

# Agricultural Sustainability in Bulgaria – Levels and Factors



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## Abstract

This article presents a holistic approach for assessing agrarian sustainability in Bulgaria based on its economic, social and ecological aspects on sectoral macro-level. It is based on official statistical and other information as well as on expert evaluation. Our study has found that the Bulgarian agriculture on macro-level has good sustainability. Some of the sustainability aspects have higher levels such as the economic aspect, while others like social and environmental aspects are inferior. Study results could help in focusing the political efforts, so that the agrarian sustainability, in its social and ecological aspect, could be increased. However, a further research is needed to evaluate the level of sustainability at micro-level, so that the major issues and problem areas are addressed accordingly.

**Keywords:** Agrarian Sustainability; Sustainability Indicators; Economic; Social; Ecological Aspects and Bulgarian Agriculture

## Introduction

In the world literature, the question of assessing agrarian sustainability is among the most discussed by scientists, policy makers, farmers and stakeholders [1-7]. The agrarian sustainability has usually been assessed at national or international level and usually it is described as ability to satisfy a diverse set of goals through time Brklacich et al. 1991, Hansen et al. 1996 or the ability to maintain or improve its functions Lopez-Ridaura et al. 2002 Often the term sustainability is wrongly associated only with preserving the environment and productivity of the agricultural resources but in our research we consider that agriculture is sustainable if it could maintain its economic, ecological and social functions in a long-term [8,9]. There is a substantial literature dedicated to analyzing the different aspects of sustainability - economic, social and/or ecological. These three aspects are related to multiple functions of modern agriculture, they are equally important and have to be always accounted for. Agriculture is sustainable if it is: economically viable and efficient; socially responsible regarding farmers, workers, other agents, communities, consumers and society; and ecologically sustainable [10]. The agrarian sustainability is a topic of great interest in Bulgaria, as well, and it has been subject of studies, mainly focusing on the sustainability of the agrarian holdings and/or specific activities or sectors. However, this is the first attempt to make a comprehensive assessment of the sustainability of the Bulgarian agriculture on a sectoral macro-level embracing its three aspects. This article

presents a holistic approach for assessing agrarian sustainability based on its economic, social and ecological aspects on sectoral macro-level. It also identifies critical socio-economic, political, behavioral, institutional etc. factors for sustainable development at the current stage of evolution of Bulgarian agriculture. The study is based on official statistical and other information as well as on expert evaluation and survey with farm managers. Its aim is to estimate the sustainability index for each one of the tree main aspects and to identify the critical areas that lead to improving the level of agrarian sustainability in Bulgaria.

## Research Background

Despite the enormous progress in the theory and practice of sustainability assessment in the last decades, still there is no consensus on “what is (how to define) agrarian sustainability”, “what is the relation between the farm and the agrarian sustainability”, “which are the critical factors of agrarian sustainability”, and “how to evaluate the sustainability level” in a dynamic world, where hardly there is anything actually “sustainable”.

All these questions are a part of a more general problem for defining and assessing sustainability as a whole, which leads to a suggestion “to spend less time in attempts to define sustainable agriculture and more time working on its achievement” Ikerd 2016 But is it possible to work for sustainable agriculture without first defining it? Disagreements among experts are mostly associated with the “approaches for assessment” of

sustainability levels, rather than the sustainability “goals” towards efforts have to be directed.

In academic publications, official documents and agricultural practices there is a clear understanding that in addition to “pure” production and economic dimensions, the agrarian sustainability has broader social and ecological aspects, which are equally important and have to be taken into account when measure the overall sustainability level. There are suggested and used numerous indicators for assessing agrarian sustainability at “farm level” and diverse approaches for their integration and interpretation. However, most of the assessments of agricultural sustainability are at industry, national or international level [4-7] while the important “farm level” is usually missing. Consequently, the important links between sustainability governance and sustainability levels are not properly studied [8] both relations between farm management and impacts on agro-ecosystems and their sustainability are clarified [6].

Often the estimates of farm’s sustainability and agrarian sustainability unjustifiably are equalized. Agrarian sustainability has larger dimensions and in addition to the sustainability of certain type of farms (“family”, “cooperative”, “community” etc.) includes: the importance of individual (type of) farms in the overall resources management and the socio-economic life of households, region and industry; and the collective actions of diverse agrarian agents; and the overall (agrarian) utilization of resources and the impacts on natural environment; and the amelioration of living and working conditions of farmers and farm households; and the overall state and development of agriculture and rural households; and the (participation in) overall social governance; and the food security, and the conservation of agrarian capability, traditions, etc. [11]. For example, the experience around the globe shows, that there are many “highly” sustainable farming enterprises little contributing to agrarian sustainability – numerous “semi-market” holdings and subsistence farms, large enterprise based on leased-in lands, public farms etc. in Bulgaria with “low” standards for environmental protection. On the other hand, sustainable agrarian development is commonly associated with the restructuring and adaptation of farming enterprises to constantly evolving market, institutional, and natural environment. That process (pre)determines the low sustainability (non-sustainability) and the diminishing importance of farms of certain type (public, cooperative, small-scale), and the modernization of another part of them through diversification of activity, transformation of family farms into partnerships, firms, vertically-integrated forms, etc..

Furthermore, in most cases a holistic approach is not applied, and the “pure” economic (income, profitability, financial independence, etc.), “pure” production (land, livestock and labor productivity, eco-conservation technologies, etc.), “pure” ecological (eco-pressure, harmful emissions, eco-impact etc.), and “pure” social” (social responsibility, social contribution) aspects

of agrarian development are studied (assessed) independently from one another. In most of the available frameworks for assessing sustainability level there is no hierarchical structure or systemic organization of the aspects and the components of agrarian sustainability, which (pre)determines the random selection of sustainability indicators.

Also the critical “governance” aspects of agrarian sustainability, and the costs associated with the governance, and the relations between different aspects of sustainability are mostly ignored [6,7]. Nevertheless, very often the level of the governance efficiency and the adaptability predetermine the overall level of agrarian sustainability independent from the productivity, social or ecological responsibility of activity. Now it is broadly recognized that the agriculture “produces” multiple products, “private” and “public” goods such as food, rural amenities for hunting, tourism, landscape enjoyment, environmental and cultural services, habitat for wild animals and plants, biodiversity, including less desirable ones such as waste, harmful impacts, etc. Therefore, all these socio-economic and ecological functions of the sector have to be taken into account when assessing agrarian sustainability.

In each particular stage of the evolution of individual countries, communities, eco-systems, sub-sectors of agriculture and type of farms, there is a specific knowledge for the agrarian sustainability (e.g. for the links between farming activity and climate change, water pollution, desertification, etc.), individual and social value system (preferences for the “desirable state” of natural resources, biodiversity, human health, preservation of traditions, etc.), institutional structure (rights on food security and safety, good labor conditions, clean nature and biodiversity, of vulnerable groups, producers in developing countries, future generations, animal welfare, etc.), and goals of socio-economic development [10]. Thus, the understanding, content, and assessment of the agrarian sustainability are always specific for a particular historical moment (period) of time and for a particular socio-economic, institutional and natural environment, in which agriculture is functioning. Majority of suggested frameworks for sustainability assessment apply an “universal” approach for “faceless” agriculture, without taking into consideration the specificity of individual holdings (type, resource endowment, specialization, stage of development, etc.) and the environment in which they function (competition, institutional support and restrictions, environmental challenges and risks, etc.). What is more, usually most systems cannot be practically used by the managerial bodies, since they are “difficult to understand, calculate, and monitor in everyday activity” Hayati et al. 2010. In this article we try to overcome all these shortcomings in sustainability assessment, and suggest a practical and holistic approach for assessing sustainability in Bulgaria.

### Research Methods

In the literature and managerial practice there are diverse approaches for defining agrarian sustainability – as an

alternative ideology Edwards et al.; VanLoon et al. as a new (set of) strategy/ies Mirovitskaya and Ascher; as a characteristics of agrarian systems – e.g. “ability to satisfy a diverse set of goals through time” Brklacich et al.; Hansen, “ability (potential) of the system to maintain or improve its functions” Lopez-Ridaura et al; Lewandowski et al. ; as a “process of learning about changes and adapting to these changes” (Raman), etc. Definition of agrarian sustainability has to be based on the “literal” meaning of that term and perceived as a system characteristics and “ability to continue through time”. It is a feature of agricultural activity – production associated with cultivation of animals, plants, fungi, and other life forms for human and livestock food, raw materials for processing industries, bioenergy, medicinal and other products and services. Its important feature is the management and utilization of agro-ecosystems of different type (plain, mountainous, riverside, seaside, open-air, closed, etc.), and the “responsibility” for their preservation for future generations.

The characterization of sustainability has to be “system-oriented” while the system is to be clearly specified, including its time and spatial boundaries, components, functions, goals, and importance in the hierarchy. That implies taking into account the diverse socio-economic and environment conservation functions of agrarian sector, the type and efficiency of agrarian organization, and the mutual links (importance, dependency, complementarily) of different governance and organizational structures, and relations with sustainability of households, region, eco-system and the entire sector (industry).

Sustainability has to reflect both the internal capability of agriculture to function and adapt as well as the external impact of constantly evolving socio-economic and natural environment. However, it is to be well distinguished the features of relatively independent (sub) systems – e.g. While “satisfaction from farming activity” is an important social attribute of agrarian sustainability, the modernization of social infrastructure and services in rural areas is merely a prerequisite (factor) for the long-term sustainability of farms and agrarian sector. Incorporated internal dynamism of the systems also implies an “end life” (there is no system which is sustainable forever) as a particular agrarian system is considered to be sustainable if it achieves (realizes) its “expected lifespan” (Raman). For instance, if due to the augmentation of farm households’ income the number of subsistence and part-time farms is decreasing

while agrarian resources are effectively transferred to other structures, this process should not be associated with a negative change in sustainability. On the other hand, if farms of a particular type and sector are not able to adapt to the dynamic economic, institutional and climate changes through adequate modernization in technology, product, and organization, their sustainability is low.

Characterization of sustainability must also be predictive since it deals with future changes rather than the past and only the present. In addition, sustainability has to be a criterion for guiding changes in policies, and farming and consumption practices, agents’ behavior, for focusing of research and development priorities, etc. In that sense, analysis of the levels and factors of “historical” sustainability of farms of certain type and specialization, particular agro-ecosystems or regions, or entire sector (“achieved level of sustainability”) are extremely useful for the theory and practice. The assessments of past states help identify critical factors and trends in sustainability of farms and industry, and undertake efficient measures for its improvement by managers, stakeholders, state authority, etc. Sustainability is to allow facile and rapid diagnostic, and possibility for intervention through identification and prioritizing restrictions, testing hypothesis, and giving possibility for comprehensive assessments. Since most system are difficult to comprehend, calculate, and monitor in everyday activity Hayati et al. the later suggests that agrarian sustainability is easy to understand and practical to use by agents without being associated with huge costs.

Agrarian sustainability characterizes the ability of agriculture to maintain its economic, ecological and social functions in a long-term. Agriculture “produces” multiple products, “private” and “public” goods (food, rural amenities for hunting, tourism, landscape enjoyment), environmental and cultural services, habitat for wild animals and plants, biodiversity, including less desirable ones such as waste, harmful impacts etc. All these functions of agrarian production are to be taken into account as sustainable agriculture must be economically sustainable, and ecologically sustainable, and socially sustainable. The evaluation of Bulgarian agrarian sustainability is based on a methodology developed for analysis of governance systems and sustainability levels in Bulgarian agriculture which is presented in details in our previous publications [12].

**Table 1:** Principles, criteria and indicators for assessment of Bulgarian agrarian sustainability at sectoral level.

Principles	Criteria	Indicators	Reference value
<b>Economic Aspect</b>			
Financial stability	Reducing dependence on subsidies	Share of direct payments in Net Income	EU average level
	Sufficient liquidity	Stocks	EU average level
	Minimizing dependence on external capital	Ratio of assets growth to interest paid	EU average level

Economic effectiveness	Positive or high profitability	Cost - effectiveness	EU average level
		Profitability of capital	EU average level
	Maximize or increase labour productivity	Labour productivity	EU average level
	Maximize or increase land productivity	Productivity of land	EU average level
Competitiveness	Support or increase of marketed output	Share of imported product in the total agricultural product	EU average level
	Support or increase of sales	GVA change	EU average level
Adaptability to economic environment	Sufficient adaptability to market environment	Ratio of factor income to fixed costs	EU average level
	High investment activity	Growth of long-term assets	EU average level
<b>Social Aspect</b>			
Welfare of employed in agriculture	Equality of income with other sectors	Ratio of agricultural income to the average income in the country	National economy average level
	Equality of income with other sectors	Ratio of agricultural income to the average income in the country	National economy average level
	Fair distribution of income in agriculture	Variation of payment of hired labour to factor income	National economy average level
	Sufficient satisfaction from farm activity	Variation of employed in agriculture to the entire population	EU average level
	Satisfactory working conditions	Correspondence to official norms	Expert assessment
Conservation of farming	Preservation of the number of family farms	Number of family farms	EU average level
		Share of family labour to all employed	EU average level
	Increasing the knowledge and skills	Average age of managers	EU average level
		Share of trained farmers	EU average level
Gender equality	Equality in men-women relations	Share of female farm managers	Program target
Social capital	Participation in professional associations and initiatives	Share of hired labour members of labour unions	EU average level
	Contribution to the development of regions and communities	Share of farm population in general population	EU average level
Adaptability to the social environment	Sufficient ability to respond to the ceasing farming activity and the demographic crisis	Change in gross fixed capital formation to the change in the number of people employed in agriculture	EU average level
<b>Ecological Aspect</b>			
Air quality	Maintaining and improving air quality	Reduction of CO2 emissions	Scientific norms

Land quality	Minimizing soil losses	Soil water erosion index	Scientific norms
		Soil wind erosion index	Scientific norms
	Preservation and improvement of soil fertility	Amount of nitrogen fertilization	Scientific norms
		Amount of phosphorus fertilization	Scientific norms
	Maintaining a balanced land use structure	Share of arable land (without fallow) in total agricultural areas	Program targets
Preservation of landscape features	Amount of area covering the requirements for "green" direct payments through maintaining landscape elements	Program targets	
Water quality	Maintaining and improving water quality	Index of groundwater pollution	Scientific norms
Effective energy consumption	Minimizing the use of conventional energy	Fuel consumption per unit area	Scientific norms
Biodiversity	Maintaining or enhancing natural habitats	Change in the number of habitats	Program targets
		Share of agricultural land in NATURA 2000 and other protected areas	Program targets
Animal welfare	Compliance with the principles of animal welfare	Level of compliance with the principles of animal welfare	Program targets
Organic production	Increasing the organic production	Share of areas under conversion or certified for organic production	EU average level
Adaptability to the environment	Sufficient adaptability to climate change	Variation in the yield of main crops	EU average level
		Share of production losses in gross output in livestock sector	EU average level

**Table 2:** Limits for grouping of integral assessments of agrarian sustainability.

Sustainability Index	Sustainability level
0,91 - 1	Very High Sustainability
0,71 - 0,90	High Sustainability
0,51 - 0,70	Good Sustainability
0,31 - 0,50	Moderate Sustainability
0,11 - 0,30	Insufficient Sustainability
0 - 0,10	Unsustainable

The system for assessing agrarian sustainability includes properly formulated and selected principles, criteria, indicators and reference values for each of them (Table 1). The principles are the highest level which expresses the state of sustainability within the three major aspects - economic, social and ecological. The criteria are more specific than principles and are related to

indicators which express the state of agricultural sector assessed when the relevant principle is realized. The indicators are quantitative and qualitative variables from a different type, for example behavior, business, investment, outcome, impact which can be valued and allow the measurement of correspondence with a criteria, giving idea of sustainability in all its aspects. Reference values are the desired values such as absolute, relative, quality of each of the indicators for specific conditions of Bulgarian agriculture which assist the evaluation and give direction to improve/achieve sustainability. Information for each indicator is gathered from official sources – EUROSTAT, DG Agriculture and rural development, National Statistical Institute, Department "Agrostatistics" at the MAF, Ministry of environment and waters. For some of the indicators expert assessment is used. Very often individual indicators for each Criteria, Principles and Aspects of sustainability are with unequal number that requires an integration of indicators (Table 1). For the integral assessment of sustainability for every Criterion, Principle, and Aspect, and the Overall level, equal weights are used for each Principle in a particular Aspect, and for each Criterion in a particular Principle, and for each Indicator in a particular Criterion (Table 2).

**The Integral Index** for a particular Criterion (ISc), Principle (ISp), Aspect of sustainability (ISa) or Overall level (ISo) is an arithmetic average of relevant Indicators and Indices

$$ISc = \sum IS_i / n \quad (n - \text{number of Indicators})$$

$$ISp = \sum ISc / n \quad (n - \text{number of Criteria})$$

$$ISa = \sum ISp / n \quad (n - \text{number of Principles})$$

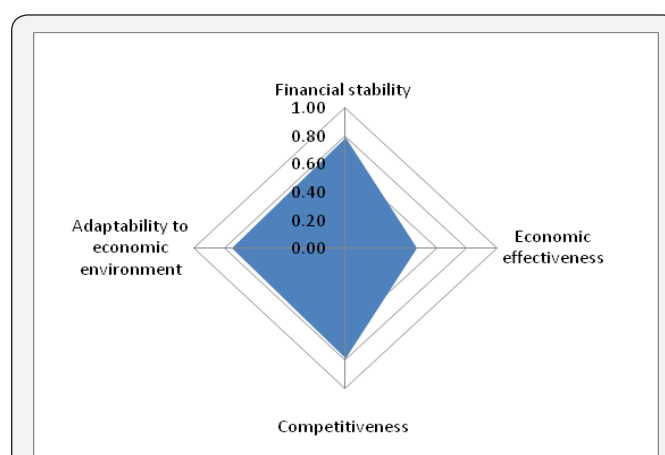
$$ISo = \sum IS_a / 3$$

On the basis of the indicators value and the reference value for each indicator sustainability score is calculated. The score could fall within one of six groups, presented in (Table 2). These groups are applied also for the interpretation of the Integral Sustainability Index. The primary level for calculating Integral indexes is the indicator sustainability score determined by the reference values. The reference values for each indicator have two thresholds (binary vector method). The lower threshold on which the indicator sustainability score is determined 0 (unsustainable) and an upper threshold, where the reference value complied to sustainability score up to 1 set up using the expert judgment, average numbers, trends, scientific norms, etc.

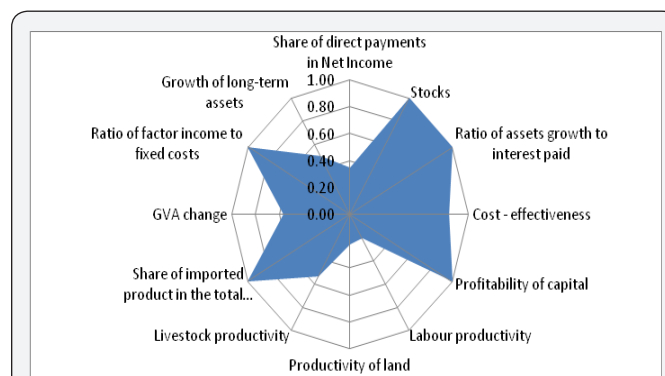
## Results and Discussion

Evaluating the different aspects of the Bulgarian agrarian sustainability is based on the developed methodology and a set of selected indicators. The focus in the research is evaluating the level of sustainability within the three main aspects – economic, social and ecological, and identifying the critical elements. Based on the indicators value within the three aspects an integral sustainability score is also calculated. The integral sustainability index of the Bulgarian agriculture is 0.58. That means that the Bulgarian Agrarian Sustainability could be defined as Good. However there are still a lot of opportunities for improvement in future, because the index is closer to the lower group. That also requires understanding of the factors leading to this result and the respective role of each aspect for the Overall Sustainability of the Bulgarian agriculture. Every aspect of agrarian sustainability has its principles, criteria and indicators that help calculating the total sustainability level of the Bulgarian agriculture. The value of each indicator on sectoral level was transformed into Sustainability Index. Principles are the highest hierarchical level associated with the multiple functions of agriculture – economic, social and ecological.

Our assessment has found out that the Economic sustainability of the Bulgarian agriculture is Good (index of sustainability 0.7). This aspect has been evaluated on the basis of four major principles – Financial stability, Economic effectiveness, Competitiveness and Adaptability. The lowest integral score is for the Economic effectiveness principle – 0.47 (Figure 1). Each of these principles has different criteria and indicators that are used for calculating the sustainability score.



**Figure 1:** Indexes of sustainability for the major principles within the Economic aspect of agrarian sustainability.



**Figure 2:** Indicators of economic sustainability of Bulgarian agriculture.

Twelve indicators are used to calculate the sustainability score of each one of the eleven criteria for the four principles of economic sustainability (Figure 2) presents the sustainability scores of the different indicators. The index of Economic effectiveness sustainability has been calculated on the basis of 5 indicators – Cost-effectiveness; Profitability of capital; Labour productivity; Productivity of land; and Livestock productivity. Bulgarian agriculture is characterized by low labour, land and livestock productivity. This is due to different factors. The labour productivity in Bulgaria is lower than the EU average not only in the agriculture, but in the other economic sectors as well. That is due usually to low or old technology use, low labour quality, lack of qualification, lower motivation due to insufficient payment, aging labour force and other socio-economic factors. The labour productivity affects the economic effectiveness, but it is also strongly connected with the social aspects of the agrarian sustainability.

The land productivity of the Bulgarian agriculture is also on unsatisfactory level. The gross output per hectare in Bulgaria for the major arable crops is well below the EU average and it varies from year to year. The sustainability score for the livestock productivity is higher, but it is still only on Good level

and it needs to be improved in order to ensure higher economic sustainability for the Bulgarian agriculture. Other indicators that show low or only Moderate sustainability levels are the Share of direct payments in the net income (0.35) and the Growth of the long term assets (0.50). Good is the sustainability score of the GVA change (0.53). These indicators demonstrate the high dependency of the Bulgarian agriculture on government transfers through the direct payments. In case these transfers are decreased or they stop this would affect the financial stability of the Bulgarian agriculture. Insufficient increase in the GVA of the Bulgarian agriculture and small rate of investment growth affects its long term economic sustainability negatively. The Social and Environmental sustainability of the Bulgarian agriculture are assessed as good (the score for both of them is 0.53). The assessment of the Social aspect of the agrarian sustainability is based on five principles: Welfare of employed in agriculture; Conservation of farming; Gender equality; Social capital; and Adaptability to the social environment. Each of these principles is evaluated based on set of criteria and indicators. The lowest level has the sustainability index for the Social capital principle, the Gender equality principle and the Welfare of the employed in agriculture (Figure 3). The indicators used to assess the sustainability (Figure 4) of the Welfare of employed in agriculture are: Ratio of agricultural income to the average income in the country; Variation of payment of hired labor to factor income; Variation in the number of employed in agriculture to the entire population; Correspondence to official norms. While there is no big variation of the Payments of the hired labor to the factor income (the sustainability score of this indicator is 0.8 which mean High sustainability) and Variation in the number of employed (0.52 sustainability score which denotes Good sustainability), the other two indicators have low sustainability score - Ratio of agricultural income to the average income in the country has a score of only 0.15 and Correspondence to official norms - 0.27 that means they have Insufficient sustainability.

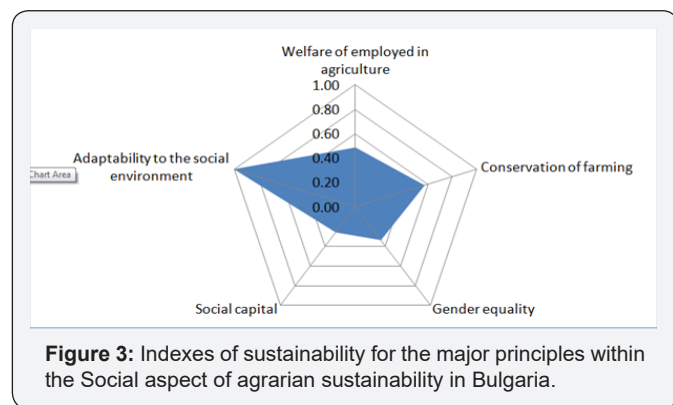


Figure 3: Indexes of sustainability for the major principles within the Social aspect of agrarian sustainability in Bulgaria.

Higher sustainability score has the Conservation of farming principle, although the share of trained farms is very low. Its sustainability score is only 0.06. This indicator emphasizes a specific problem that need and should be addressed. More employed in the agriculture should receive training and possibilities to develop their skills and knowledge in order to

increase the sustainability of the agricultural sector. One of the problems is that a big percent of the employed are seasonal workers that could not be trained specifically for a certain job or operation. Gender inequality is another major issue that Bulgarian agriculture faces and which leads to low score for the Equality principle. Based on data of the share of women farm managers the indicator value suggests that there is inequality. The percentage of women on managerial positions is low, as well as the number of women that own agriculture businesses. However, the women are active members of the rural community which could in future increase their decision-making roles.

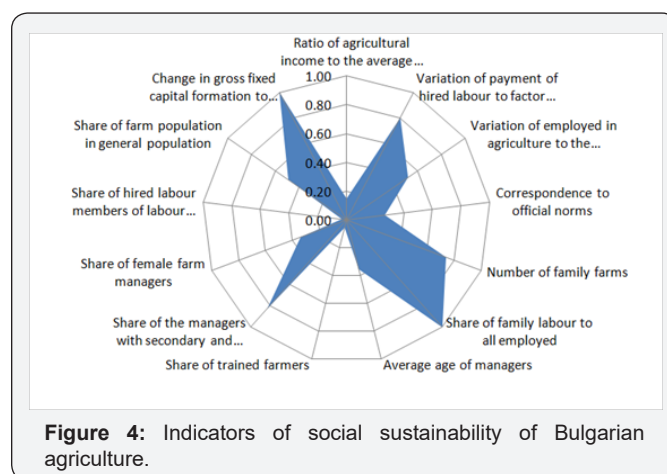


Figure 4: Indicators of social sustainability of Bulgarian agriculture.

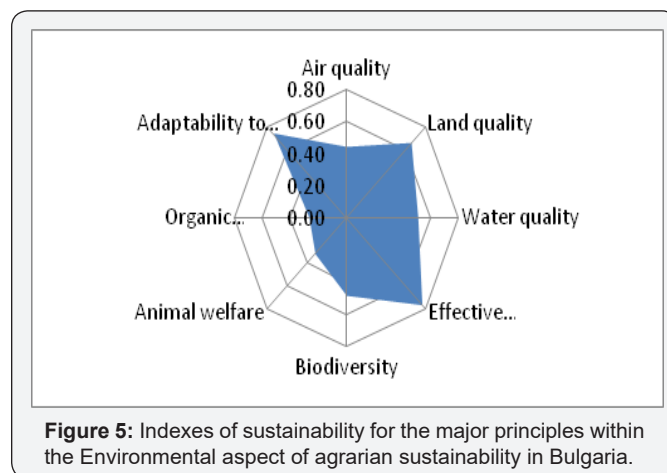


Figure 5: Indexes of sustainability for the major principles within the Environmental aspect of agrarian sustainability in Bulgaria.

The highest is the value of the Index of adaptability to the social environment. Having in mind the changing social structure, the decline in the number of employed in agriculture, as well as the demographic crisis in the rural areas, there is a positive trend in the ratio of gross fixed capital formation to labour availability. That means that the shortage of labour could be successfully resolved with more capital formation. The Environmental sustainability of the Bulgarian agriculture is assessed as Good with a score of 0.53. This is the aspect with most diverse indicators covering eight principles of environmental sustainability (Figure 5). The highest level of sustainability has been measured for the Effective energy consumption (0.77) and

the Adaptability to the environment (0.74). Concerns stem from the level of the indexes for some of the principles that are critical for ensuring environmental sustainability. Such principles are the Air quality, Biodiversity, Animal welfare, and Organic production.

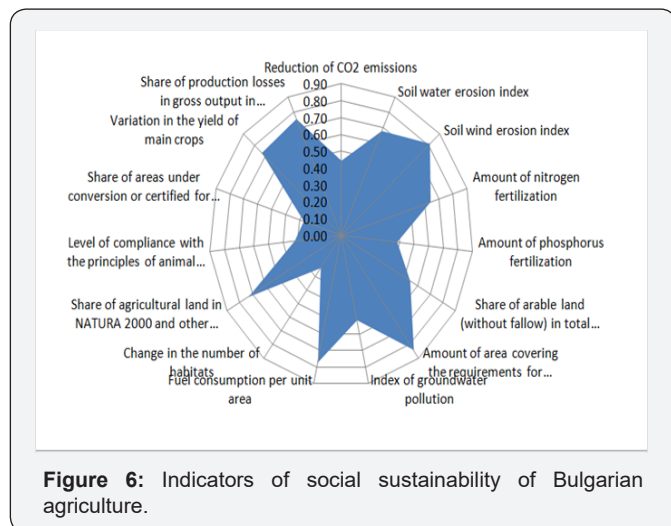


Figure 6: Indicators of social sustainability of Bulgarian agriculture.

The role of agriculture for maintaining and improving the air, water and soil quality, and preserving the biodiversity is important, since it has direct effects on the environment and its elements. As evident from the sustainability assessment we have conducted, these areas are also among the critical fields where the public and governmental efforts should be focused. The individual scores of the different indicators within the ecological aspect of sustainability are also very diverse (Figure 6). The highest sustainability score is calculated for the Amount of area covering the requirements for “green” direct payments through maintaining landscape elements (0.84) and the Soil wind erosion index (0.81). The high level of compliance of the Bulgarian farmers with the so called “green” requirements could be attributed to the different options they were able to choose from. The lowest score is for the following indicators: Change in the number of habitats (0.24), Share of areas under conversion or certified for organic production (0.27), and Level of compliance with the principles of animal welfare (0.32). All this indicators reveal that there is still much work needed in order to ensure that the agriculture does not harm the environment and the biodiversity. It is important to point out that in several areas the Bulgarian agriculture demonstrates strong sustainability, like the effective energy consumption. It should be made sure that in case of more intensive economic growth these high scoring factors will not deteriorate.

The agrarian sustainability assessment is important for detecting critical areas that should be addressed by the policy makers in Bulgaria. Previous attempts to assess the agriculture on macro-level haven’t been made, but on micro-level [12,13] analyzes the level of sustainability of the Bulgarian farms. According to survey with farm managers the economic

sustainability is weaker than the environmental and social at farm level. Our sectoral analyzes gives the opposite results - a higher economic sustainability and lower social and ecological. This could be due to several reasons - the different objectives and assessment methodology of studies. While our current assessment is on the sustainability of agriculture, the former study concerns sustainability of diverse farming structures (which is only a part of the sustainability of agrarian sector as a whole). Similarly, data for this study are at national level, from national statistics and are summarized, while farm level data used in referred publication is from survey with farm managers. It is well-known that the managers of agricultural holdings usually consider their economic situation as more important and often identify ecological and social aspects as secondary and therefore consider that these objectives are easier to achieve. Most of the managers in the survey quote that their activity meets almost all ecological and social requirements. This discrepancy is also a reason to implement a research at the farm level as part of this research project with the same methodology and indicators used at sectoral level. This will allow for full comparability of the results and will provide a picture of the actual differences in the way micro-and micro-level sustainability is assessed and evaluated in agriculture.

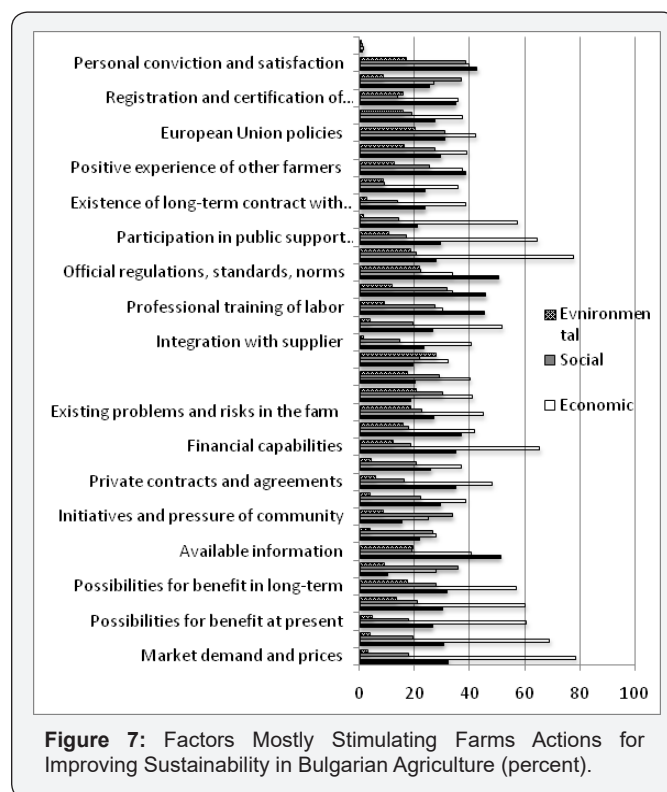


Figure 7: Factors Mostly Stimulating Farms Actions for Improving Sustainability in Bulgarian Agriculture (percent).

Diverse social, economic, market, ideological personal, etc. factors in various extent stimulate or restrict agricultural activities for sustainable operations and development. According to managers of Bulgarian farms, factors which to the greatest extent stimulate their actions for increasing governance sustainability of holdings are: Access to Advisory



Services, Professional Training of Manager and Hired Labor, Personal Conviction and Satisfaction, Positive Experience of Other Farms, Available Innovations, Financial Capability, Private Contracts and Agreements, and Registration and Certification of Products, Services, etc. (Figure 7). Factors which to the greatest extent stimulate actions of most farms for improving economic sustainability are: Market Demand and Prices, Received Direct State Subsidies, Market Competition, Financial Capability, Participation in Public Support Programs, Possibilities for Benefits in Present Moment, Possibilities for Benefits in Near Future, Tax Preferences, Possibilities for Benefits in Long-term, and Integration with Buyer of Product. For the biggest part of farms the factors which to the greatest extent stimulate their actions for enhancing social aspect of sustainability are: Personal Conviction and Satisfaction, Social Recognition of Contribution, Immediate Benefits for Other Persons and Groups, Community Initiatives and Pressure in Region, Access to Advisory Services, Policies of European Union, and Existing Problems and Risks in the Region.

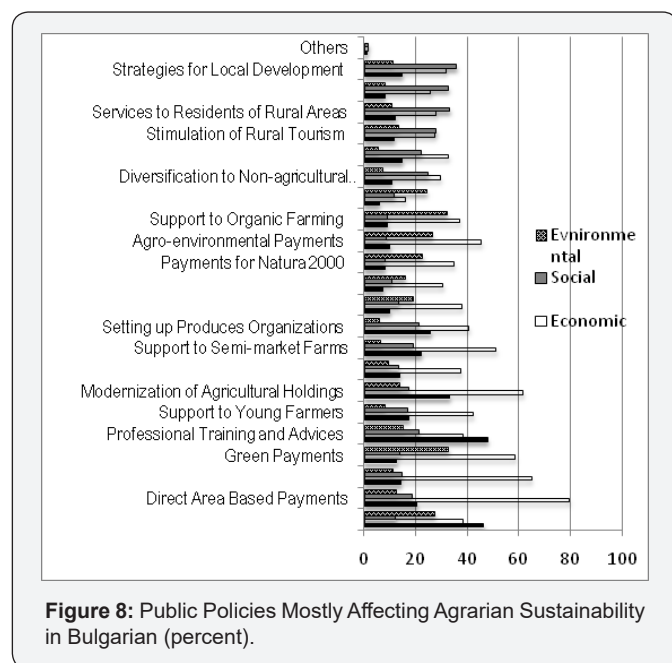


Figure 8: Public Policies Mostly Affecting Agrarian Sustainability in Bulgarian (percent).

Factors which to the greatest extent stimulate farming enterprises for increasing environmental sustainability are: Existing Problems and Risks in Global Scale, Official Regulations, Standards, Norms, etc., Existing Problems and Risks in the Region, and Policies of European Union. All these specific incentives for Bulgarian agriculture has to be taken into account in the process of modernization of public policies and programs for sustainable development. Our survey has found out that public policies relatively weakly affect governance sustainability of Bulgarian farms (Figure 8). National and European Union mechanisms of regulation and support, which to the greatest extent increase governance sustainability of surveyed holdings are: Professional Training and Advices, Obligatory Standards,

Norms, Rules and Restrictions, Modernization of Agricultural Holdings, and Setting up Produces Organizations. On the other hand, the impact on governance aspect of sustainability of smallest number of farms is from measures such as: Afforestation and Restoration of Forests, Natural Handicap Payments to Farmers in Non-mountain Areas, Payments for Natura 2000, and Restoration and Development of Residential Areas [14-17].

Diverse mechanisms of public support to the greatest extent improve economic sustainability of agriculture in the country. Instruments, which impact the economic sustainability, are: Direct Area Based Payments, National Tops Ups for Products, Livestock, etc., Modernization of Agricultural Holdings, Green Payments, Support to Semi-market Farms. The impact of national and European policies on social and environmental sustainability of Bulgarian agriculture is relatively smallest. Instruments, which augment social sustainability of the sector are: Strategies for Local Development, Services to Residents of Rural Areas, Restoration and Development of Residential Areas, and Stimulation of Rural Tourism. For improving environmental sustainability of Bulgarian agriculture most important are: Green Payments, Support to Organic Farming, Obligatory Standards, Norms, Rules and Restrictions, and Agro-environmental Payments. All these data for real impact of individual mechanisms and instruments of public support on different aspects of agrarian sustainability in Bulgarian are to be taken into account when improve support policies and programs in the sector.

### Conclusion

The development of coherent and adequate agricultural and food policies require recognizing the main critical areas that influence negatively the development of sustainable and efficient agriculture. Sustainability is a key concept that will have greater importance in the future, having in mind the problems the world population is facing with the climate and all unexpected effects of its change. Agricultural scientists have recognized the importance of sustainable agrarian development, although there is no universally accepted definition and methodology to assess it. This article offers methodology and assessment of the different aspects of the Bulgarian agrarian sustainability in its economic, social and ecological aspects. The overall level of sustainability is Good (0.58). All the aspects have been assessed as Good, but the sustainability index of the economic aspect (0.70) is significantly higher than the indexes of the social and ecological aspects (both 0.53). There are critical areas within each aspect that require specific measures in order to ensure the sustainable development of the Bulgarian agriculture.

The most important factors which stimulate to the greatest extent the actions for improving individual aspects of agrarian sustainability in Bulgaria are: Access to Advisory Services, Professional Training of Manager and Hired Labor, Personal Conviction and Satisfaction, Positive Experience of Other Farms,

Available Innovations, Financial Capability, Private Contracts and Agreements, and Registration and Certification of Products, Services, etc., Market Demand and Prices, Received Direct State Subsidies, Market Competition, Participation in Public Support Programs, Possibilities for Benefits in Present Moment, Possibilities for Benefits in Near Future, Tax Preferences, Possibilities for Benefits in Long-term, Integration with Buyer of Product, Social Recognition of Contribution, Immediate Benefits for Other Persons and Groups, Community Initiatives and Pressure in Region, Policies of European Union, Existing Problems and Risks in Region, Existing Problems and Risks in Global Scale, Official Regulations, Standards, Norms, etc. All these specific incentives have to be taken into account in improving public policies and programs of sustainable development.

National and European mechanisms of regulation and support, which affect to the greatest extent economic sustainability Bulgarian agriculture are: Direct Area Based Payments, National Top Ups for Products, Livestock, etc., Modernization of Agricultural Holdings, Green Payments, Support to Semi-market Farms. Impacts of national and European policies on governance, social and environmental sustainability of Bulgarian agriculture is relatively weak. Suggested holistic approach will be further experimented at different (subsector, ecosystem, regional, farm) levels, improved and ultimately applied for comparative studies of sustainability levels of Bulgarian and other (Chinese, East European, etc.) agricultures.

### References

1. Andreoli M, V Tellarini (2000) Farm sustainability evaluation: methodology and practice, *Agriculture, Ecosystems & Environment* 77(1-2): 43-52.
2. Bachev H (2008) Post Communist Transformation in Bulgaria - Implications for Development of Agricultural Specialization and Farming Structures, in *Agricultural Transformation: Concepts and Country Perspectives*, Icfai University Press, USA, pp. 91-115.
3. Bastianoni S, N Marchettini, M Panzieri, E Tiezzi (2001) Sustainability assessment of a farm in the Chianti area (Italy). *Journal of Cleaner Production* 9(4): 365-373.
4. FAO (2013) SAFA Sustainability Assessment of Food and Agriculture systems indicators, FAO.
5. Häni F, L Pintér, H Herren (2006) Sustainable Agriculture. From Common Principles to Common Practice, Proceedings of the first Symposium of the International Forum on Assessing Sustainability in Agriculture, Switzerland, Europe.
6. Sauvenier X, J Valekx, N Van Cauwenbergh, E Wauters, H Bachev (2005) Framework for Assessing Sustainability Levels in Belgium Agricultural Systems – SAFE. Belgium Science Policy, Brussels, Europe.
7. OECD (2001) Environmental indicators for agriculture. Methods and Results. OECD, Paris, France.
8. Bachev H (2010) Governance of Agrarian Sustainability. Nova Science Publishers, USA.
9. Bashev H (2016) The Sustainability of Farms. *Economics* 21(1): 20-53.
10. Bachev H (2016) A Framework for Assessing Sustainability of Farming Enterprises. *Journal of Applied Economic Sciences* 11(39): 24-43.
11. Bachev H, B Ivanov, D Toteva, E Sokolova (2016) Agrarian Sustainability and its Governance - Understanding, Evaluation, Improvement. *Journal of Environmental Management and Tourism* 7(4): 639-663.
12. Bachev H (2017) Sustainability level of Bulgarian farms. *Bulg J Agric Sci* 23(1): 1-13.
13. Bachev H, N Koteva, K Kaneva, D Terziev, D Vanev (2016) Sustainability of Bulgarian Farms during Reformed CAP Implementation, Proceedings of International Conference „Fostering agriculture innovation and business opportunities for rural renaissance“.
14. Bachev H (2014) Environmental management in agriculture - Mechanisms, Forms and Efficiency. LAP LAMBERT Academic Publishing.
15. Bachev H, N Koteva, M Mladenova (2014) The Effects Of Implementing European Policies In Agricultural Holdings In The Republic Of Bulgaria 4(1): 90-106.
16. Bachev Hrabrin, Ivanov, Bodjidar, Toteva (2017) Framework for Analyzing and Assessing the System of Governance and the Level of Agrarian Sustainability in Bulgaria and China.
17. Bachev H, B Ivanov, D Toteva, E Toteva (2017) Agrarian sustainability in Bulgaria - economic, social and ecological aspects. *Bulgarian Journal of Agricultural Science* 23 (4): 519-525.



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