020).

Driven by the idea of adopting innovations and innovative concepts, and exploring the process of their implementation, TRI also highlights the importance of several factors or conditions that are assumed to be motivators and indicators of conservation behavior: higher income, profiled education, larger farm scale, presence of a „vulnerable" plot (eroded and/or with pronounced slopes) (Ranjan P.,2019), and farmers' propensity to seek and use information. Therefore, using a targeted approach that directs technical and financial resources to the most vulnerable land, but also ensures that farmers have autonomy in the targeting process, can be useful in promoting pro-environmental-conservation behavior (Arbuckle J.,2013; Ranjan P.,2020a). The importance of having domain-specific knowledge highlights the need for professionals to target their knowledge and efforts to innovators in a particular community, as well as those who have not yet adopted CPs or have adopted minimal ones (Lu et al.,2021; Ranjan P.,2020 b; Lu J.,2022). Prokopy has found that increased diversity in the agricultural portfolio can be positively associated with multiple social, economic, and environmental benefits (Prokopy L.S., 2020). Last but not least, the effectiveness of CP in providing both private and public benefits is an important consideration for adopting attitudes towards a pa type of behavior (Lu J.,2022).

The psychological factors that influence pro-environmental behavior boil down to concern for the quality of agricultural products; farmer's general concern; habits; satisfaction with farm labor; values; and risk avoidance (Lu J., 2022).

Farmers' pro-environmental decision-making is motivated to varying degrees by the characteristics of the CP. Literature analyses made it clear that farmers' propensity to seek and use information, the size and vulnerability of their land, and higher

levels of income and education were major factors predicting attitudes towards conservation behavior. The quantitative and qualitative studies analyzed showed that while attitudes toward new sustainable practices and programs are important for both actual adoption and intention toward it, behaviors such as previous or current adoption of other CPs, as well as farm characteristics as a business unit are more definitive in predicting actual adoption. In addition, land ownership is essential for pro-environmental decision making. Farmers who are in sole possession of their land are often expected to be better at conserving natural resources and adopting CP (Caswell M., 2001; Soule M.J., 2000; Ranjan P., 2019). However, it is found that the presence of such a property asset predetermines attitudes towards the uptake of KP, and due to other factors that affect the actual continuity (Lu J., 2022).

Many scholars who study conservation behavior pay increasing but limited attention to the practice itself. For example, recent research has focused on understanding adoption of CP as part of a farming system in which farmers adopt combinations of practices (Rudnick J., 2021). Others focus on perceiving CPs as synergistic and ancillary effects or grouping them into separate categories (Lu J., 2022).

It is not only the factors that influence the actual uptake of SSPs that are the subject of research in the literature, but those that influence the intention to uptake them. Analyses reveal some differences between them. Positive attitudes toward the environment and/or toward such a program/practice, higher levels of education, and information seeking and use are positively associated with both intention and actual adoption (Lu J., 2022). Additional factors were also found to be individually significant for each category. For example, the percentage of land owned, is highly associated only with the intention to adopt UPA (Lu J., 2022).

It is important to note that the intention to adopt a particular CP, as a result of a positive attitude towards it, does not necessarily lead to its implementation. Several factors – cost, farm characteristics, lack of information/technology/equipment, (un)availability of cost share, status quo bias, weather variability, market price fluctuations, etc. can hinder actual adoption. The final findings suggest that farmers who have successfully overcome barriers to adoption as a result of previous or ongoing adoption of other CPs are more likely to adopt a particular CP. Various farm characteristics were found to be positively associated with actual uptake but not with intention to uptake. For example, larger farm size and/or amount of arable area may be indicative and encourage experimentation with CP. Similarly, the type of crop grown may have an impact (Rogers E.M., 1995).

Environmental behavior is also influenced by financial factors. Analysis of the literature showed that, from a practical perspective, it is likely that on-farm personal finance is the primary driver of continuity, while off-farm benefits are the secondary driver. Lu J., (2022) found that higher levels of income predicted the adoption of CPs that primarily provided offfarm benefits.

The estimates that are unique to each category of factors, including farmer and farm characteristics; financial/management; exogenous; psychological; economic; SLM categories; information and environmental awareness shed some light on the underlying motivations that drive farmers to engage in conservation behavior. As a result of this synergy, the farmer can experience self-efficacy in achieving benefits both on and off the farm (Floress K., 2015).

The literature review revealed that there is a wide variety of theories describing the implementation of sustainable agricultural practices and a number of factors that may influence farmers' attitudes towards adoption. Exploring different factors and uncovering the relationships between variables can lead to the description of patterns of behavior under certain conditions, which in turn will assist in better understanding the farming unit and the sector as a whole.

From the point of view of the agricultural sector in Bulgaria, there is limited research of this type, which gives rise to the need for future studies. Analyses in the field would contribute to the enrichment of already existing and/or the development of completely new programs and/or policies related to the sustainable management of agriculture in Bulgaria, on the one hand, and the pursuit of the development of pro-environmental behavior – the bridge to environmental sustainability, on the other.

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REDUCING FOOD WASTE WHEN EATING OUT – RESEARCH ON THE PERCEPTIONS OF BULGARIAN STUDENTS

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Abstract

Food waste is a critical global challenge with far-reaching environmental and social consequences. Addressing this issue requires understanding consumer behaviours, habits, and knowledge related to food waste. Research on food waste in eating out covers various aspects, including factors that contribute to food waste, consumer behaviour and potential solutions. Key to understanding the problem of food waste and to finding and implementing effective solutions is research into the knowledge and behaviour of young people, and students in particular, regarding dietary choices, eating habits, food waste and their attitudes towards food in general. This paper delves into the urgency of reducing food waste, encompassing its definition, stages in the food supply chain, and its relevance to achieving Sustainable Development Goals (SDGs). The European Union's efforts and Bulgaria's initiatives provide context to the broader discourse on food waste reduction. The European Commission has set out a number of policies and instruments aimed at reducing food loss and waste as part of the Circular Economy Action Plan and the Farm to Fork Strategy. In line with EU objectives, a National Programme for the Prevention and Reduction of Food Loss (2021-2026) has been developed in Bulgaria, which sets out the framework for joint action to reduce food loss and waste and for society to rethink its attitudes to food consumption and value. However, food waste problems at the consumer level in Bulgaria are understudied. The aim of the current study is to explore the personal perceptions and behaviours of Bulgarian students towards food waste when eating out. Information was collected through a structured online questionnaire. The survey was conducted during the academic year 2022/2023 among Bulgarian students of the University of National and World Economy in Sofia, Bulgaria. There were 123 participants between the ages of 18 and 35. The main findings of the study showed that over 50% of the respondents were of the opinion that the largest amount of food waste is generated when eating out. The majority of the respondents have stated that they throw away less than 5% of their food when eating out and they take the leftovers home „often" or „sometimes", which indicates that Bulgarian students eat most of the food they order when eating out and throw away a small portion of it. Overall, this research contributes to the understanding of food waste patterns and encourages targeted interventions to promote sustainable consumption among students and beyond.

Key words: food waste, eating out, students, Bulgaria

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Introduction

Reducing food waste is an urgent global challenge and understanding consumer behaviour, habits and knowledge in relation to food waste is critical to developing effective strategies to reduce food waste.

Food waste refers to any food that is discarded, lost or uneaten and cannot be consumed by humans. This includes both edible and inedible parts of food, such as peelings, cores and bones. Food waste can occur at different stages of the food supply chain, including production, processing, distribution, retail and consumption. Preventing food waste is paramount to reducing environmental impacts and achieving sustainable development goals.

The Sustainable Development Goals set by the UN in 2015 provide a comprehensive framework for global development, including specific targets related to reducing food waste. Target 12.3 aims to reduce food waste by 50% at the retail and consumer level, and to reduce food waste in production and supply chains by 2030. Achieving these goals requires a comprehensive approach involving different stakeholders such as governments, businesses, consumers and civil society. Key strategies include: raising awareness and promoting behaviour change through education campaigns and public awareness initiatives; improving food governance and infrastructure; strengthening policy frameworks and regulations; fostering collaboration and partnerships between governments, businesses, non-profit and community organisations through sharing best practices, implementing joint initiatives and driving systemic change.

Literature Review

Food loss and waste is a global problem. According to the Food and Agriculture Organization of the United Nations (FAO), nearly one-third of all food produced worldwide is lost or wasted somewhere along the food supply chain. In the European Union, this amounts to nearly 88 million tonnes of food per year (Recommendations and guidelines for a common European food waste policy framework, 2016). To prevent food loss and waste, the EU and Member States are putting in place measures to take action to reuse, recycle or repurpose food. The European Parliament's Waste Framework Directive 2008/98/EU sets out „measures to protect the environment and human health by preventing or reducing the production of waste" (DIRECTIVE 2008/98/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 November 2008 on waste and repealing certain Directives).

In 2016, the Council made a political commitment to a number of initiatives, including better monitoring of food waste, raising awareness among the general population, better understanding and use of 'best before' and 'use by' labels (including among consumers) and facilitating the donation of unsold food products to various charities and other organisations.

With the launch of the European Green Deal in December 2019, the Commission set out a number of policies and instruments aimed at reducing food loss and waste as part of the Circular Economy Action Plan and the Farm to Fork Strategy. The EU's objectives are to reduce the environmental and climate impacts of the EU food system and strengthen its resilience, to ensure food security in the face of climate change and biodiversity loss.

In Bulgaria, food waste problems at the consumer level are understudied, and this provides huge opportunities for researchers.

According to the National Statistical Institute (NSI) in 2018, 31.3% of Bulgarians could not afford to consume meat, chicken or fish every second day, and more than half of Bulgarians did not eat a nutritious diet. Below the poverty line were 22% of the country's population, with 26% of children aged 0-17 in Bulgaria at risk of poverty (Food and Basic Material Assistance Programme 2021-2027).

This situation calls for measures to change attitudes towards food wastage as the only way to ensure sustainable food production and consumption and to reduce the adverse impact of food systems on the environment.

In line with EU objectives, a National Programme for the Prevention and Reduction of Food Loss (2021-2026) has been developed in Bulgaria, which sets out the framework for joint action to reduce food loss and waste and for society to rethink its attitudes to food consumption and value. The programme includes the following areas of action:

- Prevention of food loss (unrealised surplus);
- Redistribution of unmarketable food for consumption by people in need;
- Public awareness and information on the problem of food loss and waste.

The national food waste prevention and reduction programme covers all stages of the food chain (or food production and supply chain): primary production; processing and manufacturing; retail and other food distribution; restaurants and catering services; households (consumption by the final consumer).

Research on food waste in eating out covers various aspects, including factors that contribute to food waste, consumer behaviour and potential solutions. Key to understanding the problem of food waste and to finding and implementing effective solutions is research into the knowledge and behaviour of young people, and students in particular, regarding dietary choices, eating habits, food waste and their attitudes towards food in general.

Understanding the root causes of food waste among students requires a multidimensional approach. Research in this area considers factors such as individual attitudes, knowledge, and awareness of food waste (Yagoub et al., 2022); social norms and peer influence (Stefan, Herpen, Tudoran, and Lähteenmäki, 2013); campus dining practices; and the presence of initiatives to reduce food waste (Smith, 2015). By gaining insight into these factors, interventions can be developed to effectively target student behaviour and promote more sustainable consumption patterns.

Some authors (Thyberg, and Tonjes, 2016) believe that age plays a significant role in food waste, with younger people tending to waste more compared to older people. In Australia, for example, 38% of individuals aged 18-24 spent more than A$30 on food in a two-week period, while only 7% of individuals aged 70+ did so (Hamilton, Denniss, and Baker, 2005). A similar pattern was observed in the United Kingdom, where, according to Thyberg (2016), people over 65 wasted less food than the rest of the population.

However, it would not be correct to claim that all young people waste food. Authors Mondéjar-Jiménez, Ferrari, Secondi, and Principato (2016) investigated food wasting behaviour among Italian and Spanish young people following the Mediterranean diet, known for its environmentally sustainable practices and high consumption of perishable products. The study reveals that 59% of Italian youth households waste 15% or less of their edible food and 63% of Spanish youth report wasting 15% or less of their weekly food purchases. Furthermore, only 1.7% of Italian youth and 2% of Spanish youth waste more than 30% of their food.

Secondi, Principato, and Pratesi (2015) found that Italian youth are more aware of food waste and more likely to reduce it. Increased awareness of the consequences of food waste is known to influence young people's behaviour and they show a willingness to, for example, make shopping lists, which according to Secondi (2015) contributes to reducing food waste.

However, it is worth noting that diet and awareness may not be the only factors influencing the reduction of food waste; other determinants should also be considered.

A study (Ozanne, Ballantine, and McMaster, 2022) conducted among students living in shared apartments in an urban area in New Zealand revealed that lack of organization in meal planning and shopping, inadequate sorting and waste disposal infrastructure, and careless practices in managing the contents of refrigerators contribute to food waste. This analysis highlights the need for interventions and campaigns to promote more sustainable behaviour among this demographic.

Engaging youth in research to reduce food waste not only provides valuable insights into their behaviours and attitudes, but also empowers them to be agents of change. By involving them in the research process, they can become advocates for sustainable consumption and waste reduction, spreading awareness and influencing their peers and wider communities.

In order to gain a better understanding of the problem of food waste in Bulgaria, we conducted a survey among Bulgarian students to explore their personal perceptions and behaviours towards food waste and food wastage when eating out.

Methodology

The study is part of a project on „Patterns and causes of food waste during eating out"[2], whose main objectives are:

- To assess the state of the food waste problem in eating out by identifying the causes of waste generation;
- To explore the patterns of behaviour associated with food waste generation and to propose and evaluate possible solutions to reduce and prevent food waste in eating out.

The subjects of the study were Bulgarian students from the University of National and World Economy between the age of 18 and 35 and their perceptions of the reasons behind food waste when eating out.

The survey was conducted during the academic year 2022/2023 among Bulgarian students of the University of National and World Economy in Sofia, Bulgaria.

123 people from different faculties and majors, studying full-time or remotely, participated in the survey.

The survey consists of 30 mostly closed-ended questions, most of which are single-choice and others multiple-choice. A Likert scale was used for statements such as „People waste more food when they eat out" and „Young people waste more food" to test 5 possible responses ranging between „strongly disagree" and „strongly agree".

Information was collected through a structured online questionnaire developed using Microsoft Forms and sent out via university domain emails to ensure that only students from the UNWE would participate. This method was preferred due to some advantages of online questionnaires such as low cost, quick and easy distribution, convenience of completion through different mobile devices, instant feedback, quick and easy administration of the collected data.

Comparative and descriptive analysis were used to analyse the primary data collected.

Results and discussion

A total of 123 Bulgarian students participated in the survey, between the ages of 18 and 35. The distribution of respondents by age group is as follows: 24 fall into the 18-20 age group, 53 into the 21-23 age group (the largest number of respondents are from this group), 7 into the 24-26 age group, 10 into the 27-30 age group, 9 into the 31-35 age group and 20 into the over 35 age group. Of the total respondents, 28% or 34 were male and 72% or 89 were female. Nearly 70% of both male and female respondents thought that young people waste more food.

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[2] As the implementation of the project „Patterns and causes of food waste generation in eating out" is carried out by a research team, some of the questions in the survey have been analysed for the purpose of this report.

The following tables summarize some of the results of the survey related to students' perceptions and behaviours regarding food loss and food waste when eating out. From the results shown in Table 1, we can see that 52% of the respondents were of the opinion that the largest amount of food waste is generated when eating out, with the second largest amount of food waste being consumed in the household. These results are consistent with a similar survey (Yagoub et al., 2022) conducted among UAE students, which found that 38% of respondents believed that a large proportion of food is wasted at the consumption level. Based on this data, it should be noted that efforts should be directed towards educational campaigns to reduce food waste at the consumption stage.

Table 1. Respondents' views on stage at which food is likely to be wasted

Which stage of the food chain do you think is likely to generate the most food waste?						
Production	**Distribution**	**Retail and wholesale**	**Food processing**	**Household food consumption**	**Eating out**	**Total**
12	3	10	12	22	64	123
10%	2%	8%	10%	18%	52%	

Source: Authors' own calculations

Table 2 shows that the highest number of respondents (76%) indicated that they threw away less than 5% of their food when eating out, followed by those who threw away between 5% and 10%. Only 7% of respondents threw away between 10% and 15% and only one participant responded that they threw away more than 15% when eating out. These results indicate that Bulgarian students eat the majority of their food when eating out and throw away a small portion. In comparison, according to a report (Gunders, and Bloom, 2017) by the National Resources Defense Council, U.S. restaurant customers leave an average of 17% of the food they order uneaten, and 55% of those leftovers remain on the table. This is primarily due to the large portions served at most restaurants, but often people order more than they can eat or do not take the food home. To overcome this problem, efforts are needed from both educational institutions, through campaigns to explain the benefits of reducing food waste, and businesses, through portion control, incentives for takeaways, food donations, etc.

Table 2. Food disposal when eating out

On average, what percentage of food do you throw away when you eat out?				
Less than 5%	**Between 5% and 10%**	**Between 10% and 15%**	**More than 15%**	**Total**
94	20	8	1	123
76%	16%	7%	1%	

Source: Authors' own calculations

The data in Table 3 shows that the highest percentage of respondents answered that they often take leftover food home, followed by those who answered „sometimes". The final and definite answers, „never" and „always" had the lowest percentages, 6% and 18% respectively. Trying to understand how often people take leftovers home when eating out is not sufficient to offer theoretical explanations and practical measures to address food waste when eating out. Instead, there is a need to establish whether take-out of leftovers reduces food waste or shifts its location from restaurants to households (Talwar, Kaur, Yadav, Sharma, and Dhir, 2021). Talwar et al. (2021) propose to investigate the role of routine reuse of leftovers to better understand food waste generation and reduction.

Table 3. Take-home food leftovers

When you are eating out and have leftover food, how often do you take it home?					
Never	Seldom	Sometimes	Often	Always	Total
7	23	32	39	22	123
6%	19%	26%	32%	18%	

Source: Authors' own calculations

Conclusion

The growing trend towards eating out has contributed significantly to the increase in food waste generated at every level of the food chain. It is therefore essential to understand the causes of food waste and the factors that influence the desire and intention to reduce its harmful effects. Among the most important issues to be addressed is filling the gap in research on the knowledge and behaviour of Bulgarian youth on food waste. More attention needs to be paid to the analysis of everyday practices leading to food waste. A proper understanding of this issue could support the implementation of effective information campaigns to reduce food waste. Measures to reduce food waste should also be based on the interrelationship be-

tween all economic actors. By working together, researchers, educational institutions, public organisations and private businesses can provide relevant information relating both to the quantities of food wasted and to the economic and environmental consequences of food waste. In this way, the most effective tools and interventions to reduce food waste can be identified.

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