
Hrabrin Bachev

# Agricultural Economics, Governance and Innovation in Bulgaria

Vol. 2

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# Preface

In Bulgaria, like in many other countries, practically there are no comprehensive assessments of the governance sustainability of agriculture and its importance for the overall agrarian development. This study tries to fill the gap and suggests a holistic framework for understanding and assessing the governance sustainability of Bulgarian agriculture. The newly elaborated approach is "tested" in a large-scale study for assessing the governance sustainability of country's agriculture at national, sectoral, regional, eco-system and farm levels. The study has proved that it is important to include the "missing" Governance Pillar in the assessment of the Integral sustainability of agriculture and sustainability of agro-systems of various type. Multiple Principles, Criteria and Indicators assessment of the Governance sustainability of Bulgarian agriculture indicates that the Overall Governance Sustainability is at a "Good" but very close to the "Satisfactory" level. Besides, there is a considerable differentiation in the level of Integral Governance sustainability of different agro-systems in the country. What is more, the individual indicators with the highest and lowest sustainability values determine the

"critical" factors enhancing and deterring the particular and integral Governance sustainability of evaluated agro-system. Last but not least important, results on the integral agrarian sustainability assessment based on micro (farm) and macro (statistical, etc.) data show some discrepancies which have to be taken into consideration in the analysis and interpretation, while assessment indicators, methods and data sources further improved.

The interdisciplinary New Institutional Economics framework is applied and assessment made on specific effects of major components of the "external" institutional environment on agrarian sustainability level in different administrative, geographical and ecological regions, subsectors of agriculture, and farms of variousjuridical type and size in Bulgaria. Our study has found out that individual elements of external institutional, market and natural environment affect quite unequally farms of different types, individual subsectors of agriculture, and specific ecological and geographical regions.This type of studies is to be expended and their precision and representation increased. The latter however, requires a close cooperation between all interested parties, and participation of the farmers, agrarian organizations, local and central authorities, interest groups, research institutes and experts, etc.

The issue of assessment sustainability of agricultural farms as a whole and of different type is among the most topical for researchers, farmers, investors, administrators, politicians, interests groups and public at large. Despite that practically there are no assessments on sustainability level of Bulgarian farms in conditions of European Union Common Agricultural Policy implementation. This article applies a holistic framework and assesses sustainability of Bulgarian farms as a whole and of different juridical type, size, production specialization, and ecological and geographical location. Initially the method of the study is outlined, and

overall characteristics of surveyed holdings presented. After that an assessment is made of integral, governance, economic, social, environmental sustainability of farms in general and of different type and location. Next, structure of farms with different sustainability levels is analyzed. Finally, factors for improving sustainability of Bulgarian farms are identified, and directions for further research and amelioration of farm management and public intervention in the sector suggested.Our study has found out that overall sustainability of Bulgarian farms is at a good level, with superior levels for environmental and social sustainability, and inferior level for governance and economic sustainability. There are great variations in sustainability levels of farms of different type and location as well as in shares of holdings with unlike level of sustainability. Factors which stimulate to the greatest extent the actions of Bulgarian farms for improving individual aspects of sustainability 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. National and European mechanisms of regulation and support, which affect to the greatest extent economic sustainability of Bulgarian farms are: Direct Area Based Payments, National Tops Ups for Products, Livestock, etc., Modernization of Agricultural Holdings, Green Payments, Support to Semi-market Farms.

A need to include "the fourth" Governance pillar in the concept for understanding and the assessment system of (overall and) agrarian sustainability is increasingly justified in academic literature and finds place in the frameworks of government, international, private, etc. organizations Nevertheless, still there is no general consensus on: whether

and how to include the governance as a new pillar of agrarian sustainability; how to define the governance sustainability; what are the relations between the governance sustainability of a farming enterprise and agriculture; what are the critical factors of governance sustainability; how to formulate, select, measure and integrate diverse sustainability indicators; and how to properly evaluate the level of governance sustainability, etc. In Bulgaria, like in many other countries, practically there are no comprehensive assessments of the governance sustainability of agriculture and its importance for the overall agrarian development. This study tries to fill the gap and suggests a holistic framework for understanding and assessing the governance sustainability of Bulgarian agriculture. The newly elaborated approach is "tested" in a large-scale study for assessing the governance sustainability of country's agriculture at national, sectoral, regional, eco-system and farm levels.The study has proved that it is important to include the "missing" Governance Pillar in the assessment of the Integral sustainability of agriculture and sustainability of agro-systems of various type. Multiple Principles, Criteria and Indicators assessment of the Governance sustainability of Bulgarian agriculture indicates that the Overall Governance Sustainability is at a "Good" but very close to the "Satisfactory" level. Besides, there is a considerable differentiation in the level of Integral Governance sustainability of different agro-systems in the country. Last but not least important, results on the integral agrarian sustainability assessment based on micro (farm) and macro (statistical, etc.) data show some discrepancies which have to be taken into consideration in the analysis and interpretation, while assessment indicators, methods and data sources further improved. Having in mind the importance of holistic assessments of this kind for improving the agrarian sustainability in general, and the Governance

sustainability of agriculture in particular, they are to be expended and their precision and representation increased. The later requires improvement of the precision through enlargement of surveyed farms and stakeholders, and incorporating more "objective" data from surveys, statistics, expertise of professionals in the area, etc. Since the elaboration of an effective framework for Governance sustainability assessment is far from complete our and other emerging suggestions have to be further discussed, experimented, improved and adapted to the specific conditions of evaluating agricultural system and needs of decision-makers at different levels.

(Agro)ecosystem services is a "new" term, which is rapidly and widely used in academicstudies, and policies and business practices around the globe.Nevertheless, in many countries around the globe, studies associated with agroecosystem services and their "management" are at the beginning stage.This article suggests a holistic framework for defining, evaluating and improving the system of governance of agro-ecosystem services. The interdisciplinary Theory of Ecosystem Services and the New Institutional Economy are adapted, and the governance of agroecosystem services defined, various related agents identified, principle forms and mechanisms of governance classified, an adequate criterion for assessing efficiency formulated, and stages for analysis and improvement of the system of governance characterized. The proposed new approach is based on the "building up" of a hierarchy of agro-ecosystems and services related to its different levels, and an assessment of the efficiency and complementarities of the governance modes and mechanisms, corresponding to each level of "provision" of agroecosystem services.

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20 June 2021

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# 1 Level of agrarian Governance sustainability in Bulgaria

## Introduction

A common feature of all suggested and practically used modern systems for assessing sustainability of agro-systems is incorporation of three "dimensions" or "pillars" of sustainability - economic, social and environmental (Bachev *et al.,* 2017; Cruz *et al.,* 2018; EC, 2001; FAO, 2013; Hayati *et al.,* 2010; Kamalia *et al.,* 2017; Lopez-Ridauira *et al.,* 2002; Lowrance *et al.,* 2015; OECD, 2001; Sauvenier *et al.,* 2005; Singh *et al.,* 2009; Terziev *et al.,* 2018; Van Loon *et al.,* 2005). In the last years aspecial attention has beenincreasing put on the (good) "governance" as a key for achieving multiple goals of sustainable development at corporate, sectoral, national and international levels (Bachev, 2010; Bosselmann *et. al.,* 2008; Gibson, 2006; EU, 2019; Simberova *et al.,* 2012; Kayizari, 2018; UN. 2015). What is more, the list of sustainability objectives has been constantly enlarged encompassing numerous governance, cultural,

ethical etc. standards and goals (Bachev, 2010; Scobie & Young, 2018). Simultaneously "new" (cultural, human, governance, etc.) pillars has been widely added to the modern definitionof sustainability and the systems of its evaluation and management (Altinay, 2012; ASA, 2019; Bachev, 2018; Nurse, 2006; RMIT University, 2017; UCLG, 2014).

The need to include "the fourth" governance pillar in the concept for understanding and the system of measurement of sustainability is increasingly justified in academic literature (Bachev, 2010, 2018; Baeker, 2014; Burford, 2017; Fraser *et al.*, 2006; Monkelbaan, 2017) as well asfinds place in the official documents of different (government, international, private, etc.) organizations (City of Brooks, 2019; EU, 2019; IFAD, 1999). Accordingly, numerous indicators are proposed to evaluate the governance aspect of sustainability mostly at national and international level including the state of formal institutional framework, implementing policies and strategies, human resources development, established capacity, management of public authorities, stakeholder involvement in public decision-making and control, etc. (Bell & Morse 2008; Bhuta & Umbach, 2014; CoastalWiki, 2019; Ganev *et al.*, 2018; Monkelbaan, 2017; Spangenberg *et al.*, 2002). Nevertheless, the building of the system for understating and assessing the "new" governance aspect (pillar) of agrarian sustainability is a "work in progress".

In Bulgaria, like in many other countries, there are a very few studies on governance issues related to agrarian sustainability (Bachev, 2010, 2018; Bachev *et al.*, 2016; Bachev & Treziev, 2018; Georgiev, 2013; Marinov, 2019; Zvyatkova & Sarov, 2018) and the governance aspect (pillar) of agrarian sustainability (Bachev, 2016, 2017, 2018; Bachev *et al.*, 2018; Bachev & Treziev, 2017, 2019). Moreover, practically there are no comprehensive assessments of the governance

sustainability in the sector and its importance for the overall agrarian sustainability at present stage of development.

This paper tries to fill the gap and suggests a holistic framework for assessing the governance sustainability of Bulgarian agriculture. The newly elaborated approach is applied (tested) in a first in kind large-scale study for assessing the governance sustainability of country's agriculture at national, sectoral, regional, eco-system and farm levels, and its contribution to the overall agrarian sustainability in Bulgaria.

## Study method and data

Sustainability of agriculture is a "system characteristic" andhas to be perceived as "ability to continue overtime" (Bachev, 2005; Hansen, 1996). It characterizes the ability (internal capability and adaptability) of agriculture to maintain its managerial, economic, social and environmental functions in a long period of time. Agrarian sustainability has four major aspects ("pillars") which are equally important and have to be always accounted for – governance sustainability, economic sustainability, social sustainability, and environmental sustainability.

The "governance sustainability"characterizes the efficiency of the specific system of governance in an evaluated agro-system (national, subsector, ecosystem, regional, farming enterprise, etc.). Accordingly,a "good governance"means a superior governance sustainability, while a "bad" (inefficient) governance corresponds to inferior governance sustainability.

Maintaining multiple functions (sustainability) of agriculture requires an effective social order - a system of diverse (governing) mechanisms and forms regulating, coordinating, stimulating, and controlling the behavior, actions and relations of individual agents at various levels – farm, local, regional, national, transnational, global (Bachev,

2010). The system of governance includes a number of district components all of which have to be included in the sustainability assessment - *institutional environment* ("rule of the game'), *market*modes and mechanisms ("market order'), *private* modes and mechanisms ("private order'), and*public* modes and mechanisms ("public order') (Figure 1).

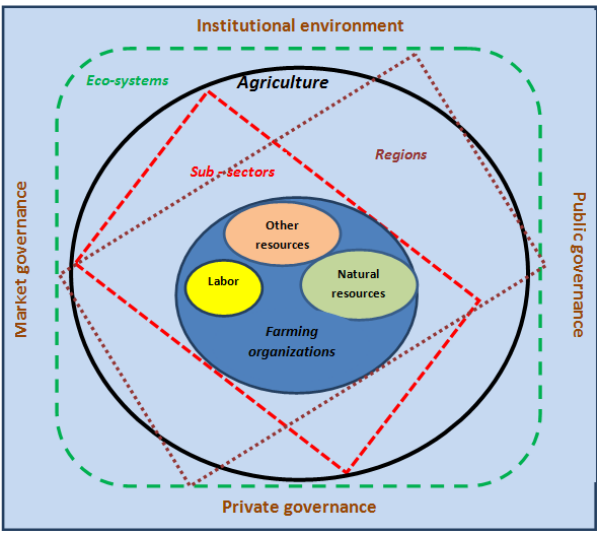



**Figure 1.** *Components and Levels of Assessment of Governance Sustainability in Agriculture*

Agriculture consists of many agro-systems – from individual "farming plot", a "farm enterprise", an "agri-ecosystem", an "agro-region", up to a "national", "European" and "global". In this study we focus on the assessment of the (governance) sustainability of Bulgarian agriculture at national level as well and for principle agricultural systems in the country – main type of farming organizations, major subsectors of agriculture, general kinds of agro-ecosystems, and all administrative (agro)regions (Figure 1). The farm is the lowest level, where the management and organization of agricultural activity (and sustainability) is carried out, and where all aspects of the

agrarian sustainability are "realized" and could be feasibly assessed (Bachev, 2005). That is why the farm (agro-system) is the first level of agrarian (economic, governance, integral, etc.) sustainability assessment.

In order to identify the individual indicators for assessing the(governance) sustainability of Bulgarian agriculture a hierarchical system of well-determined Principles, Criteria, Indicators, and Reference Values for each Aspect (Pillar) of sustainability is elaborated. Detailed justification of that *new*approach, and the ways and criteria for selection of sustainability Principles, Criteria, Indicators and Reference Values are presented in other publications by Bachev (2017, 2018), and Bachev *et al*,. (2017, 2018).

The *Governance Sustainability Principles*are "universal"and relate to the multiple functions of the agriculture representing the states of the sustainability, which is to be achieved. For the "specific" contemporary conditions of Bulgarian (and European Union) agriculture following five (governance sustainability) principles related to the generic (five) mechanisms and modes of governance[1]are identified: "Good legislative system","Democratic management", "Working agrarian administration", "Working market environment", and "Good private practices".

The *Governance Sustainability Criteria*are precise standards ("measurement approaches") for each of the Principlerepresenting a resulting state of the evaluated system when the relevant sustainability Principle is realized. For the contemporary conditions of the Bulgarian agriculture 20 Criteria for assessing diverse aspects of the governance sustainability are specified. For instance, for the Principle "Good legislative system" four Criteria are selected: "Harmonization with the European Union

[1] Components of the governance system of agriculture is comprehensively presented by Bachev (2010).

policies", "Extent of the European Union policies implementation", "Beneficiaries' satisfaction of the European Union policies", and "Policies effects" (Table 1).

The *Governance Sustainability Indicators* are quantitative and qualitative variables of different types which can be assessed in the specific conditions of the evaluated agri-system allowing measurement of compliance with a particular Criterion. The set of Indicators provides a representative picture for the agrarian sustainability in all its aspects. For assessing the Governance sustainability of the Bulgarian agriculture at micro (farm) and macro (sectoral, regional, eco-system, etc.) levels a system of respectively 22 and 26 Indicators are specified[2]. For instance, for the Criteria "Policies effects" an Indicator "Level of subsidies comparing to the average for the sector" is selectedfor farm level, as well as two Indicators for the aggregate (sectoral) level – "Coefficient of subsidies distribution from Pillar 1" and "Coefficient of distribution of investment support comparing to share in Net Value Added"(Table 1).

For assessing the particular sustainability level a system of specific Reference Values (sustainability norms, range, and standards) for each Indicator is needed. The *Governance Sustainability Reference Values*are the desirable levels for each Indicator according to the specific conditions of the evaluated agro-system. They assistthe assessment of the sustainability levels giving guidance for achieving (maintaining, improving) particular aspect and the overall agrarian sustainability. Most of the Reference Values show the level(s), at which the long-term sustainability of agrarian

[2] For the selection of the Sustainability Indicators a number of criteria, broadly applied in the sustainability assessment literature and practices, were used: "Relevance to reflecting aspects of sustainability", "Discriminatory power in time and space", "Analytical soundness", "Intelligibility and synonymity", "Measurability", "Governance and policy relevance", and "Practical applicability" (Sauvenier *et al.*, 2005).

Governance sustainability is "guaranteed" and improved. Depending on the extentof the Reference value achievementthe evaluated agro-system may be with a "high", "good", or "low" sustainability, or to be "unsustainable". For instance, agrarian system with a higher than the sectoral public support (level of subsidies) is more sustainable then othersas far as "Policy effects" are concerned, and vice versa.

Very often individual Indicators for each Criterion and/or different Criteria, and Principles of sustainability are with unequal, and frequently with controversial levels. That significantly hardens the overall assessment requiringa transformation into "unitless"Sustainability Index and integration of estimates (Figure 2).Diverse quantitative and qualitative levels for each indicator are transformed into a Index of sustainability (ISi)applying appropriate scale for each Indicator (Bachev et al., 2018).

The Integral Sustainability Index for a particular Criterion (SI(c)), Principle (SI(p)), and Aspect of sustainability (SI(a)), and the Integral Sustainability Index (SI(o)) for evaluated agro-system is calculated applying "equal weight" for each Indicator in a particular criterion, of each Criterion in a particular Principle, and each Principle in every Aspect of sustainability. Using "equal" rather thandifferentiated weight is determined by the fact that individual Sustainability Aspects, and indeed Sustainability Principles, are "by definition" equally important for the Integral Agrarian Sustainability. At the same time, differentiation of the weights of individual Criteria within each Principle and the individual Indicators within each Criteria is difficult to justify as well as to a great extent unnecessary (practically unimportant for the Integral assessment) having in mind the

big number and small relative contribution of each Indicator[3].

The Integral Index for a particular Criterion (SI(c)), Principle (SI(p)), and Aspect of sustainability (SI(a)), and the Integral Sustainability Index (SI(o)) arearithmetic averages of the Indices of composite Indicators, Criteria and Principles, calculated by the following formulas:

SI(c) = ∑SI(i)/n n – - number of Indicators in a particular Criterion;

SI(p) = ∑SI(c)/nn - number of Criteria in a particular Principle;

SI(a) = ∑SI(p)/nn - number of Principles in a particular Aspect,

SI(o) = ∑SI(a)/4

For assessing the level of Governance and Integral sustainability of agro-systems in Bulgaria the following scale, defined by the leading experts in the area (Bachev *et al.,* 2018) are used:

Index range 0,81-1 for a "High" level of sustainability;

Index range 0.50-0,8 for a "Good" level of sustainability;

Index range 0,26-0,49 for a "Satisfactory" level of sustainability;

Index range 0,06-0,25 for an "Unsatisfactory" level of sustainability;

Index range 0-0,05 for "Non-sustainable" state.

Elaborated holistic framework for assessing the Governance sustainability of Bulgarian agriculture is tested using expertsand stakeholdersassessments, and 2018 survey

[3]Calculations with and without differentiated weights do not find any significant variations in the sustainability levels (Bachev *et.al,* 2019).

data[4] from the managers of 104 "typical farms" of different size and juridical type, production specialization, and ecological and geographical locations. The structure of surveyed farms approximately corresponds to the real structure of farms in different categories in Bulgaria. Classification of the surveyed farms into juridical type, size, production specialization, and ecological and geographical location is done according to the official definitions currently used in Bulgaria (and European Union).

In Bulgaria, like in many other countries, there are no official data for calculating most of the governance, socio-economic and environmental sustainability indicators at lower (farm, eco-system, subsector, regional, etc.) level (Bachev *et. al.,* 2018). Therefore, micro and middle level assessment of socio-economic, environmental and governance sustainability is entirely based on the "original" first-hand information collected from the farm managers. The composite (Aspect and Integral) Sustainability Index of each evaluated agri-system (farming organization, agricultural subsector, agri-ecosystem, geographical region, etc.) is calculated as an arithmetic average of the Indices of relevant farms belonging to that system.

Assessment of the Governance sustainability at national (sectoral) level is evaluated in two ways – using experts and stakeholders (farmers, producers' organizations, etc.) estimates, and though aggregation ofthe information from the conducted farms survey.

## Results and discussion

Micro data collected from the farm managers are very important for the proper assessments of different aspects of

[4]Author express their gratitude to the National Agricultural Advisory Service for conducting the survey, and to participated farm managers for providing the valuable information.

the Governance Sustainability of agriculture generally and at various levels. Following parts of the paperpresents a detailed analysis of the Governance sustainability of Bulgarian agriculture based of the original farm survey data.

## 3.1. Integral level of governance sustainability

A multiple indicators assessment of the Governance sustainability level of Bulgarian agriculture indicates that the Index of Overall Sustainability is 0,51 - this represents a close to the lower ("Satisfactory") but still a "Good" level of Governance sustainability of the sector (Figure 2).

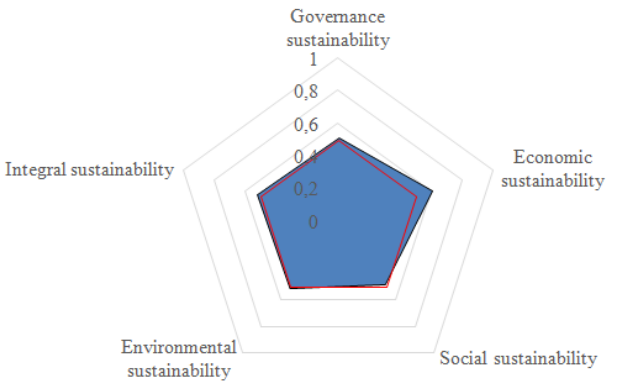



**Figure 2.** *Levels of Governance, Economic, Social, Environmental and Integral Sustainability of Bulgarian Agriculture*
**Source:** survey with farm managers

Analysis of individual Indexes for the primary sustainability Principles, Criteria, and Indicators allowsidentifyingindividual components contributing to the Governance sustainability of this important sector of Bulgarian economy. For instance, the Governance sustainability of Bulgarian agriculture is relatively low because the Index for the Principle "Good Private Practices" is at "Satisfactory" level (0,46) and compromises the Pillar's Integral sustainability (Figure 3). Moreover, Indices for

"Good Legislative System" and "Democratic management" are quite low and at the border with the "Satisfactory"level - 0,5 and 0,51 accordingly. At the sametime, Indices for the Principles "Working agrarian administration" (0,55) and "Working market environment" (0,54) are highest and contribute most for elevating (ensuring) the Governance Sustainability of the sector.

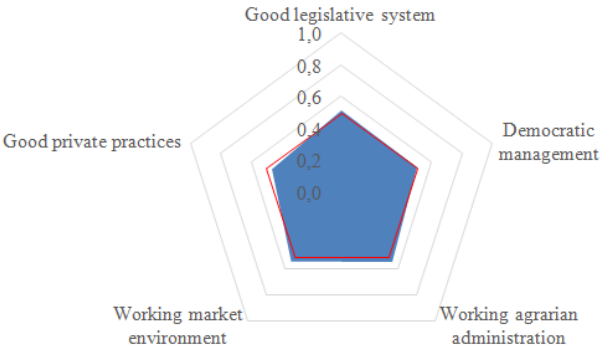



**Figure 3.** *Indices of Sustainability for Major Principles of Governance Sustainability of Bulgarian Agriculture*
**Source:** author's calculation

In depth analysis of the levels of the individual Criteria and Indicators further specifies the elements that enhance or reduce country's agricultural Governance sustainability. For instance, the insufficient "Good Private Practices"is determined by the low "External control" (over management) (0,38), weak "Contracts enforcement" (0,49) and inferior "Informal system efficiency" (0,43) (Figure 4).Similarly, despite that the Integral Index for "Democratic management" Principle is at a "Good" level, Indices for two criteria (policies)"Impact" and "Stakeholder participation in decision-making") are quite low at satisfactory territory. Likewise,"Working agrarian administration" seems "Good" but "Access to administrative services" is actually very low (0,34) at "Satisfactory" sustainability level. The same is true

for the "Working market environment" which is "Good" while Index for the Criteria "Resource concentration" reviles low sustainability (0,43).

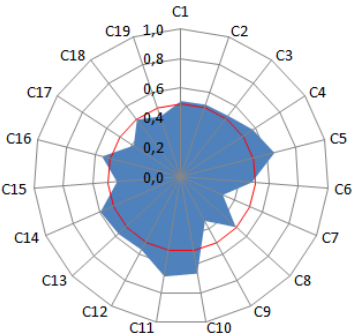



**Figure 4.** *Indices of Sustainability for Major Criteria* of Governance Sustainability of Bulgarian Agriculture*

**Notes:** *C1-Extent of policies implementation; C2-Extent of beneficiary satisfaction of EU policies; C3-Policies effects; C4-Representation; C5-Transparency; C6-Impact; C7-Stakeholder participation in decision-making; C8-Minimum costs of using; C9-Access to administrative services; C10-Information availability; C11-Quality of services; C12-Market access; C13-Free competition; C14-Competitive allocation of public resources; C15-Resource concentration; C16-Regulation implementation; C17-External control; C18-Contracts enforcement; C19-Informal system efficiency

**Source:** author's calculation

Individual sustainability Indicators give precise information about the specific factors determining one or another values of a particular Criteria. For example, ineffective "Access to administrative services" is determined accordingly by the insufficient "Agrarian administration efficiency"(0,31) and undeveloped "Administrative services digitalization"(0,37) (Figure 5). Likewise "Satisfactory" sustainability for the "Resource concentration" is a consequence of the (low) "Possibility for lands extension" (0,37).

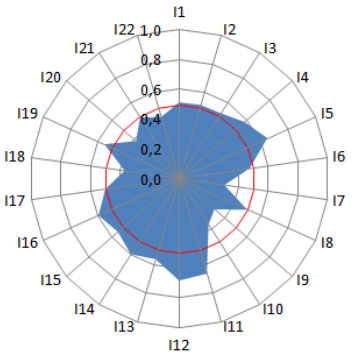



**Figure 5.** *Indicators* for Assessing the Governance Sustainability of Bulgarian Agriculture*

**Notes:** * I1-Extent of CAP implementation; I2-Extent of beneficiary satisfaction of EU policies; I3-Subsidies distribution; I4-Representativeness of state and local authorities; I5-Access to information; I6-Subsidies in Income; I7-Farmer's participation in decision-making; I8-Acceptability of legal payments; I9-Agrarian administration efficiency; I10-Administrative services digitalization; I11-Extent of awareness; I12-Administration service costs; I13-Market access difficulties; I14-Market competition; I15-Prices negotiation possibilities; I16-Extent of competitive allocation of public resources; I17-Lands concentration; I18-Possibility for lands extension; I19-Extent of regulations implementation; I20-Management Board external control; I21-Extent of contract enforcement; I22- Level of informal system efficiency.

**Source:** survey with farm managers

The low values for the Indicators help identify specific areas that require improvement through adequate changes in the institutional environment, public policy, modernization of agrarian administration, collective actions and/ormanagement strategies. At the current stage of the development the most critical for increasing the Governance sustainability of country's agriculture areprogressive improvements in following directions: "Farmer's participation in decision-making" (0,31), "Agrarian administration efficiency" (0,31), "Administrative services digitalization" (0,37), "Possibility for lands extension" (0,37), "Management Board external control"(0,38), "Level of

informal system efficiency"(0,43), "Subsidies in Income" (0,48), "Extent of contract enforcement" (0,49), "Acceptability of legal payments" (0,5), and "Lands concentration" (0,5).

The higher levels of certain Indicators show the absolute and comparative advantages of the Bulgarian agriculture in terms of good governance and sustainable development. At the current stage of development, the most prominent of these include: "Representativeness of state and local authorities" (0,58), "Market competition" (0.6), "Extent of competitive allocation of public resources" (0.6), "Access to information" (0.65), "Extent of awareness" (0.66), and "Administration service costs" (0.68). Nevertheless, the top value(s) of the Governance sustainability Indicators in Bulgarian agriculture is relatively low. Therefore, there is a great potential for improvement of governance efficiency and further elevate the Governance and Overall sustainability.

## 3.2. Governance sustainability in major sub-sectors

The analysis of the Governance sustainability of different sub-sectors of Bulgarian agriculture shows that there is a great variation in the sustainabilitylevel. The highest ("Good") level of Governance sustainability is demonstrated in the "Mix livestock" production (0,59), followed by the "Vegetables, flowers, mushrooms" and "Mix crop-livestock"sectors (0,53)(Figure 6). Therefore, these three subsectors contribute to greatest extent for improving (maintaining) the overall Governance sustainability of Bulgarian agriculture.

On the other hand, the level of Governance sustainability in the "Grazing livestock" (0,52), "Permanent crops" (0,5), and "Beekeeping" (0,5) is close to the average in the sector. Finally, in some major subsectors like "Field crops" (0,47) and "Mix crops" (0,49), the level of the Governance sustainability is "Satisfactory" and far below the general one.

This means that the later subsectors decrease in a biggest degree the Integral Governance sustainability of country's agriculture.

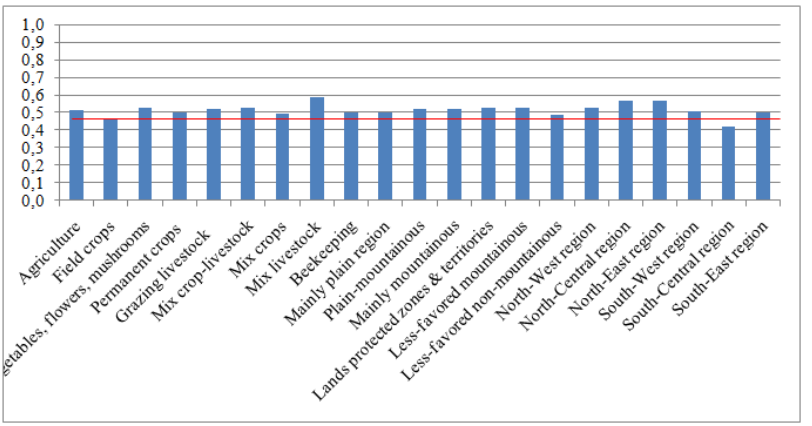



**Figure 6.** *Governance Sustainability in Different Sub-sectors of Agriculture, Agri-ecosystems and Agrarian Regions of Bulgaria*
**Source:** survey with farm managers

The different sub-sectors of Bulgarian agriculture are characterized by significant variation of the levels of Indices of the main Principles of the Governance sustainability (Figure 7). For instance, the Principle "Good legislative system" is the best realized in the "Vegetables, flowers, mushrooms" production (0,58) and "Mix-livestock" operations (0,57), and the worst in"Field crops" and "Grazing livestock" sub-sectors (0,47). The Principle of "Democratic management" is the best applied in the "Mix livestock" production (0,62), while it is not "Satisfactory" in the "Beekeeping" (0,46), and "Mix crops" and "Mix crop-livestock" sub-sectors (0,49). The interior and superior levels of the Governance sustainability for particular Principles show the directions for improving the Governance sustainability in the relevant sub-sectors of agriculture.

The Principle "Working agrarian administration" is effectively applied in "Beekeeping" (0,57), and "Grazing

livestock" and "Mix crop-livestock" (0,56), while agrarian administration does not "work" well in the sector of "Field crops" (0,44).The sustainability for the Principle "Working market environment" is the highest in "Mix livestock" (0,64), "Beekeeping" (0,63)and "Mix crop-livestock" (0,58). Simultaneously, market mechanisms are not working very well for the "Field crops" producers (0,5). Finally, "Good private practices" are the best implemented in the subsector of "Mix livestock" (0,62) and "Mix crop-livestock" (0,5), while in all other subsectors they are applied only "Satisfactorily", being particularly inferior in the "Beekeeping" (0,37) and"Field crops" (0,41).

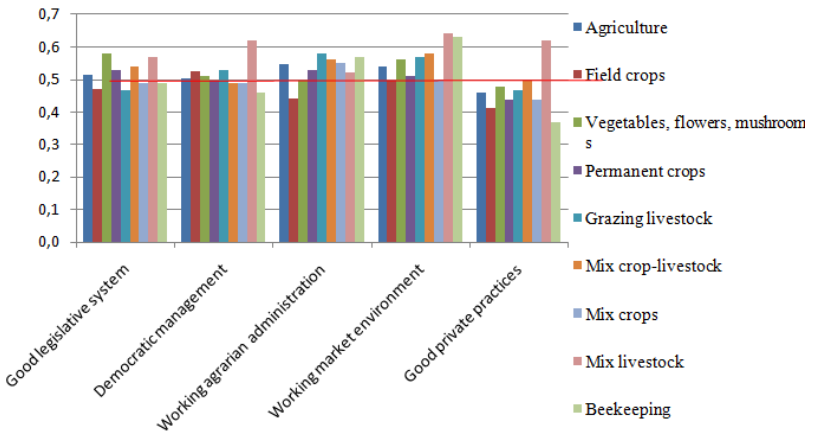



**Figure 7.** *Indices of the Principles of Governance Sustainability in Major Sub-sectors of Bulgarian agriculture*
**Source:** survey with farm managers

In depth analysis of that type identifying inferior (critical) levels for sustainability Principles has also a high practical value since they showthe specific directions (public, collective and private action areas) for improving the particular (Principle) and the Integral Governance

sustainability in the evaluated subsector and agriculture in general.

Further analysis of the sustainability level for the individual Indicators allows "complete" unpacking the "critical" factors enhancing and/or decreasing the Governance sustainability of each sub-sector. Our assessment has found out that different agricultural sub-sectors in Bulgaria are characterized by asignificant variation in the levels of individual Governance Sustainability Indicators.

The "Field crops" subsector of country's agriculture has a"Good" Governance sustainability for:" Market competition" (0,68), "Representativeness of state and local authorities" (0,61), "Market access difficulties" (0,59), "Access to information" (0,58), "Administration service costs 0,55), "Subsidies in Income" (0,54), "Subsidies distribution" (0,53), and marginal for the "Prices negotiation possibilities" (0,5) (Figure 8). At the same time for the most of the Indicators the Governance sustainability level is "Satisfactory" – "Agrarian administration efficiency" (0,37), "Extent of regulations implementation" (0,37),"Farmer's participation in decision-making (0,37), "Level of informal system efficiency" (0,38), "Acceptability of legal payments" (0,41), "Extent of CAP implementation" (0,42), "Management Board external control" (0,43), "Extent of contract enforcement" (0,47), "Extent of beneficiary satisfaction of EU policies" (0,47), "Extent of awareness" (0,48), "Lands concentration" (0,48), "Possibility for lands extension" (0,48). Fortwo indicators the value of particularly low in this type of production - "Administrative services digitalization"
(0,3) and "Extent of competitive allocation of public resources" (0,33).

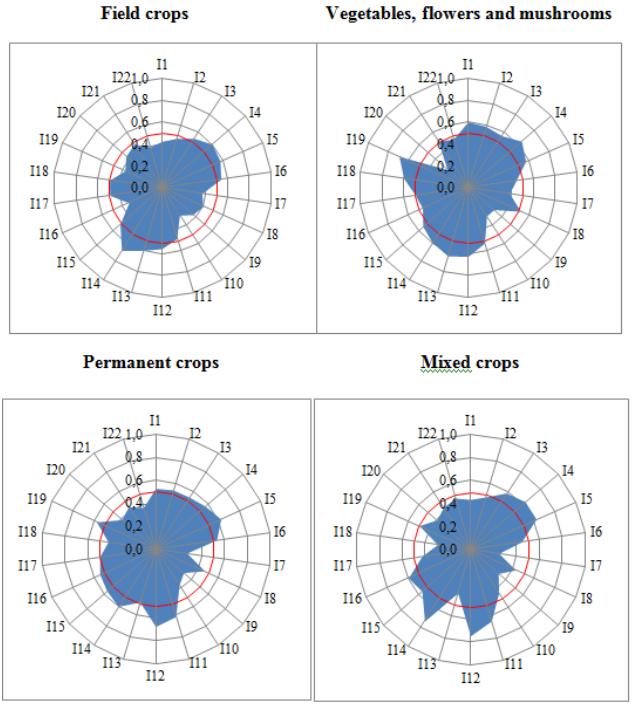



**Figure 8.** *Governance Sustainability Indicators in Different Crop Subsectors of Bulgarian Agriculture*

The Governance sustainability of the Bulgarian "Vegetables, flowers and mushrooms" subsector is "Good" for a number of Indicators with the highest scores for: "Extent of regulations implementation" (0,69), "Representativeness of state and local authorities" (0,65), "Market access difficulties" (0,65), "Administration service costs" (0,63), "Extent of CAP implementation" (0,6), and "Market competition" (0,6) (Figure 8). Simultaneously, the Governance sustainability of this important subsectors of agriculture is at "Satisfactory" level for numerous Indicators such as: "Farmer's participation in decision-making" (0,38), "Subsidies in Income" (0,44), "Level of informal system efficiency" (0,46), "Extent of competitive allocation of public resources" (0,46), "Lands concentration" (0,49), and quite

low for "Agrarian administration efficiency (0,31) and "Administrative services digitalization" (0,31). What is more, for the Indicator "Management Board external control" (0,25) the Governance sustainability is at "Unsatisfactory"level affecting adversely the overall Governance sustainability of that industry.

The Governance sustainability of the subsector of "Permanent crops" is "Good" for a number of Indicators, among which the superior are: "Administration service costs" (0,68),"Access to information" (0,62), "Extent of awareness" (0,62), "Market competition" (0,6)(Figure 8). At the same time, the level of Governance sustainability is "Satisfactory" for: "Administrative services digitalization" (0,38),"Level of informal system efficiency" (0,38), "Management Board external control" (0,39), "Possibility for lands extension" (0,42), "Extent of contract enforcement" (0,43), "Acceptability of legal payments" (0,47), "Market access difficulties" (0,49) and "Lands concentration" (0,49). Furthermore, the Governance sustainability of this important subsector of Bulgarian agriculture is particular low for the "Agrarian administration efficiency" (0,32) and close to the border with the "Unsatisfactory" level for the "Farmer's participation in decision-making" (0,27).

The Governance sustainability of the "Mix crops" productions is "Good" for several Indicators but particularly high for: "Market competition" (0,74), "Administration service costs" (0,75), "Extent of awareness" (0,65), "Representativeness of state and local authorities" (0,63) and "Access to information" (0,63)(Figure 8). Simultaneously, this subsector demonstrates "Satisfactory" Governance sustainability for: "Market access difficulties" (0,39), "Management Board external control" (0,39)."Extent of CAP implementation" (0,43), "Acceptability of legal payments" (0,43), "Lands concentration" (0,43),"Extent of contract enforcement" (0,43), "Subsidies in Income"

(0,45),"Administrative services digitalization" (0,45), "Level of informal system efficiency" (0,46),"Extent of beneficiary satisfaction of EU policies" (0,47), and "Extent of regulations implementation" (0,49). Besides, the Governance sustainability in this subsector is particularly low for the "Possibility for lands extension"(0,29) and "Agrarian administration efficiency" (0,32) and "Unsatisfactory" for "Farmer's participation in decision-making" (0,25).

The state of the Governance sustainability in different livestock productions of the Bulgarian agriculture issimilar,and a great variation in the value of the individual Indicators can be seen. The Governance sustainability in the "Grazing livestock" sub-sector is particularly "Good" for a number of areas: "Extent of awareness" (0,72), "Access to information" (0,69), "Market access difficulties" (0,67), "Representativeness of state and local authorities" (0,67), "Administration service costs" (0,65), "Acceptability of legal payments" (0,61) and "Extent of competitive allocation of public resources" (0,61) (Figure 9). Along with this however, this production experiences "Unsatisfactory" level of governance efficiency in multiple directions – "Possibility for lands extension" (0,33), "Farmer's participation in decision-making" (0,35), "Management Board external control" (0,36), "Administrative services digitalization" (0,41), "Subsidies in Income" (0,42), "Extent of CAP implementation" (0,43), "Extent of beneficiary satisfaction of EU policies" (0,43), and "Level of informal system efficiency" (0,49). Moreover, the level of Governance sustainability for the Indicator "Agrarian administration efficiency" (0,27) is very low and close to the "Unsatisfactory" level.

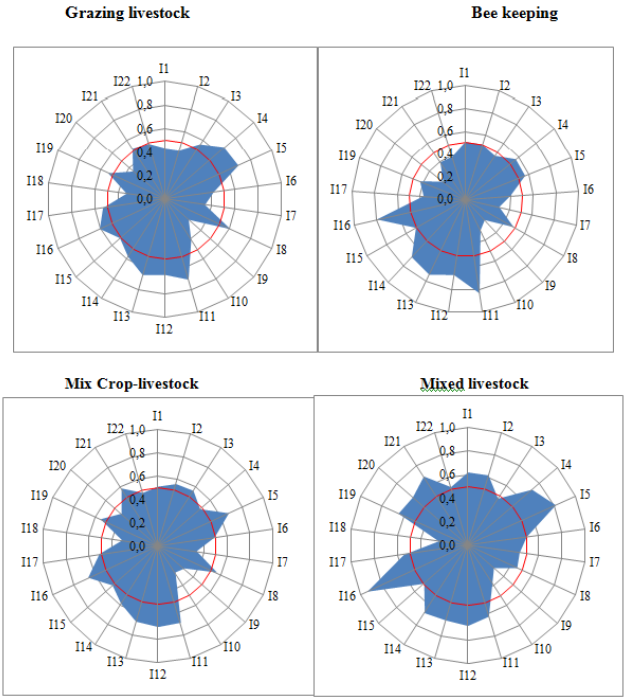



**Figure 9.** *Governance Sustainability Indicators in Different in Different Livestock Sub-sectors of Bulgarian Agriculture*
**Source:** survey with farm managers

The Governance sustainability in "Beekeeping" is "High" for the "Extent of awareness" (0,84), and very "Good" and at the border with the top level for the "Extent of competitive allocation of public resources"(0,8)(Figure 9). This sub-sector of Bulgarian agriculture also demonstrates "Good" value of sustainability Indicators for the "Market access difficulties" (0,74), "Market competition" (0,7) and "Administration service costs" (0,68). At the same time, numerous Indicators of the Beekeeping's Governance sustainability are quite low at "Satisfactory" level such as: "Farmer's participation in decision-making" (0,31),"Administrative services digitalization"(0,31), "Lands concentration" (0,37), "Extent of contract enforcement" (0,39), "Level of informal system efficiency" (0,39), "Subsidies in Income" (0,4), "Extent of

regulations implementation" (0,43),"Subsidies distribution" (0,46), and "Acceptability of legal payments" (0,49). What is more, that subsector's Governance sustainability is "Unsatisfactory" is two areas – "Agrarian administration efficiency" (0,25) and "Management Board external control" (0,25).

The Governance sustainability of "Mix crop-livestock" productions of Bulgarian agriculture is "Good" for numerous Indicators among which the superior are: "Administration service costs" (0,70),"Access to information" (0,67), "Extent of awareness" (0,69), "Market access difficulties" (0,68), and "Extent of competitive allocation of public resources" (0,66) (Figure 9). Simultaneously, that subsector's Governance sustainability is "Satisfactory" in multiple directions –"Agrarian administration efficiency" (0,3),"Possibility for lands extension" (0,31), "Farmer's participation in decision-making" (0,33), "Management Board external control" (0,42), "Level of informal system efficiency" (0,47), "Representativeness of state and local authorities" (0,48), and "Subsidies in Income" (0,49). Furthermore, the state of the Governance sustainability in this subsector is quite low and close to the "Unsatisfactory" level for the "Administrative services digitalization" (0,27).

The Governance sustainability of the "Mix livestock" productions of agriculture is "High" for the "Extent of competitive allocation of public resources" (0,93) and "Access to information" (0,82) (Figure 9). Furthermore, this industry demonstrates a very "Good" level for many indicators such as: "Representativeness of state and local authorities" (0,72), "Extent of contract enforcement" (0,69),"Administration service costs" (0,68), "Market competition" (0,68), "Market access difficulties" (0,66), "Extent of regulations implementation" (0,65), "Extent of awareness" (0,62), "Management Board external control"

(0,62),"Extent of CAP implementation" (0,61), and "Extent of beneficiary satisfaction of EU policies" (0,61). Nevertheless, for several key areas the Governance sustainability is at "Satisfactory" level - "Administrative services digitalization" (0,38), "Farmer's participation in decision-making" (0,44), "Acceptability of legal payments" (0,46), "Subsidies distribution" (0,47) and "Prices negotiation possibilities" (0,49). What is more, for the Indicator "Agrarian administration efficiency" (0,29) the Governance sustainability is quite low and near to the "Unsatisfactory" level, while for the "Possibility for lands extension" (0,25) it is within "Unsatisfactory"territory.

## 3.3. Governance sustainability in major agro-ecosystems

The Governance sustainability of major agro-ecosystems in Bulgaria also demonstrates a great variation as the highest ("Good") ones are registered for the agro-ecosystems with "Lands in protected zones and territories" (0,53) and those in "Less-favored mountainous"regions (Figure 6). At the same time, the Governance sustainability of two agro-ecosystems - "Mainly plain" (0,5) and "Less-favored non-mountainous" (0,49) arebelowthe national (sectoral) average, the second one being at inferior ("Satisfactory") level. Therefore, the later two type of agro-ecosystems decrease to the biggest extent the Integral Governance sustainability of Bulgarian agriculture.

The different agro-ecosystems of the country are further characterized by significant differentiations in the levels of Indices of main Principles of the Governance sustainability (Figure 10).The principle "Good legislative system" is the best implemented at "Good" levelin the "Plain-mountainous" agro-ecosystems (0,56), while in the "Less-favored non-mountainous" (0,45) and"Mainly plain" regions it is at "Satisfactory" level (0,49). On the other hand, the

principle of "Democratic management" is the best realized in "Less-favored non-mountainous" agro-ecosystems (0,56), in the most other type it is the same or close to the sectoral average (0,5), and in the "Mainly plain" regions it is at "Satisfactory" level (0,49). Furthermore, the principle "Working agrarian administration" is better applied inthe agro-ecosystems in "Less-favored mountainous" regions (0,6), those with "Lands in protected zones and territories" (0,57), andin "Mainly mountainous" regions (0,55) while in allother types it is in below the national level. Similarly, the Principle "Working market environment" is with the highest value inthe agro-ecosystems in "Mainly mountainous" regions (0,6), "Less-favored mountainous" regions (0,58), and "Less-favored non-mountainous" regions (0,57), while in other agro-ecosystems it is worse than national one. Finally, the Governance sustainability for the Principle "Good private practices" is best implemented in the "Lands protected zones and territories" (0,53), while in all other agro-ecosystems it is at "Satisfactory" level, being far worse than the sectoral average in the "Less-favored non-mountainous" regions (0, 36).

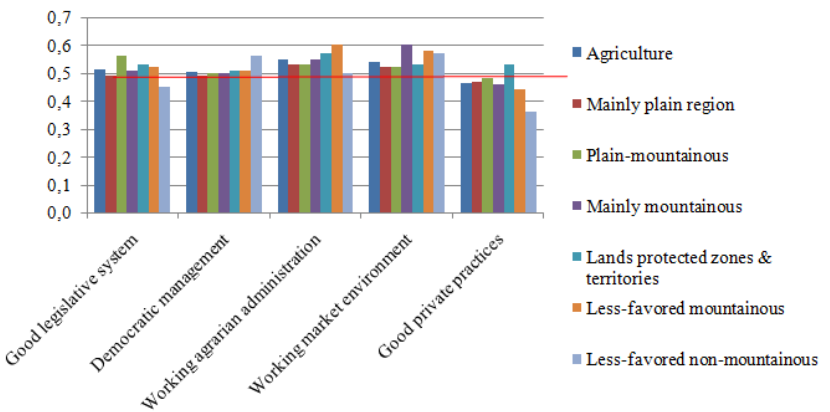



**Figure 10.** *Indices of the Principles of Governance Sustainability in Major Agri-ecosystems in Bulgaria*
**Source:** survey with farm managers

Individual Indicators for the Governance sustainability of specific agro-ecosystems of the country have quite different values. Sustainability of the agro-ecosystems in "Mainly plain" regions are with the highest governance Indicators for: "Access to information"(0,64), "Extent of awareness" (0,64), "Administration service costs" (0,64) and "Market competition" (0,6) (Figure 11). At the same time, multiple factorsassociated with the imperfections in the governance system are "Satisfactory" decreasing the (Governance) sustainability of these agro-ecosystems: "Possibility for lands extension" (0,33), "Administrative services digitalization" (0,34), "Management Board external control" (0,4), "Level of informal system efficiency" (0,43), "Lands concentration" (0,45), "Extent of CAP implementation" (0,49), "Subsidies distribution" (0,49), "Subsidies in Income" (0,49). Particularly low in this important areas are the Indices for the "Farmer's participation in decision-making" (0,27) and "Agrarian administration efficiency" (0,3).

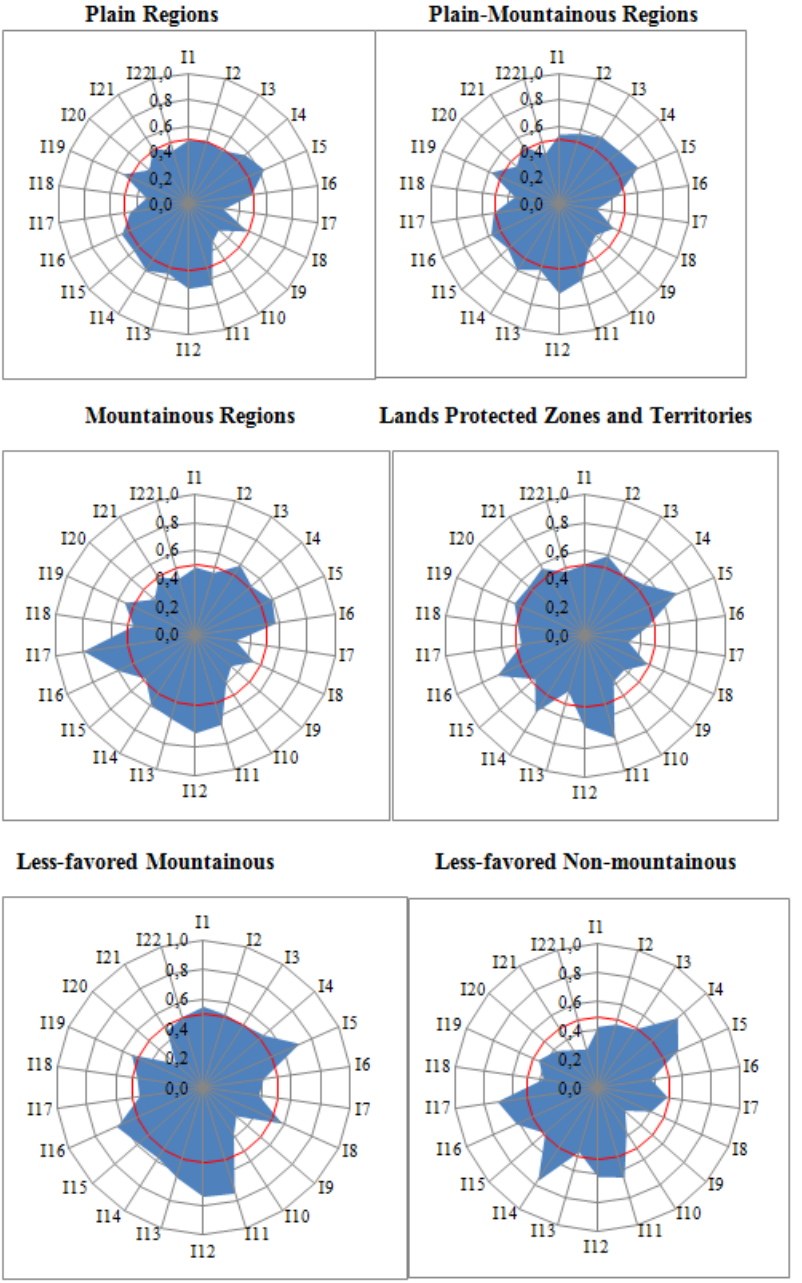



**Figure 11.** *Governance Sustainability Indicators in Different Agri-ecosystems in Bulgaria*
**Source:** survey with farm managers

The greatest Governance sustainability Indicators for the agro-ecosystems in the "Plain-Mountainous Regions" of the country are: "Administration service costs" (0,69), "Access to information" (0,66), "Extent of awareness" (0,61), "Representativeness of state and local authorities" (0,61), "Subsidies distribution" (0,6), and "Market competition" (0,6) (Figure 11). Simultaneously, for a number of key Indicators level of Governance sustainability is "Satisfactory": "Possibility for lands extension" (0,35),"Agrarian administration efficiency" (0,37),"Level of informal system efficiency" (0,39),"Administrative services digitalization" (0,41),"Management Board external control" (0,43),"Subsidies in Income" (0,45), and "Acceptability of legal payments" (0,46), being particularly inferior for the "Farmer's participation in decision-making" (0,29).

The Governance sustainability of the agro-ecosystems in "Mountainous Regions" is enhanced mostly by the"Quality of services" (0,7), "Information availability" (0,66), "Market access" (0,62), "Resource concentration" (0,63), "Competitive allocation of public resources" (0,61), and "Transparency" (0,6) (Figure 11). On the other hand, the Governance sustainability of these agor-ecosystems is at "Satisfactory" level for the "Access to administrative services" (0,37), "External control" (0,39), "Informal system efficiency" (0,42), "Extent of policies implementation" (0,48), "Extent of beneficiary satisfaction of EU policies" (0,46), "Minimum costs of using" (0,46) and "Contracts enforcement" (0,49), and particularly compromised as far as the "Stakeholder participation in decision-making" is concerned (0,29).

Agro-ecosystems with "Lands in Protected Zones and Territories" are with a very "Good" Governance sustainability for "Information availability" (0,75), "Transparency" (0,72), "Competitive allocation of public resources" (0,68),"Quality of services" (0,65) (Figure 11). On the other hand, the governance sustainability of these agro-

ecosystems is inferior in a number of areas: "Stakeholder participation in decision-making" (0,32), "Access to administrative services" (0,38), "Market access"(0,41), "Impact" (0,45), "Resource concentration" (0,47), "Informal system efficiency" (0,47), and "Minimum costs of using" (0,49).

"Less-favored Mountainous"agro-ecosystems are with quite "Good" Governance sustainability forthe "Information availability" (0,75), "Quality of services" (0,74), "Transparency" (0,72), "Competitive allocation of public resources" (0,65),"Market access" (0,64), and "Free competition" (0,58) (Figure 11).At the same time, the Governance sustainability of these agro-ecosystems is"Satisfactory" in terms of: "Access to administrative services" (0,34), "Stakeholder participation in decision-making" (0,38), "Impact" (0,41), "Resource concentration " (0,45), and "Contracts enforcement" (0,46). Besides, these type of agro-ecosystems are with "Unsatisfactory" Governance sustainability as far as the "Management Board external control" is concerned (0,25).

Finally, the agro-ecosystems in "Less-favored Non-mountainous" regions are with very "Good" sustainability for the "Market competition" (0,78),"Representativeness of state and local authorities" (0,74), "Lands concentration" (0,71),"Extent of awareness" (0,66), "Administration service costs" (0,63), "Extent of competitive allocation of public resources" (0,63), and"Access to information" (0,62). On the other hand, for all other Indicators the Governance sustainability of this specific agro-ecosystem is "Satisfactory", and for the "Agrarian administration efficiency" even "Unsatisfactory" (0,25).

## 3.4. Governance sustainability in major agro-regions

There is a significant variation in the different aspects of Governance efficiency among administrative (and

agricultural) regions of the country. The Principle of the Governance sustainability "Good legislative system" dominates in the "North-West region" (0,6) and "North-Central region" (0,59), while in the "South-Central region" (0,38) and "South-West region" (0,49) it is only applied "Satisfactorily" (Figure 6).

The Principle of "Democratic management" is the best realized in the "North-East region"(0,53) and "South-West region" (0,53), and insufficiently in the "South-Central region" (0,4) and "North-West region" (0,48) (Figure 12).The Principle "Working agrarian administration" is effectively applied in the"North-East region"(0,57) and "North-East region" (0,61).Simultaneously, that Principle is "Satisfactory" applied in the "South-Central region" (0,49). Similarly, the Principle "Working market environment" arehighly regarded inthe "North-East region" (0,63) while in the "South-Central region"(0,45) and "South-East region" is inferior (0,47).Finally, the "Good private practices" are the best carried out in the "North-Central region" (0,58) and "North-East region" (0,59) while in the three south regions of the country they are enforced "Satisfactorily" (0,41, 0,36, 0,44 accordingly).

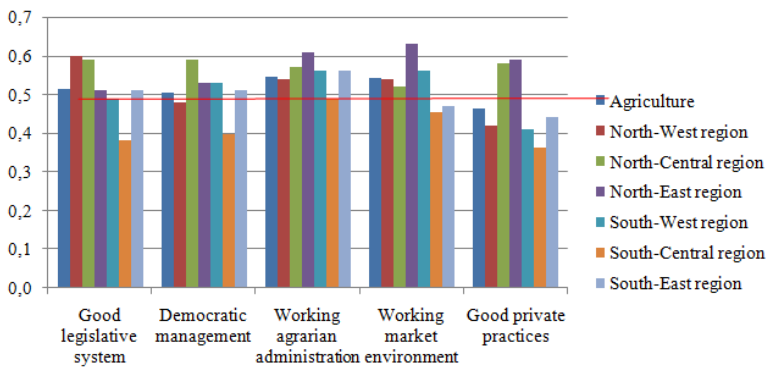



**Figure 12.** *Indices of the Principles of Governance Sustainability in Agro-regions in Bulgaria*
**Source:** survey with farm managers

There is a big variation in the levels of the Governance sustainability indicators across the territory of the country. In the "North-West Region" the highest value of sustainability is for the Indicators: "Extent of competitive allocation of public resources" (0,74), "Subsidies distribution" (0,71), "Extent of awareness" (0,67), "Administration service costs" (0,67),"Market competition" (0,66), "Prices negotiation possibilities" (0,63), and"Access to information" (0,63). At the same time, in this agro-region the Governance sustainability is "Satisfactory" for a number of Indicators: "Agrarian administration efficiency" (0,32), "Possibility for lands extension" (0,34), "Administrative services digitalization" (0,35), "Extent of contract enforcement" (0,44), "Level of informal system efficiency" (0,46), "Acceptability of legal payments" (0,49), quite low for the "Management Board external control" (0,29), and even "Unsatisfactory" for the "Farmer's participation in decision-making" (0,25) (Figure 13).

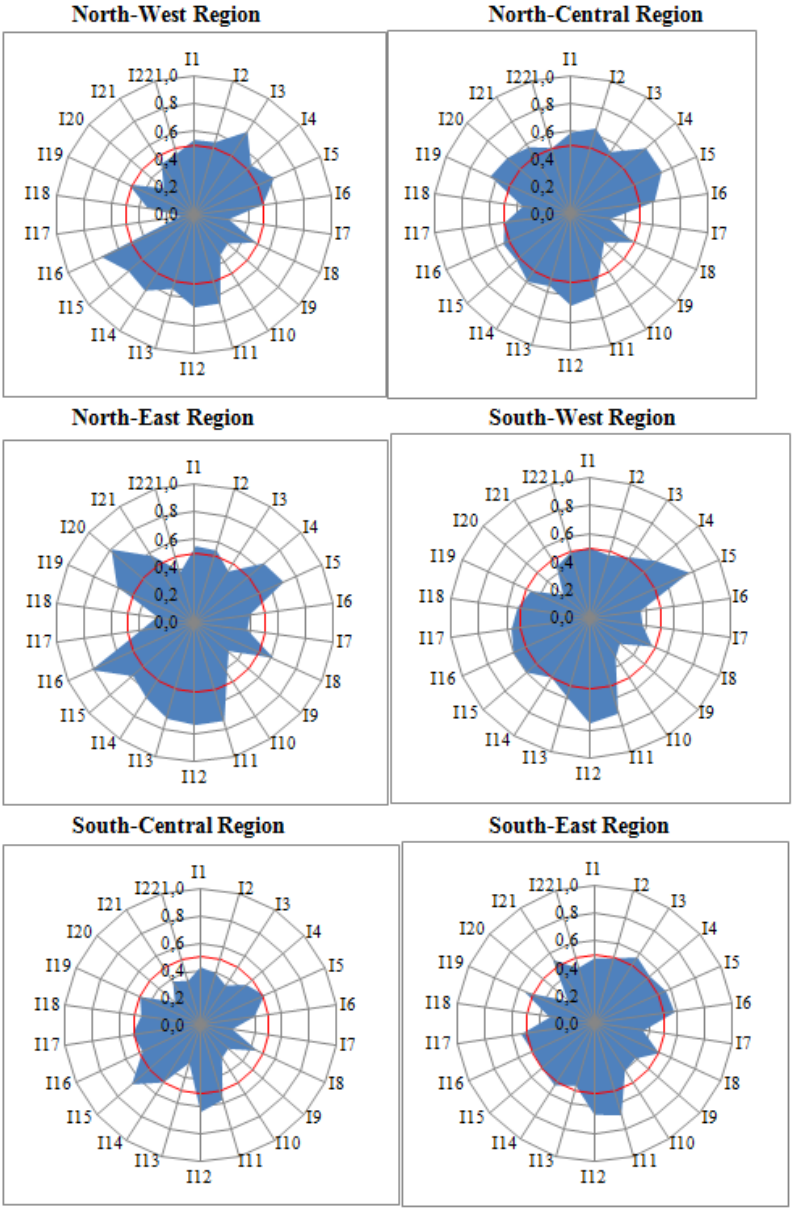



**Figure 13.** *Governance Sustainability Indicators in Different Agro-regions of Bulgaria*

The Governance sustainability of agriculture in the "North-Central Region" is very "Good" in respect to: "Access to information" (0,73), "Representativeness of state and local authorities" (0,72), "Administration service costs" (0,67), "Extent of regulations implementation"(0,65), "Extent of beneficiary satisfaction of EU policies" (0,64), "Subsidies in Income" (0,62), "Extent of awareness" (0,62), and "Management Board external control" (0.62) (Figure 13). Simultaneously, the governance system in this agro-region works only "Satisfactory" in regards to the "Farmer's participation in decision-making" (0,29), "Agrarian administration efficiency" (0,32), "Possibility for lands extension"(0,36), "Administrative services digitalization"(0,41), and "Lands concentration" (0,49).

The agrarian Governance sustainability in the "North-East Region" demonstratesa superior ("High") level forthe "Extent of competitive allocation of public resources" (0,82) and it is on the border with the highest level for the "Management Board external control" (0,8) (Figure 13). The governance efficiency is also quite "Good" in several other directions: "Extent of awareness" (0,74), "Administration service costs"(0,74), "Market access difficulties" (0,72), "Access to information" (0,7), "Market competition" (0,65), "Representativeness of state and local authorities" (0,65), "Extent of regulations implementation" (0,62) and "Acceptability of legal payments" (0,61). Nevertheless, the Governance sustainability of agriculture in that region is at "Satisfactory" level for several key areas: "Agrarian administration efficiency" (0,31), "Farmer's participation in decision-making" (0,38), "Level of informal system efficiency" (0,38), "Lands concentration" (0,4), "Subsidies in Income" (0,4), "Administrative services digitalization" (0,42), and"Subsidies distribution" (0,44), and especially low for the "Possibility for lands extension" (0,28).

Agriculture in the "South-West Region" is with a very "Good" Governance sustainability for the Indicators such as: "Access to information" (0,77), "Administration service costs" (0,75), "Extent of awareness" (0,71) and "Representativeness of state and local authorities" (0,62). On the other hand, for many indicators the Governance sustainability of this agrarian region is at "Satisfactory" level: "Administrative services digitalization" (0,34), "Subsidies in Income" (0,36), "Farmer's participation in decision-making" (0,38), "Extent of contract enforcement" (0,43),"Extent of beneficiary satisfaction of EU policies" (0,46), "Extent of regulations implementation" (0,46), "Level of informal system efficiency" (0,48), and "Acceptability of legal payments" (0,49). What is more, the efficiency of the governance system in that region's agriculture is close to the "Unsatisfactory" level for the "Agrarian administration efficiency" (0,28), and "Unsatisfactory" for the "Management Board external control" (0,25).

The "South-Central Region" agriculture is only in solid "Good" territories for two Indicators - "Administration service costs" (0,64) and "Prices negotiation possibilities" (0,67) (Figure 13). At the same time, the Governance sustainability of the sector is at "Satisfactory" level for numerous Indicators:"Level of informal system efficiency" (0,33),"Subsidies distribution" (0,34), "Extent of contract enforcement" (0,38),"Extent of beneficiary satisfaction of EU policies" (0,39), "Subsidies in Income" (0,4), "Extent of CAP implementation" (0,42), "Representativeness of state and local authorities" (0,44), "Possibility for lands extension" (0,44),"Acceptability of legal payments" (0,46),"Extent of competitive allocation of public resources" (0,47), and "Extent of regulations implementation" (0,49). Furthermore, the Governance sustainability of agriculture in this region is close to the "Unsatisfactory" levelfor the "Agrarian administration efficiency" (0,27), "Administrative services

digitalization" (0,29) and "Market access difficulties" (0,29). On the top of that, the Governance sustainability of region's agriculture is "Unsatisfactory" in terms of "Farmer's participation in decision-making" (0,24) and "Management Board external control" (0,25).

Finally, the Governance sustainability of the "South-East Region" agriculture is with relatively "Good" Indicators only in respect to the "Administration service costs" (0,66) and "Extent of awareness" (0,69) (Figure 13). In many other areas the Governance sustainability of this agrarian region is at "Satisfactory" level like:"Possibility for lands extension" (0,32),"Farmer's participation in decision-making" (0,35), "Agrarian administration efficiency" (0,39), "Administrative services digitalization" (0,41),"Level of informal system efficiency" (0,42),"Extent of CAP implementation" (0,47), "Market access difficulties" (0,47), "Extent of beneficiary satisfaction of EU policies" (0,49), and "Extent of competitive allocation of public resources" (0,49). What is more, for the "Management Board external control" (0,25) the Governance sustainability is at "Unsatisfactory" territory.

## 3.5. Governance sustainability for major types of farms

Last but not the least important, our approach let us assess what is the Governance sustainability for the various farming structures in the country, and how dominating institutional environment and modes of governance affect (contribution toward) sustainable development of major type of Bulgarian farms.

The system of governance of Bulgarian agriculture does not impact equally farms with different juridical type and size of operations. The Governance sustainability of agriculture is the highest for the "Semi-market" ("Mainly subsistence farms") and "cooperative" ("Cooperatives") sectors – the Integral Governance Sustainability Index for

these type of farming organizations is much higher than the sectoral average - 0,62 and 0,56 accordingly (Figure 14). Other main juridical type of farms like "Physical Persons" and the "Middle size" farming enterprisesalso have higher than the average Governance Sustainability Index (0,52). Therefore, all these four types of farming organizations contribute to the greatest extent to increasing (maintaining) the "Good" Governance sustainability of Bulgarian agriculture.

At the same time, for the "Small size" farms the Governance sustainability is below the national one and at the border with the "Satisfactory" level (0,5). Furthermore, for the "Agro-firms" and "Big size" farming enterprises the Governance sustainability is at "Satisfactory" level - 0.47 and 0.45 accordingly. Consequently, these major type of farming enterprises diminish to the greatest extent the overall Governance sustainability of country's agriculture.

The main Principles of the Governance sustainability are applied ("work") differently in relations to various type of Bulgarian farms. The Governance Sustainability Principles "Goodlegislative system", "Democratic management" and "Good private practices" the most favorably affect the "Cooperatives" and "Mainly subsistence" farms (Indices of Sustainability accordingly 0,65 and 0,7; 0,55 and 0,67; 0,64 and 0,56) (Figure 15). The Governance Sustainability Principle "Working agrarian administration" is the most effectively implemented in regards to "Mainly subsistence" holdings (0,66), "Physical Persons (0,55) and Middle size farms (0,55). The Governance Sustainability Principle "Working market environment" is more favorable for the "Middle size" (0,57) and "Small size" (0,56) farms.

On the other hand, the individual Principles for the Governance sustainability of agriculture are worse applied in and adversely impact different type of farms. The Sustainability for the "Good legislative system" Principle is

at "Satisfactory" level for the "Agro-firms" (0,41) and "Small size" farms (0,48).The sustainability Principle "Democratic management" is at "Satisfactory" level only for the "Big size" farming enterprises (0,47). Implementation of the Principle "Working agrarian administration" is inferior ("Satisfactory") for the "Big size" farms (0,4) and "Cooperatives" (0,43); the sustainability Principle "Working market environment" does not work well for the "Big size" farms (0,38) and "Agro-firms" (0,48); and "Good private practices" are not applied sufficiently and badly affect "Agro-firms" (0,43), "Middle size" farms (0,45), "Physical Persons" (0,46), and "Small size" holdings (0,47).

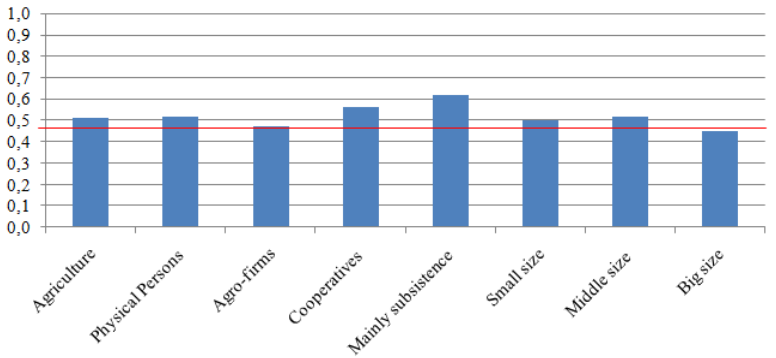



**Figure 14.** *Governance Sustainability for Major Type of Farming Organizations in Bulgaria*
**Source**: survey with farm managers

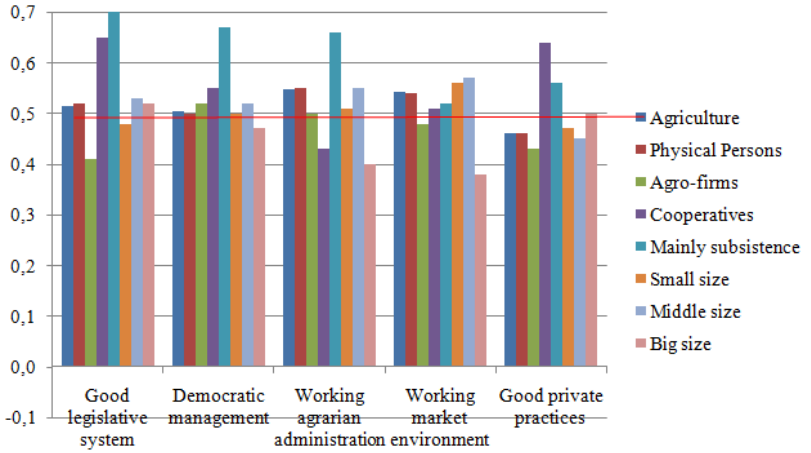
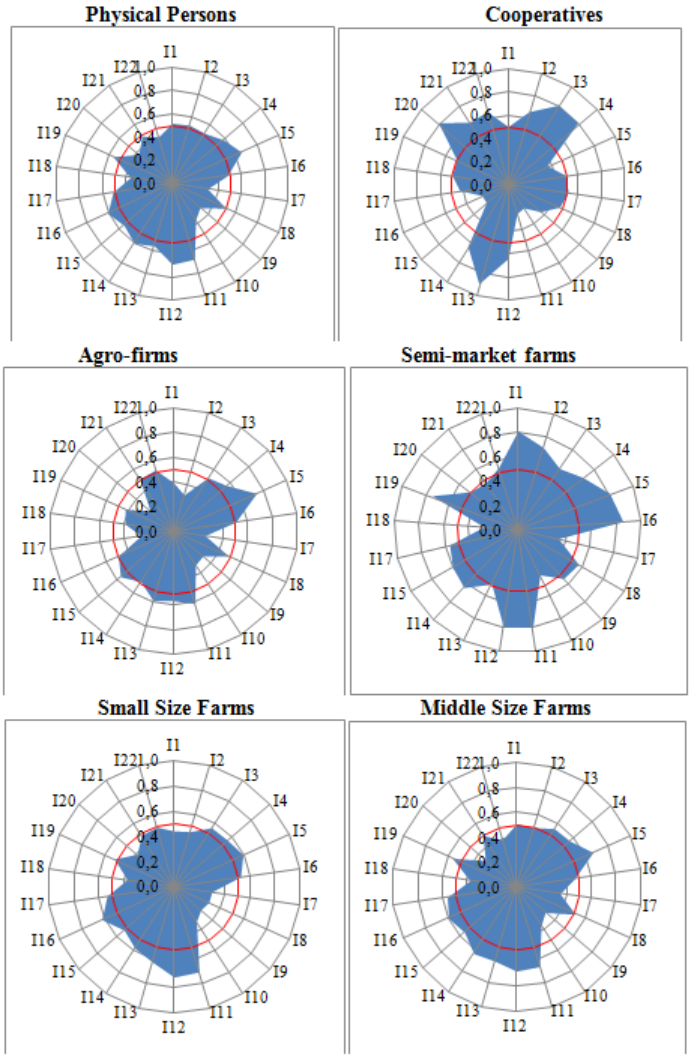



**Figure 15.** *Indices of the Principles of Governance Sustainability for Major Type of Bulgarian Farms*
**Source:** survey with farm managers

The Governance sustainability of agriculture carried out in the farms of "Physical Persons"is very "Good" in terms of: "Administration service costs" (0,69), "Extent of awareness" (0,67), "Access to information" (0,65), "Market competition" (0,61), and "Extent of competitive allocation of public resources" (0,61) (Figure 16). At the same time, the governance system for this farms work only "Satisfactory" in respect to "Farmer's participation in decision-making" (0,31), "Agrarian administration efficiency" (0,31), "Administrative services digitalization" (0,37), "Possibility for lands extension" (0,37), "Management Board external control" (0,38), "Level of informal system efficiency" (0,42), "Subsidies in Income" (0,48), and "Extent of contract enforcement" (0,48).


Physical Persons
Cooperatives
Agro-firms
Semi-market farms
Small Size Farms
Middle Size Farms
Big Size Farms
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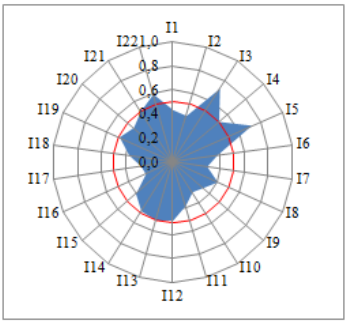


**Figure 16.** *Impact of (Contribution to) Governance Sustainability Indicators of Major Type of Farms in Bulgaria*
**Source:** survey with farm managers

The Governance sustainability of agriculture in the cooperative sector ("Cooperatives") is quite "High" for the "Market access difficulties' (0,9) (Figure 16). The Cooperative farms also are in very favorable ("Good") but at the border with the "High" level) situation for three Indicators: "Subsidies distribution" (0,8),"Management Board external control" (0,8), and "Representativeness of state and local authorities" (0,8), as well with a very "Good" level for several other areas – "Extent of contract enforcement" (0,63), "Extent of beneficiary satisfaction of EU policies" (0,65), "Administration service costs" (0,65), "Market competition" (0,65), and "Level of informal system efficiency" (0,65). Simultaneously, the Governance sustainability for the cooperatives agriculture is "Satisfactory" for the "Access to information" (0,37), "Agrarian administration efficiency" (0,37), "Lands concentration" (0,43), "Extent of CAP implementation" (0,49), "Acceptability of legal payments" (0,49), "Possibility for lands extension" (0,49), and "Extent of regulations implementation"(0,49). What is more, the Governance sustainability in the area of "Extent of awareness" (0,27) is very close to the "Unsatisfactory" level while for three Indicators it is "Unsatisfactory" – "Administrative services digitalization" (0,25), "Prices

negotiation possibilities" (0,25), and "Extent of competitive allocation of public resources" (0,25).

The Governance sustainability in "Agro-firms" is onlyrelatively "Good" for the "Access to information" (0,74) and "Extent of awareness" (0,61) (Figure 16). On the other hand, for numerous Indicators the level of agrarian Governance sustainability in corporate sector is "Unsatisfactory", namely "Extent of beneficiary satisfaction of EU policies" (0,31), "Agrarian administration efficiency" (0,31), "Administrative services digitalization" (0,33), "Extent of CAP implementation" (0,39),"Possibility for lands extension" (0,39), "Extent of regulations implementation" (0,43), "Acceptability of legal payments" (0,49), "Market competition" (0,49), and "Extent of competitive allocation of public resources (0,49). Furthermore, the level of governance efficiency is very close to the "Unsatisfactory" level for the "Farmer's participation in decision-making" (0,26) and "Lands concentration" (0,27), and it is "Unsatisfactory" for the "Management Board external control" (0,25).

Diverse aspects of the Governance sustainability of agriculture carried out in farming organizations of different size is also characterized with a great variation. In the "Semi-market"sector (Mainly Subsistence farms) it is "High" for the "Subsidies in Income" (0,86) and "Extent of awareness" (0,81), and at the border with the superior level for the "Extent of CAP implementation" (0,8), "Access to information" (0,8), "Administration service costs" (0,8) (Figure 16). The Governance sustainability for this major type of farming organizations is also very "Good" in terms of "Extent of regulations implementation" (0,75),"Extent of beneficiary satisfaction of EU policies" (0,7), "Representativeness of state and local authorities" (0,68), "Market competition" (0,65), "Prices negotiation possibilities" (0,61), and "Subsidies distribution" (0,6).At the

same type,the Governance sustainability in the huge "semi" market sector of Bulgarian agriculture is at "Satisfactory|" level for the "Farmer's participation in decision-making" (0,34), "Administrative services digitalization" (0,41), "Extent of contract enforcement" (0,46), "Market access difficulties" (0,49), and "Management Board external control" (0,49), and quite low for the "Possibility for lands extension" (0,28).

The Governance sustainability in Bulgarian small scale agriculture ("Small Size Farms") is very "Good" in regards to "Administration service costs" (0,72),"Extent of awareness" (0,7), "Extent of competitive allocation of public resources" (0,63), "Market access difficulties" (0,62), and "Access to information" (0,6). On the other hand, the Governance sustainability in that dominant sector of agriculture is at "Satisfactory" level in multiple directions - "Farmer's participation in decision-making" (0,3), "Acceptability of legal payments" (0,3), "Administrative services digitalization" (0,33), "Possibility for lands extension" (0,38), "Management Board external control" (0,39), "Extent of CAP implementation" (0,44), "Extent of beneficiary satisfaction of EU policies" (0,45), "Extent of contract enforcement" (0.48), "Level of informal system efficiency" (0,49), being particularly low for the "Agrarian administration efficiency" (0,28).

The Governance sustainability of agriculture in the "Middle Size Farms" is quite "Good" for the "Access to information" (0,68), "Administration service costs"(0,67), "Extent of awareness" (0,66), "Market competition" (0,63), "Market access difficulties" (0,62) and "Extent of competitive allocation of public resources" (0.6) (Figure 16). Simultaneously, the sustainability is "Satisfactory" in several key areas – "Agrarian administration efficiency" (0,31),"Management Board external control" (0,33), "Farmer's participation in decision-making (0,36),

"Administrative services digitalization" (0,37), "Possibility for lands extension" (0,38), "Level of informal system efficiency" (0,4) and "Subsidies in Income" (0,47).

Finally, the Governance sustainability of agriculture in the large scale enterprises ("Big Size Farms") is favorably "Good" in respect to two areas - "Subsidies distribution" (0,72), and "Access to information" (0,72). However, for many indicators the Governance sustainability for this type of farming organizations are at "Satisfactory" level – "Administrative services digitalization" (0,3),"Agrarian administration efficiency" (0,33), "Subsidies in Income" (0,37),"Possibility for lands extension" (0,37),"Extent of awareness" (0,38), "Extent of beneficiary satisfaction of EU policies" (0,4),"Acceptability of legal payments" (0,41), "Prices negotiation possibilities" (0,41),"Extent of CAP implementation" (0,43), "Management Board external control" (0,43),"Possibility for lands extension" (0,37),"Administration service costs" (0,49), "Market competition" (0,49), "Extent of regulations implementation" (0,49). Moreover, the Governance efficiency for this large "subsector" of Bulgarian agriculture is close to or at "Unsatisfactory" level for the "Extent of competitive allocation of public resources" (0,25), "Lands concentration" (0,27), and "Farmer's participation in decision-making" (0,29).

## Comparison of assessments based on micro and macro data

The comprehensive assessment of the Governance sustainability of the Bulgarian agriculture by using aggregate (sectoral) and farming (survey) data shows quite unlike results – "Satisfactory" level in the former case, and (close to the border with "satisfactory" level but still) a "Good" level in the later case (Figures 17 and Figure 2).

The Overall and Principles sustainability estimates based on the farm managersassessments are higher than those calculated on the base of the official (statistical, FADN, etc.) information, and experts and producers' organizations estimates(Figure 18). The discrepancies in the estimates for three Principles ("Democratic management", "Working market environment", and "Good legislative system")are crucial since they put the Governance sustainability in different (inferior) levels. Therefore, Governance sustainability assessments always have to be based both on (complementary) macro and micro data in order to increase accuracy and extend reliability. Besides, theoretical and practical work for the improvement of the assessment methods and data sources of the sectoral sustainability assessments (especially as far as the Governance Pillar is concerned) is to continue.

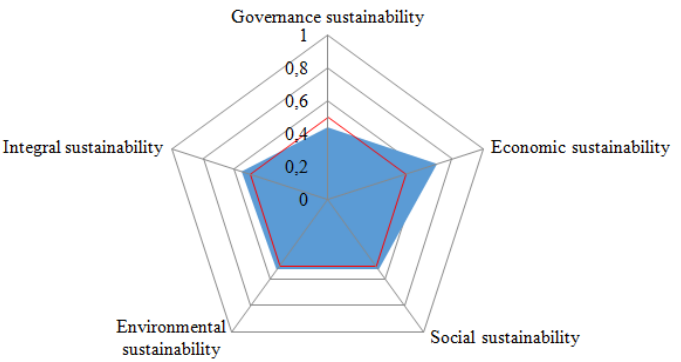


**Figure 17.** *Levels of Governance, Economic, Social, Environmental and Integral Sustainability of Bulgarian Agriculture, calculation based on aggregate (sectoral) data*
**Source:** Agro-statistics, experts' assessments

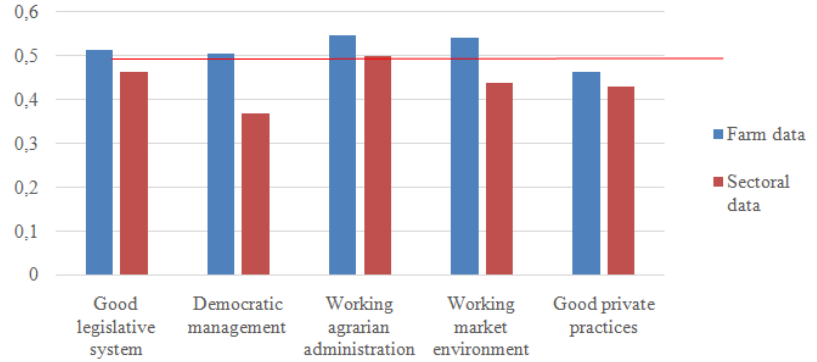


**Figure 18.** *Sustainability Indexes for major Principles of Governance Sustainability, calculated on the base of sectoral and farm data*

The inclusion of the "Governance Aspect" in the sustainability calculations changes the Integral Sustainability Index of Bulgarian agriculture using sectoral (with 0,03), and to a smaller extent farm (with 0,005) based estimates (Figure 19). However, taking into account the Governance aspect does not modify the overall ("Good") sustainability level using both type of information. The later is due to the fact that there are also differences in the Sustainability Indexes for the Economic, Social and Environmental aspects based on the aggregate (sectoral) and aggregated first hand farm data (Figure 2 and Figure 17), being particularly high for the Economic and Social sustainability (0,1 and 0,05 accordingly). The estimates based on the official aggregate sectoral data for the Economic, Social and Environmental aspects are higher than the corresponding levels based of micro farm data. Consequently, they do not affect the Integral sustainability "compensating" the contribution to the overall sustainability level of the Governance pillar.

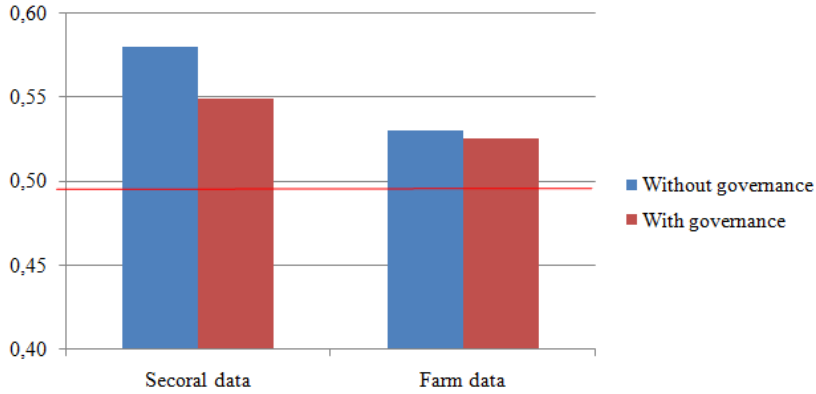


**Figure 19.** *Integral Sustainability of Bulgarian Agriculture "with" and "without" Including Governance Aspect*
**Source:** Bachev *et al*, 2019; author's calculations

Nevertheless, the inclusion of the missing "new" and important Governance aspect is crucial since it ameliorates adequacy and precision of the sustainability assessment of Bulgarian agriculture. At the same time, all dynamics and discrepancies in the estimates between sustainability pillars and the estimates based of different (statistical, farm, etc.) type of data have to be taken into consideration in the analysis and the interpretation of results, while assessment indicators, methods and data sourcesfurther improved (Bachev et.al., 2019).

## Conclusions

This study has proved that it is important to include the "missing" Governance Pillar in the assessment of the Integral sustainability of agriculture and sustainability of agro-systems of various type. Furthermore, it has demonstrated that (and how) the Governance sustainability level can be quantitatively "measured" and "integrated" in the system of overall sustainability assessment. Finally, the elaborated holistic framework has been successfully tested in Bulgarian conditions and showed promising results for

proper understanding and fully "unpacking"the Governance sustainability of country's agriculture.

This first in kind comprehensive assessment of the Governance sustainability of Bulgarian agriculture let make some important specific conclusions about the state of (Governance) sustainability of diverse agro-systems, and recommendations for improvement of the managerial and assessment practices. The elaborated and experimented holistic approach gives a possibility to improve the overall and Governance sustainability assessment. Therefore, it has to be further discussed, experimented, improved and adapted to the specific conditions of evaluated agricultural systems and needs of decision-makers at different levels.

Multiple Principles, Criteria and Indicators assessment of the Governance sustainability of Bulgarian agriculture indicates that the Overall Sustainability is at a "Good" but very close to the "Satisfactory" level. Besides, there is a considerable differentiation in the level of Integral Governance sustainability of different agro-systems in the country – agricultural sub-sectors, agro-ecosystems, agro-regions, and type of farming organizations. What is more, the individual indicators with the highest and lowest sustainability values determine the "critical" factors enhancing and deterring the particular and integral Governance sustainability of evaluated agro-system. Last but not least important, results on the integral agrarian sustainability assessment of this study based on micro (farm) and macro (statistical, etc.) data show some discrepancies which have to be taken into consideration in the analysis and interpretation, while assessment indicators, methods and data sources further improved.

This study reviled that much of the needed information for calculating the Governance sustainability is not readily available and have to be collected though experts' assessments, farm managers and professional associations

surveys, etc. Nevertheless, a big challenge is the (level of) competency and willingness for "honest" estimated of the interviewed agents. For instance, for some highly "sensitive" questions in the conducted ("anonymous") survey many of the farm managers did not respond due to lack of opinion, experience, capability and/or reluctancefor assessment, etc.

Having in mind the importance of holistic assessments of this kind for improving the agrarian sustainability in general, and the Governance sustainability of agriculture in particular, they are to be expended and their precision and representation increased. The later requires improvement of the precision through enlargement of surveyed farms and stakeholders, and incorporating more "objective" data from surveys, statistics, expertise of professionals in the area, etc.

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# 2 A study on impacts of institutions on sustainability of Bulgarian agriculture

## Introduction

The specific system of governance is a critical factor, which to a great extent (pre)determines the type and the speed of development of different countries, industries, regions, communities, etc. (North, 1990; Williamson, 1996). Having in mind the importance of the agrarian sector (in terms of employed resources, contribution to individuals and social welfare, positive and/or negative impacts on environment, etc.), the assessment and the improvement of the governance of agrarian sustainability is among the most topical theoretical and practicalissues at contemporary stage (Bachev, 2010, 2016; Bachev *et al.*, 2016, 2017; Raman, 2006; Sauvenier *et al.*, 2005; Terziev & Radeva, 2016; UN, 1992, 2015).

Despite that however, with a very few exceptions (Bachev, 2002, 2003, 2009, 2010, 2011, 2014, 2017, 2018; Bachev & Tsuji, 2001; Bachev & Terziev, 2017, 2018; Nacjhev

& Nanseki, 2008; Bachev & Kagatsume, 2002, 2003) still there are no sufficient comprehensive empirical studies on the impact of institutional, market and natural environment on agrarian sustainability in Bulgaria and abroad. The latter is a consequence of the "newness" of that problem, the lack of statistical and other information, inadequacy of the traditional economic modes of analysis in that area, etc. Subsequently, the economic analyses do not give a full insight on "driving" factors of socio-economic development, and possibility to effectively assist public policy, and individual and collective actions for sustainable development.

This article applies the interdisciplinary New Institutional Economics (combining Economics, Organization, Sociology, Law, Political and Behavioral Sciences), and assesses the impact of institutional, market and natural environment on agrarian sustainability in Bulgaria.

## Methodological framework

Maintaining the social, economic and environmental functions of agriculture requires an effective *social order* (a "good governance") - a system mechanisms and forms regulating, coordinating, stimulating, and controlling the behaviors, actions and relations of individual agents at different levels (Bachev, 2010). The system of governance of agrarian sustainability is a *part* of the specific system of agrarian governance and includes: diverse *agrarian* (farm managers, resource owners, hired labor) and *non-agrarian*(agrarian and related business, consumers, residents of rural area, interests groups, agrarian administration) agents, and a *variety of mechanisms and forms* for governing of behavior, activity, relations, and impacts of related agents.

The system of governance of agrarian sustainability includes a number of *principle* mechanisms and modes, which manage the behavior and actions of individual agents,

and eventually predetermine the level of agrarian sustainability including (Figure 1):

- *institutional environment* ("rules of the game") - that is the distribution of formal and informal rights and obligations between individuals, groups, and generations, and the system(s) of enforcement of these rights and rules (North, 1990);
- *market modes* ("invisible hand of market") – those are various decentralized initiatives governed by the free market price movements and market competition;
- *private modes* ("private or collective order") – diverse private initiatives, and special contractual and organizational arrangements;
- *public modes* ("public order") – those are various forms of public (community, state, international) interventions in the market and private sector such as: public guidance, regulation, assistance, taxation, funding, provision, modernization of property rights and rules, etc.;
- *hybrid forms* – some combination of the above three like public-private partnership, etc.

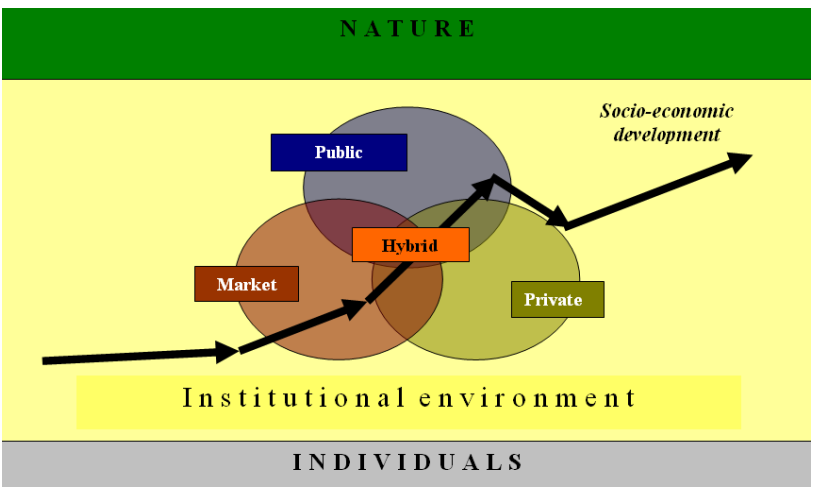


**Figure 1.** *System of governance of agrarian sustainability*
**Source:** author

Institutional development is initiated by the public (state, community) authorities, international actions (agreements, assistance, pressure), and private and collective actions of individuals. It is associated with the modernization and/or redistribution of existing rights, and evolution of new rights and novel (private, public, hybrid) institutions for their enforcement. For instance, the European Union (EU) membership of Bulgaria is associated with adaptation of the modern European legislation (Acquis Communautaire) as well as better enforcement of the entire system of laws and standards for quality, labor, social protection, environment conservation, animal welfare, etc. At current stage many of the institutional innovations are also results of the pressure and initiatives of certain interests groups - eco-associations, consumer organizations, etc.

Institutional environment creates unequal incentives, restrictions, costs, and impacts for different aspects of agrarian sustainability, and in the long run (pre)determines the type and character of agrarian development. Efficiency of the specific system of governance of agrarian sustainability eventually finds expression in certain level and dynamics of the social, economic, and environmental sustainability of agriculture (Bachev, 2010, 2016). Accordingly, a high or increasing agrarian sustainability means a high efficiency of the system of governance, and vice versa. The agrarian sustainability and its individual aspects have multiple dimensions. Therefore, in order to assess the efficiency of the governance it is necessary to work out an adequate system for assessing the social, economic, environmental, and integral sustainability of agriculture (Bachev, 2016; Bachev *et al.*, 2016).

Agricultural producers (farms) are major agents in the system of governance of agrarian sustainability.For identification ofthe specific modes of governance of agrarian sustainability in Bulgaria and in different regions of the

country, subsectors of agriculture, types of agro-ecosystems, as well as sustainability contribution of the farms of different juridical type and size, in 2017 in-depth interviews were carried out with managers of 40 farms of different kind and location. For identification of the "typical" fora particular region agricultural farms an assistance is used ofthe major producers associations, state agencies, processors, bio-certifying and servicing organizations, and local authorities. The structure and the specific features of the surveyed farms approximately correspond to the real structure of all farms in the studied regions of the country.

The survey comprises multiple questions associated with the impact of major elements of socio-economic, institutional and natural environment on socio-economic, environmental, and integral sustainability of surveyed holdings. Initially the managers assessed the impact of each component of the institutional environment as "positive", "neutral", or "negative". After that, the relations between the "estimates of managers" for the impacts of the elements of external environment and the sustainability level of respective farms are specified. The frameworkapplied for assessing the socio-economic, environmental and integral sustainability level is presented in details in another publication (Bachev *et.al.* 2016). The integral estimates are arithmetic averages of the assessments of individual farms of a particular type.

## Results and discussion

Provided and well protected by the existing institutional arrangements private rights on diverse agrarian resources (farmlands, pastures and meadows, material and intellectual assets, water sources, ecosystems, etc.) are important factors for effective exploitation of resources and sustainable development. Our survey have proved that, for the majority of interviewed agricultural producers (37,5%) "provided rights on agrarian resources and the costs for protection of

private rights" have a positive impact on multiple aspects of agrarian sustainability (Figure 2).

According to the majority of the farmers existing private rights and costs for their protection are of a primary importance for the improvement of economic sustainability. The system of private property rights has a high economic significance since it creates incentives for investment and effective utilization of resources. What is more, for many managers dominating structure of rights and rules in the sectors, modernized according to the EU standards, impact positively social and environmental aspects of agrarian sustainability as well. Furthermore, for almost every third of the surveyed farms existing private rights on agrarian resources and (a high) level of costs for their protection and exchange affect rather negatively different aspects of agrarian sustainability. One of the interviewed points out that managed by him farmlands is situated in 500 different locations with distance between individual plots up to 30 km. Besides great transportation costs that farm also has a high cost for governance, protection of property and yield, application for public subsidies and other relations with authorities. For instance, in order to submit numerous (1500) applications in the municipality office, the farmer has to bring own papers and toners for printing out applications.

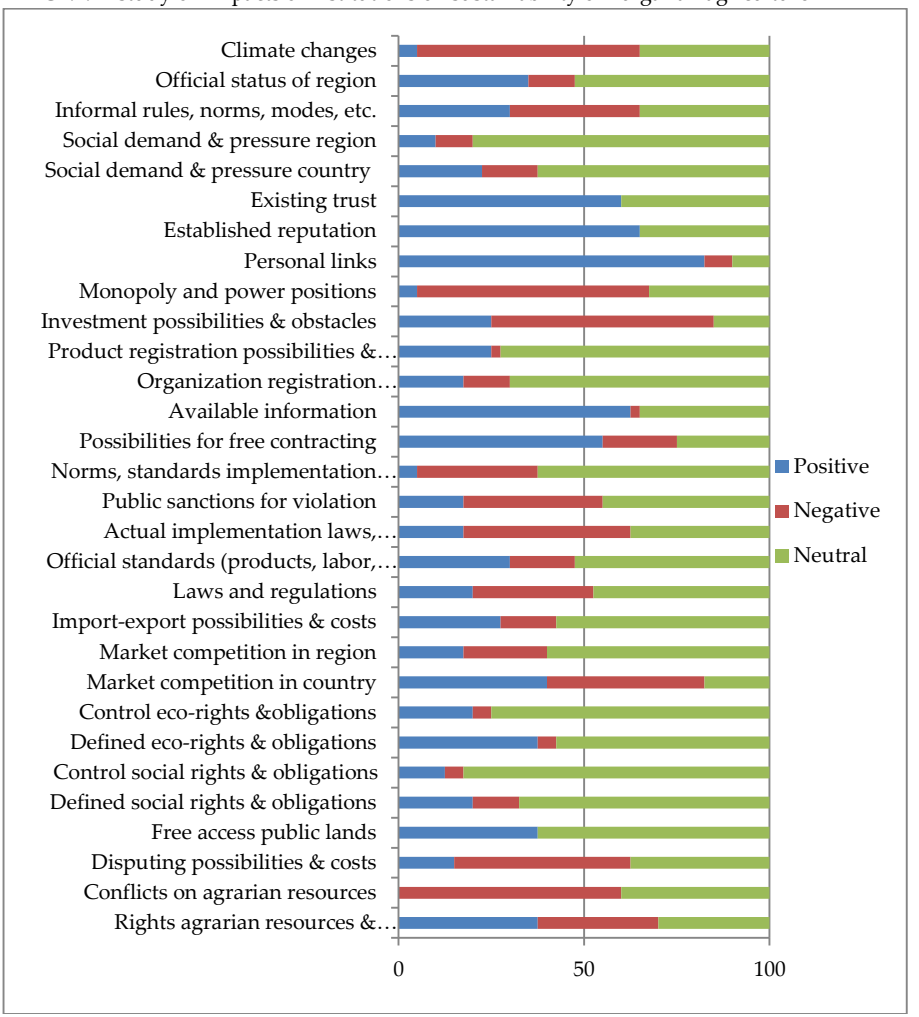


**Figure 2.** *Impact of major elements of socio-economic, institutional and natural environment on agrarian sustainability (percent)*
**Source:** interviews with managers of farms, 2017.

The negative impact of the structure and the costs, associated with rights on agrarian resources, affects farms of various types (Figure 3). The only exceptions are holdingsspecialized in Vegetables, Flowers, and Mushrooms, Pigs, Poultries, and Rabbits, and Mix livestock, as well as those located in Less-favored non-mountainous regions. All

these farms usually use smaller amount of own or rented lands (greenhouse vegetable production, pig production, middle size holdings), have access to usage of public meadows and pastures (grazing livestock) and no need to trade (purchase or lease) of agricultural lands in large amount or other intellectual agrarian products (origins, new crop varieties and technologies, etc.).

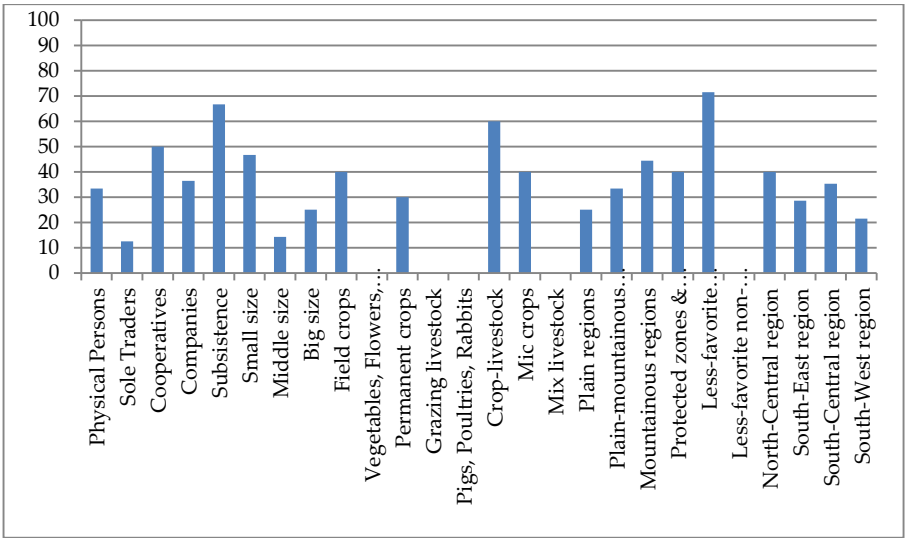


**Figure 3.** *Negative impact of provided rights on agrarian resources and costs for protection of private rights on agrarian sustainability in Bulgaria (percent)*

**Source:** interviews with managers of farms, 2017

On the other hand, holdings, implementing intensive deals (purchases, leases) of farmlands with numerous land owners for an effective exploration of scales and scopes, or using ownership as a collateral for loan, to a bigger extent are affected by the negative consequences of imperfect institutional framework (identification of property rights) and costs for protection and transfer of private rights. For example, a half of the Cooperatives, 60% of holdings in Mix

crop-livestock, 40% of farms in Field crops and Mix crops, underline the negative impact of that factor.

Many cases are reported, when for producers is difficult to organize efficient operations on larger land plots, due to practical impossibility to negotiate lease-in or purchase of dispersed small plots of landlords – lack of formal ownership titles, many heirs, absence from the country, disputes with a third party, enormous costs, etc. One of the surveyed farm, representing a big for the region investor in vine operation, points out the existence of numerous little "islands" of (fragmented, unidentified, multiple owners, etc.) land property in the area for expansion of enterprise. All these land plots are practicallyimpossible to acquire and that impedes planned effective enlargement of the production in that farm.

That restricting element of the institutional environment is particularly critical for farms with smaller sizes (46,67%), having no potential (negotiation power, sufficient staff, access to lawyers, etc.) typical for the large business enterprises. Some smaller farms and semi-market holdings report for discrepancy in the description and borders in the formal ownership documents with the actual sizes and locations of the property (lands, buildings, etc.) also preventing the effective investments and deals.Identification of the ownership rights and correction of documentary mistakes from the past through bureaucratic and courtprocedures, is a long, costly, and inaccessible for many (small) producers process. The latter is a consequence of the existence of many and/or lack of anyheirs, numerous interested parties, high costs for expertise, lawyers, lawsuits, introduction into new ownership, etc. The adverse impact on sustainability of that factor is particularly strong for semi-market holdings – two-third of surveyed farms Predominantly for subsistence.

The negative impact of existing structure and possibilities for protection of private property rights is particularly strong for holdings in Mountainous regions (44,44%), where agrarian resources are limited and dislocate in large areas. Also, a good part of the farms in Less-favoredmountainous regions (71,43%) and those with Lands in protected zones and territories(40%) are influenced by the negative impact of that component of institutional environment due to multiple restrictions of/for utilization of resources related with the (special) status of such areas.

Many producers of different type also report having high costs for protection of resources and output, due to constant thefts of property and yields. A good number of holdings provide permanent security for yield, which additionally make product more expensive or turn managers, owners and their families into guards. According to a surveyed strawberry producer, he and his farther spend 24 hours on the field during ripening of fruits. Another surveyed producer shares experience in which in order to protect the property from repeated thieves he had built an expensive fence around, and subsequently the valuable fence was stolen. A president of the surveyed cooperative also underlines that problem and the fact, that after he terminate "work" in the office, he "becomes a guard, since the municipality does not secure needed protection of the fields". The multiple complains of the latter manager against "well known" thieves, are not resolved by the authorities "since harms were too small to be punished". Because of the same reason, in the South-East region of the country it is not produced corn of big farmers at all (easy to steal). Another cooperative in that region regularly hires security guards for protection of the property in the farmyard and the grape yields.

There are also many examples, when private animals destroy harvest of other farmers and it is very difficult to

punish offenders, due to uncertainty, or difficulty to prove and claim through lawful way. In other instances, wild animals destroy sow, permanent crops and/or yield, and for assault on property is not by persons, but there is needs (costs) for managing natural risk (purchase of insurance, building fence, payment for security guards, etc.). For almost 30% of surveyed farms the rights on agrarian resources and the costs for their protection have no importance (neutrality) in relation to aspects of agrarian sustainability. The latter means, that existing system of governance, and concentration, transfer and protection of agrarian resources in these holdings "work well" and do not prevent strategies and activities for sustainable development.

The character, strength, and possibility for rapid and costless resolution of conflicts, associated with the rights on agrarian resources, are important factor for effective governance of agrarian sustainability. For 60% of the surveyed farms "existing conflicts over agrarian resources" impact negatively diverse aspects of agrarian sustainability, while for the rest part they are not essential (Figure 2).The conflicts usually obstruct efficient distribution and sustainable exploitation of agrarian resources, and are related with significant costs for prevention and resolution. According to the managers of surveyed holdings, that factor, most often considerably diminish economic sustainability, sometimes environmental sustainability, and occasionally social sustainability in the sector.

Conflicts of various types, associated with agrarian resources, have unequal effect on sustainability of different subsectors, regions, and type of farming organizations (Figure 4). Such conflicts are commonly associated with the strong interests for acquisition of ownership and/or utilization of certain limited (valuable) agrarian resources by two or more parties – individual agents, farms, related and unrelated businesses, powerful groups, etc. In certain cases

there are strong conflicts, related to strategies of some large groups for "legitimate" acquisition of major resources (lands, processing facilities, entire enterprises) from smaller producers through variousschemes (applying pressure, unfair competition, severe conditions for crediting, lawsuits and bankruptcy). There are many instances of conflicts, caused by not defined or badly defined rights of ownership, direction, utilization etc. of certain resources or by their "public" (good) character, as it is for the new technologies, state and municipal pastures and lands, water sources, ecosystem services, critical infrastructure, etc.

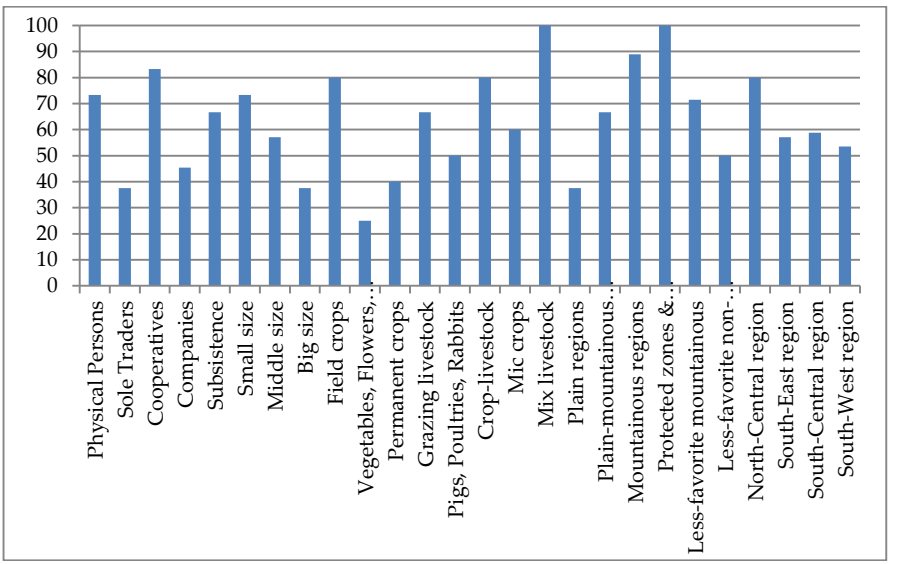


**Figure 4.** *Negative impact of existing conflicts on agrarian resources on agrarian sustainability in Bulgaria (percent)*
**Source:** interviews with managers of farms, 2017

To the greatest extent conflicts over agrarian resources affect negatively the Cooperative farms (83,33%) and holdings of Physical Persons (73,33%). On the other hand, the adverse impact of that factor to a lesser extent is faced by the firms of various types. Agro-firms possess or use more-

efficient mechanisms for prevention and/or effective overcoming of existing conflicts with other agents on agrarian resources. Despite that a good proportion of Sole Traders (37,5%) and Companies (44,45%) evaluate, that conflict on agrarian resources impact negatively agrarian sustainability.

The negative impact of conflicts, related to agrarian resources, increases along with the reduction of farm size, and it is typical for holdings with Small sizes (73,33%), semi-market holdings (66,67%), and farms with Middlesizes (57,14%). Furthermore, a considerable portion of Large farms (37,5%) also indicate, that such conflicts diminish agrarian sustainability. To the greatest extent the conflicts over agrarian resources influence different aspects of agrarian sustainability in sectors Mix livestock (all farms), Field crops and Mix crop-livestock (four fifths of holdings), Grazing livestock (two thirds of farms), and Mix crops (60% of holdings). The adverse effect of conflicts on resources is smallest in sectors Vegetables, Flowers and Mushrooms (one quarter of farms), where the amount of employed agrarian resources in individual holing and overall is also relatively small.

The negative impact of conflicts, associated with agrarian resources, on agrarian sustainability is the most pronounced in Mountainous regions (88,89%) and in (all) farms with Lands in protected zones and territories, and to the less extent in Plain regions of the country. The latter is consequence of the fact, that in mountainous regions the amount of agrarian resources is relatively limited and all related conflicts affect severely the sustainable development in such regions. The negative impact of that factorto a greater extent is expressed in North-Central region, in comparison with studied south regions of the country.

Possibilities and costs for disputing of absolute and contractual rights through a legitimate way are important

feature of the institutional environment greatly determining opportunities for sustainable development. When there is no practical possibility to enforce (protect) legitimate rights or resolve emerging disputes and conflicts between agents through legitimate way or costs for disputing rights on resources and contractual terms through a third party (court, administration, local authority, independent expertise, arbitrage, etc.) are too high, then realization of economic, social, and environmental objectives of sustainable development is difficult.

According to a big part of the interviewed managers (47,5%) the real "possibilities and costs for disputing rights and contracts through a legitimate way" affect negatively agrarian sustainability (Figure 2). That is a consequence of the fact, that legitimate means for disputes and conflicts resolution are actually "impossible", not accessible or too expensive for using by the significant fraction of agrarian agents. For example, many surveyed agricultural producers complain from a delayed payment of purchased produce by big buyers, processors and/or food chains, or untimely provision of subsidies, compensations or assistance by the responsible state agencies. Often delayed payment by private agents or government organizations takes months, and in some cases years (e.g. compensation for damagesfrom natural disasters), and sometimes not take place at all.

Many instances are reported, when it is too expensive or practically impossible to enforce legitimate rights on certain resources or activities through awful way, due to not working, slow or costly to use by individual agents public system of identification, enforcement, disputing and provision of rights. In all these cases, unilateral dependent from certain buyers and/or state institutions agricultural producers are harmed, without being able to enforce legitimate rights on resources and activities, or get compensation for realized losses or missed benefits. What is

more, when costs (for enforcement) of private contracts are enormous then agents replace the most effective form for governing of agrarian sustainability with less efficient, but "safer" mode for safeguarding their investments and interests – restrictions of deals and relationships with market agents, personification of trade, weaker cooperation with external agents, complete (internal) integration of transactions, targeting short-term benefits and solely own (private) profit, etc.

Only for a small portion of holdings (15%) the possibilities and costs for disputing the rights and contracts through legitimate way impact positively diverse aspects of agrarian sustainability. At the same time, according to a relatively big portion of the farms (37,5%), that possibilities and associated costs are neutral in regards to sustainability. These figures indicates, that for the majority of Bulgarian holdings the official system for disputing the rights and contracts either "work" well, or they possess (use) other informal and more-effective mechanisms for protection of their rights and contracts – good relations, privileged and/or powerful positions, personal connections, assistance from a third party, unlawful modes, etc. Some holdings do not need at all to use the official system of conflict resolution due to the lack of interest or conflicts over resources and obligations with other parties – small amount of owned or used resources, absence or small number of contractual relations, etc.

Possibilities and costs for disputing the rights and contracts thorough legitimate way are negative factor for agrarian sustainability for two third of Physical Persons and every another one of Sole Traders, one third of Cooperatives, and just above a quarter of Companies (Figure 5).Apparently, the last types of farming enterprises possess greater possibilities for covering (often high) costs associated

with the protection of private rights and contractual obligations.

Among holdings with smaller sizes and the biggest farms comparatively larger number feel the adverse impact of that factor. That is due to highcosts of a "unit" of contestation, lack of experience, capability, possibilities, low frequency, etc. (for the former type of farms) or significant "overall" costs for multiple disputes as a result of the scale of activity, employed resources and contractual relations with other parties (for the latter type of farms). The negative impact on agrarian sustainability of the existing possibilities and costs for disputing of rights and contracts through legitimate way is dissimilar in different agricultural subsectors.Those factorsadversely affect all or predominant part of holdings with Mix livestock (100%), Mix crop-livestock (70%), and Field crops (60%). Among farms specialized in Permanent crops, Pigs, Poultries and Rabbits, and Vegetables, Flowers, and Mushrooms, the negative impacts is reported by each another one. For all of the managers of holdings, specialized in Grazing livestock and Mix corps, possibilities and costs of disputing the rights and contracts through legitimate way are positive or neutral factor for agrarian sustainability.

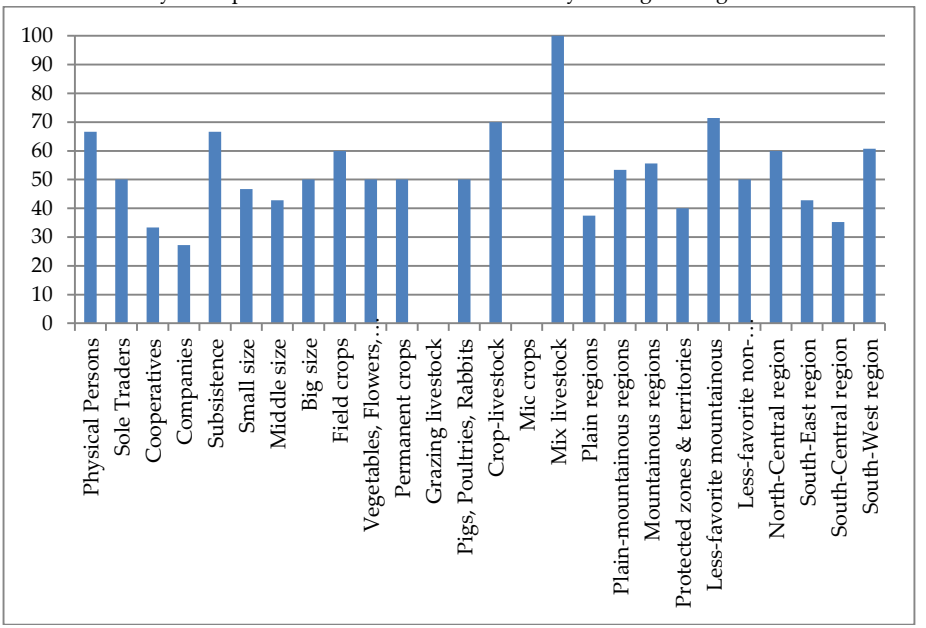


**Figure 5.** *Negative impact of possibilities and costs for disputing rights and contracts through legitimate way on agrarian sustainability in Bulgaria (percent)*

**Source:** interviews with managers of farms, 2017

In various ecosystems to the greatest extent are exposed of the negative impact of possibilities and costs for disputing the rights and contracts through legitimate way the farms in Less-favoredmountainous regions (71,43%),Mountainous regions generally (55,56%) and Plain-mountainous regions (53,33%), On the other hand, farms located in Plain regions, and those with Lands in protected zones and territories, suffer to a lesser extent by the adverse effect of that factor. There is a great regional differentiation inthe effects of the system and costs for disputing the rights and contracts through lawful way. To the biggest extent by the inefficiency of the existing system suffer holdings located in South-West and North-Central region of the country (60% of all), while farms in South-Central region are affected to the least extent (35,29%). Existing regional differentiation of the impact of

that factor is determined by the different efficiency of the formal system of disputing of rights in each region, specific structure (and efficiency) of informal institutional environment and modes of governance, and unlike needs, challenges, contractual structure, accumulated experience, and internal capability of farms in each region and ecosystem.

Provision of rights to use agrarian resources (farmlands, meadows and pastures, fishponds, water basins, etc.) is an important factor for their sustainable management (exploitation) as well as for sustainable development of agriculture in certain regions (mountainous, less-favored, with limited resources, inhabited or in a process of depopulation, etc.) and some major subsectors (livestock, collection of wild plants and animal species, etc.). A significant part of the surveyed holdings (37,5%) report, that the "free access to public lands" is an essential positive factor foragrarian sustainability,simultaneouslyfor the economic as well as social and environmental aspects (Figure 2). At the same time, none of the managers assesses that such an access impact negatively the agrarian sustainability.

Despite that, many small producers in mountainous and other regions complain, that public lands not always are fairly distributed. Many instances are reported for allocation of public (state, municipal) pastures and meadows in large sizes to individuals and groups "with connections", for which lands huge public subsidies are received. Such modes decrease social efficiency (sustainability), although they may not necessarily change (even could increase) economic and/or environmental sustainability ofland use in the region. What is more, in many residential areas there are no (sufficient) municipal pastures and that createsseries problems for sustainable development of many small-scale livestock breeders. On the other hand, in certain regions the land and other resources with "free access" are not utilized

sustainably due to overuse (more that allowed number of livestock on a pasture, uncontrolled collection of wild plants, snails, etc.) or underuse (lack of care for public resources due to the "absence" of owners).

To the greatest degree the favorableimpact of such institutional organization ("free" rather than restricted or no access to public lands) on agrarian sustainability is reported by the Physical Persons and holdings Predominately for subsistence (two third of the total number), Companies (36,36%) and Small size farms (40%), all farms specialized in Grazing livestock and Mix livestock, as well the majority of the Mix crop-livestock holdings (80%) (Figure 6). The positive impact of that factor is confirmed by the farms, located in Mountainous regions (77,78%), in two third of holdings in Less-favored non-mountainous regions, and most of the surveyed farms in the South-East region (57,14%).The latter is subsequence of the fact, that mostly holdings with small size, growing grazing livestock, located in the mountainous regions of the country, to the greatest extent take advantage of suchgood opportunity. In these regions private agricultural lands are limited and there are large pastures and meadows, which are widely provided for use to local farmers. In some cases bigger livestock holdings, which are with juridical status of companies also use large municipal and state pastures and meadows. Therefore, all these produce appreciate the positive effect of the free access to public lands on agrarian sustainability.

Well formulated and controlled social rights and obligations are important element of the institutional environment, which is to improve the social aspect and the overall level of agrarian sustainability. Well defined and effectively enforced social rights of individual agents (hired labor, residents and visitors of rural areas, final consumers, etc.) facilitate relationships, secure a public protection of "weak" parties, and lead to improvement of social and

overall sustainability in agriculture. According to one fifth of the interviewed farms managers "defined social rights and obligations" at the current stage of development have positive impact on agrarian sustainability, and particularly on its social aspect (Figure 2). The favorable impact is pointed out by the majority of Cooperative farms, in which social goals are principally an essential priority for the overall activity. One of the interviewed presidents of cooperatives underlines, that social responsibilities for providing employment for members are important, and therefore the coop members accept lower labor productivity in comparison to other structures. The positive impact on agrarian sustainability is also determined by other big employers (Sole Traders, Companies), which believe that social rights of workers are to be respected, and that secured workers are also economically more productive, and ecologically more efficient.

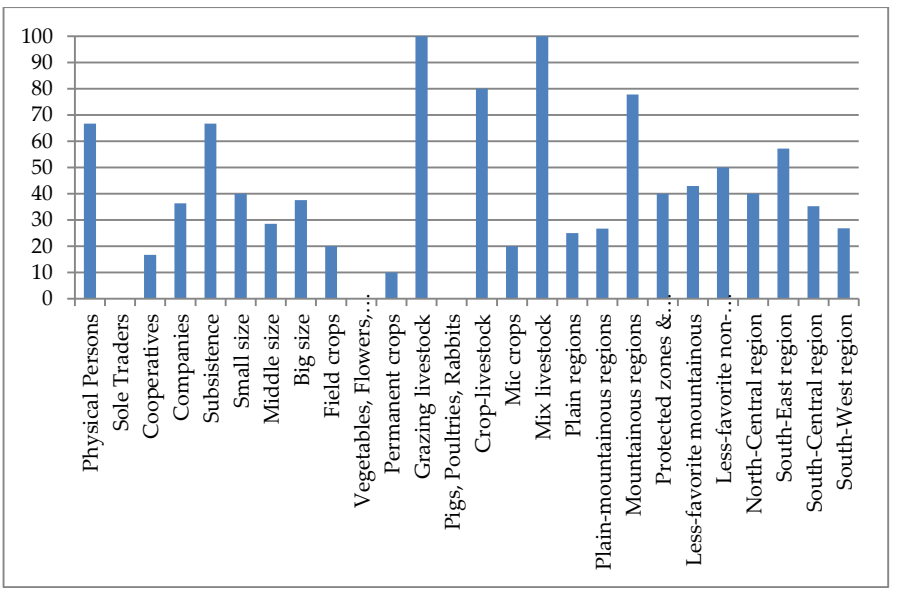


**Figure 6.** *Positive impact of free access to public lands on agrarian sustainability in Bulgaria (percent)*
**Source:** interviews with managers of farms, 2017

However, for the majority of the surveyed farms (67,5%) formally defined by the institutional environment social rights and obligations do not have any impact on agrarian sustainability or any of its individual aspects (including social one). That is a consequence of the fact, that many formal norms and standards, related to social rights, labor conditions and payment, etc. are not well respected or controlled in agriculture.

For a good fraction of the farms (12,5%) regulatory determined social rights and obligations have a negative impact on agrarian sustainability. Principally, bigger holdings and major employers are forced to complyto a greater extent with official norms for contracting, working conditions, wage payments, insurance, social security, etc. These farms are subject of considerable public subsidizing and along with that to a stricter control and sanctions by the state agencies for noncompliance with variety of (quality, social, environmental, etc.) standards. For some managers "new" social obligations, arising from the modernization of legislation, are associated with additional costs and diminishing economic efficiency, and together with that of overall sustainability of the sector. A large interviewed employer of seasonal labor pointed out as example the high costs for labor and social security payment (reaching up to a third of the total firm's costs), and for preparing temporary contracts, and for constant issuing of orders forunpaid leave of absence due to unregularly appearance to work, and for termination of contracts, and for penalties, etc. At the same time it is underlined, that competitors with a smaller size in the "shadow economy" attract workers with higher wages.

On the other hand however, the greatest portion of the interviewed managers (82,5%) believe, that "efficiency of controlling social rights and obligations " is a neutral factor for agrarian sustainability and its individual aspects (Figure 2). That is due to the fact that implementation and

enforcement of social rights and obligations in the sector (similarly to other sectors in the country) is not at a good level and have no real impact on sustainability and its social aspect.Simultaneously, a good portion of holdings (12,5%) assess as positive the impact of effective control on social rights and obligations. That is a consequence of that fact, that a stricter control improves significantly the status-quo and lead to implementation of otherwise "good" social standards and norms, introduced during pre- and post-accession to European Union. At the same time, for a relatively little part of the farms (5%), "improved" control on strict implementation of social rights and obligations is undesirable, because it considerably increase costs of production and affect negatively the overall sustainability of holdings activities.

Well-defined and enforced environmental rights and obligations are a major element of the institutional structure at the contemporary stage, and important factors for sustainable exploitation and conservation of natural resources. Theyare particularly crucial in agrarian production, which is a major polluter and user of natural environment, as well as one of the key factors for preservation, recovery and amelioration of natural resources. In pre-accession period and after the integration of the country to the European Union a significant modernization of environmental rights have taken place, as eco-standards have been harmonized with superior European levels, new rights and rules introduced for use and conservation of lands, waters, air, ecosystem services, etc., protection and improvement of biodiversity and landscape, compliance with principles of animal welfare, etc.

According to the significant part of the interviewed farm managers (37,5%) "defined eco-rights and obligations" affect positively agrarian sustainability, particularly its environmental aspect, and eventuallycontribute to

enhancing social and economicdimensions of sustainability as well. The favorable impact of that factor is assessed equally by holdings with different juridical type, specialization, sizes, geographical and ecological location. A big number of agricultural producers receive public subsidies, which require complying with modern eco-standards and norms. Besides, there are special measures for assisting agro-ecology and organic production imposing even higher environmental standards. There are also introducednumerous norms and standards for protection and exploitation of natural resources as a whole or in certain regions (NATURA, less-favored, protected zones and reserves, etc.), which are obligatory for agrarian resources owners, agricultural producers and non-agrarian agents (industry, residents, visitors, etc.).

Only a tiny section of surveyed farms (5%) indicate that the structure of regulated eco-rights and obligations is a negative factor for agrarian sustainability. The latter is consequence of the fact that adaptation of holdings to requirements of new environmental rules in the sector is associated with additional costs or considerable lost benefits. At the same time, the majority of interviewed managers (57,5%) believe, that defined eco-rights and obligations are not important for agrarian sustainability, including its environmental aspect. Very often agricultural producers are not well familiar with or implement new eco rules and norms due to the lack of means, capability for adaptation or weak (practically impossible, too expensive, politically unacceptable) control by the state bodies. Subsequently most agricultural producers do not put any importance on the structure of eco-rights and eco-obligations in the governance of agrarian sustainability.

In other instances provided rights for profiting from eco-activities and products do not allow obtaining any market and contractual bonus. According to some of surveyed

holdings, which are certified for organic production, they mostly sell their output at normal market prices without receiving needed bonus for organic produce. That is further reinforced due to the fact that internal demand for organic produce in the country is not big, markets for agrarian organic products are in the process of development, and/or many small producers have no access to such markets.

Moreover, three quarters of surveyed farms do not think, that the "efficiency of the control of eco-rights and obligations" is of significant importance for agrarian sustainability, and for environmental aspect in particular (Figure 2). The reason for the latter is that permanent control on eco-standards in a geographically extensive and multifaceted sector like agriculture is relatively weak (or practicallyimpossible), violations are easily hidden, often disputed or difficult to prove (through expertise, court, etc.), while sanctions for noncompliance are insufficient to induce mass pro-environment behavior. On the other hand however, every fifth holdings believes that improved efficiency of the control on eco rights and obligations in the past years affect favorably agrarian sustainability and its environmental dimensions. These are mostly larger producers, which understand well and try to comply with mandatory standards for quality, ecology, protection of nature and biodiversity, etc. These holdings strive to preserve (and improve) quality of utilized natural resources, since to a greater extent are controlled by the state bodies, and greatly suffer from detected violation and sanctions (fines, ceasing production, restoration costs, etc.). Some producers also think that "production" pressure of the sector on environment is not strong due to low application offertilizers, crop protection chemicals, intensification of activity, etc.

Relativelyfew farms (5%) indicate, that control efficiency on eco-rights and obligations affect negatively agrarian

sustainability. Those are producers which are either unconvinced (aware) with the meaning of effective eco management, or disinterested in the latter (due to advance age, part time involvement of farming, practicing a short-term lease of others resources, negative impacts on third parties, etc.), or have no financial, expert etc. capabilities to carry necessary eco-activities in a needed scale and terms. For that type of producers the improved public control is an "obstacle" for sustainable development of their holdings, since it is associated with additional costs for eco-actions, payments of penalties for violations, bribes to controlling authorities, etc. Many examples are presented for not provided accurate information about the real (eco)state in order to trade on markets and/or participate in public programs, professional and other organizations, as shortage of efficient "external" (quality, integral crop protection, pollution, waste management, etc.) control favor that. For instance, in order to take part in the selection control, an interviewed cooperative provides inaccurate information for the number of livestock, to prove unfeasible (but required) normative milk yield per cow head.

Creation of an environment for effective market competition in the country and its individual regions is an important factor for efficient resources allocation and utilizationand for governing sustainable development of the sector. A big portion of interviewed holdings (40%) report that "existing market competition in the country" impact positively agrarian sustainability and its aspects (Figure 2). Bulgaria is a small country and many bigger farms compete successfully with local and international producers in a nationwide scale. However, for the majority of interviewed managers (42,5%) the type and character of market competition in the country is a negative factor for agrarian sustainability. Many farmers believe that there are not favorable conditions for loyal competition with foreign

goods and between domestic producers. As reasons for the latter are following: policies for trade liberalization (including countries outside of the European Union), bad regulations and/or control for illegal import, domination of large buyers (food chains, processors, exporters, middlemen, etc.), wide informal (shadow) sector in the country, unequal public support to different subsectors of agriculture and type of producers, etc. An interviewed big livestock farmers indicates, that multiple bankruptcies in recent years as a result of the "low milk price" are a serious problem, still waiting solution. Another farmer in integrated grape and wine production lost his winery due to a failure to pay high bank interests. According to that manager it is necessary to establish a guarantee (supporting) national fund in order to prevent failures of structures with a high productivity but financial difficulties.

Many surveyed farmers also report, that the severe market competition leads to compromising social and environmental aspects of agrarian sustainability in order to maintain economic vitality. Examples are also given for missing or undeveloped markets for certain products in agriculture such as Lucerne, silage, manure, lack of short or long term agrarian credit, etc. In the latter cases, producers look for private ways for dealing with the issues – own production, contraction of activity, free provision, barter or combine exchanges, illegal waste disposal, contracts for chemicals etc. supply interlinked with crediting ("portion payment"), and so forth. Another reason for that problem in the country is that still there are not developed more complex and (often) more efficient market forms as alternative of competition with current prices such as future deals, forecasting and waiting for "high" prices, long-term contracts, vertical integration, etc. That is a consequence of the insufficient experience, information, superior costs (for of

harvest storing, keeping, etc., contracting), uncertainty and risk for holdings, etc.

For a relatively small portion of the farms (17,5%) market competition in the country is a neutral factor for agrarian sustainability. Those are mainly smaller size producers, semi-market holdings or farms with unique produce and guaranteed marketing (due to freshness, superior taste, preferred local products and varieties, etc.). That type of producers has no serious competition in local or regional scale and/or competes with big players at national or international scale.

The negative impact of market competition in the country on agrarian sustainability is faced differently by farms of various juridical type, sizes, production specialization, geographical and ecological location. To the greatest extent the adverse effect on agrarian sustainability is felt by Physical Persons (53,33%), holdings with Small size (60%), producers specialized in Vegetables, Flowers, and Mushrooms(75%), Grazing livestock (66,67%), Permanent crops (60%), and Pigs, Poultries and Rabbits (50%) (Figure 7). The latter categories of holdings and agricultural subsectors mostly suffer from the intensification of competition in the country in the past several years.

Existing nationwide market competition is a negative factor in regards to agrarian sustainability for every another farms situated in Plain regions of the country, for all holdings in North-Central region , and more than a half of the farms in South-Central region. The adverse effect to the least degree impact Sole Traders (12,5%) and Cooperatives (16,67%), farms with Big sizes (25%), holdings specialized in Field crops (20%), and located in Less-favoredmountainous (14,29%) and non-mountainous(25%) regions, as well as with Lands in protected zones and territories (20%). All these type of farms, production subsectors, and ecological regions are with superior comparative advantages for exploration of

economies of scale and scope in production and marketing, with good competitive and negotiating positions, established reputation and effective marketing channels. Moreover, these holdings, productions and regions also enjoy the biggest public support – subsidies for areas of utilized lands, agroecology, less-favored regions, etc.

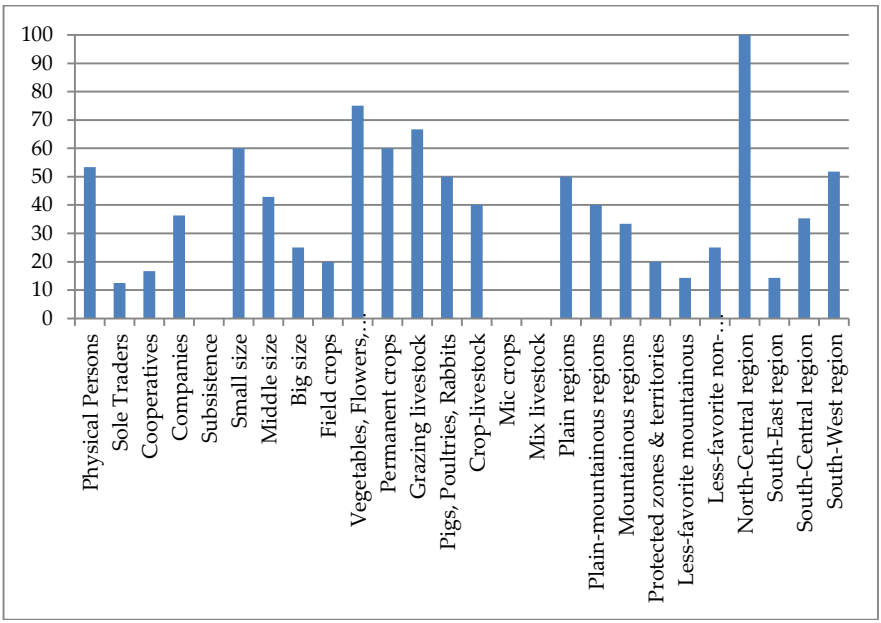


**Figure 7.** *Negative impact of existing market competition in the country on agrarian sustainability in Bulgaria (percent)*
**Source:** interviews with managers of farms, 2017

For the majority of surveyed agricultural producers (60%) "existing market competition in the region" is a neutral factor in relation to agrarian sustainability and its aspects. The little importance of the local competition is caused by the fact that many of producers work (and compete) for national and international markets and/or supply giant commercial chains and processors. Competition at local level is between limited numbers of small producers for restricted number of local buyers, and here relations are "governed"

by personal, rather than market connections – high trust, elaborated clientalisation, and high frequency of deals between same partners, etc.

Simultaneously, for a good proportion of the interviewed managers (22,5%), market competition in the region is a negative factor for agrarian sustainability, and particularly its social and environmental dimensions. The latter is mostly typical in the regions with intensive production, high population density, and for smaller size commercial holdings. What is more, many of interviewed managers indicate the lack of sufficient qualified and low skilled workers in the sector as one of the main factors, obstructing development at the current time. The latter demonstrates that local markets do not work well and bring an increase in the prices and "satisfaction" of existing demand for hired labor. Subsequently farm size is not expended to the effective scale, or important agro-technical and other activities implement in an effective scale, or more expensive mode of governance applied (as a permanent labor contract, purchase of external services, leasing out of "idle" resources, etc. instead of using a contract for seasonal employment). Many managers also complain from the shortage of financing in agriculture, which is indicative that loan markets do not work well at local and national level (unattractiveness, high risk, long pay back periods, etc. in the sector). Many examples are also given for farmers selling output and /or supplying from agents in other (often remote) regions, becauselocalsuppliers and buyers are not reliable (delayed implementation or default of negotiated terms).

On the other hand, a good portion of surveyed farms (17,5%) indicate the positive impact of market competition in the region on agrarian sustainability. A well working local market provides opportunity for numerous smaller producers in the region to realize comparative advantages in relation to producers (products) of other regions of the

country and/or import– lower prices, higher quality, freshness, origin authenticity, rapid and quality supplies, produce marketing in a "package with service" (farm visit, protection of nature, personal consultation, etc.). Superior competitiveness allows not only to maintain the economic vitality of local farms, but also to improve their social and environmental functions.

Liberalization andcosts, associated withinternational trade, are important factors for stimulation of local producers and realization of their competitive advantages in larger international scales. The majority of surveyed holdings (57,5%) do not directly take part in export or compete immediately with imported goods, and for them "possibilities and costs for import and export" are neutral factor for agrarian sustainability and its aspects (Figure 2). The majority of interviewed managers (27,5%) evaluate at positive the existing possibilities and costs for import and export on agrarian sustainability at current stage. Those are mostly larger producers in export oriented or related agricultural subsectors, for which possibilities for effective participation in international trade additionally improve some or all aspects of agrarian sustainability in the country. At the same time however, for 15% of holdings, the good opportunities and low costs for import and export ("globalization") are negative factor diminishing competitiveness, destroying national production and producers, and having not only socio-economic but also environmental consequences (devastation of family holdings, inferior lands fertilization and cultivation, lack of irrigation, practicing monoculture in large scales, unproductive utilization and/or abandoning of fertile lands, lost traditional varieties, productions, and biodiversity, etc.).

Legislative and regulatory arrangements are important element of the institutional environment, whichare to regulate (govern) the maintenance or achievement of

agrarian sustainability and all of its aspects. According to the majority of interviewed managers (47,5%) existing in the country "legislative and regulatory arrangements" do not any effect on agrarian sustainability or its aspects (Figure 2). The latter means that either the system of laws and formal regulations does not aim at improving agrarian sustainability, or the extent of implementation and enforcement of the system of laws and rules contribute to achievement of goals of sustainable agrarian development. For example, many interviewed managers confessthat they apply for different type of subsidies (for products, ecology, organic agriculture, etc.) only to get public support, and after that they destroy subsidized crops. Obviously, such kind of subsidies (public "assistance") has no particular benefit for agrarian sustainability and program objectives (besides creating temporary employment).

A good fraction of the farms (32,5%) assess as negative the impact of legislative and regulatory settings in the country on agrarian sustainability. Numerousfarmers complain that the multiple regulations of the Ministry of Agriculture and Food are difficult to study, not published on time, with a very short period for examination, preparation and application for support or complying with regulations, while sanctions for violation are great. The latter means that existing laws and regulations at the present time of development in the country do not stimulate or regulate well activity of the main agents in the sector (farm managers, owners of agrarian resources, agrarian bureaucracy, users of agricultural produce and services). In some instance, they even obstruct realization of socio-economic and environmental aspects of agrarian sustainability. An interviewed large producergives a goodexample demonstrating how difficult and costly is to register a big size combine purchases in Yambol (South-East Bulgaria). Combine inspection and registration have to be done in Sofia

(300 km away in West Bulgaria), and numerous (for each administrative region) special permissions are required for movement of the combine through all 7 regions from Yambol to Sofia.In order to deal with that challenge unlawful driving of the combine in the country is undertaken (with paying fines and/or bribes to police). Also many examples are shown for delayed payments of subsidies, compensation, etc. by the state agencies, creatingenormous difficulties for producers of different type. Merely for each fifth of the interviewed managers, the contemporary legislative and regulatory arrangements contributes (impact positively) to accomplishing agrarian sustainability.

There is a great differentiation in the negative impact of the legislative and regulatory settings on the behavior for sustainable agriculture of producers of different juridical type, sizes, productspecialization, geographical and ecological location (Figure 8). To the greatest extent the adverse impact of the legislative and regulatory framework affect Physical Persons (40%) and Companies (45,45%), holdings with Small size (46,67%),and those specialized in Vegetables, Flowers, and Mushrooms (75%), Grazing livestock (66,67%), Mix crop-livestock (50%), as well as farms located in the Less-favored non-mountainous regions (50%), and North-Central and South-Central regions of the country (accordingly 40% and 46,06%).

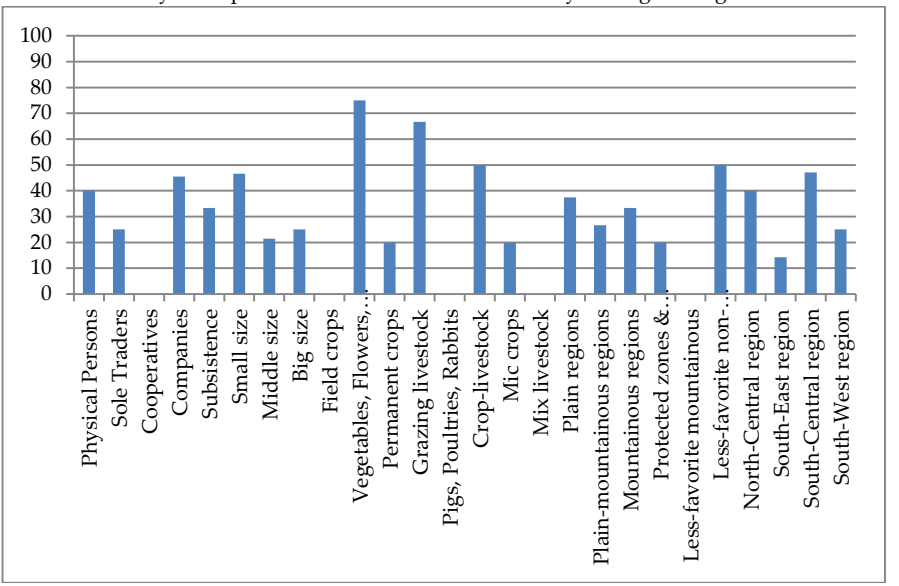


**Figure 8.** *Negative impact of existing legislative and regulatory arrangements on agrarian sustainability in Bulgaria (percent)*
**Source:** interviews with managers of farms, 2017

On the other hand, legislative and regulatory settings do not affect adversely agrarian sustainability in Cooperatives and holdings, specialized in Field crops, Pigs, Poultries and Rabbits, Mix livestock, and farms in Less-favoredmountainous regions. The negative impact of the legislative and regulatory arrangement is lesser for Sole Traders (25%), holdings with Middle (21,43%) and Big (25%) sizes, and in subsectors of Permanent crops and Mix crops (each 20%), located in Plain-mountainous regions (26,67%), and with Lands in protected zones and territories (20%). To the least extent the legislative and regulatory framework affects agrarian sustainability of farms in South-East (14,29%) and South-West (25%) regions of the country.

Official standards for product quality, working conditions, environment protection, etc. greatly (could) facilitate activity and relations of various agents, assist increasing efficiency, and sustainable development.

According to more than a half of interviewed farmers (52,5%), existing in the country system of "formal standards for products, labor, etc." has no impact on agrarian sustainability and its socio-economic and environmental aspects. That is a consequence of the fact, that dominating system of formal standards is not directed toward realization of diverse goals of agrarian sustainability in the greatest part of agricultural producers, due to a bad design, mismatch with practical needs and/or inferior practical implementation.

At the same time however, 30% of surveyed farms believe that official standards for products, labor, etc. support sustainable development and are a positive factor for achieving agrarian sustainability and its main aspects. Apparently, introduction and control of modern standards of European Union for products quality and safety, conditions and assurance of labor, natural resources protection, cross-compliance, etc. also contribute to improvement of agrarian sustainability in the country. The latter however, concerns mostly larger producers and major market players, having greater capability, strong interests and financial means to introduce new standards and meet market and institutional requirements. That also concerns the best part of holdings receiving public subsidies and participating in various support programs, since they are a subject of constant and stricter control by different state bodies.

For a good portion of holdings (17.50%) adaptation to novel quality, environmental, labor, etc. standards is too expensive, technically not feasible, undesirable or unnecessary, and leads to negative consequences in regards to agrarian sustainability or some of its aspects. Principally, those are smaller-size holdings, with a lower capability (expertise, financial potential) for adaptation, in less developed regions of the country, as well as owned by

advance age entrepreneurs. That type of farms also suffer greatly from enhanced control for precisecompliance with modern standards from the state authority, due to the high costs for adaptation and complicated bureaucratic procedures, impossibility or big losses from paying penalties, bribes, etc.

The actual implementation of existing laws, standards, rules, etc. is an important component of the institutional environment and factor for sustainable development. In Bulgariathe entire legislation was "harmonized" with that of European Union and high standards for quality, safety, environment protection, animal welfare, etc. introduced in the pre-accession period. Despite that, a big part of otherwise good laws and regulations does not work well due to the bad implementation by the state and private agents, insufficient control and lack of efficient mechanisms for stimulation and/or punishment. It is not by accident that a majority of the interviewed farm managers (45%) report that the "real implementation of laws, standards, etc." in Bulgaria is a negative factor for agrarian sustainability (Figure 2). The biggest fraction of the farmers believe that there is not supremacy of law and/or laws and rules are implemented equally to all in the sector and/or equally well in all regions of the country. There are also some managers, according to whom "good" enforcement of certain laws and rules id not associated with real improvement of individual aspects of agrarian sustainability, due to inferior (not corresponding to the needs, costly for agents, cumbersome, etc.) regulatory system.

An important part of interviewed managers (37,5%) assess as neutral the impact of the actual implementation of laws, standards, etc. on agrarian sustainability. In many cases, existing on paper "good" laws and standards practically "are not implemented" or incompletely applied.That consequently leads to nonfulfillmentof

expected results for amelioration of diverse aspects of agrarian sustainability. The smallest portion of surveyed managers (17,5%) suggests that real implementation of laws, standards, etc. is effective, and that contribute to improvement of socio-economic and environmental aspects of agrarian sustainability. Those are agricultural producers, subsectors and regions, where formal laws and rules are applied and controlled comparatively well and that is associated with an actual enhancement of agrarian sustainability. That share of farms give also approximate insight for (insignificant) extent of agricultural holdings in the country, in which official rules, standards, norms, etc. are implemented and controlled well.

To the greatest extent the negative impact of the (low) "efficiency" of the system of actual application of laws, standards, etc. is faced by Companies (54,55%), Sole Traders (50%), Physical Persons (46,67%), holdings with Small (46,67%) and Big (62,5) sizes, producers specialized in Vegetables, Flowers, and Mushrooms(100%), Mix livestock (100%) and Mix crop-livestock (70%) (Figure 8). On the other hand, Cooperatives (16,67%), farms with Middle size (21,43%), holdings specialized in Grazing livestock (0%), Field crops and Mix crops (by 20%), and Permanent crops, to a lesser degree are affected by the adverseimpact of that factor. Similarly, while only a little portion of farms in Plain-mountainous regions (26,67%) and in South-East region of the country (14,29%) report the negative impact of agrarian sustainability of the extent of real implementation of laws, standards, etc., a comparatively greater portion of agricultural producers in Plain (56,25%) and Mountainous (55,56%) regions, and in South-West region of the country (66,07%) are affected by the adverse consequences of that imperfect institutional organization.

Presence, type and amount of public sanctions for violating laws, rules, norms, etc. are important factor for

effective operation of the institutional environment and governing activities of various agents (resources owners. Producers, consumers, government administration, etc.). The biggest part ofinterviewed managers (45%) do not think that "existing public sanctions (fines, punishments) for violation" affect in any way activities and actions of agents for maintaining and/or increasing agrarian sustainability and its aspects (Figure 2).

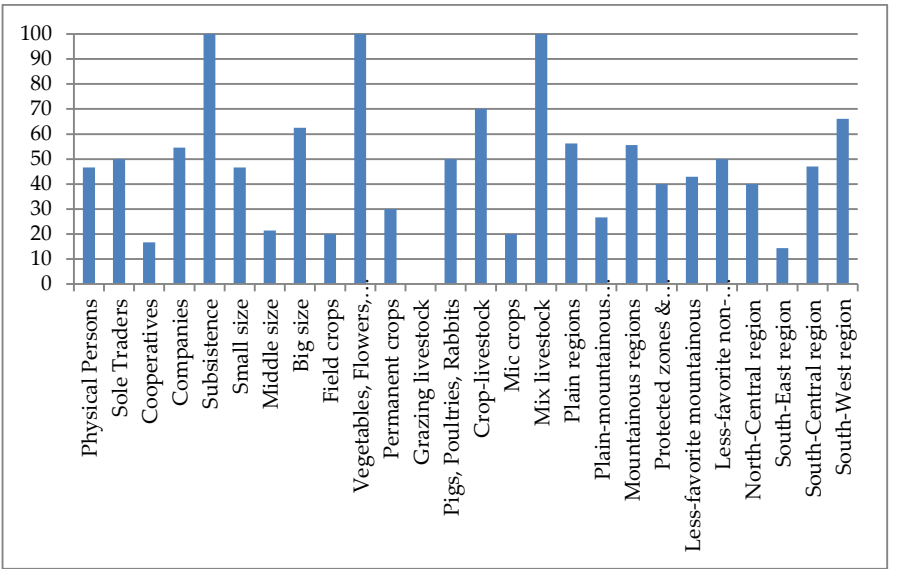


**Figure 9.** *Negative impact of the extent of real implementation of laws, standards, etc. on agrarian sustainability in Bulgaria (percent)*
**Source:** interviews with managers of farms, 2017

That is a consequence of the fact that existing system of sanctions does not provoke adequate behavior for amelioration of agrarian sustainability due to insufficient amount (fines, punishments, etc.) or inefficient organization (weak control, monitoring, lack of correlation between sanctions and outcome of activity, slow procedures, etc.). At the same time, only a tiny portion of holdings (17,5%) suggest that the system of public sanctions for violation

"work well" and lead to positive results in regards to elevation of agrarian sustainability. A big proportion of farm managers (37,5%) evaluate as negative the impact of the character and the size of public sanctions for violation on agrarian sustainability and its different aspects. That is a result of the fact that superior and adequate sanctions are associated with increasingcosts for prevention of likely violations and/or payments for actual violations, without however being always connected with any orproportionate improvement of agrarian sustainability or its specific aspects.

To the greatest extent the negative impact of the public sanctions for violation are faced by the Physical Persons (40%) and Companies (45,45%), while among Sole Traders and Cooperatives affects only a quarter and a third of them accordingly (Figure 9). The latter kind of farms either have less and unimportant violations (less frequent and smaller sanctions) or the sanctions payments to a lesser extent affect the overall outcome of their activity (a tiny share of sanctions in total costs, high return on costs for sanction payments comparing to the benefits of violations, etc.).

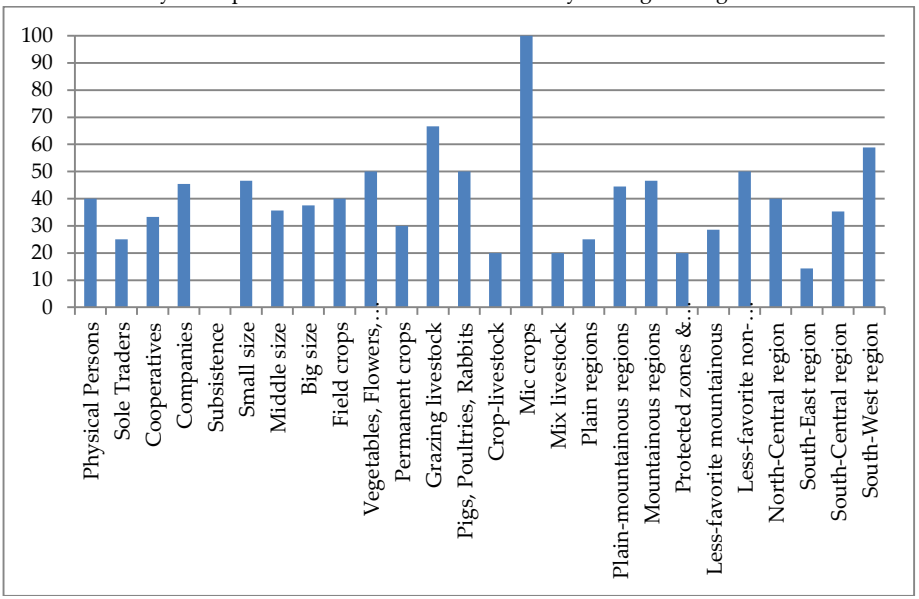


**Figure 9.** *Negative impact of the existing public sanctions (fines, punishments) for violation on agrarian sustainability in Bulgaria (percent)*

**Source:** interviews with managers of farms, 2017

The adverse effect of the public sanctions for violation is greater for Smaller size (46,67%) and farms specialized in Grazing livestock (two third of them), Mix crops (100%), Vegetables, Flowers, and Mushrooms, as well as Pigs, Poultries, and Rabbits (correspondingly for every another one). On the other hand, farms with Mix livestock and Mix crop-livestock to a lesser extent are impacted by the system of public sanctions for violation (every fifth one). The latter either make less violations (a high compliance with public norms and standards), or their violations are more difficult to detect and effectively punished, or implemented sanctions are not proportional to received benefits from breaking rules. Depending on the ecosystems, farms located in Mountainous (46,67%) and Plain-mountainous(44,44%) regions as well as in Less-favored non-mountainous regions (50%) most

greatly indicate the negative effect of the public sanctions for violation. Similarly, most farms located in South-West region of the country (58,92%) report the negative impact on agrarian sustainability of public sanctions for violation, while in South-East region of the country they are least numerous (14,29%).

"Costs for implementation of formal and informal norms, standards, etc." are costs of the farms for adaptation to requirements of socio-economic, institutional and market environment. Along with traditional ("production") costs, they determine to a great extent the efficiency of farming activity, as their high level could impede sustainable agrarian development. According the majority of interviewed managers (62,5%) the level of such costs have no effect on agrarian sustainability or certain aspects (Figure 2). Therefore, costs for adaptation to regulatory requirements are not important for maintaining or increasing agrarian sustainability, or the actual agrarian sustainability level does not depends on effective amount of such costs. Simultaneously merely 5% of all holdings believe that the real costs for implementation of formal and informal norms, standards, etc. have a positive impact on agrarian sustainability or some of its aspects.

At the same time however, for a relatively good portion of farms (32,5%) growing amount of costs for adaptation to constantly evolving formal requirements of institutional and market environment as well as existing informal rules are negative factor for agrarian sustainability. It is well known that farms have high additional costs for complying with novel standards for quality, safety, ecology, etc. of the European Union, with voluntary or compulsory "codes of behavior" of various professional organizations, purchasing industries, commercial chains, consumer associations, etc. Studying out and training in/and implementation of multiple laws, norms, etc. in agrarian sphere is also

associated with enormous costs for individual producers. Furthermore, agricultural producers have significant costs for "complying" with informal rules – informal standards of buyers, bribe payments, doing "favors", giving "presents" to controlling and protecting bodies and persons, etc.

The greatest adverse effect on agrarian sustainability have theamount and character of costs for implementation of formal and informal norms, standards, etc. for the managers of firms of different type – Sole Traders (37,5%) and Companies (26,36%) (Figure 10). On the other hand, to least extent the negative impact of that type of costs is felt by the Cooperative farms – sole 16,67% of them.

The costs for implementation of formal and informal norms, standards, etc. are negative factor for agrarian sustainability according to the majority of managers of Big size holdings (62,5%). These farms to a greater extent comply with formal rules, interact with external agents and institutions, and have higher absolute and relative costs of that type. In individual subsectors of agricultural production the negative impact on agrarian sustainability of the costs for implementation of formal and informal norms, standards, etc. is faced to the greatest degree by farms specialized in Mix livestock (all of them), Grazing livestock (two third), and in Vegetables, Flowers, and Mushrooms (every another one).

In all these subsectors the size of farms is relatively small, while costs for adaptation to the new standards of the European Union, market counterparts, and nonmarket agentsextremely high. To alittle extent the negative impact of such costs affects highly standardized and mechanized productions like Pigs, Poultries, and Rabbits (0%), Field crops, Permanent crops, and Mix crops (one fifth of holdings).

Costs for implementation of formal and informal norms, standards, etc. to a greater extent impact negatively the

farms, located in Plain regions of the country (37,5%), while in Less-favorite mountainous (14,29%) and non-mountainous (25%) regions, and in the farms with Lands in protected zones and territories (14,29%) the adverse effect of that factor on agrarian sustainability is less important.

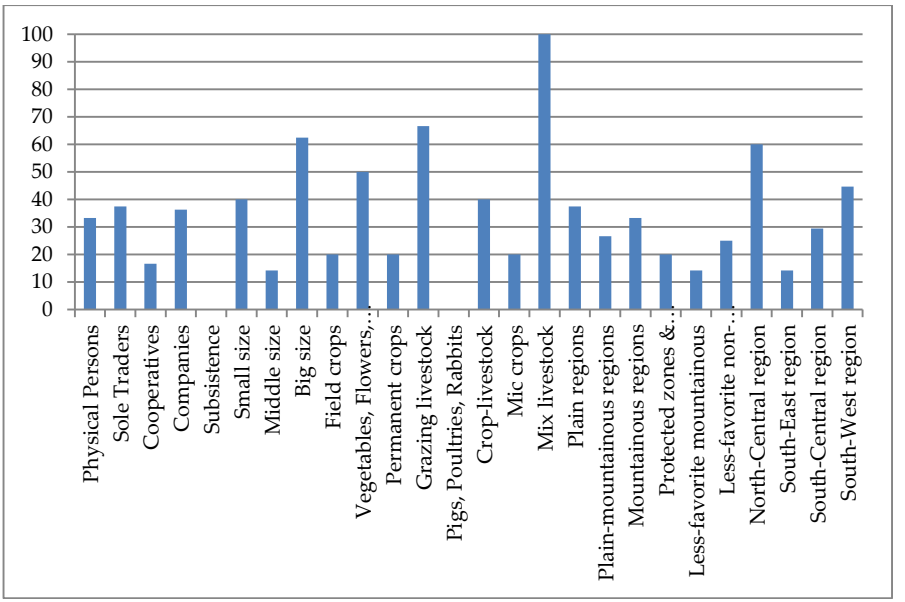


**Figure 10.** *Negative impact of the costs for implementation of formal and informal norms, standardsetc. on agrarian sustainability in Bulgaria (percent)*

**Source:** interviews with managers of farms, 2017

Similarly, costs for implementation of formal and informal norms, standards, etc. are negative factors for the significant part of farms, situated in North-Central region (60%), while in South-East region of the country they are essential only for relatively small fraction of holdings (14,29%).

Possibilities and restrictions for free contracting are important factors for optimization of the governance of sustainable development according to the interests and

initiatives of various private and market agents. For more than a half of surveyed farms (55%) existing "possibilities for free contracting" are a positive factors for agrarian sustainability, predominately for economic, and to a smaller extent for social and environmental aspect (Figure 2). The positive impact of that factor is pointed out by farmmanagers of different type, for which provided real freedom to negotiate conditions and prices of exchange are critical for effective and sustainable development.

At the same time however, every fifth of surveyed farms indicates that "possibilities for free contracting" affect negatively agrarian sustainability or its individual aspects (mostly economic one). That concern commercial holdings of various juridical type, size, production specialization, and locations, all of which suffer from "free contracting" with counterparts. Many of the Bulgarian farms of different type have a high asymmetry of contractual positions (a great unilateral dependency) with dominating buyers and/or sellers – big quasi or monopoly suppliers of materials, energy, water, credits, etc. and/or buyers of agricultural produce and services. Agricultural producers have no real possibility to choose a partner and negotiate prices, terms of payment, amount of damages, etc. in relations with suppliers and buyers. At the same time, farms are not able (too expensive) or willing (lack of alternative supplier or buyer) to protect their interests in legitimate way and therefore constantly suffer by the "provided freedom".

Interviewed managers also point out many examples for contracts violation by public (state, municipal, international) bodies adversely affecting agrarian sustainability. For instance, often negotiated subsidies transferred on time or in a required amount, contracted terms are not fulfilled by local and state authorities, etc. Disputing of such "contracts" through a third part (court, etc.) is too expensive or undesirable for individual producers, due to a high

specificity, low efficiency, huge costs and bureaucratic procedures, as well as likelihood for subsequent "punitive actions" by the provider of public services (and sanctioned) state body. For a quarter of interviewed managers existing possibilities for free contracting have no importance for agrarian sustainability or some of its aspects in the contemporary conditions of Bulgarian agriculture.

Quantity and quality of available information of interested agents is essential factor, which predetermine the efficiency of the governance of agrarian sustainability. According to the majority of surveyed managers (62,5%) "available information for prices, markets, innovations, etc." Impact positively agrarian sustainability and its different aspects (Figure 2). The favorable effect of the "system of provision" of information for effective governance of agrarian sustainability is indicated by all type of agricultural producers. Different kind of holdings (large, small, individual, group, specialized, not specialized, etc.) have unequal information needs and possibilities for access (collection, purchase, etc.) and processing (skills, qualification, available experts, etc.) of diverse information. Despite that however all underlinethat external environment work well and information they possess lead to improvement of agrarian sustainability or some of its socio-economic and environmental aspects.

Only 2,5% of farms suggest that available information for prices, markets, innovations, etc. is not sufficient or misleading, and therefore is a negative factor for agrarian sustainability. Simultaneously, a good portion of agricultural producers (35%) evaluate as neutral the importance of available information for process, markets, innovations, etc. in relation to sustainable agrarian development. Some of the latter holdings (small, subsistence, extensive, etc.) have no great information needs, while another part have no access to information (from media, advisory and training system,

consultants, etc.), which is beneficial to the management of their multifunctional activity. Our survey also has found out that many farm managers have none or sufficient reliable information for important parameters related to agrarian sustainability such as: extent of erosion and pollution of soils, quality of ground waters, protected species, biodiversity, etc. in the region or in the area of their farms.

Existing "freedom and restrictions" for formal registration of business forms, joint organizations and associations of agrarian and non-agrarian agents, and associated costs and time of interested parties is one of the major factor for development of efficient private and public modes of governance of agrarian sustainability. According to the majority of surveyed farms existing "possibilities and costs for registration of enterprises, associations, and organizations" at present stage have a little impact on agrarian sustainability or its main aspects (Figure 2). That means that for most managers there are no formal institutional restrictions or high costs and difficulties for registration of various private and collective modes for governing of activity and relations, managing relations with market and privateagents, and for lobbying for public support. These farmers of different type assess as "normal" possibilities and costs for registration of private and collective organizations of agricultural producers. Another reason is that majority of Bulgarian farmers rarely participate in a formal registration of any business and other forms (firms, joint ventures, cooperatives, associations, etc.).

A relatively small fraction of interviewed managers (17,5%) indicate that existing possibilities and associated costs for registration of farms, associations and organizations affect favorably agrarian sustainability. That group includes managers-innovators looking for new organizational forms for improving activity and actively (and frequently) taking part in procedures for formal registration of

variousorganizational formations. Many of these entrepreneurs are with accumulated experiences in such activity, or use qualified specialists for carrying out formal registrations, and therefore their costs and efforts are not big.

However, a good number of surveyed farms (12,5%) believe that existing possibilities and costs for registration of farms, associations, and organizations affect negatively agrarian sustainability. Those are usually smaller producers with little experience in formal procedures and/or capability to hire expensive specialists (consultants, lawyers, etc.), for which related institutional restrictions (bureaucratic procedures, high costs of resources and timing, etc.) are obstacle for improving agrarian sustainability or some of its aspects.

Existing formal possibilities for registration and protection of products, origins, activities, etc. and associated costs and time are another important factors for effective development of variety of new forms for governing of agrarian sustainability and its diverse aspects. For the majority of surveyed holdings institutionally determined possibilities (freedom, restrictions) and costs for registration of products, origins, activities, etc. have no significant impact on the governance of agrarian sustainability (Figure 2). That is a consequence of the fact, that most Bulgarian farmers do not formallyregister new products, origins, trademarks, etc. and therefore think that available possibilities and related costs are important in regards to agrarian sustainability. At the same time, for every forth of the interviewed managers existing "possibilities and costs for registration of products, origins, activities, etc." have a favorable impact on agrarian sustainability and its individual aspects. These are predominately entrepreneurswell familiar with and using formal procedures for official registration of special products, origins, technologies, etc. Along with introduction of the European legislation in the area of registration and

protection of agrarian intellectual property in the country gradually are disseminated various forms byprivate agents and/or farmers organizations (protected products, denominations, origins, bio certification, eco-products and services, etc.). These innovations give new opportunities for increasing efficiency of private and collective initiatives and investments, while the lack of bureaucraticobstacles and/or costs, associated with their registration, enhance agrarian sustainability.

Only a tiny proportion of surveyed holdings (2,5%) assess as negative the impact of existing possibilities and costs for registration of products, origins, activities, etc. on agrarian sustainability. For someentrepreneurs existing institutional restrictions and costs prevent effective registration of novel products, origins, activities, etc. That is a result of inferior financial capabilities for payment of fees, wages, bribes, etc., insufficient experience and/or expertise for such activity, lack of qualified personnel or practical difficulties, associated with complicated, incomplete and/or vague bureaucratic rules and procedures. The respondents also point out examples when the lack of compulsory certification for certain activities (e.g. production of propagating plants, eco-products, etc.) is a factor for widespread dissemination of inauthentictodeclaredorigin and quality products.

Existing opportunities or obstacles for investment in agriculture and economy as a whole are important factors for improving agrarian sustainability and all its aspects. A quarter of surveyed farm managers evaluate as positive the impact of "possibilities and obstacles for investment" atcurrent stage of development of Bulgarian agriculture (Figure 2). For a relatively little portion of the farms (15%) possibilities and obstacles for investment in the operating environment, are neutral factors, which neither stimulate nor deter improvement of agrarian sustainability. For the majority of agricultural producers (60%) however, real

possibilities and obstacles for investment in agrarian sphere obstruct agrarian sustainability and its aspects. For most Bulgarian holdings socio-economic and institutional environment do not provide favorable opportunities for finding investment resources or sufficient incentives for investment activity for increasing economic, social and/or environmental sustainability in the sector.

To the greatest extent existing possibilities and obstacles for investment deter agrarian sustainability in Cooperatives (83,33%), holdings with Small sizes (86,67), (all) farms specialized in Vegetables, Flowers and Mushrooms, as well as Pigs, Poultries and Rabbits, farms with Lands in protected zones and territories(80%), and located in Less-favored non-mountainous regions (75%), as well as in North-Central region of the country (Figure 11).On the other hand, the specific socio-economic and institutional environment to a lesser extent affects adversely the investment activity for improvement agrarian sustainability of Companies (45,45%), farms with Big size (12,5%), holdings specialized in Grazing livestock and Mix livestock(0%), and those situated in Mountainous regions (44,44%), Less-favored mountainous regions (42,86%), and in South-East region of the country (28,57%).

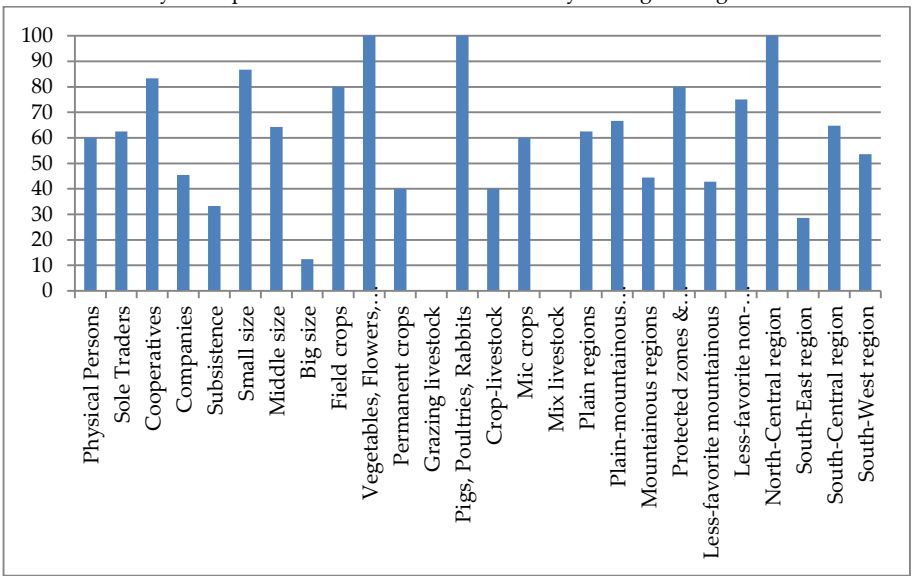


**Figure 11.** *Negative impact of existing possibilities and obstacles for investment on agrarian sustainability in Bulgaria (percent)*
**Source:** interviews with managers of farms, 2017

Existing monopoly and power positions most often considerably obstruct effective allocation of resources and sustainable development of business organizations, sectors of economy, and individual regions and communities. That is particularly important in agriculture, where producers rarely have monopoly positions – numerous small and competing farms, inefficient national organizations for price negotiation, lack of public prices regulation (guarantee), etc. What is more, very often farms face complete or partial monopoly both in the supply of materials, energy, credit, insurance and other services, as well as in marketing of farm produce.

Our survey has proved that for the majority of the managers of agricultural holdings (62,5%) "existing monopoly and power positions" affect negatively agrarian sustainability and its individual aspects (Figure 2). Merely 5% of all farms asses the actual situation in regards to

monopoly as favorable for agrarian sustainability. Such holdings commonly are contractually or completely integrated in some structures with "power" positions and benefit from the monopoly positions of that mode. A significant portion of the managers (32,5%) evaluate as neutral existing state regarding presence of monopoly and effects on agrarian sustainability. Such farms either trade on competitive (well working) markets with many sellers and buyers, or most of their relationships are carried with local and predominately small buyers and/or sellers (absence of monopoly).

All categories of holdings, subsectors of agriculture and regions of the country, suffer from the negative impact of existing monopoly and power positions (Figure 12). To the greatest extent the adverse effect of the monopoly and power positions impact agrarian sustainability in Sole Traders (three quarters), holdings with Middle size (78,57%), farms specialized in Pigs, Poultries and Rabbits, and Mix livestock (by 100%), as well as Permanent crops (70%), farms located in Plain-mountainous regions (73,33%), Less-favoritemountainous and non-mountainous (71,43% and 75% accordingly), and in North-Central (80%) and South-West (71,42%) regions of the country.On the other hand, the negative effect of monopoly and power positions in regards to agrariansustainability, to a comparatively lesser degree affects Companies (45,45%), farms with Big sizes (37,5%) and those Predominately for subsistence (33,33%), holdings specialized in Field crops and Mix crops (by 40%), and located in Mountainous regions (55,56%), and South-East region of the country (42,86%).

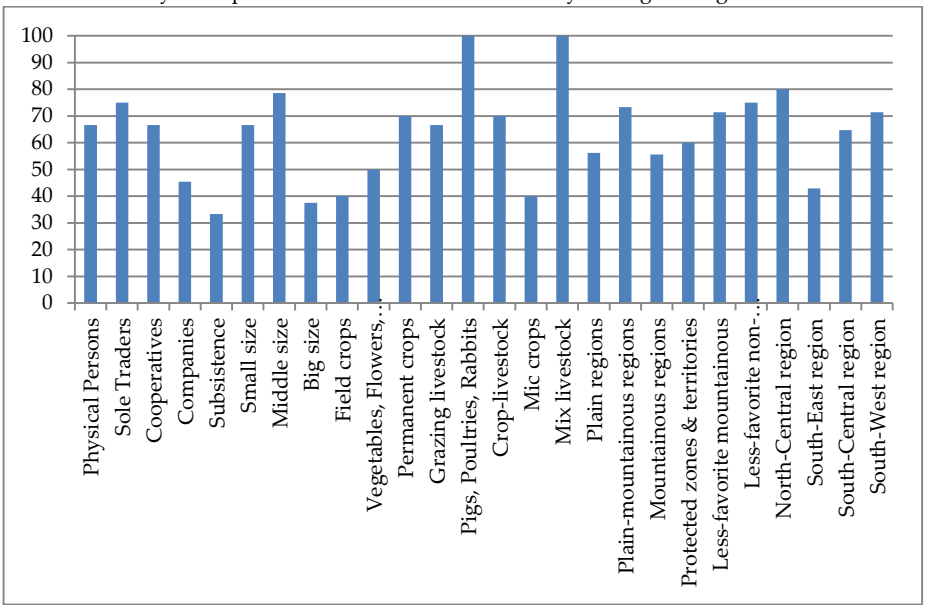


**Figure 12.** *Negative impact of existing monopoly and power positions on agrarian sustainability in Bulgaria (percent)*
**Source:** interviews with managers of farms, 2017

Personal connections are crucial factor for effective management of relations between different agents. They are particularly important when market mechanisms and private contracts "do not work" and there is no effective public (court) system for enforcement of private contracts and obligations. In the present conditions of Bulgarian agriculture the traditional "personal collections" are still reported as an important positive factor for agrarian agriculture by the great majority (82,5%) of interviewed managers (Figure 2). The favorable effect of personal connection for agrarian sustainability is indicated by all type of farms, subsectors of agriculture, and in different regions of the country. Personal links between close friends, relatives, partisans, etc. dominate both in the governance of commercial relations (deals of different type) andvarious "relations" with public (state, municipal, non-governmental,

etc.) organizations, as well as in participation in collective initiatives and/or organizations of different type (marketing, inputs supply, eco-management, lobbying for public support, etc.).

For one tenth of the holdings the personal connections have no importance in the governance of relationships with other agents and in regards to agrarian sustainability. Those are mainly large commercial farms, for which market (prices, competition, trade conditions) rather than personal factors are essential for choosing a partner for exchange and coalition. Comparatively small part of interviewed managers (7,5%) indicates that domination of personal connections in Bulgarian agrarian sphere is a negative factor for amelioration of agrarian sustainability and its individual aspects. That type of governance frequently is associated with the privilege and even illegitimate "inclusion" in public support programs or access to major public resources by certain groups and individuals with "good connections" with authority at national, regional and/or local level.

Building a good reputation is perceived as animportant factor contributing to selection of an appropriate supplier, buyer orpartner for join initiatives. Therefore, agents having intention to stay a long-time in certain business and improve agrarian sustainability tend to invest in establishment of a "good name". firm or product reputation, etc. On the other hand, created "bad" social reputation gives a good signal for avoiding relations with certain (undesirable) agents and eventually assists the effective governance of agrarian sustainability. According to the majority of surveyed managers (65%) establishedreputation has a positive impact on the governance of agrarian sustainability and its main aspects (Figure 2). The favorable effect of that factor is equallyreported by farms of different juridical type, size, production specialization, geographical and ecological location. Simultaneously, none of the investigated holdings

suggests that information about/for building a (good, bad) reputation hinders agrarian sustainability.

At the same time however, for a good fraction of holdings (35%) the established reputation is not a factors affecting agrarian sustainability. The governance of diverse aspects of agrarian sustainability often require relations with new counterparts, for whichusually there in no reliable reputation information (new business, regional, or country players, etc.). Therefore agrarian agents use other "faceless" mechanisms for controlling quality and protection of interests as recommendations, collateral, joint investments, short-term contracts, taking additional risk for a higher benefits, etc.

The state of trust between partners, and agents of a particular kind, in a specific region, subsector of economy, etc. is an n important factor facilitating relations and cooperation, and leading to realization of socio-economic and environmental objectives of sustainable development. According to the majority of interviewed managers (60%) "existing trust" at the contemporary stage of agrarian development have a positive impact on agrarian sustainability and its main aspects (Figure 2). The high trust affects favorably sustainability according to the managers of different type of farms, subsectorsof agriculture, geographical and ecological regions of the country.

In agrarian sphere and rural communities a great portion of the relations are between agents, knowing each other well for a long-period of time, and developing trust, reputation and personal connections. Namely such informal mechanisms (trust, good reputation, personal connections, mutual interest to avoid and/or quick resolution of disputes and conflicts, etc.) to a great extent govern effectively a significant part of the activity and determinebehavior of the majority of participating agents. Subsequently, a great portion of the agreements in the sector are based on informal

contracts, governed by the "high trust" and the "good will" of parties. At the same time, none of the respondents indicates that the extent of trust is a negative factor for agrarian sustainability. That is indicative that those who base their relations on those type (informal) mechanismsappreciate its positive importance in the governance of agrarian sustainability or its aspects.

Nevertheless, for a considerable fraction of the holdings (40%) existing social trust is a neutral factor for governing agrarian sustainability. At the present stage the agrarian agents increasingly have to trade with unknown counterparts from other regions and/or countries without being able to use traditional interpersonal forms, based on good knowledge, personal connections, punishment through building a bad reputation, etc. What is more, achieving or maintaining agrarian sustainability often requires along-term efforts and involvements of a big number of participants ("collective actions")in vast territories. The latter gives possibilities for opportunistic behavior of some or most of the participants often leading to a failure of common projects. Many examples are also presented when excess trust to a certain partner(s) in bilateral or multilateral deals lead to failures, nonfulfillment of agreements, unrealized objectives and significant losses for certain parties. All that necessitates in the agrarian sphere increasingly to be used other more efficient forms for governing of agrarian sustainability such as formal contracts and agreements, market competition, assistance of a third party, dispute resolution through a court system,etc.

Evolution of social demands and pressure at national and regional scale is an essential "driving" factor for the pace and character of socio-economic development. However, not always satisfying current social needs leads to accomplishment of multiple goals of sustainable development. The majority of interviewed managers (62,5%)

believe that "social needs and pressure at national scale" at current stage has no substantial impact for achieving or maintaining agrarian sustainability or any of its aspects (Figure 2). Besides, 15% of holdings event think that social needs and pressure have a negative outcome regarding agrarian sustainability or its social and/or environmentaldimensions.

A good proportion of the managers (22,5%) however, have opinion that evolution of social needs, demand for products and services of agrarian sector and pressure of interests groups, government, non-governmental and international organizations, and public at large have a positive significance for realization of agrarian sustainability. Such novel national needs and "pressure" direct (assist, stimulate, sanction) efforts of a considerable part of agricultural producers in line for achieving socio-economic and environmental objectives of sustainable development. Those are predominately bigger commercial farms, which are sensitive to market demand for certain products and services from the consumers in national and/or international scale for socially responsible, environmental friendly, etc. agriculture. There are also numerousgood examples for progressive models, introduced by young entrepreneurs, who react to new trends in social needs introducing original initiatives or join novel national or international "movements" for sustainable agriculture (organic agriculture, permaculture, etc.).

As far as "social needs and pressure in the region" is concerned, for the best portion of interviewed managers, they are mostly neutral (80%), and even negative factor (10%) (Figure 2). For every tenth farm however, social needs and pressure in the region is a positive factor for agrarian sustainability, apart from its economic increasingly for the environmental and/or social aspect as well. That concerns mainly smaller holdings which meet local demands and

forced greatly to take into account various needs of residents and visitors of the region.

Informal institutions are important factor of the institutional environment, which significantly affect the (transition) process and character of agrarian sustainability. According to 30%of surveyed managers "informal rules, norms, modes, etc." impact positively agrarian sustainability and its main aspects (Figure2). In agrarian environment traditionally dominate a great variety of informal rules, norms and forms (contracts, agreements, norms, etc.) which determine greatly relations and behavior of agrarian agents. In the conditions of not well working system of formal institutions, agrarian agents widely use such informal rules and diverse forms for organization and management of entire activity. For a fraction of holdings they also assist the improvement of agrarian sustainability or its individual aspects.

A significant part of the managers asses as neutral the impact of informal rules, norms, forms, etc. on agrarian sustainability. Along with development of the system of formal rules and markets, and improvement of the control and enforcement of formal standards, norms, etc. through lawful way, the formal institutions (greatly) replace informal one in governing relations and behavior of a tiny fraction of agrarian agents. At the same time however, a good portion of holdings (35%) argue that domination of informal rules, norms, forms, etc. affect adversely agrarian sustainability. A dual system of formal and informal structures in the sector punishes those, who comply with laws and regulations, and favor those violating them. According to the manager of a greenhouse, 90% of the sector is in the shadow sector where there is no quality and safety control, tax and social security are not paid, etc. That hinders development of the "light" structures and diminishes their competitiveness. In the country still there is no effective system for implementation

and enforcement of laws standards, and regulations, as massively are applied informal (even illegal) forms for carrying out activity, conflicts resolution, assets acquisition, access to public resources and support funds, etc. That impedes evolution of the effective (formal) structure for governing of agrarian sustainability and each of its aspects.

All categories of farms, subsectors of agriculture, and regions of the country are exposed to theadverse effect of the informal modes of governance (Figure 13). The only exceptions are Big farms and holdings specialized in Grazing livestock and Mix livestock.In the latter groups the informal institutions "work well" assisting or not disturbing agrarian sustainability and its aspects.

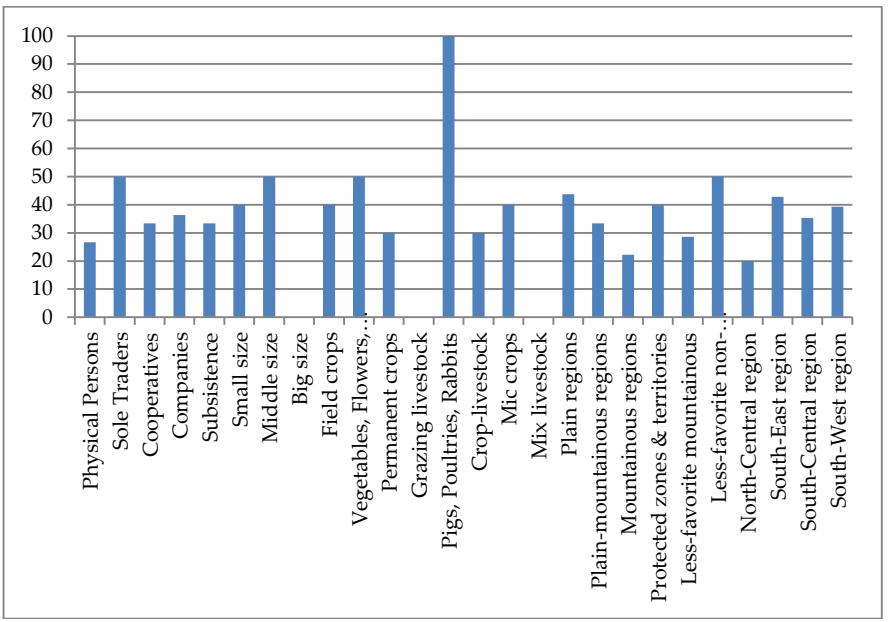


**Figure 13.** *Negative impact of existing informal rules, norms, forms, etc. on agrarian sustainability in Bulgaria (percent)*
**Source:** interviews with managers of farms, 2017

By the negative impact of the widespread application of informal rules, norms and forms, to the greatest extent are

affected Sole Traders (50%), farms with Middle size (50%), holdingsspecialized in Pigs, Poultries and Rabbits (100%), Vegetables, Flowers and Mushrooms (50%), farms located in the Plain regions (43,75%), and in South-East region of the country (42,86%). On the other hand, relatively smaller share of Physical Persons (26,67%), Cooperatives (33,36%), holdings Predominately for subsistence (33,33%), farms specialized in Permanent crops and Mix crop-livestock operation (by 30%), those located in Plain regions (22,22%), and in North-Central region, to a lesser degree evaluate as negative theapplication of informal rules, norms, forms, etc. In these groups of holdings, subsectors and regions the official rules and forms dominate while informal rules either are not employed or their implementation is neutral or more efficient (cheap, favorable) for participating agents.

Official status of the region (rural, national park, resort, etc.), where a particular farm or agricultural production is located, often provides some socio-economic, institutional and natural advantages for farmers generally or in certain subsectors. For the biggest fraction of holdings (52,5%), the "official status of the region" is not essential for agrarian sustainability since they are not located in such regions or their situation does not give any benefits, or it is associated with additional costs (Figure 2). Nevertheless, according to a good portion ofinterviewed managers (35%) the region's official status is a positive factor for agrarian sustainability or some of its aspects. The latter equallyconcerns farms of different juridical type, sizes, production specialization, ecological and geographical location. Usually farm's location infavorable (resort, more developed, border, etc.) regions gives a number of socio-economics advantages like superior prices, guaranteed marketing, diversification in related and other activities (restaurant, hotel, ecosystem services, tourism, etc.). On the other hand, location of the holding in special (rural, less-favored, protected zones and territories,

etc.) region gives opportunities for participation in various public support schemes and leads to improvement of agrarian sustainability. Nevertheless, for a good proportion of farms (12,5%), the special status of the region have a negative impact on agrarian sustainability or individual aspects. Affiliation of the farm to such a region most often is associated with numerouscomparative disadvantages (low productivity, superior costs, remoteness from markets, restrictions for resources utilization and certain activities, etc.), which are not compensated or insufficiently offset through public support forms, and eventually compromise agrarian sustainability or some of its aspects.

Climate changes are important factor for agrarian sustainability and often discussed in recent years as affecting positively, negatively or neutrally agricultural producers and agrarian sustainability. Our study has found out that according to the majority of surveyed farms (60%) "climate changes" are a negative factor in regards to agrarian sustainability, and its economic, social and environmental aspects (Figure 2). A great part of Bulgarian farms are not prepared or able to adapt to climate changes (warming, draughts, natural extremes, floods, etc.) though appropriate changes in production structure, technologies, organizational and governing forms. All that diminishes agrarian sustainability and its individual aspects. Some managers point out that bad "management" such as incorrect zoning, agro-techniques, etc., additionally strengthened (or caused) adverse impacts of climate. For instance, the best conditions for production of valuable ("expensive") apples are not in Pazarjik region (200 m above sea level), but at a higher grounds (600 m); Tracian lowland is ideal for fruits and vegetables, rather than widespread wheat and corn cultivation, broadly practiced zero or insufficient irrigation cannot offset changed needs and lead to adverse climate impact, etc.

Only 5% of interviewed managers report that climate changes affect positively agrarian sustainability. Some farmers are obviouslyfavored from the climate changes as warming, drought, heavy rainfalls, etc. For that type of holdings climate changes are associated with amelioration of conditions, yields growth, prolong of agro-techniques period, and possibility to produce new crops and/or diversify in new activities. For a good portion of Bulgarian farms (35%), climate changes are not important in relation to agrarian sustainability. The managers of the latter holdings believe that such changes are not new and threatenagriculture abnormalities (rather a normal process of fluctuations) and that farms possess sufficient adaptation capability for counteraction to changes, or holdings are somehow favored from the novel trends in climate evolution.

Climate changes to the greatest extent affectsnegatively Cooperatives (100%) and Companies (72,73%), large and as a rule highly specialized enterprises (100%), holdings in Field crops (100%) and Permanent crops (80%), farms with Lands in protected zones and territories (100%), those located on Less-favoredmountainous regions (85,71%), as well as in South-East region of the country (85,71%) (Figure 14). On the other hand, the adverse impact of climate changes on agrarian sustainability is not felt by none among farms specialized in Grazing livestock, and Pigs, Poultries, and Rabbits. To a lesser degree under the influence of climate changes are holdings specialized in Vegetables, Flowers and Mushrooms, widely using greenhouses, as well as holdings located in Less-favored non-mountainous regions (by 25%).

Holdings of Physical Persons (40%) are affected less negatively byclimate changes comparing to other juridical types. Also holdings Predominately for subsistence (33,33%) and with Middle sizes (42,25%) are less sensitive to adverseconsequences of climate changes. Similarly, a smaller

share of the farms located in Mountainous regions (55,56%) are adversely affected by climate changes in comparison with holdings in Plain and Plain-mountainous regions. Also smaller number of agricultural producers in South-Central region of the country (47,06%) assesses as negative the impact of climate changes comparing to farms in other regions of the country.

Analysis of the relationships between agrarian sustainability level in the farms, and the importance that managers give to the individual elements of external environment and governing modes, also allow evaluating the actual efficiency of different governing mechanisms and modes for improving agrarian sustainability in the country.

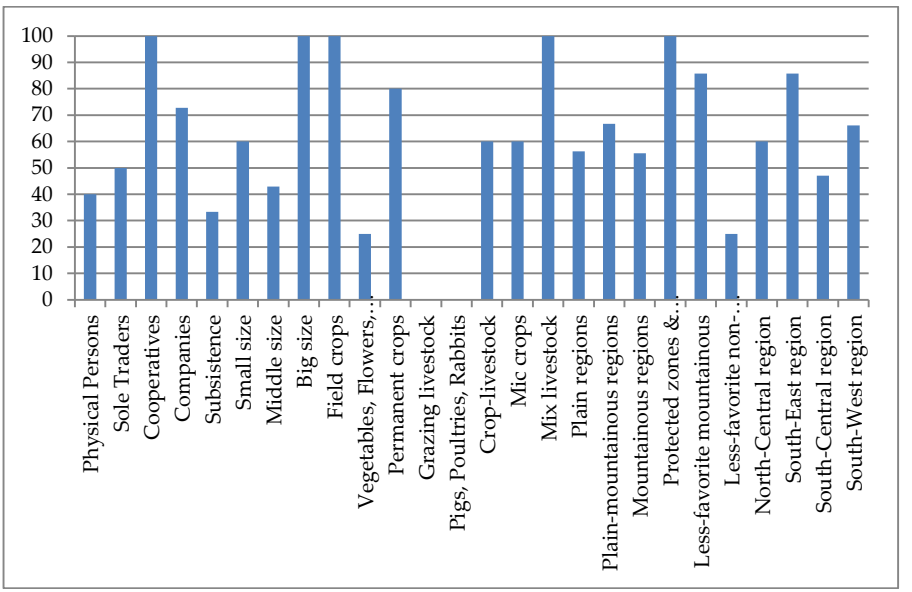


**Figure 14.** *Negative impact of climate changes on agrarian sustainability in Bulgaria (percent)*
**Source:** interviews with managers of farms, 2017

In regards to most components of the external institutional, market and natural environment there is no a strong correlation between the good and high levels of

sustainability and the (positive, negative) assessments of managers for the impact of corresponding factors on agrarian sustainability (Figure 15). The only exceptions are "free access to public lands" (93,33%), "established reputation" (92,31%),and "existing trust" (91,67%), where the farms with a positive estimates for the impact of factors demonstrate also superior levels of agrarian sustainability. Apparently, for the rest elements of external environment, the farms adapt to conditions for achieving agrarian sustainability, independent of the favorable or adverse impact of considered factors.

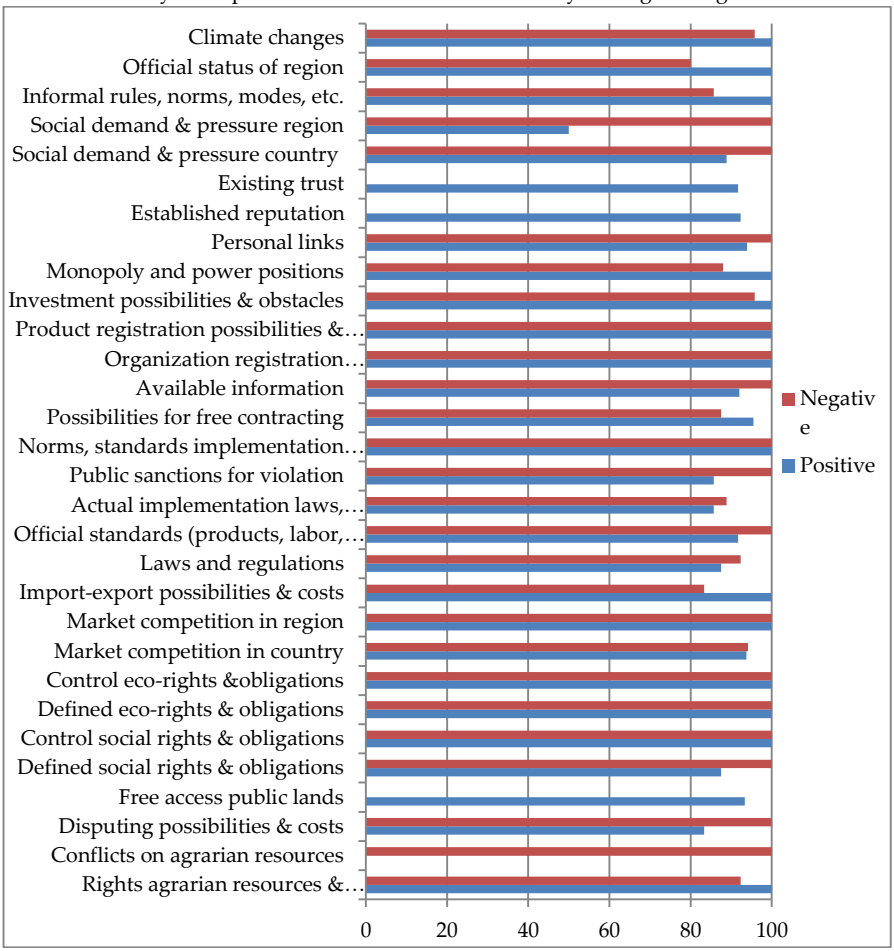


**Figure 15.** *Share of farms with good and high sustainability, which evaluate as positive or negative the impact of external environment in Bulgaria (percent)*

**Source:** interviews with managers of farms, and assessment of sustainability of agricultural farms, 2017

## Conclusion

Implemented first of a kind empirical study on impact of diverse elements of socio-economic, market, institutional and natural environment on agrarian sustainability made it possible to identify and assess the factors of "external"

environment, mostly affecting agrarian sustainability in the country, and in individual subsectors of agriculture, geographical and administrative regions, (agro)ecosystems, and type of farming enterprises.Our study has found out that individual elements of external institutional, market and natural environment affect quite unequally farms of different types, individual subsectors of agriculture, and specific ecological and geographical regions.

Nevertheless, evolution of the system of governance and the level of agrarian sustainability depends on various economic, political, behavioral, demographic, technological, international, natural etc. factors as well as dominating market, private, collective, public, etc. modes of governance applied by agents. Separate and joint effects of all these important factors are to be accounted for and assessed in further research in that new area. Besides, always there is a certain "time lag" between the "improvement" of the governance system, and the change in agentsbehavior, and the positive, negative or neutral impact on the state of agrarian sustainability, and its individual aspects. All these factors are to be studied in further studies as estimates also made on the "dynamics" of impact over a longer time horizon.

Having in mind the importance of comprehensive assessments of the impacts of institutional environment on agrarian sustainability, and the enormous benefits for the farm management and agrarian policies, this type of studies are to be expended and their precision and representation increased. The latter however, requires a close cooperation between all interested parties, and participation of the farmers, agrarian organizations, local and central authorities, interest groups, research institutes and experts, etc. Moreover, estimates precision has to be improved, and besides on the assessments of farm managers to incorporate other relevant information – expertise, studies on "actual"

behavior of various agrarian and associated "effects", report, statistical, etc. data.

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# 3 Assessing multi-aspects and integral sustainability of Bulgarian farms

## Introduction

The issue of assessment of sustainability of farms is among the most topical for researcher, farmers, investors, administrators, policy-makers, interests groups and public at large around the globe (Andreoli & Tellarini, 2000; Bachev, 2005, 2006, 2016a, 2016b, 2016c, 2016d, 2016e; Bachev & Petters, 2005; Bachev *et al.*, 2016; Bastianoni *et al.*, 2001; EC, 2001; FAO, 2013; Fuentes, 2004; Häni *et al.*, 2006; OECD, 2001; Rigby *et al.*, 2001; Sauvenier *et al.*, 2005; UN, 2015). Nevertheless, practicallythere are no comprehensive assessments on sustainability level of Bulgarian farmsin the conditions of European Union (EU) Common Agricultural Policy (CAP) implementation.

This article applies a holistic framework and assesses sustainability of Bulgarian farms as a whole and of different juridical type, size, production specialization, and ecological

and geographical location. Initially, methods of the study are presented.

First, we justify a new "governance" and "institutional" aspect of farm sustainability, and resent methodology of the study. Next, an overall characteristics of the surveyed farms is outlined. After that, integral, governance, economic, social, and environmental sustainability of the farms in general and of different type and location is assessed. Finally, factors for improving sustainability of farms are identified, and directions for further research and practices in sustainability assessment suggested. The ultimate goal of the study is assist improvement of farm management and strategies and public intervention for sustainable development in the sector.

## Methods of the study

Studying out of farm as a governance structure let properly understand efficiency and sustainability of economic organizations in agriculture (Bachev, 2004; 2005). In a long-term no economic organization would exist if it were not efficient, otherwise it will be replaced by more efficient arrangement. Therefore, the problem of assessment of sustainability of farms is directly related to estimation of level of governance, economic, social and environmental efficiency of farms.

In Traditional Economics the farm is presented as a "production structure" and analyses of efficiency is restricted to "optimization of technological factors" ("production" costs) according to marginal rule. This approach fails to explain a high sustainability and coexistence of numerous farms of different type (semi-market holdings, cooperatives, small commercial farms, large agri-firms) with great variation in "efficiency levels" in Bulgaria (and other Central and East European countries) during last two and a half decades.

In real economy with positive transition costs and institutions "that matter" farms and other agrarian organizations are not only production but major governance structures – modes for governing of activity and transactions (Bachev, 2004). Therefore, sustainability of diverse type of farming structures cannot be properly understood and estimated without analyzing their comparative production *and* governance potential. Following New Institutional Economics logic (Williamson, 1996) governance efficiency characterizes comparative potential of a particular form (type of farm) to minimize transaction costs and increase transaction benefits in relation to another feasible organization in specific socio-economic and natural environment.

Hence a farm will be efficient (sustainable) if it manages all activities and transactions in the most economical for owner(s) way. If a farm does not govern transactions (activity) effectively, it will be unsustainable since it will have high costs and difficulties for functioning in specific environment (possibilities and restrictions) *comparing* to another feasible (alternative) organization. In that case, there will be strong incentives for exploring existing potential (adapting to a sustainable state) through reduction or enlargement of farm size, or via reorganization or liquidation of farm. Consequently, some of following will take place - alternative farm or non-farm application of available resources; or farm expansion through employment of additional resources; or trade instead of internal use of owned land and labor; or taking over by or merger with another farm of business (Bachev, & Petters, 2005).

Modes of governance and acceptable (for owners, community, society) net benefits will vary according to personal preference of individual agents, entrepreneurial capability and experience, risk aversion, opportunity costs of owned resources, institutional restrictions and norms,

pressure and opportunities of specific environment (competition, demand, cooperation, support, climate change), etc.

Major types of farm activities (and transactions) subject of management are: supply and governance of labor resources; supply and governance of land and natural resources; supply and governance of material inputs; supply and governance of innovations; supply and governance of finance; and governance of marketing of products and services, etc. Sustainability assessment is to include comparative efficiency of governance of each of these activities of a farm in specific institutional, economic, social and natural environment in which that holding functions and evolves. If it is detected a lack of acceptable efficiency (significant costs and difficulties, insufficient benefits) in relation to feasible alternative(s), then farm is to be considered as low-sustainable or non-sustainable.

Next, it has to be evaluated the farm's potential for adaptation to constantly evolving market, economic, institutional, social and natural environment through effective changes in governing forms, size, production structure, technologies, and behavior. If the farm does not have potential to stay at or adapt to new more sustainable level(s) it will diminish its comparative advantages and sustainability, and (eventually) will be liquidated or transformed in to another type of organization. For instance, if a farm faces enormous difficulties meeting institutional norms and restrictions (imposed and enforced by EU new standards for quality, safety, environmental protection, animal welfare); higher social norms and requirements (for working conditions, income level, welfare of farmers and farm households; new demands of rural communities), and taking advantage of institutional opportunities (access to public support programs); or it has serious problems supplying managerial capital (as it is in a one-person farm

when an aged farmer does not have a successor wishing or capable of taking over the business), or supply of farmland (big demand of farmland by other entrepreneurs or for non-agricultural use), or funding activities (insufficient town finance, impossibility for coalition, selling equity or buying credit), or marketing output and services (changing market demand for certain products or needs of co-owners and buyers, a strong competition with imported products); or it is unable to adapt to existing environmental challenges and risks (warning, extreme climate, soil acidification, waters pollution, etc.), then twill not be sustainable despite the high historical or current efficiency. Therefore, adaptability of farm characterizes to the greatest extent farm sustainability and has to be used as a main criteria and indicator for sustainability assessment[1].

We have proved that definition farm sustainability has to be based on the "literal" meaning of that term and perceived as a system characteristics and "ability to continue through time" (Bachev, 2005). It has to characterize all major aspects of farming enterprise activity, which is to be managerially sustainable, and economically sustainable, and socially sustainable, and environmentally sustainable.

Therefore, sustainability characterizes the ability (capability) of a particular farming enterprise to exist in time and maintain in a long-term its governance, economic, ecological and social functions in the specific socio-economic and natural environment in which it operates and evolves (Bachev, 2006a, 2016b).

Farm sustainability has four aspects (pillars), which are equally important – governance, economic, social and environmental (Bachev, 2005, 2016a). A farm is sustainable if:

[1]Our suggestion to use adaptability as a criteria and indicator for sustainability has been already incorporated in one of the most comprehensive System for Assessing Sustainability of Agriculture Systems in Belgium – SAFE (Sauvenier *et al.*, 2005).

i) it has a good *governance efficiency* – that is to say it is a preferable for the farmers (owners) form and has the same or greater potential for governing of activities and transactions comparing to other farms or economic organizations (Bachev, 2004; 2005); ii) it is *economically viable* and efficient – that is to say it allows acceptable economic return on used resources and a financial stability of the enterprise; iii) it is *socially responsible* in relation to farmers, hired labor, other agents, communities, consumers and society, that is to say it contributes toward improvement of welfare and living standards of the farmer and rural households, preservation of agrarian resources and traditions, and sustainable development of rural communities and the society as a whole; iv) it is *environmentally friendly* – that is to say its activity is also associated with the conservation, recovery and improvement of the components of natural environment (lands, waters, biodiversity, atmosphere, climate, ecosystem etc.) and the nature as a whole, animal welfare, etc.

ly important: managerial (governance), economic, social and environmental. Depending on the combination of all four dimensions, sustainability of a particular farmcould be high, good, low, or it is unsustainable. In this study we apply a hierarchical framework including 12 Principles, 21 Criteria, 45 Indicators and Reference Values to assess sustainability level of Bulgarian farms (Figure 1). The content, justification, modes of calculation and integration of sustainability indicators are already presented in details in our previous publication (Bachev, 2016a).

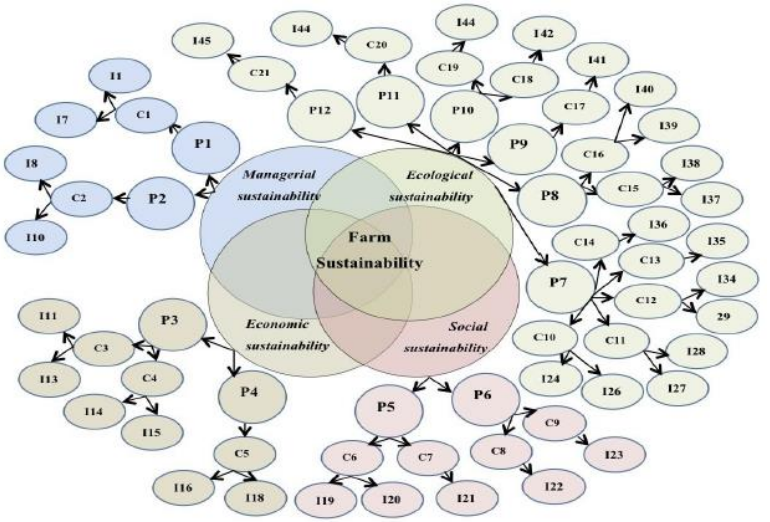


**Figure 1.** *Framework for Assessing Sustainability of Bulgarian Farms*

Assessment of sustainability of farms in the country is based on a 2016 survey with the managers of "representative" market-oriented farmsof different type. The survey was carried out with the assistance of the National Agricultural Advisory Service and the major associations of agricultural producers in the country, which identified the "typical" holdings of different type and location.

Assessment of sustainability level of individual farm is based on estimates of the managers for each Indicator in four qualitative levels: "High/Higher or Better that the Average in the Sector/Region", "Similar/Good", "Low/Lower or Worse than the Average in the Sector/Region", "Negative/Unsatisfactory/Unacceptable". After that the qualitative estimates for individual farms were quantified and transformed into Sustainability Indexes for each Indicator (SI(i)) using following scales: 1 for "High", 0,66 for "Good or Average", 0,33 for "Low", and 0 for "Unsatisfactory or Unacceptable".

For classification of farms according to juridical type (Physical Person, Sole Trader, Cooperative, Company),

production specialization (Field Crops, Vegetables, Flowers, and Mushrooms, Permanent Crops, Grazing Livestock, Pigs, Poultry, and Rabbits, Mix Crop-Livestock, Mix Crops, Mix Livestock), geographical and administrative regions (North-West Region, North-Central Region, North-East Region, South-West Region, South-Central Region, South-East Region), and ecological locations (Mountainous or Non-mountainous regions with Natural Handicaps, with Lands in Protected Zones and Territories) the official typology for farming holdings in the country is used. In addition, every manager self-determined his/her farm as Predominately for Subsistence, rather Small, Middle size or Large for the sector, and located mainly in Plain, Plain-mountainous or Mountainous region. The latter approach guarantees an adequate assessment since the farms managers are well aware of the specificity and comparative characteristics of their holdings in relations to others in the region and the (sub) sector.

For the integral assessment of sustainability of a farm for every Criteria, Principle, and Aspect, and 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. Sustainability Index for individual Criteria (SI(c)), Principle (SI(p)), and Aspect (SI(a)), and Integral Sustainability Index (SI(i)) are calculated by formulas:

$SI(c) = \sum SI(i)/n$ n – number of Indicators in a particular Criteria

$SI(p) = \sum SI(c)/n$ n - number of Criteria in a particular Principle

$SI(a) = \sum SI(p)/n$ n - number of Principles in a particular Aspect

$SI(i) = \sum SI(a)/4$

# Overall characteristics of surveyed farms

The survey with the farm managers took part in summer of 2016 and included 190 registered agricultural producers, which comprise around 0,2% of all registered under 1999 Regulation No 3 for Creation and Maintaining a Registry of Agricultural Producers in Bulgaria[2].

Managers of "representative" farms of all juridical type, size, specialization and location have were surveyed. (Table 1).The structure and importance of surveyed farms approximately corresponds to the real structure of registered agricultural producers and market-oriented holdings in the country.

**Table 1.** *Type and Number of Surveyed Agricultural Farms (percent, number*)*

| Type and location of farms | Physical persons | Sole Traders | Cooperatives | Companies | Total |
|---|---|---|---|---|---|
| Total | 80,00 | 4,21 | 6,84 | 8,95 | 190* |
| Mainly subsistence | 11,18 | 0,00 | 0,00 | 0,00 | 8,95 |
| Small size | 57,89 | 37,50 | 0,00 | 5,88 | 48,42 |
| Middle size | 28,95 | 37,50 | 92,31 | 70,59 | 37,37 |
| Big size | 1,32 | 25,00 | 7,69 | 23,53 | 4,74 |
| Field crops | 10,53 | 25,00 | 69,23 | 29,41 | 16,84 |
| Vegetables, flowers, and mushrooms | 13,82 | 12,50 | 0,00 | 0,00 | 11,58 |
| Permanent crops | 24,34 | 25,00 | 0,00 | 11,76 | 21,58 |
| Grazing livestock | 17,76 | 25,00 | 0,00 | 5,88 | 15,79 |
| Pigs, poultry, and rabbits | 0,66 | 0,00 | 7,69 | 0,00 | 1,05 |
| Mix crop-livestock | 14,47 | 0,00 | 23,08 | 23,53 | 15,26 |
| Mix crops | 13,82 | 12,50 | 0,00 | 29,41 | 14,21 |
| Mix livestock | 4,61 | 0,00 | 0,00 | 0,00 | 3,68 |
| Mainly plain region | 51,97 | 50,00 | 53,85 | 64,71 | 53,68 |
| Plain-mountainous | 19,74 | 50,00 | 38,46 | 17,65 | 22,11 |
| Mainly mountainous | 14,47 | 0,00 | 7,69 | 17,65 | 13,68 |
| Lands in protected zones and territories | 6,58 | 0,00 | 0,00 | 17,65 | 6,84 |

[2] According to the Ministry of Agriculture and Food during 2014/15 business year there is a significant agmentation of the number of registered agricultural producers, whcih in the end of Jule 2015 reached 94815 (Agrarian Report, 2015).

| | | | | | |
|---|---|---|---|---|---|
| Mountainous regions with natural handicaps | 15,13 | 0,00 | 7,69 | 11,76 | 13,68 |
| Non-mountainous regions with natural handicap | 1,97 | 0,00 | 7,69 | 0,00 | 2,11 |
| North-West region | 15,79 | 37,50 | 7,69 | 11,76 | 15,79 |
| North-Central region | 21,05 | 0,00 | 23,08 | 23,53 | 20,53 |
| North-East region | 15,13 | 12,50 | 38,46 | 11,76 | 16,32 |
| South-West region | 14,47 | 0,00 | 7,69 | 11,76 | 13,16 |
| South-Central region | 19,74 | 12,50 | 15,38 | 29,41 | 20,00 |
| South-East region | 13,82 | 37,50 | 7,69 | 11,76 | 14,21 |

** mainly Corporations and 5,88% Partnerships.

**Source:** Survey with managers of farms, July 2016

The survey has found out that the majority of farms are located in regions with "Normal" economic, social and environmental problems (Figure 1). However, a significant part of holdings are in regions with "Big" or "Extreme" economic, social and environmental challenges.A third of the managers indicate that their farm is located in a region with "Small" or "Without" environmental problems, while share of enterprises with similar economic and social problems is smaller. A good portion of the managers are not aware of he character or are not able to assess the level of socio-economic and environmental problems in the region, where their farm is located. The latter concerns to the greatest extent competency of farmers in regard to environmental problems in the region, followed by the social and economic challenges.

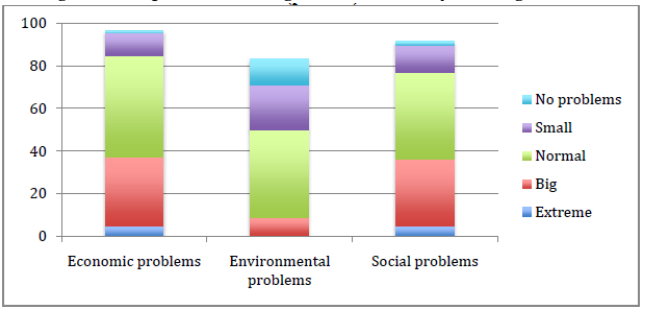


**Figure 1.** *Character of Problems in the Region, where Surveyed Farm is Located (percent)*
**Source:** Survey with managers of farms, July 2016

The owners and/or managers of three-quarter of surveyed farms are male, and around 60% are of up to 55 old. Such gender and age structure of managers (owners) will manage the majority of Bulgarian farms in coming 10-15 and more years and contribute to one or another sustainability level of holdings.

A good number of surveyed farms are with a relatively short period of existence up to 5 year, including almost 30% of them "less than two years". The majority of holdings however, are with a longer period of operation, including around 29% with 11 and more year effectively experience in management of farming sustainability. A little more than a half of surveyed farms indicate, that the period they put efforts for improving sustainability of farms look is up to 5 year. Another significant part of them is with a long-term experience in improving farm sustainability, including 19% with 11 and more year.

Awareness and respecting of major principles of sustainable agriculture is a base for effective management of farm sustainability. Majority of farms know Well or Very good the principles of governance and economic sustainability (Figure 2). At the same time, most holding acknowledge that their knowledge of principles of social and

environmental sustainability is Satisfactory or entirelyAbsent.

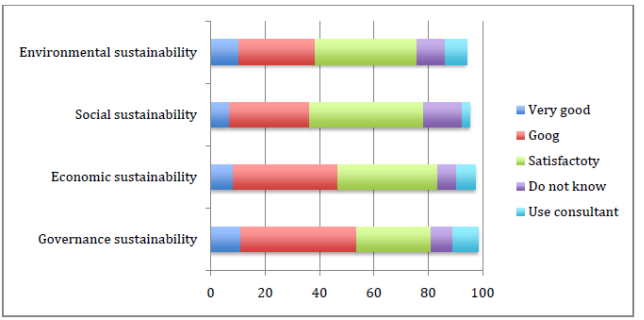


**Figure 2.** *Extent of Knowledge of Principles of Governance, Economic, Social and Environmental Sustainability by Farm Managers in Bulgaria (percent)*

**Source:** Survey with managers of farms, July 2016

A good portion of surveyed farms increase their capability for management of sustainability through hiring a consultant, as the biggest share of this mode is as far governance, environmental and economic sustainability is concerned.

With relatively the greatest own (internal) capability for management of diverse aspects of sustainability are Cooperatives, out of which a considerable fraction know Very well or Well the principles of governance, economic, social and environmental sustainability. Internal knowledge regarding sustainabilityprinciples is also high for Sole Traders and Companies, while for Physical Persons it is relatively lower.To the greatest extent consultants are used for enhancing knowledge of economic and environmental sustainability by Sole Traders (by 12%) and Physical Persons (accordingly 12% and 9%).

Competency of sustainability principles increase along with the size of farms and larger holdings tend to know better governance, economic, social and environmental

sustainability. There is also a differentiation of competency according to specialization of holdings as those in Field Crops, Grazing Livestock, Pigs, Poultry and Rabbits, and Mix Crop-Livestock are with a bigger competency of governance sustainability, specialized in Pigs, Poultry and Rabbits, and Mix Crop-Livestock with the best awareness of economic sustainability, and those with Mix Livestock with the highest competency in respect to environmental sustainability. Similarly, the share of holdings with a high competency on sustainability principles is the greatest for those with Lands in Protected Zones and Territories, and farms located in South-West Region of the country.

In the future more efforts are to be directed t improving competency of farms with low culture in regard to principles of agrarian sustainability through education, training, consultation, advices, exchange of positive experiences, etc.

Due to incomplete knowledge and other economic, technological, agronomical, behavioral, etc. reasons, and in different period of time, farmers not always apply strictly principles of sustainable agriculture. According to the best part of the managers in farms are applied Strictly or Well principles of governance, economic, social and environmental sustainability (Figure 3). Nevertheless, a significant fraction of holdings respect principles of social, economic, environmental and governance sustainability only Satisfactorily. What is more, a part of holding indicates that they do not Respect such Principles, or respect there merely If Sanctions are Applied. (reaching up to 8% for environmental sustainability).

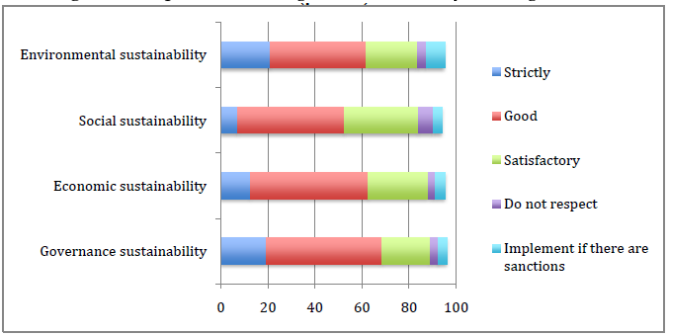


**Figure 3.** *Extent in which Farms Implement Principles of Sustainable Agriculture (percent)*
**Source:** Survey with managers of farms, July 2016

To the greatest extent principles of agrarian sustainability are integrated (applied) in the overall management by Cooperatives and Companies. Around8% of Cooperatives apply principles of environmental sustainability only if there are sanctions. Relatively smaller scale of Sole Traders and Physical Persons apply principles of social sustainability to a great extent. A good segment of Physical Persons respect principles of sustainable agriculture only if there are sanctions - 9% of them for environmental sustainability, 5% for economic sustainability and by 5% for governance and social sustainability.All these data demonstrate, that sanctions of state, local authority, owners, members, etc. induce business behavior for amelioration of environmental sustainability for certain type of farms like Cooperatives and Physical Persons. Application of sustainability principles increases along with the size of holdings and as a rule larger farms respect better governance, economic, social and environmental sustainability. Regarding principles of sustainability is most common for farms specialized in Field Crops, Grazing Livestock, Mix Crop-Livestock and Mix Crops, and holdings with Lands in Protected Zones and Territories, and located in Non-mountainous Regions with Natural Handicaps, and South-West Region of the country.

For all groups of farms the share of those which respect well or strictly the principles of agrarian sustainability overpass the portion of these which know well or very well these principles. Therefore, there is questionable how some holdings apply effectively principles, which they do not know well.

## Sustainability level of agricultural farms

Multi-indicators assessment of sustainability level of surveyed farms indicates, that the Index of Integral Sustainability of holdings is 0,55, which represents a *good* level of sustainability of Bulgarian farms (Figure 4). With the highest levels are Indexes of Environmental (0,61) and Social (0,57) Sustainability of holdings, while Indexes of Governance (0,52) and Economic (0,5) Sustainability are at the border with a low level. Therefore, improvement of the latter two is critical for maintaining a good sustainability of farming enterprises in the country.

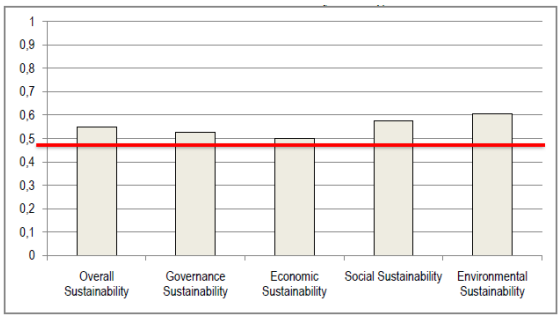


**Figure 4.** *Indexes of Integral, Governance, Economics, Social and Environmental Sustainability of Bulgarian Farms*
***Source:*** Survey with managers of farms, July 2016

Analysis of individual Indexes for major sustainability Principles, Criteria and Indicators let identify components contributing to diverse aspects of farms' sustainability in the country. For instance, governance and economic

sustainability of Bulgarian farms are relatively low because of the fact that the Index of Governance Efficiency (0,49) and the Index of Financial Stability (0,47) of holdings are low (Figure 5). Similarly, it is clear that despite that the overall environmental sustainability is relatively high, the Index of Preservation of Agricultural Lands (0,52) and the Index of Preservation of Biodiversity (0,56) are relatively low and critical for maintaining the achieved level.

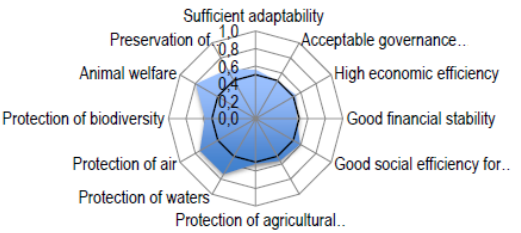


**Figure 5.** *Index of Sustainability of Bulgarian Farms for Major Principles for Governance, Economics, Social and Environmental Sustainability*
**Source:** Survey with managers of farms, July 2016

In depth analysis for individual Criteria and Indicators further specifies the elements, which enhance or reduce farms' sustainability level. For instance, insufficient Comparative Governance Efficiency and Financial Capability (Figure 6) are determined accordingly by: a low Comparative Efficiency of Supply of Short-term Inputs in relations to alternative organizations (0,28), and unsatisfactory Profitability of Own Capital (0,41) and Overall Liquidity (0,48) of farms (Figure 7). Similarly, low levels of Indexes of Preservation of Agricultural Lands and Preservation of Biodiversity are determined accordingly by insufficient Application of Recommended Irrigation Norms(0,46), high level of Soils Water Erosion (0,55), and lowered Number of Wild Animals on Farm Territory (0,53).

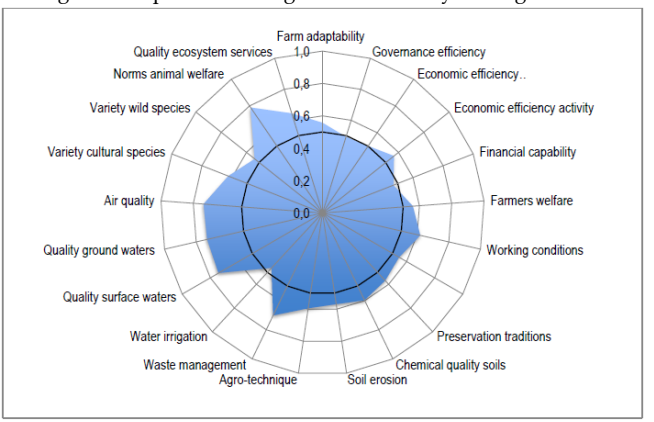


**Figure 6.** *Level of Sustainability of Bulgarian Farms for Individual Criteria for Governance, Economics, Social and Environmental Sustainability*

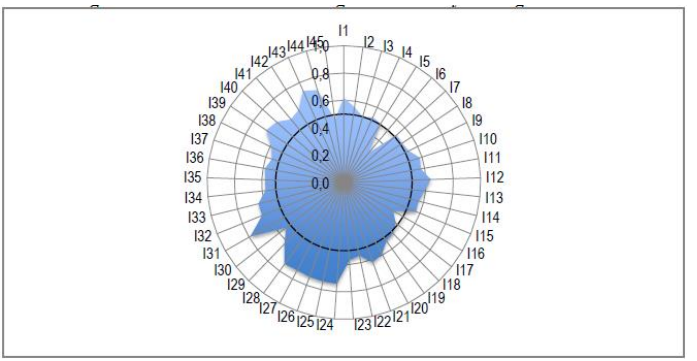


**Figure 7.** *Indicators* of Assessing Sustainability of Bulgarian Farms*

**Notes:** **I1-Level of Adaptability to Market Environment; I2-Level of Adaptability to Institutional Environment; I3-Level of Adaptability to Natural Environment; I4-Comparative Efficiency of Supply and Governance of Labor Resources; I5-Comparative Efficiency of Supply and Governance of Natural Recourses; I6-Comparative Efficiency of Supply and Governance of Short-term inputs; I7-Comparative Efficiency of Supply and Governance of Long-term Inputs; I8-Comparative Efficiency of Supply and Governance of Innovation; I9-Comparative Efficiency of Supply and Governance of Finance; I10-Comparative Efficiency of Governance of Marketing of Products and Services; I11-Land productivity; I12-Livestock Productivity; I13-Level of Labor productivity; I14-Rate of Profitability of Production; I15-Income of Enterprise; I16-Rate of Profitability of Own Capital; I-17-Overall Liquidity; I18-Financial Autonomy; I19-Income per

Farm-household Member; I-20-Satisfaction of Activity; I21-Compliance with Working Conditions Standards; I22-Contribution to Preservation of Rural Communities; I23-Contribution to Preservation of Traditions; I24-Nitrate Content in Surface Waters; I25-Pesticide Content in Surface Waters; I26-Nitrate Content in Ground Waters; I27-Pesticide Content in Ground Waters; I28-Extent of Air Pollution; I-29-Number of Cultural Species; I30-Number of Wild Species; I31-Extent of Respecting Animal Welfare; I32-Extent of Preservation of Quality of Ecosystem Services; I33-Soil Organic Content; I34-Soil Acidity; I35-Soil Soltification; I36-Extent of Wind Erosion; I37-Extent of Water Erosion; I38-Crop Rotation; I39-Number of Livestock per ha of Farmland; I40-Norm of Nitrogen Fertilization; I41-Norm of Phosphorus Fertilization; I42-Norm of Potassium Fertilization; I43-Extent of Application of Good Agricultural Practices; I44-Type of Manure Storage; I45-Irrigation Rate

**Source:** Survey with managers of farms, July 2016

Low levels of indicators identify the specific areas for improvement of sustainability of farms through adequate changes in management strategy and/or public policies. For instance, despite that the overall Adaptability of Farms is relatively high (0,56), the Adaptability of Farms to Changes in Natural Environment (climate, extreme events, etc.) is relatively low (0,5). Therefore, effective measures are to be undertaken to improve the latter type of adaptability through education, training, information, amelioration of agro-techniques, structure of production and varieties, technological and organizational innovations, etc.

On the other hand, superior levels of certain indicators show the absolute and comparative advantages of Bulgarian farms related to sustainable development. At the current stage of development the latter are associated with respecting Animal Welfare standards, Preservation of Quality of Surface and Ground Waters from contamination with nitrates and pesticides, Preservation of Air Quality, implementation of Good Agricultural Practices, reduced Number of Livestock per unit of Farmland, acceptable Labor Conditions and comparative Satisfaction from Farming Activity, optimal Productivity of Livestock, good

Adaptability to Market (prices, competition, demands), and Comparative Governance Efficiency of Marketing of Products and Services.

There is a great variation in sustainability levels of farms of different type and location (Figure 8). Only holdings Predominately for Subsistence and Mix Livestock are with low sustainability. Economic, governance, and social sustainability of first ones are particularly low (Figure 9). The second group is with low economic, environmental and governance sustainability, and a marginal social sustainability.

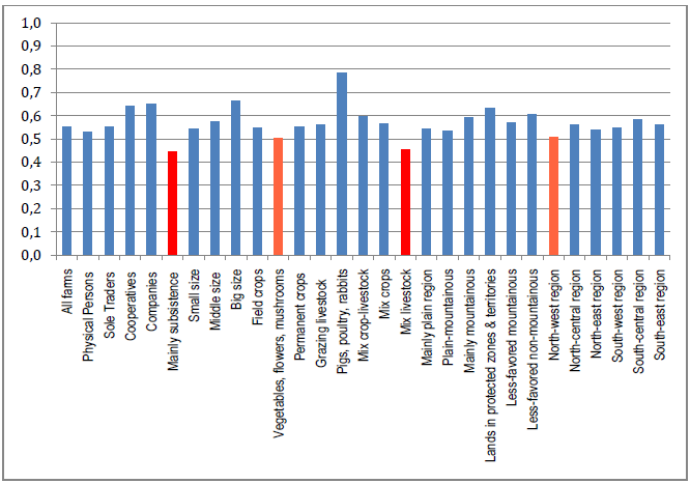


**Figure 8.** *Index of Sustainability of Bulgarian Farms of Different Type and Location*

**Source:** Survey with managers of farms, July 2016

Another category of farms is with a good sustainability, but with levels on or close to the border with inferior one. In the latter group are holdings specialized in Vegetables, Flowers and Mushrooms having a low governance and economic sustainability, and not a particularly good social and environmental sustainability. In that group are also Physical Persons and farms located in North-West Region of

the country. Former are with a low economic sustainability and a marginal social and governance sustainability. The latter are with a low economic sustainability and not particularly good social, governance and environmental sustainability. For all these enterprises effective measures have to be undertaken for improving all aspects of sustainability.

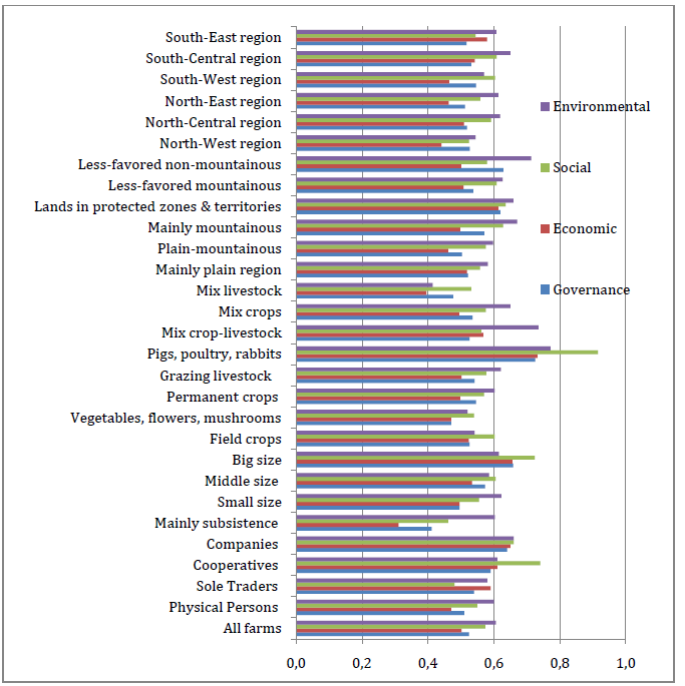


**Figure 9.** *Levels of Governance, Economic, Social and Environmental Sustainability of Bulgarian Farms of Different Type and Location*
**Source:** Survey with managers of farms, July 2016

With a low economic sustainability are also farming enterprises with Small size, those specialized in Mix Crops and Permanent Crops, and holdings situated in Mountainous Regions, and in North-East and South-West Regions of the country. Consequently, overall sustainability of these farms is close to the border with inferior level. For all these

enterprises effective measures are to be undertaken for increasing their economic sustainability in order to improve overall long-term sustainability.

With a low social sustainability are merely farming enterprises of Sole Traders for which adequate measures are to be introduced for improvement of that aspect such as training, stimulation, regulation, support, etc.

With the best overall sustainability are Companies, Cooperatives, and farms with Big size, all having high levels of governance, economic, social and environmental sustainability. Holdings specialized in Pigs, Poultries and Rabbits are with highest sustainability, having very good levels for governance, economic and environmental aspects. The latter are the only type of enterprises, having a high level of sustainability of a certain aspect.

Farming enterprises with Lands in Protected Zones and Territories, and those located in Non-mountainous Regions with Natural Handicaps and in South-Central Region are with superior levels of sustainability. Former group are with high governance, economic, social and environmental sustainability.

On the other hand, Holdings in Non-mountainous Regions with Natural Handicaps and in South-Central Region are with relatively good levels of certain aspects of sustainability – governance and environmental for the first ones, and environmental and social for the latter. The rest aspects of sustainability of all these farming enterprise are with relatively low levels – accordingly for the former ones economic and social sustainability, and for the latter ones governance and economic sustainability. The other aspects of sustainability of these categories of holdings are with relatedly low levels – accordingly for former ones in regard to economic and social sustainability, and for the latter ones for governance and economic sustainability. Similarly, Mix Crop-Livestock farms are with a relatively high

environmental sustainability, but with a lower level of governance sustainability. The latter necessitates undertaking adequate measures to improve sustainability in aspects with critical inferior levels for these types of farms.

## Sustainability indicators for farms enterprises of different type

There is a great variation in levels of individual sustainability indicators for farms of different juridical type (Figure 10).

Most sustainability indicators of Physical Persons are low and lead to a decrease in sustainability for individual aspects and overall sustainability. In governance aspect of sustainability of these enterprises are low: Level of Adaptability to Natural Environment (0,49), and Comparative Efficiency of Supply and Governance of Labor Resources (0,49), Natural Resources (0,49), Long-term Inputs (0,48) and Innovations (0,49), and extremely low Comparative Efficiency of Supply and Governance of Short-term Inputs (0,26). In the economics aspect sustainability of Physical Persons is particularly low in respect to Livestock Productivity (0,34), Rate of Profitability of Own Capital (0,36), Overall Liquidity (0,44), and Financial Autonomy (0,48). In social perspective sustainability of these enterprises is only low in relation to Income per Farm-household Member (0,49) while in environmental plan in respect to complying with norms for Number of Livestock per ha (0,39), Type of Manure Storage (0,39), Extent of Respecting Animal Welfare (0,43) and Irrigation Rate (0,49). In all these directions adequate measures have to be undertaken by managers and state authority in order to improve aspect and overall sustainability of that type of farms.

At the same time, a number of indicators for environmental sustainability of Physical Persons are with

relatively high positive positions within the good level: Nitrate and Pesticides Content in Surface and Ground Waters, Extent of Air Pollution, and Extent of Application of Good Agricultural Practices. All these advantages of Physical Persons are to be maintained and enhanced, while other indicators for eco-efficiency increased in order to preserve and increase aspect and overall sustainability of these types of holdings.

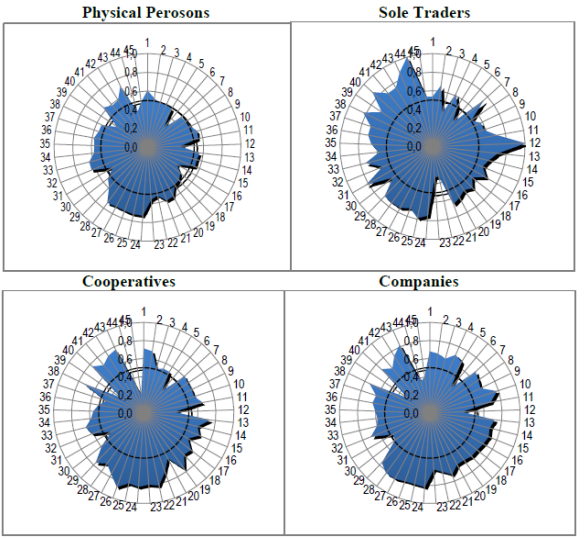


**Figure 10.** *Sustainability Indicators of Farms of Different Juridical Type in Bulgaria*

**Source:** Survey with farm managers, July 2016

Sole Traders are with low values for governance sustainability in respect to Level of Adaptability to Natural Environment (0,37) and Comparative Efficiency of Supply and Governance of Short-term inputs (0,33), and for social sustainability in respect to their Contribution to Preservation of Rural Communities and Preservation of Traditions (by 0,33).

Simultaneously, Sole Traders have high sustainability for eco-aspects of activity in relation to Type of Manure Storage,

Norm of Nitrogen Fertilization, and Extent of Application of Good Agricultural Practices, and marginal to the highest level for implementation of effective Crop Rotation. What is more, enterprises with livestock are with a high sustainability for Livestock Productivity as well as a marginal to the highest level for Extent of Respecting Animal Welfare Standards. Furthermore, many indicators for environmental sustainability of Sole Traders are with high positive values within the borders of good level: Nitrate and Pesticides Content in Surface and Ground Waters, Extent of Air Pollution, Number of Cultural Species, Soil Organic Content, Extent of Wind and Water Erosion, and application of recommended Norms of Potassium and Phosphorus Fertilization. Sole Traders are also with a high position, within the borders of a good level, for Comparative Efficiency of Supply and Governance of Long-term Inputs, Level of Labor Productivity, and Land Productivity. All that also contributes to a growth in their governance and economic sustainability.

For Cooperatives, in the borders of a good sustainability level, the highest indicators values are for governance, social and economic sustainability: Level of Adaptability to Market Environment, Level of Labor Productivity, Income per Farm-household Member, Contribution to Preservation of Rural Communities and Preservation of Traditions. Numerous of the environmental indicators of cooperative enterprises are also with superior levels – a high eco-sustainability for Nitrate Content in Ground Waters, and a good eco-sustainability for Nitrate and Pesticide Content in Surface Waters, Pesticide Content in Ground Waters, Number of Cultural Species, Extent of Application of Good Agricultural Practices, efficient Crop Rotation, and application of Norms of Nitrogen and Phosphorus Fertilization. All these positive aspects of the activity of Cooperative enterprises are to be maintained and expended.

On the other hand, Cooperatives are environmentally unsustainable in respect to Irrigation Rate (0,2) and with low levels for Comparative Efficiency of Supply and Governance of Short-term Inputs (0,3), Livestock Productivity (0,33), required Number of Livestock per ha (0,31), Type of Manure Storage (0,31), Extent of Respecting Animal Welfare (0,41), and Extent of Water Erosion (0,43). These parts of Cooperatives' activity have to be considerably improved in order to increase governance, economic, environmental and integral sustainability of these enterprises.

For Companies, within the borders of a good sustainability, the highest are levels for indicators of governance sustainability: Comparative Efficiency of Supply and Governance of Labor Resources, and Comparative Efficiency of Governance of Marketing of Products and Services. In respect to economic sustainability the best levels are for Labor Productivity and Income of Enterprise, while for social sustainability for Compliance with Working Conditions Standards. For environmental suitability superior are indicators for Nitrate and Pesticides Content in Surface and Ground Waters, Extent of Air Pollution, Extent of Application of Good Agricultural Practices, efficient Crop Rotation, Number of Cultural Species, application of Norms of Nitrogen and Phosphorus Fertilization, and Extent of Preservation of Quality of Ecosystem Service.

With the lowest values for Companies are indicators for governance and economic sustainability: Comparative Efficiency of Supply and Governance of Short-term Inputs (0,35) and Livestock Productivity (0,35), and indicators for eco-sustainability: permissible Number of Livestock per ha (0,29), Type of Manure Storage (0,35), Extent of Respecting Animal Welfare (0,41), Irrigation Rate (0,41) and Number of Wild Species on the Territory of Farm (0,49). These sides of activity of corporative enterprises have to be improved in

order to increase their governance, economic, environmental and integral sustainability.

Farms with different size are characterized with a big differentiation in levels of sustainability as a whole and for individual indicators (Figure 11).

Holdings Predominately for Subsistence are with a low Level of Adaptability to Market (0,47), Institutional (0,45), and Natural (0,45) Environment, insufficient Comparative Efficiency of Supply and Governance of Labor (0,39) and Natural (0,39) Resources, Long-term Inputs (0,37), Innovations (0,41), Finance (0,39), and Marketing of Products and Services (0,45), and they are unsustainable regarding Comparative Efficiency of Supply and Governance of Short-term Inputs (0,19). Besides, these farms are with a low Land Productivity (0,39), Level of Labor Productivity (0,41), Rate of Profitability of Production (0,35), Income Return of Enterprise (0,43), Overall Liquidity (0,31), and Financial Autonomy (0,35), and they are unsustainable in respect to Livestock Productivity (0,17), and Rate of Profitability of Own Capital (017). These holdings also have inferior indicators for social sustainability like: Income per Farm-household Member (0,33), and Contribution to Preservation of Rural Communities (0,41) and Preservation of Traditions (0,49). Similarly, some indicators for eco-sustainability are with low levels such as: Extent of Wind (0,41) and Water (0,47) Erosion, Soil Acidity (0,49), Type of Manure Storage (0,35), and Number of Livestock per ha (0,37).

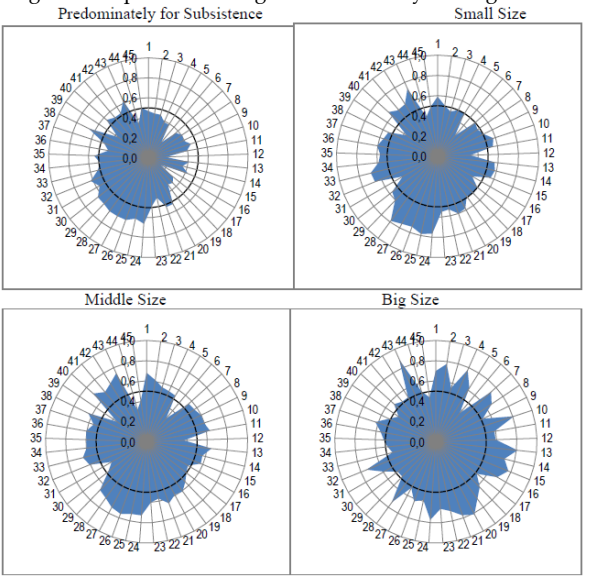


**Figure 11.** *Sustainability Indicators of Farms of Different Size in Bulgaria*

**Source:** Survey with farm managers, July 2016

At the same time, semi market holdings have relatively high indicators, within a good sustainability level, for: Nitrate Content in Surface and Ground Waters, Pesticide Content in Surface and Ground Waters, Extent of Air Pollution, efficient Corp Rotation, Number of Cultural Species, and Number of Wild Species on the Territory of the Farm.

Farms with Small size for the sector are with a low Level of Adaptability to Natural Environment (0,46), Comparative Efficiency of Supply and Governance of Short-term Inputs (0,27) and Innovations (0,47), Livestock Productivity (0,32), Rate of Profitability of Own Capital (0,39), and Income per Farm-household Member (0,49). Furthermore, a number of main indicators for governance and economic sustainability are on the border low a level of sustainability - Comparative Efficiency of Supply and Governance of Labor and Natural Resources, Long-term Inputs, and Finance as well as Overall

Liquidity. Some indicators for eco-sustainability are also with low levels such as: Extent of Respecting Animal Welfare (0,4), Number of Livestock per ha (0,37), Type of Manure Storage (0,4), and Irrigation Rate (0,49). Other parts of indicators for environmental sustainability are with relatively good levels like: Extent of Air Pollution, Nitrate and Pesticide Content in Surface and Ground Waters, Extent of Application of Good Agricultural Practices, Soil Organic Content, Extent of Preservation of Quality of Ecosystem Services, and Norm of Nitrogen Fertilization.

Farms with Middle size for the sector have low Comparative Efficiency of Supply and Governance of Short-term Inputs (0,3), Livestock Productivity (0,37), Rate of Profitability of Own Capital (0,47), as their Overall Liquidity is marginal to low level of sustainability (0,5). Certain indicators for eco-sustainability are also at low levels like: Type of Manure Storage (0,33), Number of Livestock per ha (0,35), Extent of Respecting Animal Welfare (0,4), Irrigation Rate (0,41), Number of Wild Species on the Territory of the Farm (0,48). The highest for the Middle size enterprises are indicators: Nitrate and Pesticides Content in Surface and Ground Waters, Extent of Application of Good Agricultural Practices, Norm of Nitrogen Fertilization, Extent of Air Pollution, application of Norms of Phosphorus Fertilization, and Level of Adaptability to Market Environment.

Farms with Big size for the sector are highly sustainable regarding Extent of Application of Good Agricultural Practices, and have superior level, within good sustainability borders, for indicators: Comparative Efficiency of Governance of Marketing of Products and Services, Level of Labor Productivity, Satisfaction of Activity, Level of Adaptability to Institutional and Market Environment, Comparative Efficiency of Supply and Governance of Long-term Inputs and Labor Resources, Income Return of Enterprise and Rate of Profitability of Production,

Compliance with Working Conditions Standards and Income per Farm-household Member, Contribution to Preservation of Rural Communities, Nitrate Content in Surface Waters, Extent of Air Pollution, and Extent of Preservation of Quality of Ecosystem Services.

Simultaneously, large-scale enterprises are little sustainable in respect to Comparative Efficiency of Supply and Governance of Short-term Inputs (0,37), and a number of eco-indicators such as: Soil Organic Content (0,44), Irrigation Rate (0,44), Number of Livestock per ha (0,44), Number of Cultural Species (0,48), Number of Wild Species on the Territory of the Farm (0,48), and Soil Acidity (0,48).

There are also significant differences in the levels of individual sustainability indicators for farming enterprises with different production specialization (Figure 12, Figure 13).

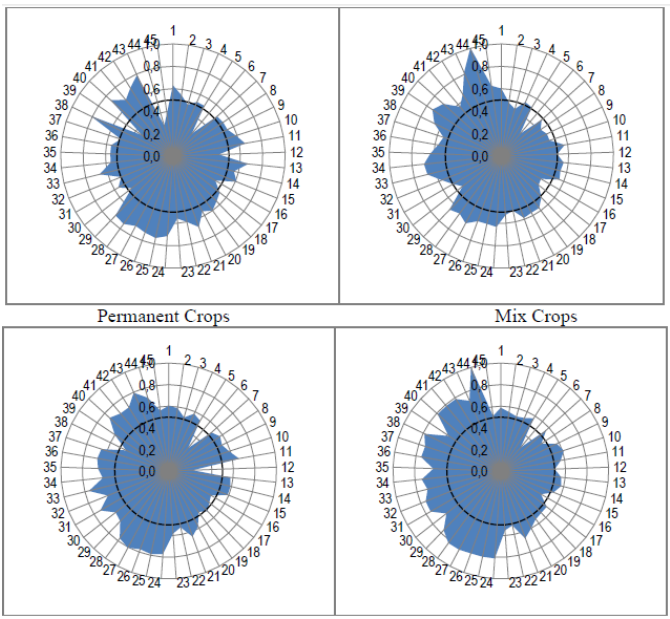


**Figure 12.** *Sustainability Indicators of Farms of Different Crop Specialisation in Bulgaria*

**Source:** Survey with farm managers, July 2016

For enterprises specialized in Field Crops the highest socio-economic indicators, within a good sustainability level, are: Level of Labor Productivity, Land Productivity, Income Return of Enterprise, Compliance with Working Conditions Standards, Income per Farm-household Member, and Contribution to Preservation of Rural Communities. At the same time, that type of enterprises are low sustainable in respect to Level of Adaptability to Natural Environment (0,48), Comparative Efficiency of Supply and Governance of Short-term Inputs (0,26), Rate of Profitability of Own Capital (0,43), and those among them with livestock operations for Livestock Productivity (0,41).

The best values for eco-sustainability of farms in Field Crops are for Implementation of efficient Crop rotation, Extent of Application of Good Agricultural Practices, Extent of Air Pollution, Number of Cultural Species, Nitrate and Pesticides Content in Surface and Ground Waters, and application of Norms of Nitrogen and Phosphorus Fertilization. On the other hand, these enterprises are low sustainable in respect to Irrigation Rate (0,38), Number of Wild Species on the Territory of the Farm (0,47), and Extent of Water Erosion (0,49), while those with livestock also for Type of Manure Storage (0,28) and Number of Livestock per ha (0,33).

Farms specialized in Vegetables, Flowers, and Mushrooms are with low governance sustainability regarding Adaptability to Natural (0,44) and Institutional (0,48) Environment, Comparative Efficiency of Supply and Governance of Short-term (0,26) and Long-term (0,48) Inputs, Innovations (0,42), Finance (0,45), and Marketing of Products and Services (0,45). Moreover, they are with low economic sustainability for Rate of Profitability of Own Capital (0,41) and Overall Liquidity (0,42), while those with livestock have their Livestock Productivity at the border with a low level

(0,5). Eco-sustainability is only low for Number of Wild Species on the Territory of the Farm (0,44).

For these enterprises the highest values are for a number of indicators for eco-sustainability as the Extent of Application of Good Agricultural Practices is on the border with the highest level, while others at relatively good levels - Soil Acidity, application of Norms of Nitrogen Fertilization, Soil Organic Content, Pesticide Content in Ground Waters, efficient Crop Rotation, and Number of Cultural Species. Enterprises with livestock in that group have a high sustainability for Type of Manure Storage, and relatively good for Number of Livestock per ha.

Farms specialized in Permanent Crops are low sustainable in respect to Comparative Efficiency of Supply and Governance of Short-term Inputs (0,27), Rate of Profitability of Own Capital (0,45) and Overall Liquidity (0,48), Income per Farm-household Member (0,47), efficient Crop Rotation (0,44), while those with livestock also to Livestock Productivity (0,22).

At the same time, that group of enterprises has comparatively good values for a number of indicators for eco-sustainability such as: Extent of Application of Good Agricultural Practices, Nitrate Content in Surface and Ground Waters, Extent of Air Pollution, Soil Organic Content, application of Norms of Nitrogen, Potassium and Phosphorus Fertilization. Holdings of this type with livestock also have good values for Extent of Respecting Animal Welfare, and Type of Manure Storage.

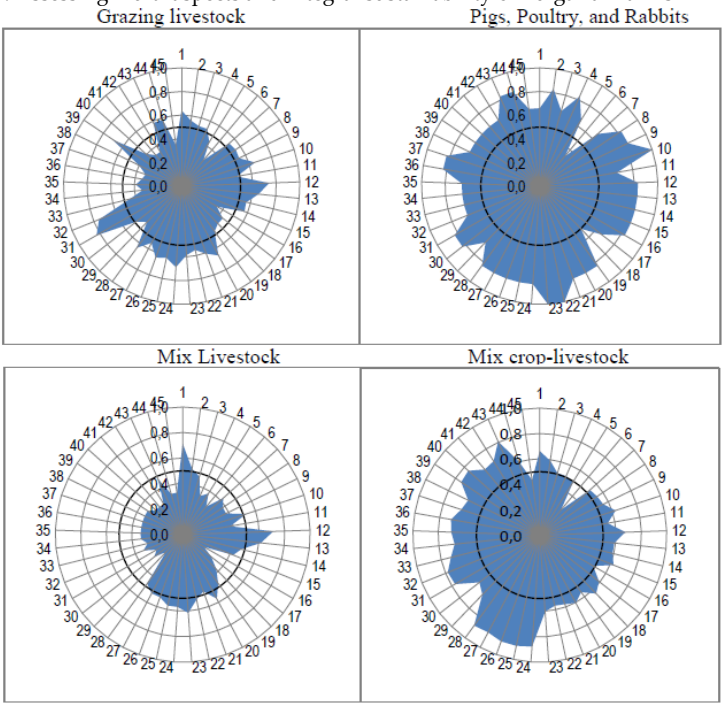


**Figure 13.** *Sustainability Indicators of Farms of Different Livestock Specialisation in Bulgaria*
**Source:** Survey with farm managers, July 2016

Farms specialized in Grazing livestock are with a low level of sustainability for numerous indicators: Efficiency of Supply and Governance of Short-term Inputs (0,29) and Natural Recourses (0,44), Land Productivity (0,47), Rate of Profitability of Own Capital (0,34), Overall Liquidity (0,44), Financial Autonomy (0,44), Income per Farm-household Member (0,47), Number of Cultural Species (0,42), Number of Wild Species on the Territory of the Farm (0,49), Soil Acidity (0,33), Soltification (0,39) and Organic Content (0,45), Extent of Wind (0,34) and Water (0,32) Erosion, application of Norms of Nitrogen (0,41), Potassium (0,34) and Phosphorus (0,34) Fertilization, Irrigation Rate (0,35), and practicing efficient Crop Rotation (0,4).

Simultaneously, these enterprises have relatively good levels for indicators: Livestock Productivity, Satisfaction of Activity, Extent of Preservation of Quality of Ecosystem Services, Number of Livestock per ha, and Nitrate Content in Surface Waters, while the Extent of Respecting Animal Welfare is on the border with a high sustainability level.

Farms specialized in Mix Crops are low sustainable in regard to Efficiency of Supply and Governance of Short-term Inputs (0,28) and Innovations (0,45), and Rate of Profitability of Own Capital (0,43), and these with livestock to Livestock Productivity (0,5).

Simultaneously, for that type of enterprises the best indicators are for eco-sustainability: Nitrate and Pesticide Content in Surface and Ground Waters, Extent of Air Pollution, application of Norms of Nitrogen, Potassium and Phosphorus Fertilization, implementation of efficient Crop Rotation, Number of Cultural Species, Extent of Preservation of Quality of Ecosystem Services, and Extent of Wind Erosion, and for those with livestock operations - Extent of Respecting Animal Welfare. What is more, the latter sup-group is highly sustainable as far as Type of Manure Storage is concerned.

Farms enterprises specialized in Pigs, Poultry, and Rabbits are low sustainable solely in respect to Efficiency of Supply and Governance of Short-term Inputs (0,33), while the level of Financial Autonomy is at the border with a low zone (0,5).

On the other hand, that group of enterprises is highly sustainable regarding Comparative Efficiency of Governance of Marketing of Products and Services as well as Contribution to Preservation of Rural Communities and Preservation of Traditions. Furthermore, they have marginal values to a high sustainability level for multiple indicators - Adaptability to Institutional Environment, Comparative Efficiency of Supply and Governance of Labor Resources, Innovations, and Finance, Livestock Productivity, Level of

Labor Productivity, Rate of Profitability of Production, Income Return of Enterprise, Rate of Profitability of Own Capital, Income per Farm-household Member, Satisfaction of Activity, Compliance with Working Conditions Standards, Nitrate and Pesticide Content in Surface and Ground Waters, Extent of Air Pollution, Number of Wild Species on the Territory of the Farm, Extent of Respecting Animal Welfare, Extent of Wind and Water Erosion, Extent of Application of Good Agricultural Practices, and Type of Manure Storage.

Farms specialized in Mix Livestock are unsustainable in regards to Rate of Profitability of Own Capital (0,19), and Number of Cultural Species (0,19). Furthermore, that category of farms are low sustainable in respect to a number of important socio-economic and governance indicators like: Adaptability to Natural Environment (0,47), Efficiency of Supply and Governance of Short-term (0,28) and Long-term (0,43) Inputs, Labor (0,33) and Natural (0,38) Resources, Innovations (0,38) and Finance (0,38), Land Productivity (0,38), Overall Liquidity (0,28), Financial Autonomy (0,38), Income Return of Enterprise (0,43), Rate of Profitability of Production (0,47), Income per Farm-household Member and Satisfaction of Activity (by 0,47).

Moreover, mix-livestock enterprises are with a low eco-sustainability for numerous indicators such as: Respecting Animal Welfare (0,24), Number of Wild Species on the Territory of the Farm (0,28), Soil Organic Content (0,28), application of Norms of Nitrogen, Potassium and Phosphorus Fertilization (by 0,28), Extent of Preservation of Quality of Ecosystem Services (0,33), Soil Acidity and Soltification (by 0,33), Extent of Wind and Water Erosion (by 0,33), practicing efficient Crop Rotation (0,33), Number of Livestock per ha (0,33), Type of Manure Storage (0,33), Irrigation Rate (0,33), Extent of Air Pollution (0,47), and Extent of Application of Good Agricultural Practices (0,47). On the other hand, the best indicators for that group of

enterprises are: Adaptability to Market Environment, Livestock Productivity, Level of Labor Productivity, and Contribution to Preservation of Traditions.

Farms specialized in Mix Crop-Livestock are unsustainable for Efficiency of Supply and Governance of Short-term Inputs (0,26), Rate of Profitability of Own Capital (0,49), and Irrigation Rate (0,44), while Comparative Efficiency of Supply and Governance of Natural Recourses is at the border with a low level. At the same time, that category of enterprises is highly sustainable in environmental aspect regarding Nitrate and Pesticide Content in Surface and Ground Waters, and Extent of Air Pollution. These enterprises have also very good values for: Extent of Application of Good Agricultural Practices, Extent of Preservation of Quality of Ecosystem Services, compliance with Norm of Nitrogen Fertilization, Number of Livestock per ha, Soil Organic Content, Extent of Wind Erosion, and Soil Soltification.

There is also a great variation in levels of individual sustainability indicators for farms located in different type of ecosystems, and geographical regions of the country (Figure 14, Figure 15).

Farms located mainly in Plain Regions of the country are low sustainable in respect to Efficiency of Supply and Governance of Short-term (0,28) and Long-term (0,49) Inputs, and Innovations (0,49), Livestock Productivity (0,28), Rate of Profitability of Own Capital (0,45), Type of Manure Storage (0,29), Number of Livestock per ha (0,3), Extent of Respecting Animal Welfare (0,37), Irrigation Rate (0,42), Number of Wild Species on the Territory of the Farm (0,48), and at the border with a low level for Adaptability to Natural Environment (0,5).

The best for that type of holdings are indicators for eco-sustainability: Nitrate and Pesticide Content in Surface and Ground Waters, Extent of Air Pollution, Extent of

Application of Good Agricultural Practices, and application of Norms of Nitrogen Fertilization.

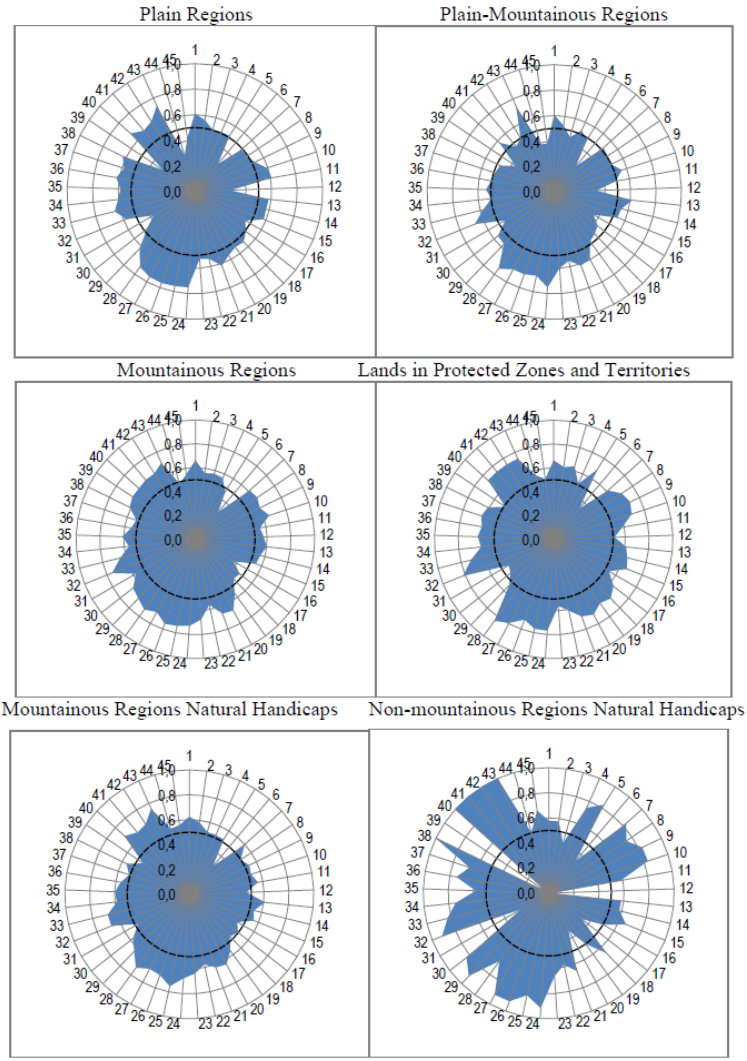


**Figure 14.** *Sustainability Indicators of Farms Located in Different Type of Ecosystems in Bulgaria*
**Source:** Survey with farm managers, July 2016

Farms located in Plain-Mountainous Regions of the country are low sustainable in regard to Adaptability to

Natural Environment (0,45), Efficiency of Supply and Governance of Short-term Inputs (0,26) and Natural Resources (0,49), Livestock Productivity (0,33) and Land Productivity (0,49), Rate of Profitability of Own Capital (0,35), Overall Liquidity (0,43), Financial Autonomy (0,48), Income per Farm-household Member (0,48), Number of Livestock per ha (0,36), Type of Manure Storage (0,39), Irrigation Rate (0,39), application of Norm of Potassium Fertilization (0,47), efficient Crop Rotation (0,47), Extent of Water Erosion (0,49), and Extent of Respecting Animal Welfare (0,44).

Besides, some indicators of that enterprise type are on the border with a low sustainability level - Efficiency of Supply and Governance of Finance and Innovations, Soil Acidity, application of Norm of Phosphorus Fertilization, and Extent of Wind Erosion. The best for this category enterprises are indicators for eco-sustainability: Nitrate and Pesticide Content in Surface and Ground Waters, Extent of Application of Good Agricultural Practices, Extent of Air Pollution, and Extent of Preservation of Quality of Ecosystem Services.

Farms located mainly in Mountainous Regions of the country are with low governance and economic sustainability in relations to: Efficiency of Supply and Governance of Short-term Inputs (0,29) and Natural Resources (0,47), Rate of Profitability of Own Capital (0,37), Overall Liquidity (0,47), and Financial Autonomy (0,46), and insufficient eco-sustainable for Type of Manure Storage (0,48).

Simultaneously, the best values for mountainous enterprises are indicators for social sustainability like: Satisfaction of Activity, Contribution to Preservation of Traditions, and Compliance with Working Conditions Standards. These enterprises have also relatively a high levels of eco-sustainability, particularly for: Extent of

Preservation of Quality of Ecosystem Services, Nitrate and Pesticide Content in Surface and Ground Waters, Extent of Air Pollution, Extent of Application of Good Agricultural Practices, Number of Cultural Species, and Number of Wild Species on the Territory of the Farm.

Farms with Lands in Protected Zones and Territories have a number of good indicators for governance and socio-economic sustainability - Adaptability to Market Environment, Efficiency of Supply and Governance of Natural Resources, Innovations, and Finance, of Marketing of Products and Services, Financial Autonomy, Income per Farm-household Member, Satisfaction of Activity, and Compliance with Working Conditions Standards.

Farms in such zones and territories are with high environmental sustainability in respect to Extent of Air Pollution while simultaneously have good levels for Extent of Preservation of Quality of Ecosystem Services, Nitrate and Pesticide Content in Surface and Ground Waters, Extent of Application of Good Agricultural Practices, application of Norms of Nitrogen, Phosphorus and Potassium Fertilization, and Soil Organic Content. On the other hand, that category of enterprises are relatively low sustainable in regard to Efficiency of Supply and Governance of Short-term Inputs (0,33), Extent of Respecting Animal Welfare (0,43), Number of Wild Species on the Territory of the Farm (0,46), and Number of Livestock per ha (0,48).

Farms located in Mountainous Regions with Natural Handicaps have low sustainability in respect to Efficiency of Supply and Governance of Short-term Inputs (0,29), Rate of Profitability of Own Capital (0,45), Number of Livestock per ha (0,45), Livestock Productivity (0,46), Financial Autonomy (0,47), and Extent of Respecting Animal Welfare (0,47) as well as marginal with a low level (0,5) for Efficiency of Supply and Governance of Innovations, and Overall Liquidity.

At the same time, enterprises in such regions have the best positive values for environmental sustainability for: Extent of Application of Good Agricultural Practices, Extent of Air Pollution, Nitrate and Pesticide Content in Surface and Ground Waters, application of Norm of Nitrogen Fertilization, Extent of Preservation of Quality of Ecosystem Services, and Soil Organic Content.

Farms located in Non-mountainous Regions with Natural Handicaps are with low sustainability regarding Adaptability to Natural Environment (0,41), Efficiency of Supply and Governance of Short-term Inputs (0,33), Livestock Productivity (0 [3] ), Overall Liquidity (0,33), Satisfaction of Activity (0,33), and Extent of Respecting Animal Welfare (0,25), and Number of Livestock per ha (0[4]). For a number of indicators sustainability levels of that type of enterprises are at the border with a low level - Rate of Profitability of Own Capital, Income per Farm-household Member, and Type of Manure Storage.

On the other hand, that type of enterprises is with maximal or high values for sustainability for numerous eco-indicators: practicing effective Crop Rotation, application of Norms of Nitrogen, Phosphorus and Potassium Fertilization, Extent of Application of Good Agricultural Practices, Nitrate Content in Surface Waters, Nitrate and Pesticide Content in Ground Waters, Number of Cultural Species, and Extent of Preservation of Quality of Ecosystem Services. What is more, for a number of indicators sustainability levels of these enterprises are at the border with a high level - Efficiency of Supply and Governance of Natural Resources, Long-term Inputs, Finance, and of Marketing of Products and Services, Pesticide Content in Surface Waters, Number of Wild Species on the Territory of the Farm, and Soil Organic Content. These holdings have also good positive levels for Efficiency

[3] "0" means unacceptable for farmer/owner.
[4] "0" means unsatisfactory.

of Supply and Governance of Labor Resources, and Innovations, Soil Acidity, and Extent of Wind Erosion.

Finally, there is also a differentiation of levels of sustainability indicators of farms in different administrative regions of the country (Figure 15).

For farms located in North-West Region of the country the best values of sustainability indicators are for: Adaptability to Market Environment, Nitrate and Pesticide Content in Surface and Ground Waters, Extent of Air Pollution, and Number of Cultural Species.

At the same time, sustainability of enterprises in this region is low in respect to Adaptability to Natural Environment (0,48), Efficiency of Supply and Governance of Short-term Inputs (0,36), Natural Resources (0,44), and Innovations (0,46), Livestock Productivity (0,28), Income Return of Enterprise (0,45), Rate of Profitability of Own Capital (0,43), Overall Liquidity (0,44), Financial Autonomy (0,39), Contribution to Preservation of Rural Communities and Traditions (by 0,47), Extent of Respecting Animal Welfare (0,35), Number of Livestock per ha (0,25), Type of Manure Storage (0,3) and Irrigation Rate (0,4). Besides, two indicators are at marginal with a low level - Rate of Profitability of Production, and Extent of Preservation of Quality of Ecosystem Services.

Farms located in North-Central Region of the country are low sustainable in regard to Efficiency of Supply and Governance of Short-term Inputs (0,25), Livestock Productivity (0,36), Rate of Profitability of Own Capital (0,46), Extent of Respecting Animal Welfare (0,38), Number of Livestock per ha (0,44), Type of Manure Storage (0,42) and Irrigation Rate (0,36), while for Overall Liquidity they are at the border with a low level.

Superior for farms in this region are indicators for eco-sustainability: Nitrate and Pesticide Content in Surface and Ground Waters, Extent of Air Pollution, Extent of

Preservation of Quality of Ecosystem Services, and Extent of Application of Good Agricultural Practices.

Farming enterprises located in North-East Region of the country are low sustainable regarding Adaptability to Natural Environment (0,43), Efficiency of Supply and Governance of Short-term (0,27) and Long-term (0,45) Inputs, Labor Resources (0,48), Livestock Productivity (0,4), Rate of Profitability of Own Capital (0,27), Overall Liquidity (0,42), and Financial Autonomy (0,49), Income per Farm-household Member (0,46), Number of Livestock per ha (0,41), Extent of Water Erosion (0,47), and Soil Soltification (0,49).

Furthermore, Efficiency of Supply and Governance of Finance, and Irrigation Rate are at the border of a low level. On the other hand, the best sustainability indicators for the holdings in this region are: Nitrate and Pesticide Content in Surface and Ground Waters, Extent of Application of Good Agricultural Practices, Extent of Air Pollution, and Norm of Nitrogen Fertilization.

Farms located in South-West Region of the country are with low governance, economic and environmental sustainability regarding Efficiency of Supply and Governance of Short-term Inputs (0,26) and Natural Resources (0,44), Livestock Productivity (0,48), Rate of Profitability of Own Capital (0,37), Overall Liquidity (0,4), and Financial Autonomy (0,42), Number of Wild Species on the Territory of the Farm (0,42), Extent of Wind (0,49) and Water (0,48) Erosion, and Type of Manure Storage (0,45).

For farms in this region the best indicators'' levels are for: Adaptability to Market Environment, Satisfaction of Activity, Extent of Application of Good Agricultural Practices, Extent of Preservation of Quality of Ecosystem Services, Soil Organic Content, application of Norm of Nitrogen Fertilization, and Nitrate Content in Surface Waters.

Farms located in South-Central Region of the country are low sustainable in respect to Efficiency of Supply and

Governance of Short-term Inputs (0,25), Livestock Productivity (0,23), Rate of Profitability of Own Capital (0,42), and are at marginal with a low level of sustainability for Efficiency of Supply and Governance of Finance (0,5). Moreover, they have low values for indicators for eco-sustainability related to livestock operations: Extent of Respecting Animal Welfare (0,38), Number of Livestock per ha (0,3), and Manure Storage (0,34).

For farms in this region with the best values are indicators for eco-sustainability: Extent of Application of Good Agricultural Practices, Nitrate and Pesticide Content in Surface and Ground Waters, Extent of Air Pollution, application of Norms of Nitrogen, Phosphorus, and Potassium Fertilization, and Extent of Preservation of Quality of Ecosystem Services.

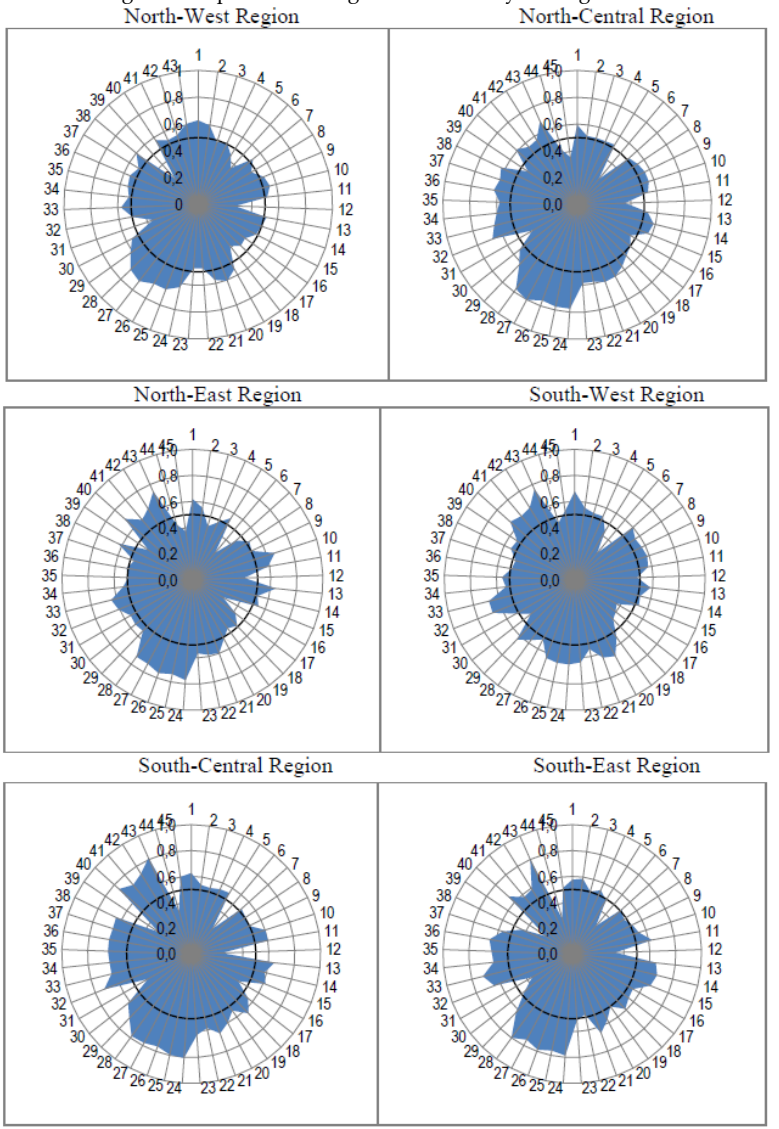


**Figure 15.** *Sustainability Indicators of Farms Located in Different Administrative Regions in Bulgaria*
**Source:** Survey with farm managers, July 2016

Farms located in South-East Region of the country are with insufficient governance and socio-economics sustainability regarding Efficiency of Supply and

Governance of Short-term Inputs (0,28), Innovations (0,48), and Natural Resources (0,49), Livestock Productivity (0,33), and Contribution to Preservation of Rural Communities (0,48), and they are on the border with a low level (0,5) for Adaptability to Natural Environment, and Income per Farm-household Member.

Moreover, farms in the region are low eco-sustainable for Number of Livestock per ha (0,25), Type of Manure Storage (0,28), Extent of Respecting Animal Welfare (0,36), application of efficient Crop Rotation (0,43), and Number of Wild Species on the Territory of the Farm (0,47). Simultaneously the enterprises in that region have very good levels for Rate of Profitability of Production, and a number of eco-indicators like: Extent of Application of Good Agricultural Practices, Extent of Air Pollution, Nitrate and Pesticide Content in Surface and Ground Waters, and Soil Organic Content.

## Share of farms with different levels of sustainability

The overall and partial levels of farms' enterprises do not give a full picture about the state of all holdings since there is a great variation in the share of farms with different sustainability levels. The biggest portion of Bulgarian farms is with a good sustainability and only under 2% with a high sustainability (Figure 16). At the same time, 30% of agricultural holdings in the country are with a low sustainability or unsustainable at all.

The greatest share of farming enterprises with a good and high sustainability is among Companies, following by Cooperatives, and Sole Traders, The smallest is the fraction of holdings with a good sustainability among Physical Persons, where merely less than 1% is highly sustainable. Furthermore, more than a third of latter holdings are with a

low sustainability or unsustainable at all. Every forth of Sole Traders is with a low sustainability, like 15% of Cooperatives, while only 6% of Companies are in the group of low sustainable enterprises.

There are also considerable differences in the portion of farms with unlike sustainability depending on the size of holdings. While all farms with Big size for the sectors are with a good sustainability, more than a half of holdings Predominately for Subsistence are with a low sustainability or unsustainable. Around a third of farms with Small size and almost a quarter of those with Middle size are with a low sustainability or unsustainable.

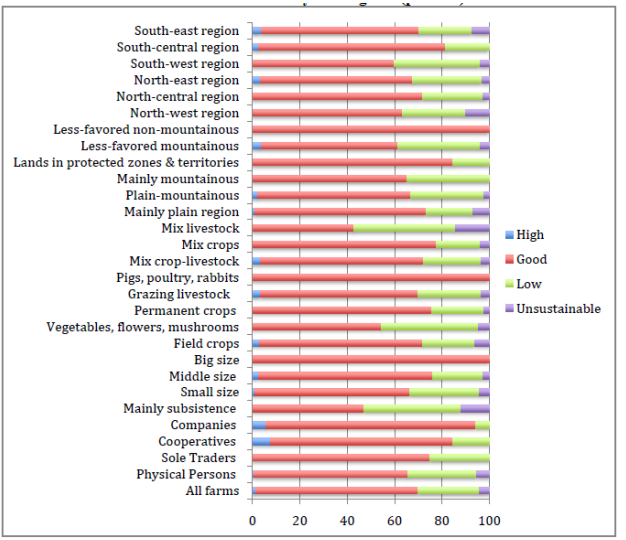


**Figure 16.** *Structure of Farms of Various Type and Location with Different Levels of Overall Sustainability in Bulgaria (percent)*
**Source:** Survey with farm managers, July 2016

Among farms with diverse specialization, the share of holdings with a good and high sustainability is the greatest for Pigs, Poultry and Rabbits, Mix-crops, Permanent Crops, Mix Crop-livestock, Field Crops and Grazing Livestock. On the other hand, majority of holdings in Mix-livestock are

with a low sustainability (43%) or unsustainable (14%). A good portion of the farms specialized in Vegetables, Flowers and Mushrooms is also low sustainable (41%) or unsustainable (4%).

The share of farms with a good and high sustainability is significant among those located in Non-mountainous Regions with Natural Handicaps, with Lands in Protected Zones and Territories, in Plain Regions, in South-Central, North-Central, and South-East Regions of the country. Simultaneously, 40% of holdings in South-West Region with low sustainability or unsustainable, similar to 37% of those in North-West and 32% in North-East Region. North-West Region is the leader in segment of unsustainable farms, where every tenth is unsustainable. Many holdings in Mountainous Regions with Natural Handicaps (38%), and Mountainous Regions (35%), and a third in Plain-mountainous Regions are low sustainable or unsustainable.

Data for dispersion of farms of different type in groups with diverse level of sustainability has to be taken into account when forecast the number and importance of holdings of each kind, and modernize public (structural, sectorial, regional, environmental, etc.) policies for supporting agricultural producers of certain type, sub-sectors, eco-systems, and regions of the country.

Analysis of structure of farms with different level of sustainability for each aspect gives important information about the long-term sustainability of farms and factors for its improvement. Our assessment shows that 40% of holdings in the country are with a low governance sustainability or managerially unsustainable (Figure 17). That means that the comparative governance efficiency for supply of labor, land, finance, etc. and/or marketing of produce in these farms is lower than another feasible organization, and that the adaptability to evolving socio-economic, institutional and natural environment is insufficient.

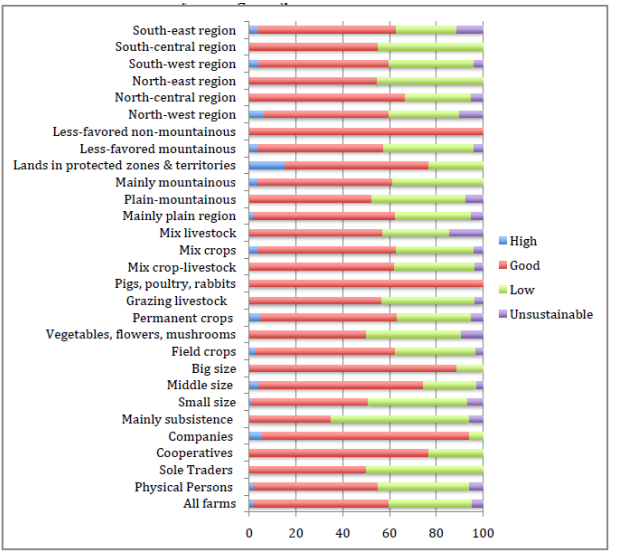


**Figure 17.** *Structure of Farms of Various Type and Location with Different Governance Sustainability in Bulgaria (percent)*
**Source:** Survey with farm managers, July 2016

Furthermore, 42% of all farms are with a low economic sustainability or unsustainable at all (Figure 18). That means that economic and financial efficiency of activity and resource utilization in a good portion of Bulgarian farms is low and do not correspond to the modern management and competition requirements.


**Figure 18.** *Structure of Farms of Various Type and Location with Different Economics Sustainability in Bulgaria (percent)*
**Source:** Survey with farm managers, July 2016

The biggest is the share of farms with a good and high governance sustainability among Companies and Cooperatives, holding with Big and Middle size for the sector, these specialized in Pigs, Poultry and Rabbits, Permanent Crops, Mix Crops, Field Crops, and Mix Crop-Livestock as well as located in Non-mountainous Regions with Natural Handicaps, with Lands in Protected Zones and Territories, Plain Regions, Mountainous Regions with Natural Handicaps, and in North-Central, South-East, North-West and South-West Regions of the country. With the greatest portion of farms with a low or lack of governance sustainability are Sole Traders (50%) and Physical Persons (45%), holdings Predominately for Subsistence (65%) and Small size for the sector (49%), specialized in Vegetables,

Flowers and Mushrooms (50%), and situated in Plain-Mountainous Regions (48%), and those in North-East and South-Central Regions of the country (by 45%).

All that means that a considerable fraction of Bulgarian farms are with insufficient governance sustainability for meeting contemporary socio-economic, institutional and natural challenges, and they have to modernize or they will cease to exists in a middle term.

The biggest share of farms with a good or superior economic sustainability is among Companies, Cooperatives, and Sole Traders. Moreover, a significant portion of firms is with a high economic sustainability. Besides, all enterprises with Big size for the sector are with a good economics sustainability. All these prove the comparative economic advantages of registered holdings and those with large scale.

The relative share of farms with a good and high economic sustainability is also considerable for farms with Middle size for the sector, specialized in Pigs, Poultry and Rabbits, Mix Crop-Livestock, Field Crops, Mix Crops, and Permanent Crops, and these with Lands in Protected Zones and Territories, located in Plain Regions, and Mountainous Regions with Natural Handicaps, and in South-East, South-Central, and North-Central Regions of the country.

The greatest fraction of farms with a low or lack of economic sustainability are among Physical Persons (48%), most part of holdings Predominately for Subsistence (88%), and among specialized in Mix-Livestock (57%), Grazing Livestock (47%), and Vegetables, Flowers and Mushrooms (45%) as well as located in Mountainous (54%) and Plain-Mountainous (45%) Regions, and those in North-East (58%) and South-West (52%) Regions of the country. Moreover, a significant portion of latter category of holdings are currently economically unsustainable, which concerns almost every tenth of Physical Persons, 29% of farms with Mix-Livestock, each fifth farm located in North-West Region and 12% of

those in South-West Region of the country, 18% of holdings Predominately for Subsistence, 9% of specialized in Vegetables, Flowers and Mushrooms, almost 9% of holdings with Small size, and 7% of those located in Plain-Mountainous regions of the country.

All these indicates that, a great part of Bulgarian farms currently are with low economic sustainability or economically unsustainable, and most likely they will cease to exists in near future or in coming years, unless effective measures are taken (public support regulations, etc.) for improving their economic sustainability.

As far as social aspect of sustainability is concerned the majority of surveyed farms in the country are with a good or high sustainability (Figure 19). Despite that holdings with a low social sustainability are numerous (almost 18%), and each tenth one is socially unsustainable. That demonstrates that social efficiency of enterprises for farmers, communities and society and a whole do not correspond to contemporary requirements and standards.

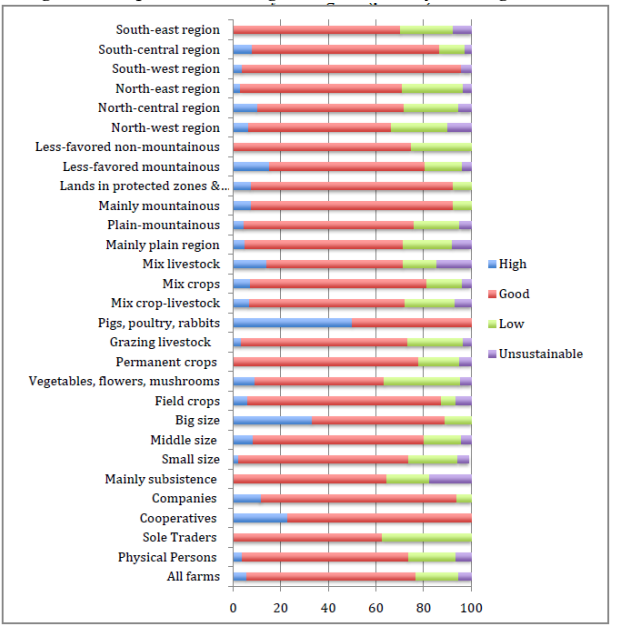


**Figure 19.** *Structure of Farms of Various Type and Location with Different Social Sustainability in Bulgaria (percent)*
**Source:** Survey with farm managers, July 2016

A considerable part of Cooperatives is with a good social sustainability, and the rest 23% are with a high social sustainability. The share of Companies with a good and high social sustainability also is impressive, as merely 6% of them are low sustainable in social sense. A significant portion of Physical Persons is also with a good or high social sustainability. Despite that, each fifth of the latter holdings are socially low sustainable, while 7% are unsustainable in social plan. With the greatest fraction of low sustainable in social aspect enterprises are Sole Traders – around 38% of the total number.

The level of social sustainability increases along with the size of farms. Every third of enterprises with Big size for the sector are with a high social sustainability, and another major segment is with a good social sustainability. For enterprises

with Middle size dominates those with a good and high social sustainability as almost each fifth is socially low sustainable or unsustainable. Contrary to the traditional perception with the largest portion of low sustainable or unsustainable in social aspect farms are semi-market ones (Predominately for Subsistence), including 18% unsustainable, as well as every forth of Small size farms.

In groups with diverse specialization the largest is the share of farms with a good and high social sustainability in Pigs, Poultry and Rabbits, Filed Crops, and Mix Crops. On the other hand, 37% of specialized in Vegetables, Flowers, and Mushrooms are with low social sustainability or socially unsustainable, followed by holdings with Mix Livestock, out of which 29% are with inferiors social sustainability (including around 14% unsustainable).

With a good or high social sustainability are farms located in Mountainous Regions and in Protected Zones and Territories, and in South-West, South-Central, and North-Central Regions of the country. At the same time, most numerous socially low sustainable or unsustainable enterprises are located in Plain and Plain-Mountainous Regions as well as in North-West, South-East, and North-East Regions of the country.

All these data show, that a good portion of Bulgarian farms currently are with a low social sustainability or socially unsustainable, which compromises their overall middle and long-term sustainability. Therefore, effective measures have to be undertaken to improve income, labor and living conditions of farmers and farm households as well as their importance for preservation of rural communities and traditions.

Environmental sustainability of the majority of surveyed farms is good or superior, while a considerable portion is with a low sustainability (18%) or environmentally unsustainable (4%) (Figure 20). The latter two figures clarify

that eco-efficiency in a large number of Bulgarian farms do not meet contemporary norms and standards for preservation of lands, waters, air, biodiversity, ecosystem services, and animal welfare.

A big share of Companies and a good number of Physical Persons and Cooperatives are with a high environmental sustainability, while majority of enterprises in these categories are with a good eco-sustainability. Despite that, main portion of these holdings are with low sustainability (accordingly 24%, 18% and 23%), as every twentieth of Physical Persons is even environmentally unsustainable. All of Sole are with a good level of eco-efficiency.

The largest is the portion of farms with good and high eco-sustainability among holdings Predominately for Subsistence, with Small size for the industry, and Big farms. The greatest part of holdings with a low or unacceptable eco-sustainability is in groups of Middle and Big sizes.

The fraction of strongly environmentally sustainable farms is significant among those specialized in Crop-Livestock, Grazing Livestock, Mix Crops, and Permanent Crops. All holdings specialized in Pigs, Poultry and Rabbits, most of those in Mix Crops and by three-quarters in Crop-Livestock and Permanent Crops are with a good environmental sustainability.

At the same time a considerable portion of enterprises specialized in Vegetables, Flowers, and Mushrooms are with a low eco-sustainability (32%) or eco-unsustainable (14%), similarly to those in Mix Livestock (accordingly 29% and 14%) and Field Crops (accordingly 31% and 3%). The share of environmentally unsustainable farms is also considerable among those specialized in Permanent Crops (a little more than 7%) as well as a low sustainable in environmental regard holdings among those in Grazing Livestock.

All farms located in Non-mountainous Regions with Natural Handicaps are with a good environmental

sustainability as well as most with Lands in Protected Zones and Territories. The biggest share of holdings with a high eco-sustainability is in Plain Mountainous and Mountainous Regions as well as in Mountainous Regions with Natural Handicaps. At the same time, the greatest fraction of enterprises with a low eco-sustainability or eco-unsustainable are in Plain-Mountainous (26%) and Plain (25%) Regions as well as in Mountainous Regions with Natural Handicaps (19%). The biggest part of enterprise with a high and good eco-sustainability is in North-Central and South-Central Regions of the country while of these with a low eco-sustainability or eco-unsustainable in South-West, North-West, South-East and North-East Regions.

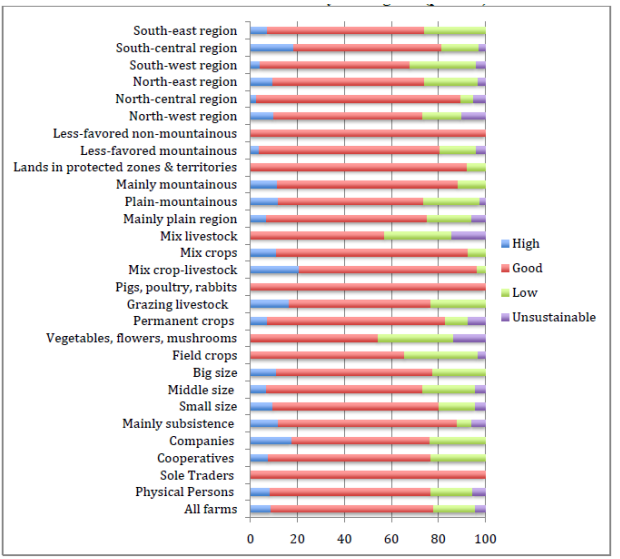


**Figure 20.** *Structure of Farms of Various Type and Location with Different Environmental Sustainability in Bulgaria (percent)*
**Source:** Survey with farm managers, July 2016

All these data indicates, that a good number of Bulgarian farms are with a low eco-sustainability or environmentally unsustainable, which also compromises their overall long-

term sustainability. Therefore, effective measures have to be undertaken to improve eco-efficiency in these groups through training, informing, stimulation, sanctions, etc.

## Factors for farms sustainability in Bulgaria

Diverse social, economic, market, ideological personal, etc. factors in various extent stimulate or restrict activities of agricultural farms for sustainable operations and development. According to managers of surveyed 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 21).

Factors which to the greatest extend 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. 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 farms as a whole and of different type has to be taken into account in the process of modernization od public policies and programs for sustainable development.

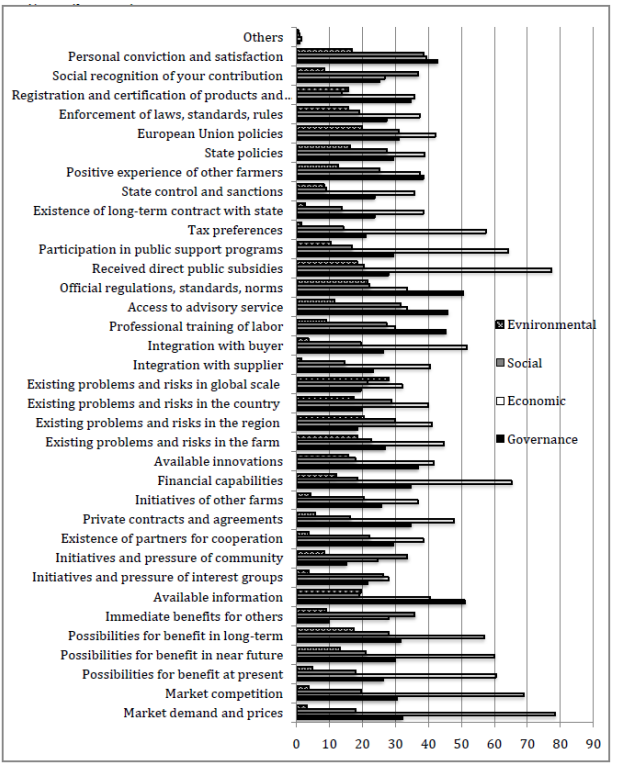


**Figure 21.** *Factors Mostly Stimulating Farms Actions for Improving Sustainabilityin Bulgaria (percent)*

**Source:** Survey with farm managers, July 2016

Our survey has found out that public policies relatively weakly affect governance sustainability of Bulgarian farms (Figure 22). 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.

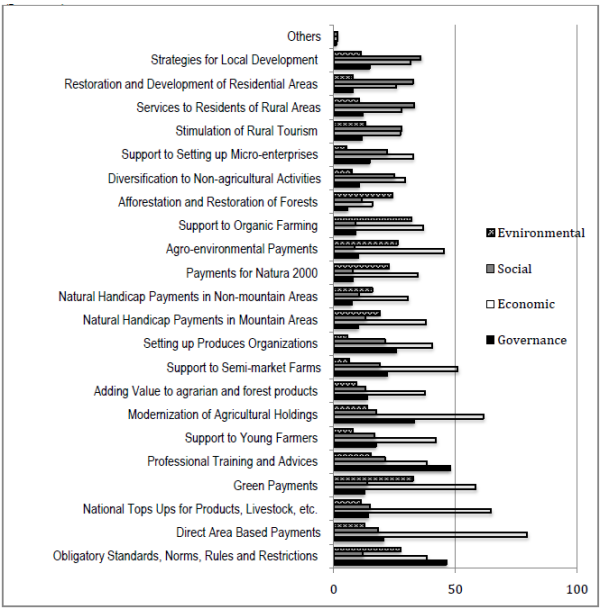


**Figure 22.** *Public Policies Mostly Affecting Farms Sustainability in Bulgarian (percent)*

**Source:** Survey with farm managers, July 2016

Diverse mechanisms of public support to the greatest extent improve economic sustainability of farms in the country. Instruments, which impact the economic sustainability of the most part of surveyed enterprises are: Direct Area Based Payments, National Tops Ups for Products, Livestock, etc., Modernization of Agricultural

Holdings, Green Payments, Support to Semi-market Farms. At the same time, measures such as Afforestation and Restoration of Forests, Restoration and Development of Residential Areas, Stimulation of Rural Tourism, and Services to Residents of Rural Areas affect considerable economic sustainability of small amount of holdings.

The impact of national and European policies on social and environmental sustainability of Bulgarian farms is relatively smallest. Instruments, which augment social sustainability of most farms are: Strategies for Local Development, Services to Residents of Rural Areas, Restoration and Development of Residential Areas, and Stimulation of Rural Tourism. Simultaneously, social sustainability of least number of holdings is improved by "eco-measures" like: Payments for Natura 2000, Agro-environmental Payments, and Support to Organic Farming.

For improving environmental sustainability of farms most important are: Green Payments, Support to Organic Farming, Obligatory Standards, Norms, Rules and Restrictions, and Agro-environmental Payments. On the other hand, public instruments with the least impact on eco-sustainability of Bulgarian farms at the current stage of development are: Support to Setting up Micro-enterprises, Setting up Produces Organizations, Support to Semi-market Farms, Diversification to Non-agricultural Activities, Support to Young Farmers, and Restoration and Development of Residential Areas.

There is differentiation of impacts of individual instruments of public policies on sustainability of farms of different type and location. Mechanisms and instruments of national and European policies, which to the greatest extent affect improvement of sustainability of Bulgarian farms are: Obligatory Standards, Norms, Rules and Restrictions in respect to governance sustainability of Big size enterprises (66,67%) and environmental sustainability of enterprises

specialized in Pigs, Poultry and Rabbits (100%); Direct Area Based Payments for economic sustainability of Sole Traders (87.50%), Cooperatives (84.62%), Companies (82.35%), holdings with Small size for the sector (81.52%), enterprise specialized in Pigs, Poultry and Rabbits (100%), Mix Crops (88,89%) and Permanent Crops (87,8%), and those located in Non-mountainous Regions with Natural Handicaps (100%), with Lands in Protected Zones and Territories (100%), in mainly on Mountainous Regions of the country (92,31%), in Mountainous Regions with Natural Handicaps (88,46%), South-West (88,%) and South-Central (84,21%) regions of the country; National Tops Ups for Products, Livestock, etc. in regard to economic sustainability of Companies (82.35%), holdings Predominately for Subsistence (76.47%), and those specialized in Grazing Livestock (80%), mainly in Mountainous Regions (88,46%) and with Lands in Protected Zones and Territories (76,92%), and located in North-Central (74,36%) and South-West (72%) regions of the country; Green Payments for economic sustainability of enterprises located in Mountainous Regions, and with Lands in Protected Zones and Territories (by 69,23%), and those in South-West Region of the country (68%); Professional Training and Advices for Big size enterprises (66,67%); Modernization of Agricultural Holdings in relations to economic sustainability of Sole Traders (87,5%), Companies (76,47%), and specialized in Mix Livestock (71,43%) and Mix Crops (70,37%), and located in Mountainous Regions (76,92%), and North-Central (76,92%) and South-Central (71,05%) regions of the country; Support to Semi-market Farms and Setting up Produces Organizations for economic sustainability of holdings Predominately for Subsistence (accordingly 76,47% and 70,59%); Natural Handicap Payments to Farmers in Mountain Areas for economic sustainability of farming enterprises located in such areas (73,08%).

All these data for real impact of individual mechanisms and instruments of public support on different aspect of sustainability of Bulgarian farms are to be taken into account when improve support policies and programs in the sectors and enterprises of diverse type and location.

We have also studied out relations between the personal characteristics of farmmanagers (such as age, gender, competency on sustainability issues, etc.), the type of problems in the region, and the level of holdings sustainability. For surveyed farms share of male managers whose holdings are with a "good or high" sustainability is significant (70,5%) and bigger than of the female managers (57,89%). Nevertheless, the high levels for both genders indicate that there are not significant differences in regards to sustainable management of farms in the country.

There exists a strong correlation between the age of the manager and the sustainability of farm, as the highest is the portion of holdings with a superior sustainability of managers above 65 (83,33%) and younger than 40 (82,35%). Relatively smaller share of managers between 56 and 65 with a good and high sustainability of holdings shows, that the latter category either focus of pure economic vitality of enterprises (a strategy for profiting or survival) or they are not interested in a long-term sustainability (due to a plan for exit farming activity, lack of heir ready to undertake the farm, etc.).

Estimates on links between sustainability of farms and the character of problems in the region, where the holding is located, demonstrate that they are not important. For surveyed farms there exist no significant differences in the share of holdings with a good and high sustainability in regions with various social, economic and environmental problems. Therefore, levels of sustainability of farms depend primarily on managerial capability and strategy of managers as well as other important external factors (public policies,

etc.) rather than on the specific socio-economic and environmental challenges in the region of farms.

There is a strong correlation between the levels of competency of farm managers and respecting the principles of governance, economic, social and environmental sustainability, and the levels of sustainability of farms. For all aspects of sustainability is extremely great the portion of farms with a good and high sustainability, which know and implement well or very good principle of sustainable agriculture. Therefore, increasing competency, culture and practices of sustainable farming is a crucial factor for improving sustainability of agricultural holdings.

Analysis of surveyed farms found out that, the biggest share of holdings with a good and high sustainability is among farms with a longer period of existence and implementing actions for improving sustainability – with maximum values for holdings with a period between 11 and 15 years (accordingly 75% and 87,5%). The latter proves that sustainable farming requires a long-term strategy and targeted actions for amelioration of individual aspects of sustainability. Relatively smaller fraction of holdings with a good and high sustainability among those, taking actions more than 15 years (55%) is probably a consequences of a lack of effective modernization in strategies corresponding to constantly changing socio-economic, institutional and natural environment in the past years.

Our analysis also found out a big share of farms with a good and high sustainability for all instruments of policies, which according to the managers to the greatest extent increase governance, economic, social, and environmental sustainability of their holdings. Political mechanisms and instruments, which to the greatest extent have actually affected sustainability of Bulgarian farms are: Support to Organic Farming in respect to social (100%) and governance (94,12%) sustainability, Adding Value to Agricultural and

Forests Products for governance sustainability (92,31%), Diversification to Non-agricultural Activities for governance (90%) and environmental (85,71%) sustainability, in regard to social sustainability Natural Handicap Payments to Farmers in Mountain Areas (88%), Agro-environmental Payments (87,5%), and Natural Handicap Payments to Farmers in Non-mountain Areas (85%), and National Tops Ups for Products, Livestock, etc. in respect to governance sustainability (85,18%).

## Conclusion

Our survey includes "typical" and to a certain extent "sustainable" (perspective) agricultural farms, which means that sample sustainability level is higher than the real (average) for the country. Despite that undertaken first large-scale study on sustainability of Bulgarian farms let us make some important conclusions about the level of holdings sustainability in the country, and recommendations for managerial and assessment practices.

Suggested holistic framework gives a possibility to improve assessment, analysis and management of sustainability of individual farms and holdings of different type in general and for major aspects, principles, criteria and indicators of governance, economic, social and environmental sustainability. That approach has to be further discussed, experimented, improved and adapted to the specific conditions of operation and development of farms of different type, subsector of production, geographical region and ecosystem as well as the special needs of decision-makers at various levels.

Overall sustainability of Bulgarian farms is at a good level, with superior levels for environmental and social sustainability, and inferior level for governance and economic sustainability. Thus improvement of the latter two is critical for maintaining sustainability of Bulgarian

holdings. Governance and economic sustainability of Bulgarian farms are low because of the fact that Governance Efficiency and Financial Stability of holdings are low. Furthermore, low Comparative Efficiency of Supply of Short-term Inputs in relations to alternative organizations, and unsatisfactory Profitability of Own Capital and Overall Liquidity of farms, determine the latter. Simultaneously despite that the overall environmental sustainability is relatively high, Preservation of Agricultural Lands and Biodiversity are relatively low and critical for maintaining the achieved level. Insufficient Application of Recommended Irrigation Norms, a high level of Soils Water Erosion, and lowered Number of Wild Animals on farm territory, determines the latter inferior levels.

There are great variations in sustainability levels of farms of different type and location as well as in shares of holdings with unlike level of sustainability. Distribution of farms of different type in groups with diverse levels of sustainability has to be taken into account when forecast the number and importance of holdings of each kind, and modernize public (structural, sectorial, regional, environmental, etc.) policies for supporting agricultural producers of certain type, sub-sectors, eco-systems and regions of the country.

Factors which stimulate to the greatest extent the actions of Bulgarian farms for improving individual aspects of sustainability are quite distinct, but the most important 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 for Bulgarian farms as a whole and of different type 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 of the most Bulgarian farms are: Direct Area Based Payments, National Tops 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 farms is relatively weak. There are strong differentiations in impacts of individual policy instruments on sustainability of holdings of different type and location.

Having in mind the importance of holistic assessments of sustainability of farms and the enormous benefits for farm management and agrarian policies, such studies are to be expended and their precision and representation increased. The latter require a close cooperation between all interests parties and participation of farmers, agrarian organizations, local and state authorities, interest groups, research institutes and experts, etc. Moreover, the precision of estimates has to be improved and besides on assessments of managers to incorporate relevant information from field tests and surveys, statistical and other data, and expertise of professionals in the area.

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# 4 How to measure the governance pillar of agrarian sustainability

## Introduction

A common feature of all suggested and practically used modern systems for assessing sustainability as a whole and of agro-systems in particular is incorporation of three "dimensions" or "pillars" of sustainability - economic, social and environmental (Bachev *et al.*, 2017; Cruz *et al.*, 2018; EC, 2001; FAO, 2013; Hayati *et al.*, 2010; Kamalia *et al.*, 2017; Lopez-Ridauira *et al.*, 2002; Lowrance *et al.*, 2015; OECD, 2001; Sauvenier *et al.*, 2005; Singh *et al.*, 2009; Terziev *et al.*, 2018; VanLoon *et al.*, 2005). In the last years aspecial attention has beenincreasing put on the (good) "governance" as a key for achieving multiple goals of sustainable development at corporate, sectoral, national and international levels (Bachev, 2010; Bosselmann et. al., 2008; Gibson, 2006; EU, 2019; Simberova *et al.*, 2012; Kayizari, 2018; UN. 2015). What is more, the list of sustainability objectives of (theory, policy and practice) of development has been constantly enlarged encompassing

numerous governance, cultural, ethical etc. standards and goals (Bachev, 2010; Scobie & Young 2018). Simultaneously "new" (cultural, human, governance, etc.) pillars has been widely added to the modern definitionof sustainability and the systems of its evaluation and management (Altinay, 2012; ASA, 2019; Bachev, 2018; Nurse, 2006; RMIT University, 2017; UCLG, 2014).

The need to include "the fourth" Governance pillar in the concept for understanding and the system of measurement of sustainability is increasingly justified in academic literature (Bachev, 2010, 2018; Baeker, 2014; Burford, 2017; Fraser *et al.*, 2006; Monkelbaan, 2017) as well asfinds place in the official documents and assessment systems of different (government, international, private, etc.) organizations (City of Brooks, 2019; EU, 2019; IFAD, 1999). The "good governance" is considered to be both a goal of sustainable development and a means to successfully realized diverse socio-economic, ecological, cultural, etc. aspects of sustainability. Accordingly, numerous indicators have been proposed to evaluate the governance aspect of sustainability mostly at national and international level. The later predominately focus on the state of formal institutional framework, content of implemented policies and strategies, quality of human resources development, quality and efficiency of established capacity, efficiency of management of public authorities, extent of stakeholder involvement in public decision-making and control, etc. (Bell & Morse 2008; Bhuta & Umbach, 2014; CoastalWiki, 2019; Ganev *et al.*, 2018; Monkelbaan, 2017; Spangenberg *et al.*, 2002).

Despite enormous progress in that novel direction, the building of the system for understating and assessing the "new" governance aspect (pillar) of overall and agrarian sustainability is a "work in progress". For instance, still there is no general consensus on: whether and how to include the governance as a new pillar of (agrarian) sustainability; how

to define the governance(and the overall) agrarian sustainability; what are the relations between the governance sustainability of a farming enterprise and that of agriculture; what are the critical factors of governance (and overall) sustainability; how to formulate, select, measure and integrate diverse sustainability indicators; and how to properly evaluate the level of governance (and overall) sustainability in a dynamic world where hardly anything is actually "sustainable".

Furthermore, most of the suggested approaches for "assessing" governance sustainability are at conceptual and/or "qualitative"level. The few existing systems for governance sustainability measurement are focusingentirely on national and international level (comparison) without taking into consideration the specificity of the agricultural sector and the multiple and levels of governance and agri-(sub)systems of various types. In many cases, the governance aspect of agrarian (sectoral) sustainability and the farm (enterprise) sustainability are wrongly treated as identicaland evaluated in the same way.

What is more, all suggested and practically used systems for governance sustainability assessment contain a list of "universal" indicators equally applicable (appropriate) for the unique (socio-economic, market, institutional, political, natural, etc.) conditions of an individual country, and a quite specific state and diverse factors of agricultural development of each country and community, and the great variety of agricultural systems within a country, region, subsector, eco-system, type of farming organization, etc.

Often the governance sustainability is evaluated on the base of qualitative analysis and "experts" estimates without applying any consistent methodology, reliable (representative, first-hand, micro, etc.) information and data,specific quantitative methods, etc. Commonly a holistic approach for sustainability assessment is not applied, and

the "purely" governance, and "purely" economic, and "purely" ecological, and "purely" social aspects of agrarian development are studied (and evaluated) independently from one another. Studding and assessing the governance sustainability is usually restricted to formal institutional environment and/or"official" public modes without taking into account the important market, private, collective, and hybrid forms, and critical (and often dominating in many cases) modes of "informal" governance.

Rarely a hierarchical structure and/or systematic organization for sustainability indicators selection are applied. Principally, the individual components of the governance (and the overall) agrarian sustainability are (pre)determined by a direct and "arbitrary"selection of different indicators for sustainability evaluation. Similarly, a corresponding set of specific "reference values" is not adequately incorporated in the sustainability assessment framework for a particular (national, regional, sectoral, eco-system, farming, etc.) agro-system.

Generally, there is no any system (approaches, priorities, weights, interpretation modes, etc.) for the "integration" of the governance sustainability indicators in different (distinct) areasinto an Integral (Overall) governance and sustainability level. The later preventsthe proper understandingand assessment the specific role of various aspects of governance sustainability in the overall governance and agrarian sustainability as well as effectiveimprovement ("management") of the governance and the overall sustainability.

Finally, most of the proposed systems of sustainability assessment cannot be practically used by the managerial bodies at different decision-making levels since they are very complex and difficult to understand, calculate, monitor, correctly interpret and usedin everyday activity of individual agents, organizations and agencies.

In Bulgaria, like in many other countries, there are a very few studies on governance issues related to agrarian sustainability (Bachev, 2010, 2018; Bachev *et al.*, 2016; Bachev & Treziev, 2018; Georgiev, 2013; Marinov, 2019; Zvyatkova & Sarov, 2018). There are also very few attempts toanalyze the governance aspect (pillar) of agrarian sustainability and practically incorporate it into overall sustainability evaluation and measurement (Bachev, 2016, 2017, 2018; Bachev *et al.*, 2018; Bachev & Treziev, 2017, 2019). Moreover, practically there are no comprehensive assessments of the governance sustainability in the agrarian sector and its importance for the overall agrarian sustainability at present stage of development.

This paper tries to fill the gap and suggests a holistic framework for understanding and assessing the governance sustainability of Bulgarian agriculture. The newly elaborated approach is applied (tested) in a first in kind large-scale study for assessing the governance sustainability of country's agriculture at national, sectoral, regional, eco-system and farm levels, and its contribution to the overall agrarian sustainability in Bulgaria.

## Proper understanding of governance sustainability of agriculture

In academic literature, managerial and assessment practices still there is no consensus about "what is" (how to define) agrarian sustainability which is commonly defined as "alternative ideology" (Edwards *et al.*, 1990.; VanLoon *et al.*, 2005); "new strategy" (Mirovitskaya & Ascher, 2001); "characteristic of agrarian system like,, ability for achieving multiple goals" (Brklacich *et al.*, 1991; Hansen, 1996) or "capability (potential) for maintain and improve its functions" (Lopez-Ridaura *et al.*, 2002; Lewandowski *et al.*,

1999); "process of understanding and adapting to changes" (Raman, 2006), etc.

We have proved that sustainability of agriculture is a "system characteristic" andhas to be perceived as "ability to continue overtime" (Bachev, 2005; Hansen, 1996). It characterizes the ability (internal capability and adaptability) of agriculture and ago-systems of different type to maintain its managerial, economic, social and environmental functions in a long period of time (Bachev, 2018). Agrarian sustainability has four major aspects ("pillars") which are equally important and have to be always accounted for – the governance sustainability, the economic sustainability, the social sustainability, and the environmental sustainability. Thus agriculture is sustainable if it is:

- *economically viable and efficient* – i.e. provide enough employment and income for farm and rural households, good or high productivity of utilization of natural, personal, material, and financial resources, economic efficiency and competitiveness, and financial stability of activity;

- *socially responsible regarding farmers, workers, other agents, communities, consumers and society as a whole* - i.e. contribute to amelioration of welfare and living standards of farmers and rural households, conservation of agrarian resources and traditions, and sustainable development of rural communities and society;

- *ecologically sustainable* – i.e. activity is associated with conservation, recovery and improvement of components of natural environment (landscape, lands, waters, biodiversity, atmosphere, climate, etc.), respecting "rights" of farm and wild animals ("animal welfare"), etc.

- and *has a "Good" system of governance put in place* – i.e. effective formal and informal institutional rules and public management, working markets, private and collective modes, and adequate enforcement systems, etc.

More particularly, the "governance sustainability" characterizes the efficiency of the specific system of governance in an evaluated agro-system being national, subsector, ecosystem, regional, farming enterprise, etc. Accordingly, a "good governance"means a superior governance sustainability, while a "bad" (inefficient) governance corresponds to inferior governance sustainability. Governance sustainability is simultaneouslya major system feature as well as a means to achieveother multiple goals of the system and the "states" of economic, social and environmental sustainability. Having in mind its important role for achieving, maintain and improving the overall agrarian sustainability, it could be underline that the governance sustainability is the "first" (pillar) among (four) "equals".

Maintaining multiple functions (sustainability) of agriculture requires an effective social order - a system of diverse (governing) mechanisms and forms regulating, coordinating, stimulating, and controlling the behavior, actions and relations of individual (agrarian and non agrarian) agents (resource owners, farm managers, labor, input suppliers, buyers of farm products, investors, interest groups, residents and visitors of rural areas, state, local and agrarian authorities, policy makers, final consumers etc.) at various levels (farm, local, regional, national, transnational, and global) (Figure 1).

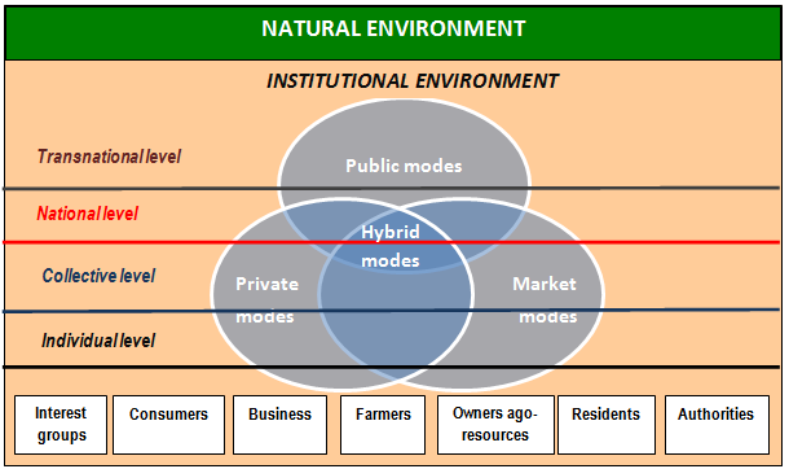


**Figure 1.** *Mechanisms and Modes of Agrarian Governance*
**Source:** authors

The system of governance includes a number of district components (governing mechanisms and modes) (Williamoson, 1996) all of which have to be included in the sustainability assessment:

First, *institutional environment* ("rule of the game") - that is the distribution of rights and obligations between individuals, groups, and generations, and the system(s) of enforcement of these rights and rules (North).

Second, *market mechanisms and modes* ("invisible hand of market", "market order") – those are various decentralized initiatives governed by the free market price movements and market competition – e.g. spotlight exchange of resources, products and services; classical purchase, lease or sell contract; trade with high quality, organic etc. products and origins, agrarian and ecosystem services, etc.

Third, *private mechanisms and modes* ("private or collective order") – diverse private initiatives, and special contractual and organizational arrangements (long-term supply and marketing contracts, voluntary eco-actions, voluntary or obligatory codes of behavior, partnerships, cooperatives and

associations, brads and trademarks, labels). For instance, conservation of natural resources is a part of the managerial strategy of many green (eco, green) farms.

Forth, *public mechanisms and modes* ("public order") – various forms of public (community, government, international) interventions in market and private sector such as public guidance, regulation, assistance, taxation, funding, provision, property right modernization, etc.

Fifth, *hybrid forms* – some combination of the above three modes like public-private partnership, public licensing and inspection of private organic farms, etc.

In a long run the specific system of governance of agrarian sector and sustainability (pre)determine the type and character of social and economic development (Bachev, 2010). Depending on the efficiency of system of governance of agrarian sustainability "put in place", individual farms, subsectors, regions and societies achieve quite dissimilar results in socio-economic development and environmental protection, and there are diverse levels and challenges in economic, social and ecological sustainability of farms, subsectors, regions and agriculture.

Agriculture consists of many agro-systems – from individual "farming plot", a "farm enterprise", an "agri-ecosystem", an "agro-region", up to a"national", "European" and "global". In this study we focus on the assessment of the (governance) sustainability of agriculture at national level as well and for the principle agricultural systems in the country – main type of farming organizations, major subsectors of agriculture, general kinds of agro-ecosystems, and all administrative (agro)regions (Figure 2).

Many holistic sustainability assessment frameworks put a smaller ecosystem (e.g. "individual farming plot", "a pond", etc.) as the lowest (first) level of sustainability assessment in agriculture (Sauvenier *et al.*, 2005). We have proved that *the farm* is the lowest level, where the management and

organization of agricultural activity (and sustainability) is carried out, and where all aspects of the agrarian sustainability are "realized" and could be feasibly assessed (Bachev, 2005). That is why the farm(agro-system) rather than the smaller agro-systems within a farm boundary is to be the first level of agrarian (economic, governance, integral, etc.) sustainability assessment.

Furthermore, a special distinction is made between the governance sustainability of agriculture and the sustainability of management ("governance") structures in agriculture[1]. While sustainability of certain type of farms (e.g. "family holding") is included as major criteria for assessing the "social"(pillar) of agrarian sustainability, the specificlevel of sustainability of the individual governing structures (different type of farms, producers organizations, administrative bodies, etc.)is not a part of or related to the agrarian sustainability evaluation. It is well known that sustainable development is commonly associated with the adaptation of farms and other governance structures to constantly evolving socio-economic, market, institutional and natural environment which process is associated with diminishing importance ("sustainability") and/or liquidation of certain type of farms (public, cooperative, small-scale), restructuring and modernization of farming enterprises and agrarian administration, and emergence of diverse complex, vertically integrated and hybrid forms of governance, etc.

On the other hand, the Governance sustainability of agriculture expresses the ("working") state and contribution (toward sustainability goals) of the principle governing mechanisms and forms in the evaluated agro-system. Most of these mechanismsand modes of governance concern (affect) the specific governing structures used by individual

[1] A comprehensive modern framework for assessing sustainability of farming enterprises is suggested by Bachev (Bachev, 2017, 2018).

agents (includingfarms, farming organizations, contractual and vertically integrated forms)and their sustainability but many are related to (farms'relations with and) other agrarian agents (resource owners, labor, inputs suppliers, processors, retailers, final consumers, agrarian administration, etc.), while other are associated with intra-entity/farm elements (e.g. enforcement of work, food safety, animal welfare, and environment standards, etc.).

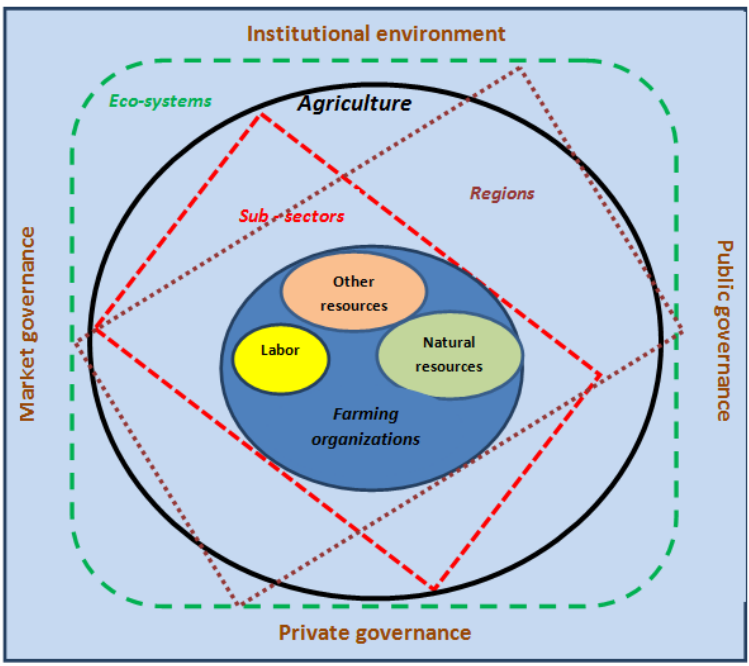


**Figure 2.** *Components and Levels of Assessment of Governance Sustainability in Agriculture*
**Source:** author

## Incorporating the "New" governance pillar in the assessment framework of agrarian sustainability

In order to identify the individual indicators for assessing the(governance) sustainability of agriculture a hierarchical system of well-determined Principles, Criteria, Indicators,

and Reference Values for each Aspect (Pillar) of sustainability is elaborated. Detailed justification of that *new*approach, and the ways and criteria for selection of sustainability Principles, Criteria, Indicators and Reference Values are presented in other publications by Bachev (2017, 2018), and Bachev *et al.*, (2017, 2018).

The *Governance Sustainability Principles*are "universal"and relate to the multiple functions of the agriculture representing the states of the sustainability, which is to be achieved (Figure 3). For instance, for the "specific" contemporary conditions of Bulgarian (and European Union) agriculture following five (governance sustainability) principles related to the generic (five) mechanisms and modes of governance are identified: "Good legislative system","Democratic management","Working agrarian administration","Working market environment", and "Good private practices" (Table 1).

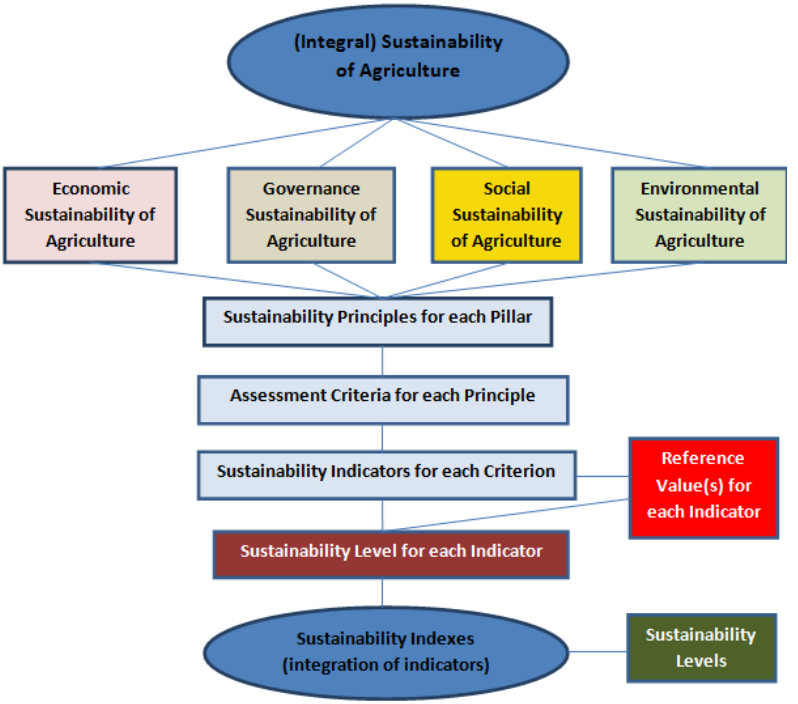


**Figure 3.** *Framework for Assessing Sustainability ofAgriculture*
**Source:** author

The *Governance Sustainability Criteria*are precise standards ("measurement approaches")for each of the Principlerepresenting a resulting state of the evaluated system when the relevant sustainability Principle is realized. For instance, for the contemporary conditions of the Bulgarian agriculture 20 Criteria for assessing diverse aspects of the governance sustainability are specified. For example, for the Principle "Good legislative system" four Criteria are selected: "Harmonization with the European Union policies", "Extent of the European Union policies implementation", "Beneficiaries' satisfaction of the European Union policies", and "Policies effects" (Table 1).

The *Governance Sustainability Indicators* are quantitative and qualitative variables of different types which can be

assessed in the specific conditions of the evaluated agri-system allowing measurement of compliance with a particular Criterion. The set of Indicators provides a representative picture for the agrarian sustainability in all its aspects. For the selection of the Sustainability Indicators a number of criteria, broadly applied in the sustainability assessment literature and practices, were used: "Relevance to reflecting aspects of sustainability", "Discriminatory power in time and space", "Analytical soundness", "Intelligibility and synonymity", "Measurability", "Governance and policy relevance", and "Practical applicability" (Sauvenier *et al.*, 2005).

For instance, for assessing the Governance sustainability of the Bulgarian agriculture at micro (farm) and macro (sectoral, regional, eco-system, etc.) levels a system of respectively 22 and 26 Indicators are specified. For example, for the Criteria "Policies effects" an Indicator "Level of subsidies comparing to the average for the sector" is selectedfor farm level, as well as two Indicators for the aggregate (sectoral) level – "Coefficient of subsidies distribution from Pillar 1" and "Coefficient of distribution of investment support comparing to share in Net Value Added"(Table 1).

**Table 1.** *System of Principles, Criteria, Indicators, and Reference Values for Assessing Governance Sustainability of Bulgarian Agriculture*

| Principles | Criteria | Indicators | | Reference values | |
|---|---|---|---|---|---|
| | | Sectoral level | Farm level | Sectoral level | Farm level |
| Good legislative system | Harmonization with EU policies | Extent of policies harmonization | na | Experts estimate | |
| | Extent of EU policies implementation | Extent of financial implementation of policies | Extent of CAP implementation | Experts estimate | Beneficiaries estimates |
| | | Extent of achievements of objectives indicators | | Experts estimate | |

| | | | | | |
|---|---|---|---|---|---|
| | Beneficiaries' satisfaction of EU policies | Extent of beneficiary satisfaction of EU policies | Extent of beneficiary satisfaction of EU policies | Beneficiaries estimates | Beneficiaries estimates |
| | Policies effects | Coefficient of subsidies distribution from Pillar 1 | Level of subsidies comparing to the average for the sector | High 0-0,25<br>Good 0,26-0,45<br>Satisfactory 0,46-0,6<br>Unsatisfactory 0,61-0,8<br>Unsustainable 0,81-1,0 | Average for the sector |
| | | Coefficient of distribution of investment support comparing to share in Net Value Added | | High 0-0,25<br>Good 0,26-0,45<br>Satisfactory 0,46-0,6<br>Unsatisfactory 0,61-0,8<br>Unsustainable 0,81-1,0 | |
| Democratic management | Representation | Share of producers represented in different public decision-making bodies | Producers' representativeness in state and local authorities | Experts estimate | Farm managers estimates |
| | Transparency | Transparency level | Level of access to information | Experts estimate | Farm managers estimates |
| | Impact | Share of overall support Net Value Added of agriculture | Share of subsidies in income | High 41-100%<br>Good 26-40%<br>Satisfactory 11-25%<br>Unsatisfactory 6-10%<br>Unsustainable bellow 5% | High 41-100%<br>Good 26-40%<br>Satisfactory 11-25%<br>Unsatisfactory 6-10%<br>Unsustainable bellow 5% |
| | | Level of subsidizing in Net Income | | High 41-100%<br>Good 26-40%<br>Satisfactory 11-25%<br>Unsatisfactory 6-10%<br>Unsustainable bellow 5% | |
| | Stakeholders' participation in decision-making process | K of real weight in the process | Farmers' participation in decision-making | Experts estimate | Farm managers estimates |

| | | | | | |
|---|---|---|---|---|---|
| Working agrarian administration | Minimum costs of using | Legitimate payments | Acceptability of legal payments | Beneficiaries estimates | Farm managers estimates |
| | | Non-legitimate payments | | Beneficiaries estimates | |
| | Access to administrative services | Share of digitalized services in overall number | Administrative services digitalization | Experts estimate | Farm managers estimates |
| | | | Agrarian administration efficiency | | Farm managers estimates |
| | Information availability | Level of awareness | Extent of awareness | Beneficiaries estimates | Farm managers estimates |
| | Quality of services | Administration costs in Value Added of Agriculture | Administration service costs | High 0-0,01<br>Good 0,2-0,05<br>Satisfactory 0,05-0,1<br>Unsatisfactory 0,11-0,2<br>Unsustainable Bigger than 0,2 | Farm managers estimates |
| Working market environment | Market access | Extent of market access | Market access difficulties | Experts estimate | Farm managers estimates |
| | Free competition | Extent of price influence | Prices negotiation possibilities | Experts estimate | Farm managers estimates |
| | | | Market competition | | Farm managers estimates |
| | Competitive allocation of public resources | Extent of competitive distribution | Extent of competitive allocation of public resources | Experts estimate | Farm managers estimates |
| | | Possibilities for taking part in public procurements | | Experts estimate | Farm managers estimates |
| | Resource concentration | K of concentration of land resources | K of lands concentration | High bellow 200 xa<br>Good 200-400 xa<br>Satisfactory 400-600 xa<br>Unsatisfactory 600-800 xa | High bellow 200 xa<br>Good 200-400 xa<br>Satisfactory 400-600 xa<br>Unsatisfact |

| | | | | | |
|---|---|---|---|---|---|
| | | | | Unsustainable above 1000 xa | ory 600-800 xa Unsustainable above 1000 xa |
| | | Real possibilities of lands extension | Possibility for lands extension | Experts estimate | Farm managers estimates |
| Good private practices | Regulation implementation | Extent of regulations implementation | Extent of regulations implementation | Experts estimate | Farm managers estimates |
| | External control | Control regulation | Management Board external control | Experts estimate | Farm managers estimates |
| | Correctness of relationships | Extent of contract enforcement | Extent of contract enforcement | Experts estimate | Farm managers estimates |
| | Efficient informal system | Level of informal system efficiency | Level of informal system efficiency | Experts estimate | Farm managers estimates |

**Source:** author

## Defining, integration and interpretation of sustainability level

For assessing the particular sustainability level a system of specific Reference Values (sustainability norms, range, and standards) for each Indicator is needed (Figure 3).

The *Governance Sustainability Reference Values*are the desirable levels for each Indicator according to the specific conditions of the evaluated agro-system. They assistthe assessment of the sustainability levels giving guidance for achieving (maintaining, improving) particular aspect and the overall agrarian sustainability. Most of the Reference Values show the level(s), at which the long-term sustainability of agrarian Governance sustainability is "guaranteed" and improved. Depending on the extent of the Reference value achievement the evaluated agro-system may be with a "high", "good", or "low" sustainability, or to be

"unsustainable". For instance, agrarian system with a higher than the sectoral public support (level of subsidies) is more sustainable then others as far as "Policy effects" are concerned, and vice versa.

Very often individual Indicators for each Criterion and/or different Criteria, and Principles of sustainability are with unequal, and frequently with controversial levels. That significantly hardens the overall assessment requiringa transformation into "unitless"Sustainability Index and integration of estimates (Figure 3). Diverse quantitative and qualitative levels for each indicator are transformed into a Index of sustainability (ISi)applying appropriate scale for each Indicator (Bachev *et al.,* 2018).

The Integral Sustainability Index for a particular Criterion (SI(c)), Principle (SI(p)), and Aspect of sustainability (SI(a)), and the Integral Sustainability Index (SI(o)) for evaluated agro-system is calculated applying "equal weight" for each Indicator in a particular criterion, of each Criterion in a particular Principle, and each Principle in every Aspect of sustainability.

Using "equal" rather thandifferentiated weight is determined by the fact that individual Sustainability Aspects, and indeed Sustainability Principles, are "by definition" equally important for the Integral Agrarian Sustainability. At the same time, differentiation of the weights of individual Criteria within each Principle and the individual Indicators within each Criteria is difficult to justify as well as to a great extent unnecessary (practically unimportant for the Integral assessment) having in mind the big number and small relative contribution of each Indicator. Besides, we have found out that the calculations with and without differentiated weights do not led to any significant variations in the sustainability levels for the conditiopns of Bulgarian agriculture (Bachev *et.al,* 2019).

The Integral Index for a particular Criterion (SI(c)), Principle (SI(p)), and Aspect of sustainability (SI(a)), and the Integral Sustainability Index (SI(o)) arearithmetic averages of the Indices of composite Indicators, Criteria and Principles, calculated by the following formulas:

SI(c) = ∑SI(i)/n n – - number of Indicators in a particular Criterion;

SI(p) = ∑SI(c)/nn - number of Criteria in a particular Principle;

SI(a) = ∑SI(p)/nn - number of Principles in a particular Aspect,

SI(o) = ∑SI(a)/4

For assessing the level of Governance and Integral sustainability of agro-systems in Bulgaria the following scale, defined by the leading experts in the area (Bachev *et al.,* 2018) are used:

Index range 0,81-1 for a "High" level of sustainability;

Index range 0.50-0,8 for a "Good" level of sustainability;

Index range 0,26-0,49 for a "Satisfactory" level of sustainability;

Index range 0,06-0,25 for an "Unsatisfactory" level of sustainability;

Index range 0-0,05 for "Non-sustainable" state.

The integration of Indicators does not diminish the analytical power of suggestedassessment system, since it makes it possible to compare the (specific and integral) sustainability of diverse aspects of an agro-systemand of agro-systems of different types, as well as identify "critical" factors for maintaining and improving sustainability, etc. Besides, since the assessment of sustainability levels for the individual Indicators is a (pre)condition for of the

integration itself, the primary information always is available and could be analyzed in details if that is necessary.Depending on the objectives of final users and the analysis, the extent of integration of Indicators could be differentiated. While farm managers, investors, researchers etc. may prefer detailed information for each Indicator, for decision-making at a higher level (government, policy-makers, etc.) more aggregated assessment are needed (sufficient).

## Assessment of governance sustainability of Bulgarian agriculture

Elaboratednovel holistic framework for assessing the Governancesustainability of Bulgarian agriculture is tested using expertsand stakeholdersassessments, and 2018 survey data[2]from the managers of 104 "typical farms" of different size and juridical type, production specialization, and ecological and geographical locations. The structure of surveyed farms approximately corresponds to the real structure of farms in different categories in Bulgaria. Classification of the surveyed farms into juridical type, size, production specialization, and ecological and geographical location is done according to the official definitions currently used in Bulgaria (and European Union).

In Bulgaria, like in many other countries, there are no official data for calculating most of the governance, socio-economic and environmental sustainability indicators at lower (farm, eco-system, subsector, regional, etc.) level (Bachev *et. al.,* 2018). Therefore, micro and middle level assessment of socio-economic, environmental and governance sustainability is entirely based on the "original"

[2]The author expresses his gratitude to the National Agricultural Advisory Service for conducting the survey, and to participated farm managers for providing the valuable information.

first-hand information collected from the farm managers. The composite (Aspect and Integral) Sustainability Index of each evaluated agri-system (farming organization, agricultural subsector, agri-ecosystem, geographical region, etc.) is calculated as an arithmetic average of the Indices of relevant farms belonging to that system.

Assessment of the Governance sustainability at national (sectoral) level is evaluated in two ways – using experts and stakeholders (farmers, producers' organizations, etc.) estimates, and though aggregation ofthe information from the conducted farms survey.

The comprehensive assessment of the Governance sustainability of the Bulgarian agriculture by using aggregate (sectoral) and farming (survey) data shows quite unlike results– "Satisfactory" level in the former case, and (close to the border with "satisfactory" level but still) a "Good" level in the later case (Figures 4 and Figure 5).

The Overall and Principles sustainability estimates based on the farm managersassessments are higher than those calculated on the base of the official (statistical, FADN, etc.) information, and experts and producers' organizationsestimates (Figure 6). The discrepanciesin the estimates for three Principles ("Democratic management", "Working market environment", and "Good legislative system")are crucial since they put the Governance sustainability in different (inferior)levels.

Therefore, Governance sustainability assessments always have to be based both on (complementary) macro and micro data in order to increase accuracy and extend reliability. Besides, theoretical and practical work for the improvement of the assessment methods and data sources of the sectoral sustainability assessments (especially as far as the Governance Pillar is concerned) is to continue.

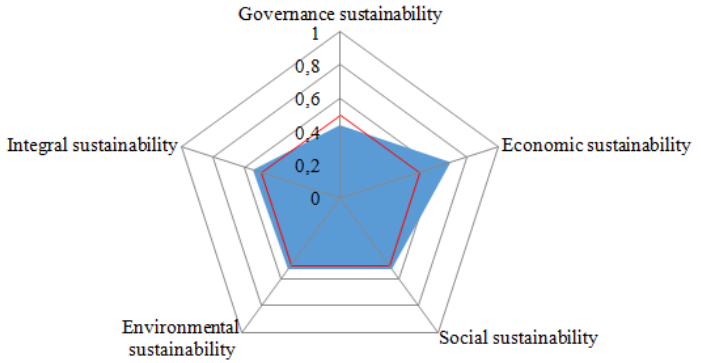


**Figure 4.** *Levels of governance, economic, social, environmental and integral sustainability of Bulgarian agriculture, calculation based on aggregate (sectoral) data*
**Source:** Agro-statistics, experts' assessments

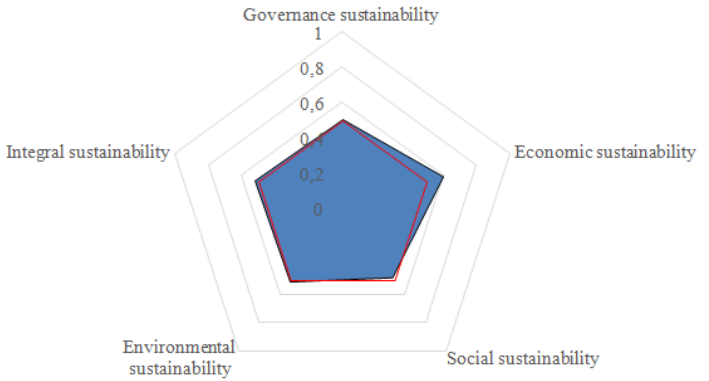


**Figure 5.** *Levels of Governance, Economic, Social, Environmental and Integral Sustainability of Bulgarian Agriculture, calculation based on farm (survey) data*
**Source:** survey with farm managers

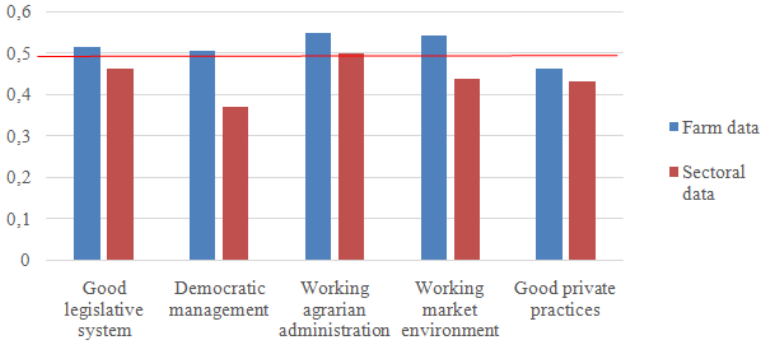


**Figure 6.** *Sustainability Indexes for major Principles of Governance Sustainability, calculated on the base of sectoral and farm data*
**Source:** authors

The inclusion of the "Governance Aspect" in the sustainability calculations changes the Integral Sustainability Indexof Bulgarian agriculture using sectoral (with 0,03), and to a smaller extent farm (with 0,005) based estimates (Figure 7). However, taking into account the Governance aspect does not modify the overall ("Good") sustainability level using both type of information. The later is due to the fact that there are also differences in the Sustainability Indexes for the Economic, Social and Environmental aspects based on the aggregate (sectoral) and aggregated first hand farm data (Figure 3 and Figure 4), being particularly high for the Economic and Social sustainability (0,1 and 0,05 accordingly). The estimates based on the official aggregate sectoral data for the Economic, Social and Environmental aspects are higher than the corresponding levels based of micro farm data. Consequently, they do not affect the Integral sustainability "compensating" the contribution to the overall sustainability level of the Governance pillar.

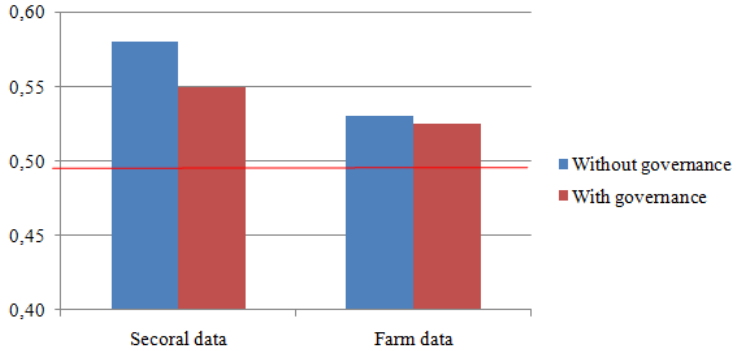


**Figure 7.** *Integral Sustainability of Bulgarian Agriculture "with" and "without" Including Governance Aspect*
**Source:** Bachev et al, 2019; authors calculations

Nevertheless, the inclusion of the missing "new" and important Governance aspect is crucial since it ameliorates adequacy and precision of the sustainability assessment of Bulgarian agriculture. At the same time, all dynamics and discrepancies in the estimates between sustainability pillars and the estimates based of different (statistical, farm, etc.) type of data have to be taken into consideration in the analysis and the interpretation of results, while assessment indicators, methods and data sourcesfurther improved (Bachev *et.al.,* 2019).

## Unpacking the governance sustainability of Bulgarian agriculture

Micro data collected from the farm managers are particularly important for the proper assessments and "unpacking" of different aspects of the Governance Sustainability of agriculture. Following is a detailed assessment of the Governance sustainability of Bulgarian agriculture based of the original farm survey data.

A multiple indicators assessment of the Governance sustainability level of Bulgarian agriculture indicates that the Index of Overall Sustainability is 0,51 - this represents a close

to the lower ("Satisfactory") but still a "Good" level of Governance sustainability of the sector (Figure 5).

Analysis of individual Indexes for the primary sustainability Principles, Criteria, and Indicators allowsidentifyingindividual components contributing to the Governance sustainability of this important sector of Bulgarian economy.

For instance, the Governance sustainability of Bulgarian agriculture is relatively low because the Index for the Principle "Good Private Practices" is at "Satisfactory" level (0,46) and compromises the Pillar's Integral sustainability. Moreover, Indices for "Good Legislative System" and "Democratic management" are quite low and at the border with the "Satisfactory"level - 0,5 and 0,51 accordingly (Figure 8). At the sametime, Indices for the Principles "Working agrarian administration" (0,55) and "Working market environment" (0,54) are highest and contribute most for elevating (ensuring) the Governance Sustainability of the sector.

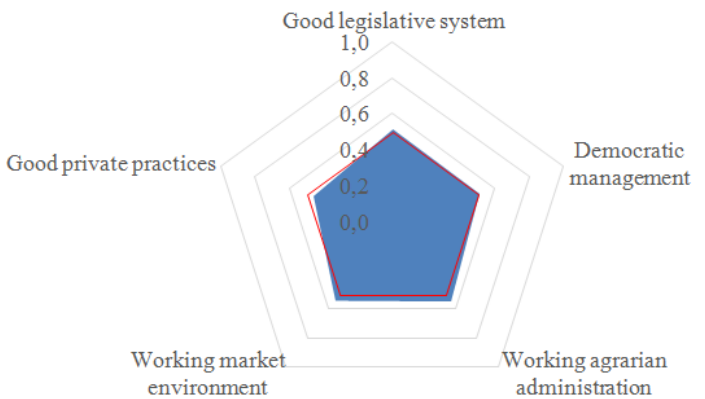


**Figure 8.** *Indices of Sustainability for Major Principles of Governance Sustainability of Bulgarian Agriculture*
**Source:** author's calculation

In depth analysis of the levels of the individual Criteria and Indicators further specifies the elements that enhance or reduce country's agricultural Governance sustainability. For instance, the insufficient "Good Private Practices"is determined by the low "External control" (over management) (0,38), weak "Contracts enforcement" (0,49) and inferior "Informal system efficiency" (0,43) (Figure 9).Similarly, despite that the Integral Index for "Democratic management" Principle is at a "Good" level, Indices for two criteria (policies)"Impact" and "Stakeholder participation in decision-making") are quite low at satisfactory territory. Likewise,"Working agrarian administration" seems "Good" but "Access to administrative services" is actually very low (0,34) at "Satisfactory" sustainability level. The same is true for the "Working market environment" which is "Good" while Index for the Criteria "Resource concentration" reviles low sustainability (0,43).

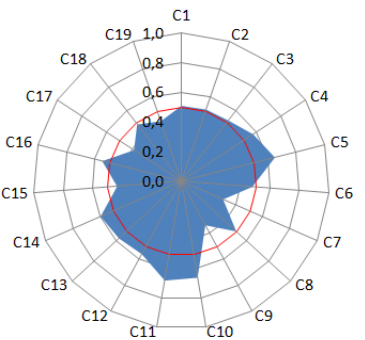


**Figure 9.** *Indices of Sustainability for Major Criteria* of Governance Sustainability of Bulgarian Agriculture*

**Notes:** *C1-Extent of policies implementation; C2-Extent of beneficiary satisfaction of EU policies; C3-Policies effects; C4-Representation; C5-Transparency; C6-Impact; C7-Stakeholder participation in decision-making; C8-Minimum costs of using; C9-Access to administrative services; C10-Information availability; C11-Quality of services; C12-Market access; C13-Free competition; C14-Competitive allocation of public resources; C15-Resource concentration; C16-Regulation implementation; C17-

External control; C18-Contracts enforcement; C19-Informal system efficiency

**Source:** author's calculation

Individual sustainability Indicators give precise information about the specific factors determining one or another values of a particular Criteria. For example, ineffective "Access to administrative services" is determined accordingly by the insufficient "Agrarian administration efficiency"(0,31) and undeveloped "Administrative services digitalization"(0,37) (Figure 10). Likewise "Satisfactory" sustainability for the "Resource concentration" is a consequence of the (low) "Possibility for lands extension" (0,37).

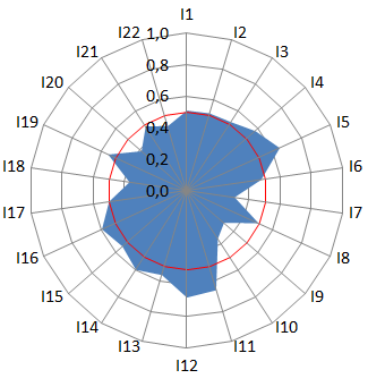


**Figure 10.** *Indicators* for Assessing the Governance Sustainability of Bulgarian Agriculture*

**Notes:** * I1-Extent of CAP implementation; I2-Extent of beneficiary satisfaction of EU policies; I3-Subsidies distribution; I4-Representativeness of state and local authorities; I5-Access to information; I6-Subsidies in Income; I7-Farmer's participation in decision-making; I8-Acceptability of legal payments; I9-Agrarian administration efficiency; I10-Administrative services digitalization; I11-Extent of awareness; I12-Administration service costs; I13-Market access difficulties; I14-Market competition; I15-Prices negotiation possibilities; I16-Extent of competitive allocation of public resources; I17-Lands concentration; I18-Possibility for lands extension; I19-Extent of regulations implementation; I20-Management Board external

control; I21-Extent of contract enforcement; I22- Level of informal system efficiency.

**Source:** survey with farm managers

The low values for the Indicators help identify specific areas that require improvement through adequate changes in the institutional environment, public policy, modernization of agrarian administration, collective actions and/ormanagement strategies. At the current stage of the development the most critical for increasing the Governance sustainability of country's agriculture areprogressive improvements in following directions: "Farmer's participation in decision-making" (0,31), "Agrarian administration efficiency" (0,31), "Administrative services digitalization" (0,37), "Possibility for lands extension" (0,37), "Management Board external control"(0,38), "Level of informal system efficiency"(0,43), "Subsidies in Income" (0,48), "Extent of contract enforcement" (0,49), "Acceptability of legal payments" (0,5), and "Lands concentration" (0,5).

The higher levels of certain Indicators show the absolute and comparative advantages of the Bulgarian agriculture in terms of good governance and sustainable development. At the current stage of development, the most prominent of these include:"Representativeness of state and local authorities" (0,58), "Market competition" (0.6),"Extent of competitive allocation of public resources" (0.6), "Access to information" (0.65), "Extent of awareness" (0.66), and "Administration service costs" (0.68). Nevertheless, the top value(s) of the Governance sustainability Indicators in Bulgarian agriculture is relatively low. Therefore, there is a great potential for improvement of governance efficiency and further elevate the Governance and Overall sustainability.

## Governance sustainability in major sub-sectors of agriculture

The analysis of the Governance sustainability of different sub-sectors of Bulgarian agriculture shows that there is a great variation in the sustainabilitylevel. The highest ("Good") level of Governance sustainability is demonstrated in the "Mix livestock" production (0,59), followed by the "Vegetables, flowers, mushrooms" and "Mix crop-livestock"sectors (0,53) (Figure 11). Therefore, these three subsectors contribute to greatest extent for improving (maintaining) the overall Governance sustainability of Bulgarian agriculture.

On the other hand, the level of Governance sustainability in the "Grazing livestock" (0,52), "Permanent crops" (0,5), and "Beekeeping" (0,5) is close to the average in the sector. Finally, in some major subsectors like "Field crops" (0,47) and "Mix crops" (0,49), the level of the Governance sustainability is "Satisfactory" and far below the general one. This means that the later subsectors decrease in a biggest degree the Integral Governance sustainability of country's agriculture.

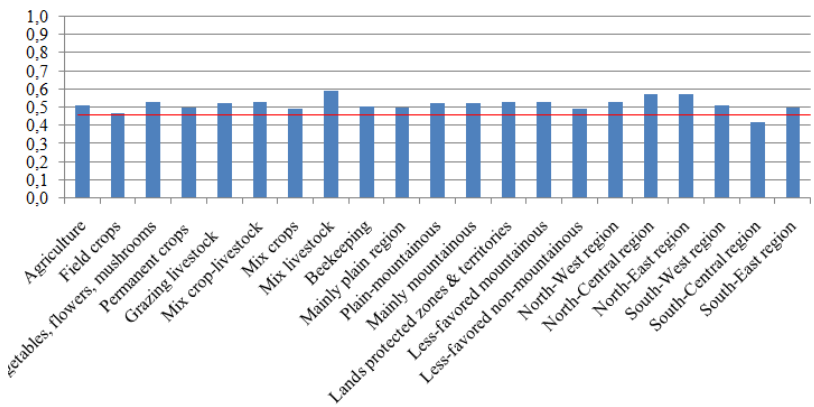


**Figure 11.** *Governance Sustainability in Different Sub-sectors of Agriculture, Agri-ecosystems and Agrarian Regions of Bulgaria*

The different sub-sectors of Bulgarian agriculture are characterized by significant variation of the levels of Indices of the main Principles of the Governance sustainability (Figure 12). For instance, the Principle "Good legislative system" is the best realized in the "Vegetables, flowers, mushrooms" production (0,58) and "Mix-livestock" operations (0,57), and the worst in "Field crops" and "Grazing livestock" sub-sectors (0,47). The Principle of "Democratic management" is the best applied in the "Mix livestock" production (0,62), while it is not "Satisfactory" in the "Beekeeping" (0,46), and "Mix crops" and "Mix crop-livestock" sub-sectors (0,49). The interior and superior levels of the Governance sustainability for particular Principles show the directions for improving the Governance sustainability in the relevant sub-sectors of agriculture.

The Principle "Working agrarian administration" is effectively applied in "Beekeeping" (0,57), and "Grazing livestock" and "Mix crop-livestock" (0,56), while agrarian administration does not "work" well in the sector of "Field crops" (0,44).The sustainability for the Principle "Working market environment" is the highest in "Mix livestock" (0,64), "Beekeeping" (0,63)and "Mix crop-livestock" (0,58). Simultaneously, market mechanisms are not working very well for the "Field crops" producers (0,5). Finally, "Good private practices" are the best implemented in the subsector of "Mix livestock" (0,62) and "Mix crop-livestock" (0,5), while in all other subsectors they are applied only "Satisfactorily", being particularly inferior in the "Beekeeping" (0,37) and"Field crops" (0,41).

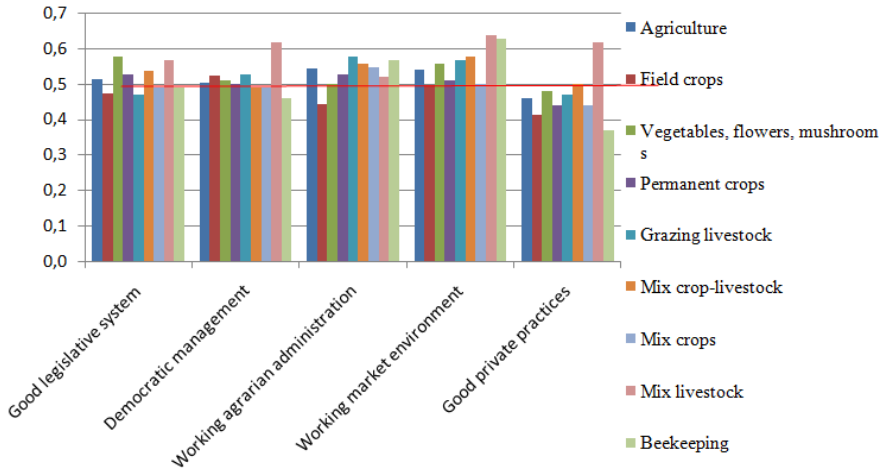


**Figure 12.** *Indices of the Principles of Governance Sustainability in Major Sub-sectors of Bulgarian agriculture*
**Source:** survey with farm managers

In depth analysis of that type identifying inferior (critical) levels for sustainability Principles has also a high practical value since they showthe specific directions (public, collective and private action areas) for improving the particular (Principle) and the Integral Governance sustainability in the evaluated subsector and agriculture in general. Further analysis of the sustainability level for the individual Indicators allows "complete" unpacking the "critical" factors enhancing and/or decreasing the Governance sustainability of each sub-sector.

The Governance sustainability of major agro-ecosystems in Bulgaria also demonstrates a great variation as the highest ("Good") ones are registered for the agro-ecosystems with "Lands in protected zones and territories" (0,53) and those in "Less-favored mountainous"regions (Figure 11). At the same time, the Governance sustainability of two agro-ecosystems - "Mainly plain" (0,5) and "Less-favored non-mountainous"(0,49) arebelowthe national (sectoral) average, the second one being at inferior ("Satisfactory") level.

Therefore, the later two type of agro-ecosystems decrease to the biggest extent the Integral Governance sustainability of Bulgarian agriculture.

The different agro-ecosystems of the country are further characterized by significant differentiations in the levels of Indices of main Principles of the Governance sustainability (Figure 13).The principle "Good legislative system" is the best implemented at "Good" levelin the "Plain-mountainous" agro-ecosystems (0,56), while in the "Less-favored non-mountainous" (0,45) and"Mainly plain" regions it is at "Satisfactory" level (0,49). On the other hand, the principle of "Democratic management" is the best realized in "Less-favored non-mountainous" agro-ecosystems (0,56), in the most other type it is the same or close to the sectoral average (0,5), and in the "Mainly plain" regions it is at "Satisfactory" level (0,49). Furthermore, the principle "Working agrarian administration" is better applied inthe agro-ecosystems in "Less-favored mountainous" regions (0,6), those with "Lands in protected zones and territories" (0,57), andin "Mainly mountainous" regions (0,55) while in allother types it is in below the national level. Similarly, the Principle "Working market environment" is with the highest value inthe agro-ecosystems in "Mainly mountainous" regions (0,6), "Less-favored mountainous" regions (0,58), and "Less-favored non-mountainous" regions (0,57), while in other agro-ecosystems it is worse than national one. Finally, the Governance sustainability for the Principle "Good private practices" is best implemented in the "Lands protected zones and territories" (0,53), while in all other agro-ecosystems it is at "Satisfactory" level, being far worse than the sectoral average in the "Less-favored non-mountainous" regions (0, 36).

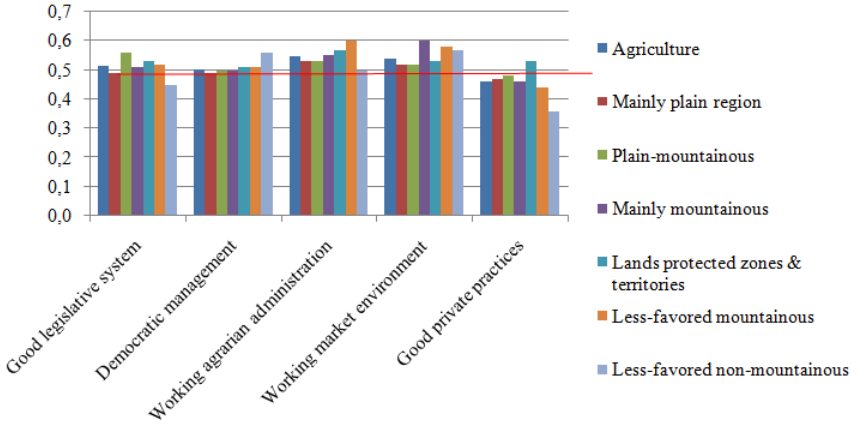


**Figure 13.** *Indices of the Principles of Governance Sustainability in Major Agri-ecosystems in Bulgaria*
**Source:** survey with farm managers

There is a significant variation in the different aspects of Governance efficiency among administrative (and agricultural) regions of the country. The Principle of the Governance sustainability "Good legislative system" dominates in the "North-West region" (0,6) and "North-Central region" (0,59), while in the "South-Central region" (0,38) and "South-West region" (0,49) it is only applied "Satisfactorily" (Figure 14).

The Principle of "Democratic management" is the best realized in the "North-East region"(0,53) and "South-West region" (0,53), and insufficiently in the "South-Central region" (0,4) and "North-West region" (0,48).The Principle "Working agrarian administration" is effectively applied in the"North-East region"(0,57) and "North-East region" (0,61).Simultaneously, that Principle is "Satisfactory" applied in the "South-Central region" (0,49). Similarly, the Principle "Working market environment" arehighly regarded inthe "North-East region" (0,63) while in the "South-Central region"(0,45) and "South-East region" is inferior (0,47).Finally, the "Good private practices" are the best

carried out in the "North-Central region" (0,58) and "North-East region" (0,59) while in the three south regions of the country they are enforced "Satisfactorily" (0,41, 0,36, 0,44 accordingly).

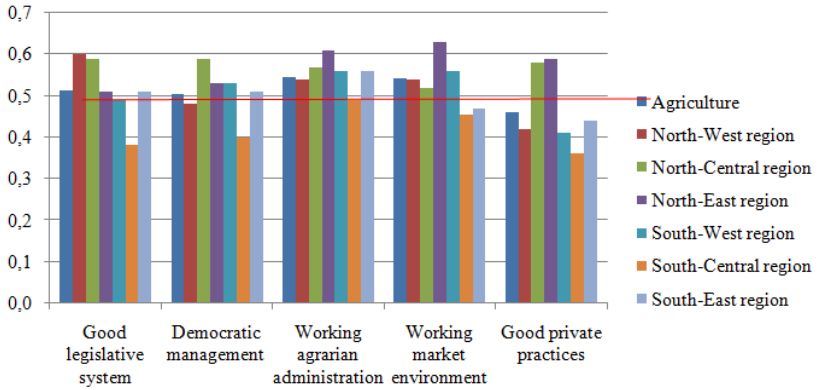


**Figure 14.** *Indices of the Principles of Governance Sustainability in Agro-regions in Bulgaria*
**Source:** survey with farm managers

Last but not the least important, our approach let us assess what is the Governance sustainability for the various farming structures in the country, and how dominating institutional environment and modes of governance affect (contribution toward) sustainable development of major type of Bulgarian farms.

The system of governance of Bulgarian agriculture does not impact equally farms with different juridical type and size of operations. The Governance sustainability of agriculture is the highest for the "Semi-market" ("Mainly subsistence farms") and "cooperative" ("Cooperatives") sectors – the Integral Governance Sustainability Index for these type of farming organizations is much higher than the sectoral average - 0,62 and 0,56 accordingly (Figure 15). Other main juridical type of farms like "Physical Persons" and the "Middle size" farming enterprisesalso have higher

than the average Governance Sustainability Index (0,52). Therefore, all these four types of farming organizations contribute to the greatest extent to increasing (maintaining) the "Good" Governance sustainability of Bulgarian agriculture.

At the same time, for the "Small size" farms the Governance sustainability is below the national one and at the border with the "Satisfactory" level (0,5). Furthermore, for the "Agro-firms" and "Big size" farming enterprises the Governance sustainability is at "Satisfactory" level - 0.47 and 0.45 accordingly. Consequently, these major type of farming enterprises diminish to the greatest extent the overall Governance sustainability of country's agriculture.

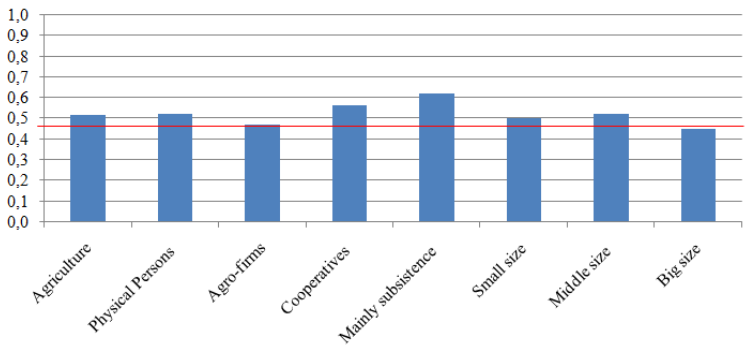


**Figure 15.** *Governance Sustainability for Major Type of Farming Organizations in Bulgaria*
**Source:** survey with farm managers

The main Principles of the Governance sustainability are applied ("work") differently in relations to various type of Bulgarian farms. The Governance Sustainability Principles "Goodlegislative system", "Democratic management" and "Good private practices" the most favorably affect the "Cooperatives" and "Mainly subsistence" farms (Indices of Sustainability accordingly 0,65 and 0,7; 0,55 and 0,67; 0,64 and 0,56) (Figure 16).The Governance SustainabilityPrinciple

"Working agrarian administration" is the most effectively implementedin regards to "Mainly subsistence" holdings (0,66), "Physical Persons (0,55) and Middle size farms (0,55).The Governance SustainabilityPrinciple "Working market environment" is more favorable for the "Middle size" (0,57) and "Small size" (0,56) farms.

On the other hand, the individual Principles for the Governance sustainability of agriculture are worse applied in and adversely impact different type of farms. The Sustainability for the "Good legislative system" Principle is at "Satisfactory" level for the "Agro-firms" (0,41) and "Small size" farms (0,48).The sustainability Principle "Democratic management" is at "Satisfactory" level only for the "Big size" farming enterprises (0,47). Implementation of the Principle "Working agrarian administration" is inferior ("Satisfactory") for the "Big size" farms (0,4) and "Cooperatives" (0,43); the sustainability Principle "Working market environment" does not work well for the "Big size" farms (0,38) and "Agro-firms" (0,48); and "Good private practices" are not applied sufficiently and badly affect "Agro-firms" (0,43), "Middle size" farms (0,45), "Physical Persons" (0,46), and "Small size" holdings (0,47).

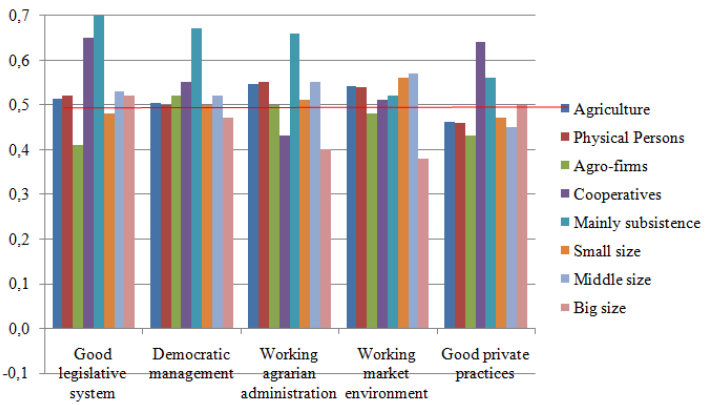


**Figure 16.** *Indices of the Principles of Governance Sustainability for Major Type of Bulgarian Farms*

## Conclusions

This study has proved that it is important to include the "missing" Governance Pillar in the assessment of the Integral sustainability of agriculture and sustainability of agro-systems of various type. Furthermore, it has demonstrated that (and how) the Governance sustainability level can be quantitatively "measured" and "integrated" in the system of overall sustainability assessment. Finally, the elaborated holistic framework has been successfully tested in Bulgarian conditions and showed promising results for proper understanding and fully "unpacking"the Governance sustainability of country's agriculture.

This first in kind comprehensive assessment of the Governance sustainability of Bulgarian agriculture let make some important specific conclusions about the state of (Governance) sustainability of diverse agro-systems, and recommendations for improvement of the managerial and assessment practices. The elaborated and experimented holistic approach gives a possibility to improve the overall and Governance sustainability assessment. Therefore, it has to be further discussed, experimented, improved and adapted to the specific conditions of evaluated agricultural systems and needs of decision-makers at different levels.

Multiple Principles, Criteria and Indicators assessment of the Governance sustainability of Bulgarian agriculture indicates that the Overall Sustainability is at a "Good" but very close to the "Satisfactory" level. Besides, there is a considerable differentiation in the level of Integral Governance sustainability of different agro-systems in the country – agricultural sub-sectors, agro-ecosystems, agro-regions, and type of farming organizations. Last but not least important, results on the integral agrarian sustainability assessment of this study based on micro (farm) and macro (statistical, etc.) data show some discrepancies which have to

be taken into consideration in the analysis and interpretation, while assessment indicators, methods and data sources further improved.

This study reviled that much of the needed information for calculating the Governance sustainability is not readily available and have to be collected though experts' assessments, farm managers and professional associations surveys, etc. Nevertheless, a big challenge is the (level of) competency and willingness for "honest" estimated of the interviewed agents. For instance, for some highly "sensitive" questions in the conducted ("anonymous") survey many of the farm managers did not respond due to lack of opinion, experience, capability and/or reluctancefor assessment, etc.

Having in mind the importance of holistic assessments of this kind for improving the agrarian sustainability in general, and the Governance sustainability of agriculture in particular, they are to be expended and their precision and representation increased. The later requires improvement of the precision through enlargement of surveyed farms and stakeholders, and incorporating more "objective" data from surveys, statistics, expertise of professionals in the area, etc.

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# 5 Understanding and improving the governance of ecosystem services: The case of agriculture

## Introduction

The products and the variety of direct and indirect benefits that humans receive from nature and the various ecosystems (agricultural, forest, grass, desert, rural, urban, mountain, lake, river, marine, coastal, etc.) are commonly known as "ecosystem services" (MEA). This “new” and rapidly enriching category includes different types of products and services of nature and diverse ecosystems - provisional (food for humans and animals, materials and resources for production and livelihoods, etc.), economic, a place for human life and activity, recreational, tourist, aesthetic, cultural, educational, informational, habitat, supporting, biodiversity conservation, water purification and retention, flood and fire protection, climate regulation, etc. (ИАОС, 2018; MEA, 2015).

In the last two decades, issues related to the understanding, study, evaluation and management of

ecosystem services (and "disservices" or the reduction of those services and agro-ecosystem damages) have been among the most topical in scientific research, politics, and business and farming practices around the world (Adhikari *et al.*, 2013; Allen *et al.*, 2011; Bachev & Ito, 2013; Boelee, 2013; De Groot *et al.*, 2002; Fremier *et al.*, 2013; EEA, 2015; FAO, 2016; Gao *et al.*, 2018; Garbach *et al.*, 2014; Habib *et al.*, 2016; Lescourret *et al.*, 2015; Laurans & Mermet, 2014; MEA, 2005; Nunes *et al.*, 2014; Novikova *et al.*, 2017; Marta-Pedroso *et al.*, 2018; Petteri *et al.*, 2013; Power, 2010; Scholes *et al.*, 2013; Tsiafouli *et al.*, 2017; Wang *et al.*, 2013; Wood *et.al.*, 2015; Zhan, 2015). The increased interest in ecosystem services is a result of the fact that this emerging concept allows us better understand the factors and goals of sustainable (agrarian) development. In addition, throughout the world, including the EU and Bulgaria, ecosystems and their services are constantly degraded as a result of diverse human activity (EEA, 2015; INRA, 2017; UN, 2005). This requires public intervention (monitoring, regulation, support, evaluation, etc.) and private and collective action for their preservation, restoration and improvement (Bachev, 2013; EU, 2005; FAO, 2016; UN, 2005).

Agricultural ecosystems of different types and their specific (agro-ecosystem) services are among the most widespread in the world, as well as in Bulgaria (ИАОС, 2017; EEA, 2015; FAO, 2016). By definition, "agrarian" ecosystems and "agrarian" ecosystem services are those that are related to agrarian "production", which as a rule is human (social) intervention in the natural order of nature. It is well known that agricultural production makes a significant contribution to the conservation, restoration and enhancement of ecosystems and their services, but also to their degradation and demolition ("agricultural disservices"). Therefore, services related to agricultural production and agro-ecosystems are among the most

intensively studied, mapped, evaluated, regulated and stimulated. Various public intervention measures (regulations, support, standards, quotas, subsidies, payments, contracts, institutions, etc.) and programs (land use and landscape development schemes; water management; biodiversity conservation; reduction of greenhouse and other gases; integrated eco-management, etc.) are also implemented, related to their maintenance and improvement. There is also wide spreadingvarious private, business and collective initiatives and forms for "ecological intensification" and improving the management of (agro) ecosystem services of a given type, a combination of several types or as a whole.

Despite the significant progress in this "new" area, most studies are usually focused on a single agro-ecosystem service, without taking into account synergies, tradeoffs, and the needs for integrated management of aggregate ecosystem services and disservices. An uni-disciplinary approach is broadly applied, with most of the studies limited to "purely" agronomic, environmental, technological, economic, etc. aspects of management. The later does not allow a proper identification of the spectrum of agro-ecosystem services, assessment of their integral socio-economic and ecological importance, and understanding of the driving (institutional, economic, behavioral, ideological, political, environmental, etc.) factors of their evolution.

Studies are limited to a specific form of management (public program, government subsidy for eco-activity, quotas for resources or emissions, tax preferences, eco-contracts, eco-cooperatives, industry standards, professional codes of conduct, eco-certification, market trading) or level of management (farm, eco-system, industry, region) without taking into account the interdependence, complementarity and/or competition of different governing structures. The rich diversity and complementarity of alternative

(practicallyused and other feasible) modes of governance (market, contractual, private, collective, public, trilateral, national, transnational) are ignored, while they increasingly "govern" much of the activity and behavior of agrarian and non-agrarian agents related to ecosystems. Also widely used are complex forms such as multilateral, multi-level, reciprocal, interlinked, and hybrid forms are not accounted form. Only the public and formal forms and mechanisms of governance are studied, while important informal institutions and organizations are not included in the analysis.

The management of activities related to (agro) ecosystem services is studied in isolation and not as an integral part of the overall management of the agrarian and total activities of farms, rural households, professional organizations, agrarian and related businesses, local authorities, etc. A "normative" related to some "ideal" or "model in other countries, industries, regions" and the "institutionally neutral" ("Nirvana") approach dominates. The specific formal and informal forms, rules, rights and restrictions, and the efficiency of their enforcement and modernization are not taken into account. Agrarian and non-agrarian agents are studied as "perfectly rational" and "equally interested" in achieving the common (eco) goals, rather than with different interests, knowledge, skills, capabilities, positions, costs and benefits, etc. The "comparative institutional" analysis and assessment of the efficiency of practically possible governance alternatives in the specific socio-economic and natural conditions of a country, region, sector, community, ecosystem, etc. are not evaluated. This leads to multiplemarket, private and public "failures" in the area of eco-management.

Significant interactions between ecosystem services and the system of governance determining the "socially preferred" level of costs and benefits are not specified on an

appropriate temporal, spatial, institutional and hierarchical scale. The "state" instead of the "flow" of ecosystem services is evaluated, and space-time lags and spillovers are not considered. Economic and overall estimates are usually limited to direct ("production") costs, neglecting significant indirect (third party, social) and "transaction" costs. As a result, understanding and management of (agro) ecosystem services is deterred. Neither effective scientific support for improving public policies and programs, and individual, business and collective action for sustainable development can be given.

In Bulgaria, with a very few exceptions (Башев;Башеви др., 2017; Казакова, 2015; Недков, 2010; Николов, 2013; Тодорова, 2014; Bachev, 2013; Grigorova & Kazakova, 2008; Todorova, 2017; ИАОС, 2009; Йорданов и др., 2016; Чипев и др, 2017) almost there are no systemic studies on the governance of agroecosystem services. The goal of the article is to present a holistic approach for defining, analyzing and improving the governance of agro-ecosystem services for the specific conditions of the country.

## Definition and agents of the governance of (agro)-ecosystem services

Maintaining, restoring and improving the services of (agro) ecosystems requires an effective *social governance* (a good governance) - a system of mechanisms and forms that regulate, coordinate, stimulate and control the behavior, actions and relationships of individual agents related to ecosystems and their services at various levels (Башев, 2013; Bachev, 2013). The system of governance of agro-ecosystem services is a part of the specific system of management of agricultural production and includes: different *agrarian* (farm managers, resource owners, hired labor) *and non-agrarian* (agrarian and related businesses, consumers, residents and

visitors to rural areas, interest groups, administration, politicians) agents; and the various *mechanisms* and *forms* for governance the behavior, activity, relationships and effects of these agents.

The agents of governance of agroecosystem services and the specific type of their relationships, interests, goals, opportunities, position, dependencies, effects and conflicts, are to be properly identified. At the present stage of development, the agricultural production is carried out by different types of farms - individual, family, cooperative, corporate, public, etc. *The farm* is the main organizational unit in agriculture that manages resources, technologies and activities and produces a variety of products, including the positive and negative services of agro-ecosystems. The governance of agro-ecosystem services is an integral part of the management of agricultural farm, and the farm -*the first* (lowest) level for agro-ecosystem services management. Regardless of its specific socio-economic form, the system of governance of agro-ecosystem services will always include the farmer as a key element and aim at improving his/herenvironmental conservation activities and behavior.

Farm borders rarely coincide with the (agro) ecosystem boundaries. A particular farm usuallyincludes one or more agro-ecosystems (agricultural parcel/section, and less frequently entire land in the area), and at the same time it is a part of one or more different type larger (agro) ecosystems (mountainous, plain, riparian) (Figure 1). Therefore, a major portion ofagro-ecosystem services is a "co-production" of a group of independent farms with different capabilities and interests, which necessitates an over (extra)farm management of "collective" actions of different farms in order to effectively supply certain ecosystem services. In addition, the individual farm often produces undesirable for other ecosystems "products" (waste, pollution of water, air, etc.), necessitating special "management" outside farm gates

for stimulating behavior to eliminate or minimize the negative effects of agro-ecosystems services.

Farms of different types (self-sufficient, part-time, market-oriented, member-oriented, organic, leisure) have different interests and potential for maintaining agro-ecosystem services. They have different purposes of existence - additional or basic income, profit, leisure, conservation of nature or farm for future generations, etc. Farms also have unequal incentives and opportunities (resources, knowledge, time horizon, positions) for sustainable agriculture. For an individual farm (owner-farmer) there is a "complete"alignment of the ecological objectives of the holding and the possibility for "self-management" of the produced and "internally" consumed and commercialized agro-ecosystem services. However, it has no incentive to make an effective contribution to ecosystem services consumed outside the holding as well as most often opportunities (sizes, resources, positions, time horizon) to realize all eco-functions on an effective scale. The later requires "outside" intervention (support, compensation, regulation) by the state, a third party, etc., and collective action (cooperation) of many farms to achieve the minimum size for efficient production of agro-ecosystem services of a particular kind. Bigger complex holdings (partnerships, cooperatives, corporations, state farms) and agrarian organizations with large membership have greater opportunities (resources, knowledge, positions, etc.), but also "internal" conflicts of interests and incentives of the various agents (owners, managers, members, hired labor). The later requires the development of a special "mechanism" for coordination and stimulation of actions, reconciling interests, resolving conflicts, etc. of the numerous agents.

Other agents also directly or "indirectly" participate in the management of agro-ecosystem services, imposing appropriate conditions, standards, norms, demand, etc., or

providing positive or negative services to farmers: the owners of agricultural (land, tangible, financial, intellectual) resources that are interested in their efficient use and storage; related to agriculturebusiness (suppliers of inputs, finance, technology, and/or buyers of agricultural products) and final consumers. These agents impose socio-economic and environmental standards, specific support and demands for environmentally sustainable farming[1]. Sometimes the activities of external (non-agrarian) agents adversely affect agro-ecosystem services, and require special "management" for adequate eco-behavior. The residents, visitors of rural areas, and diverse interest groups also "set" conditions (pressure, demand) for environmentally friendly farming and rural areas. The state and local government, international organizations, etc., also support sustainabilityinitiatives of different agents and/or impose mandatory (social, economic, environmental) standards for eco-production and consumption.

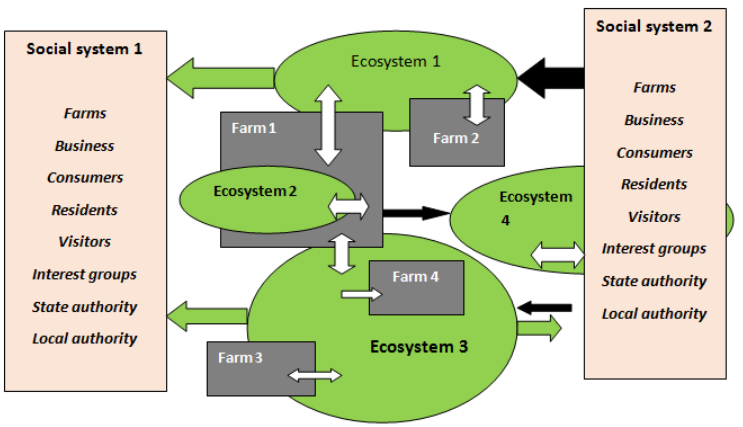


**Figure 1.** *Agents and Needs for Effective Management of Agro-ecosystem Services*

[1]For example, big processors and food chains implementown strategies and standards for "sustainability", which are their own initiatives, industrial "codes of behavior" or the result of consumer pressure to "contribute" to eco-friendly production.

In some cases, part of the agro-ecosystem services can be "managed" through independent actions of individual farms[2].Often, however, effective eco-management requires coordinated (collective) action by a group of farms, such as the sustainable use of common grassland and limited water supply, protection of local biodiversity, etc. Farming is also often associated with significant (positive and /or negative) externalities which requiresthe management of relationships (co-operation, conflict resolution, cost recovery)between different farms, and growing between farmers and non-farmers. Often, agricultural contribution benefits other ecosystems (supporting and regulating ecosystem services) and a large number of residents, visitors, associated and unrelated businesses, interest groups, future generations, without the immediate benefit to "supplying" farmers –e.g. inability to commercialize due to "public" (non-profit) character of agro-ecosystem services, a long time lags and spatial differences ("lack of links") between investments and benefits received, etc. Then a public intervention is required for a sustainable supply of "production" of agro-ecosystem services. [3] In all these cases, the management of agro-ecosystem services is far broader than simple (technical, agronomic, environmental) "relationships with nature" and includes the governance of relationships and the collective actions of agents with diverse interests, power positions, knowledge, awareness, capabilitiesetc. across a wide geographic, industry and time scales. Modern eco-management is increasingly associated with needs for "additional actions" (monitoring, coordination, investment) and integrated management of natural resources and eco-risks nationally and growing transnationally. The latter

[2]For example, a good care of private farmland is typical of family farms.

[3]since it entails significant additional costs (investment, loss of income, etc.), the state "compensates" farmers through eco-subsidies, eco-payments, payments to disadvantaged areas, etc.

includes issues related to water and waste management, biodiversity conservation, climate change, etc., which require effective regional, national, international and global governance.

Depending on the (awareness, symmetry, strength, cost of harmonization) interests of agro-ecosystem services agents, there is a different need to manage eco-actions and behavior in agriculture. In Figure 1, Farm 1 must manage its actions and relationships with Farm 2, as both receive services from Ecosystem 1 and affect (positively or negatively) the supply of services to that ecosystem. Both farms must also manage their relationships with users of Ecosystem Services 1 (Social System 1) to meet aggregate demand and offset their costs of maintaining ecosystem services. Farms 1 and 2 also need to coordinate with Social System 1 to prevent conflicts with Social System 2. Farm 1 also needs to manage its relationship with Farm 3 to effectively provide services to Ecosystem 3, and manage its interaction with Ecosystem 2. Farms 1 and 3 must manage their relationships with Farm 4 and Social System 1 and Social System 2. Farm 1, which has a negative impact on services of Ecosystem 4, needs to manage its relationships with agents in Social System 2 in order to reconcile conflicts and provide an efficient flow of ecosystem services. Therefore, Farm 1 needs to participate in seven different management systems to ensure the efficient supply of services to the ecosystems to which the farm belongs or affects.

Unlike management of "pure" agricultural activities (where "simple" private and market mechanisms work well), the effective governance of agro-ecosystem services activities often requires *complex, multilateral, and trilateral* forms and *multi-level* governance. For example, the farmer's involvement in the "organic product" chain will coordinate the relationship between producers and finale consumers. However, the positive impact on agro-ecosystem services

will be negligible unless also a form of coordination of relations (collective actions) with other farmers in an area or ecosystem is established.

## The hierarchy of agro-ecosystems

The analysis of the system of governance of agro-ecosystem services requires a proper definition of the agro-ecosystem hierarchy and the specific services of each of its levels in a particular country, region, etc. The minimum relatively separate agro-ecosystem in Bulgaria (loke in most of the countries) is the *agricultural land plot* or *section* (in the case of a closed/built-up area such as a livestock barn, a greenhouse, a beehive, a mushroom production facility, etc.) (Figure 2). This (agro) ecosystem contains a number of non-agricultural micro-ecosystems (a lake, anthill, etc.) which contribute to the production of agro-ecosystem services fi the farmland plot and larger ecosystems of which they are part, simultaneously using the services of the ecosystemfarmland plot and larger agricultural and non-agricultural ecosystems.

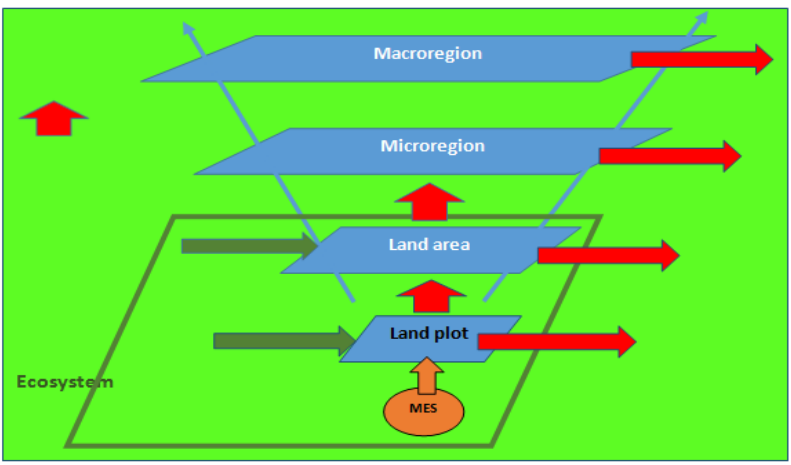


**Figure 2.** *Hierarchy of Agro-ecosystems – the case of Bulgaria*
**Notes: Blue**–agro-ecosystem, **Red** – Agroecosystem Services, **MES** – Micro ecosystem located in the land plot, **Green**– Services of non-agrarian ecosystems

Like any agro-ecosystem, the ecosystem "agricultural land plot/section" produces products and services that are consumed by it, other agricultural and non-agricultural ecosystems, or by humans (production of foods and income, conservation of biodiversity and traditions, aesthetic, educational or scientific value, etc.). Often, agro-ecosystems at this level are a source of significant negative services affecting themselves, other agrarian and non-agricultural ecosystems, and humans (pollution of waters, air, soils, and farm produce, soil erosion, etc.). Usually, services at the first hierarchical level of agro-ecosystems are an integral part of the (positive, negative) services of larger agrarian and non-agrarian ecosystems, of which they belong. Like any agro-ecosystem, the agricultural land plot/section consumes or is adversely affectedfrom (pollution, competition for natural resources, etc.) the "services" of other or larger ecosystems, of which itbelongs.

The second distinct hierarchical level of agrarian ecosystems is *land area (землище)*, which is an aggregate of numerous agricultural land plots and sections. At this level, important for the nature and society functions of (agro) ecosystems are often realized, such as: preserving soil fertility, preserving and purifying water, preventing fires and floods, etc. The next relatively distinct level of agroecosystems is *micro-region*[4]which is characterized by its own agro-ecosystem services. Some of the agroecosystems-micro-regionare withinprotected areas and territories of the Pan-European ecological network NATURA 2000, and provide irreplaceable (joint) service - habitat and conservation of certain endangered wild plant or animal species(s).

[4]Fo instance, Sandanski-Petrich hollow, Samokov, etc. which are well-known with Melnik vine, Samokov potatoes, Melnik and Samokov cultures, traditions and landscape, recreation and tourisms, etc

The next hierarchical level of agroecosystems is *macro-region* characterized by its specific (agro) ecosystem services[5]. Some of these (borderline) agro-ecosystems fall into territories of two or more countries. At higher hierarchical levels, agro-ecosystems are grouped into *megaregions* of different types - specific (agro-ecosystems in the Danube river basin, in the Black Sea basin, in Southeastern Europe), sectoral (field crops, permanent crops, grasslands, etc.), generic (plain, semi-mountainous, mountainous, riparian, coastal, urban, rural, etc.), etc. Finally, agroecosystems can be grouped in *meta-regions* such as Europe, the Northern Hemisphere, global. The most important contemporary eco-challenges (waste management, global warming, climatic excesses, droughts and fires, torrential rains and floods, the spread of diseases and pests, etc.) can only be mitigated by governing (agro) ecosystem services at mega and/or meta level.

Despite many conventionalities and uncertainties, the modern science has sufficiently reliable methods to categorize (agro) ecosystems, and to "accurately" identify and "measure" the processes and mechanisms for the production, maintenance, degradation and destruction of (agro) ecosystem services of various kinds, an across different spatial and temporal scales (FAO, 2016; Fremier *et al.,* 2013; Gao *et al.,* 2018; Gemmill-Herren, 2018; Kanianska, 2019; MEA, 2005; Munang *et al.,* 2013; Petterri *et al.,* 2013; Power, 2010; Scholes *et al.,* 2013; Tsiafouli *et al.,* 2017; VanOudenhoven *et al.,* 2020; Wood *et al.,* 2015). In Bulgaria, the system of "Good Agricultural Practices" describes in detail the science-based methods, technologies, behavior, etc. that farmers should follow to keep agro-ecosystems and their services in good condition (МЗХГ, ССА). Official

[5] E.g. Tracia Lowland, Western Stara Planina, the Valley of Struma river, etc.

categorization and mapping of ecosystems in the country is done by the Environmental Protection Executive Agency, which contains ecosystems of different types (including arable land and pastures) and their services (ИАОС). The comprehensive identification, categorization and evaluation of the specific services of each particular system is to a subject of a specific interdisciplinary study, in which economists must also participate. For example, Figure 3 presents the specific (agro) and combined services of agro-ecosystems in the Western Stara Planina (Balkan Mountains).

After specifying (the type and hierarchy of) agro-ecosystems and classifying their diverse services, the agents involved in the provision and consumption of services from each agro-ecosystem should be identified, as well as the mechanisms that govern the actions and relationships of related agents with each kind of ecosystem service. This is the subject of a proper in-depth (micro and macro) economic study.

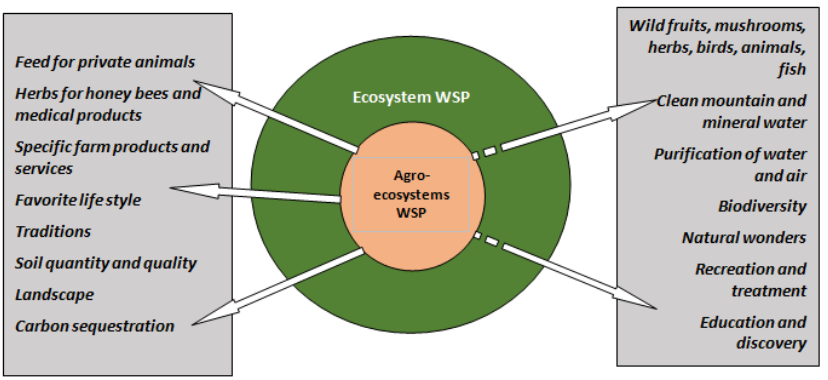


**Figure 3.** *Services of Agro-ecosystems in Western Stara Planina (WSP)*

## Mechanisms and modes of governance of agro-ecosystem services

The system of governance of agro-ecosystem services includes several *principle mechanisms* and *forms* that "manage" the behavior and activity of individual agents and ultimately determine the level of agro-ecosystem services (Figure 4):

First,*institutional environment* ("Rules of the game") – that is the distribution of rights and obligations between individuals, groups and generations, and the system of enforcement of these rights and rules (Furuboth & Richter, 1998; North, 1990). The spectrum of rights may include tangible and intangible assets, natural resources, activities, clean nature, food and eco-security, internal and inter-generational justice, etc. Enforcementof rights and rules is done by the state, social pressure, trust, reputation, private forms, or self-sanctioned by agents. Some of the rights and rules are determined by formal laws, regulations, standards, court decisions, etc. There are also important *informal rules* and *rights* established by tradition, culture, religion, ideology, ethical and moral norms, etc. The institutional "development" is initiated by public (state, community) authorities, international actions (agreements, support, pressure), and private and collective action by individuals. Modern development is characterized by the constant expansion of various eco-rights and obligations, including the granting of welfare rights to animals, wild plants and animals, and to entire ecosystems [6]. Institutions and theirmodernization create unequal incentives, constraints, costs and conflicts for: protecting and improving agro-ecosystem services, intensifying eco-exchange and

[6]Recent trend is providing rights of legal person on entire ecosytems – initialy in Pensilvania, USA 13 years ago, followed by other countries like Bolivia, Ecvador, Bangladesh, etc.

cooperation, enhancing eco-productivity, inducing private and collective eco-initiatives and investments, developing new eco- and related rights, reducing eco-disparities between social groups and regions, responding to environmental challenges, fair distribution of natural resources, etc.

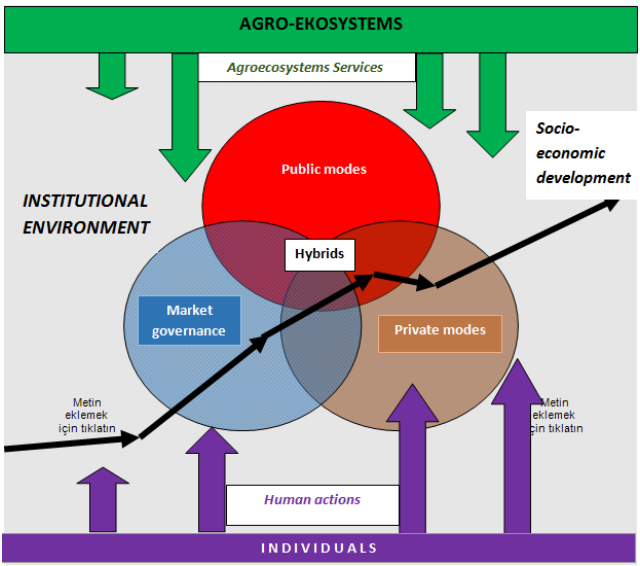


**Figure 4.** *Modes and Mechanisms for Governing of Agro-ecosystem Services*
**Source:** author

Second, *market forms* ("the invisible hand of the market") - a variety of decentralized initiatives driven by the movement of "free" market prices and market competition such as: spotlight exchange of eco-products and services, classical contract for purchase, rent or sale, production and trade with special high quality, organic, etc. products and origins, ecosystem services, etc. (Table 1). The importance of the free market for coordinating (directing, correcting) and stimulating activity, exchange and allocation of resources is well known. However, there are many examples of lack of

individual incentives, choices and/or unwanted "exchanges" related to environmental conservation and ecosystem services - missing markets, monopoly or power relationships, positive or negative externalities, etc. The free market "fails" in the effective management of the overall eco-activity, exchange and investment of individuals and leads to low environmental sustainability.

**Table 1.** *Market, Private and Collective Modes of Governance of Agro-ecosystem Services in Bulgaria*

| Market forms | Voluntary Private initiatives | Special Private Contract | Special Private Organization |
|---|---|---|---|
| Spotlight sales; Classical contracts; Eco-visits, hunting, fishing, collecting wild plants and animals; Organic products; Special origins and protected origins; "Fair trade" products; Farm-gate Sale; Own harvesting by the client; Farm eco-training; Eco-tourism, horseback riding, fishing; Eco-restaurants | Movements for Sustainable agriculture; Voluntary "Codes for eco-behavior"; Voluntary standards; "Good will"; Charity actions | Eco-contracts and cooperative agreements between farmers and interested businesses or communities involving payment for ecosystem services and resulting in production methods (improved pasture management, reduced use of agro-chemicals, conservation of wetlands), limiting water pollution, protection against floods and fires, etc.; Joint investment in eco-projects and ecosystem services | Family farms; Cooperative farms; Agro companies; Public farms; Eco-associations; Eco-cooperative; Specialized organization for restoration, maintenance and improvement of ecosystem services; Public-private partnerships; Protected Trademarks, Origins, Products, etc. |

**Source:** author

Third, *private forms* ("private or collective order") - various private initiatives and special contractual and organizational forms such as: long-term eco-contracts, voluntary eco-actions, voluntary or mandatory codes of eco-behavior, partnerships, eco-cooperatives and associations, trademarks, labels, etc. Conservation of natural resources is part of the management strategy of many agricultural (eco, green) farms. There are also many initiatives in the EU by

farmers' organizations, industry, retail chains and consumer organizations that are associated with raising the environmental sustainability of agricultural production. Individual agents benefit from economic, market, institutional, etc. opportunities and overcome institutional and market failures by selecting or designing new profitable private forms (rules) to manage their behavior, relationships and exchanges. However, there are many examples of private sector "failure" in managing sociallydesirable activities such as eco-conservation, ecosystem services, conservation of traditional species, production, rural areas, etc.

Fourth, *public forms* ("public policy") - various public (community, state, international) interventions in the market and private sectors such as: public recommendations, regulations, support, taxation, financing, provision, modernization of rights and rules, etc. (Table 2). Agrarian and rural development programs are implemented which aim at "proportional" development of agriculture and regions, preserving and improving the natural environment, etc. In many cases, effective management of individual activity and/or the organization of certain activities through market mechanisms or through private contracting may take a long time, be very expensive, fail to reach the socially desirable scale size, or not take a place. Centralized public intervention could reach the desired state faster, with less cost or more efficiently. The public is "involved" in the management of agro-ecosystem services by: providing eco-information and eco-training to private agents, stimulating and (co) financing their voluntary activities, imposing mandatory eco-regulations and sanctions, organizing eco and related activities (state-owned eco-enterprise, research, monitoring), etc. However, there are many cases of poor publicinvolvement (inaction, under-intervention, over-regulation) leading to significant development problems.

**Table 2.** *Forms of Public Interventions in Agro-ecosystem Services in Bulgaria*

| New Property Rights and Enforcement | Public Regulations | Public Taxation | Public Support | Public Provision |
|---|---|---|---|---|
| Rights for a clean and beautiful environment, biodiversity; Private rights on natural, biological and environmental resources; Collective rights over irrigation waters, pastures, etc.; Private rights for profit-oriented management of natural resources; Tradable pollution quotas (permits); Private rights to intellectual products, origins, (protection) of ecosystem services; Rights for issuing eco-bonds, shares in ownership; Private liability for pollution; Provide legal personality rights to a part or entire ecosystems | Regulations for organic farming; Regulations forTrading Ecosystem Services Protection; Emissions and use quotas for products and resources; Regulations for the introduction of alien species, genetically modified crops; Prohibition of certain activities, use of resources and technology; Nutrition and pest management standards; Regulations to protect water from nitrate pollution; Regulations for biodiversity and landscape management; Licensing for the use of water and agro-ecosystems; Rules and quotas for the use of sewage sludge; Quality and safety standards; Standards for good agricultural practices; Compulsory eco-education; Certification and licensing; Mandatory eco-labeling; Identification of threatened areas and reserves; Set-aside measures; Inspections, fines, termination of activity | Tax preferences; Eco-taxes on emissions and products; Fees for overproduction of manure; Fees on manufacturing or export for financing innovation; Waste tax; Farmland tax | Recommendations , information, demonstrations; Direct payments; Subsidies for eco-actions of farms, businesses and communities; Preferential Credit; Public eco-contracts; Government procurement (water and other resources); Price and production aid for organic production and special origins; Financing of eco-education; Assistance for farmers and environmental associations; Collection of fees to pay for provision of ecosystem services | Scientific research; Market information; Agro-meteorological forecasts; Sanitary and veterinary control, vaccinations, preventive measures; Public Agency (Company) for important ecosystems; Applying the "precautionary principle"; Environmental monitoring; Eco-forecasts; Risk Assessment |

**Source:** author

Fifth, *hybrid forms* - some combination of the above three, such as public-private partnerships, public licensing and inspection of private bio-farms, etc. For example, the supply of many of the ecosystem services by farmers can hardly be managed through private contracts with individual consumers due to the low appropriability, high uncertainty and rare character of transactions (high costs for negotiation,

contracting, payment from potential customers, disputing) (Башев). Supplying eco-services is very expensive (additional production and organizational costs) and is unlikely to be done on a voluntary basis. The financial compensation of farmers by willing consumers through a pure market form (fee, premium) is also inefficient due to the high information asymmetry and the enormous enforcement costs. A *trilateral form* with direct public involvement makes these transactions effective: on behalf of current and future consumers, a state agency negotiates a contract with farmers for environmental conservation service, coordinates the activities of the various agents, provides public payment to farmers for the eco-service and controls the fulfillment of the contractual conditions.

The efficiency of the individual forms of governance of agro-ecosystem services of different types is quite different since they have unequal potential to: provide adequate eco-information, induce positive eco-behavior, resolve eco-conflicts and coordinate eco-activities of different participants, improve environmental sustainability and reduce eco-risks, minimize overall eco-management costs (for conservation, third party, transaction, etc.), for agents with different preferences and opportunities, and in specific (socio-economic, natural) conditions of each eco-system, community, industry, region, and country. For example, a proper eco-information and training is sufficient to induce voluntary action by a "green" farmer, while most commercial enterprises need external incentives (market premium, monetary compensation, penalties); market prices generally coordinate well the relations between suppliers and users of waters, while regulating relationships between water pollutants and users requires a special private or public form; farmers' independent actions improve the condition of local eco-systems, while solving most of (regional, national, global) eco-problems requires collective

action on a large scale and time periods, etc. In the long run, the specific system of governance of the agricultural sector and sustainability (pre)determines the type and character of socio-economic development (Figure 4). Depending on the efficiency of the established system of governance of agro-ecosystem services, individual farms, sub-sectors, regions and countries achieve different results in the conservation, restoration and improvement of ecosystems, and there is a different state of natural resources, level of eco-risks and eco-costs related to the development of agricultural sector, and unequal environmental sustainability of individual farms, sub-sectors, regions, agriculture, and different countries.

## Factors for choice and efficiency of governance model

In rare cases, there is the only practically possible form of managing activity and relationships associated with a particular agro-ecosystem service.[7] Often, many *alternative* (market, private, public, hybrid) forms of governance are possible – e.g. the provision of a "biodiversity conservation service" can be managed: as a farmer's voluntary activity; through a private contract of the farmer with an interested/affected agent; through an interlinked contract between the farmer and the supplier/processor; through cooperation (collective action) with other farmers and stakeholders; by trading in the (free) market or through supported by a third party (certification body) trade with special (organic, protected, fair-trade) products; through a public contract specifying the farmer's obligations and

[7]For example, in Japanese agriculture with scattered rice paddoes, the water supply would not be possible by individual farmers (high interdependence, indivisibility of use), and therefore from the earliest times until now the organization of water retaintion and use evolvs as a public project.

compensations; through a public decree (regulation, resource/emission quotas, taxation); through a hierarchical public agency (company), or through a hybrid form.

There is no single "universal" form for governing all types of agro-ecosystem services equally, effective for all agents in diverse socio-economic and natural conditions (Башев). *The choice* of managerial mode for a particular service and the development of the system of agro-ecosystem services management depends on various factors. For example, the choice of governing form strongly depends on the *personal characteristics* of the *farmers* and *other participants* in the process - personal preferences, (ethical, religious) views, experience, awareness, training, willingness for association and/or risk-taking, professional and financial capabilities, reputation, trust, tendency for opportunism, power positions, age, eco-innovation, entrepreneurship, leadership, etc. Usually, younger, more educated and innovative farmers are more actively involved in various new forms of management of agro-ecosystems. The specific benefits for the individual farmer from eco-management take different forms - monetary or non-monetary income, profit, indirect economic benefits, enjoyment of eco-activity, desire to preserve nature for future generations, etc.

Another important factor is the *development of science and technology*, which determine the extent of awareness of the types, factors and importance of ecosystem services, provide more complete information on environmental problems and risks, and the positive and negative impact of agricultural practices, provide new opportunities for effective management of activities related to the preservation and improvement of services of agro-ecosystems of different kind (precision agriculture, digitalization, automation of monitoring, operations, etc.), etc. Digitization, for example, is revolutionizing the forms of gathering and processing information, sharing know-how, finding trading and

coalition partners, "cheap" online marketing of eco-products nationally and transnationally, etc. The development of science and technology is also related to some new challenges for the system of eco-management and control associated with the use of GMOs, artificial intelligence, etc.

The choice of governance form also depends on *the state* of ecosystems, the character of *environmental problems and risks*, and the socio-economic and ecological *significance* of the service. As a rule, a high social value and a greater environmental risk more easily induce private coalition and more public forms of intervention (standards, subsidies, regulations, etc.). For example, the "big" problems associated with the storage of manure and sewage sludge in the country led to the emergence of a new form - free delivery to using farms by the livestock complexes and water supply companies.

The choice of management form also strongly depends on *market* and *public* demand (and pressure) for the sustainable exploitation of natural resources. The nature of this demand depends on the overall socio-economic development, social importance, and priority (socio-economic and environmental) challenges at the relevant stage. Wealthy consumers and societies are willing to pay more for a wide range of ecosystem services – premium for eco-products and services, generous state and local programs for conservation of nature, cultural and historical heritage, lifestyle, etc.

The choice of governance form depends very much on the *character of the service*ofthe agro-ecosystem, the *relationship between cost and benefits*, and the amount of *time and space lag* between investment and effect. For ecosystem services with immediate benefits to the farmer and/or consumer, the market and private management works well, while those requiring long-term and large-scale investments for the production of services with a "public" goods character, it is required long-term and complex forms.

Evolution of the system of eco-management depends on the prevailing *institutionally determined eco-rights, norms and obligations*, and on the *existing and practically possible market, private and public forms* of governance. Management form is often (predetermined) by the institutional constraints, such as some form of farming, environmental, etc. activities are socially unacceptable or illegal. For example, "free$ market and private activity in protected areas is not allowed, private ownership and trade in certain natural resources (water, genetic diversity) is not possible, etc.

Another important determinant of the system of governance are *public(national, European) policies*[8], as well as the implementation of *international conventions and agreements* on various aspects of environmental sustainability. They create a new (national, European, global) order by introducing new rights and rules, markets and directions for development.

The system of eco-management also depends on the "natural" *evolution of the natural environment* (global warming, extreme climate, drought, etc.), which imposes new private, collective and hybrid forms that helpconfrontation to negative trends and/or effective adaptation to natural (and social) changes.

*A "pure" economic* factor that determines the choice of governing form is related to the efficiency. Individual governing modes are alternative, but not equally effective forms for organizing activities and transactions associated to a particular agro-ecosystem service. Each of them has specific *advantages* and *disadvantages* for safeguarding eco-rights and investments, and for coordination and stimulation of socially desirable eco-behavior and activities, for

[8] Some "green" governments give high priority to environmental protection, while others prioritize economic growth at the expense of degradation and even destruction of natural resources.

exploration of economies of scale and scope, for minimizing of production and transaction costs[9].

In the specific natural and institutional environment, various agents can manage their relations through the *free market* (adapting to market prices), through *negotiation* (agreeing on a "private order"), through *coalition*(collective decision making), in an *internal organization* ("the hand of manager"), through a *public form* or *hybrid organization*. "Rational" agents tend to choose or design *the most effective* forms for governing of their relationsthat maximize benefits and minimize their costs. In the long run, management forms that minimize *transaction* costs ultimately dominate (Williamson, 1985).

In the unrealistic conditions of "zero" transaction costs and well-defined private property rights, the state of maximum efficiency is always achieved regardless of the initial allocation of rights between individuals and the form of governance (Coase, 1960). All information about the efficient exploitation of natural and technological opportunities and the satisfaction of demand would be *costlessly* available for everybody. Individuals would costlessly coordinate their activities and protect their (absolute and contractual) rights [10], and "trade" own resources (exchange the rights on them) in the mutual interest with *equal* efficiency in the free market, through private organizations of different types, through collective decision-making, or in a single national hierarchy (company). Then the optimalrequirements for environmental sustainability, and the maximum potential for economies of

[9] A detailed description of the advantages and disadvantages of the various forms of governance is made in our previous publication (Башев).

[10] In a world of zero transaction costs, the definition (redistribution) of the *rights* by individuals, groups, and society, and effective enforcement of the new rights would be easily (costlessly) achivable.

scale and scope (maximum environmental protection/improvement, and productivity of resource, "internalizing externalities"), and improving the well-being (consumption, provision of ecosystem services, etc.) would be easily, costlessly achieved.[11]

However, when transaction costs are significant, then the costless negotiation, exchange and protection of individual rights is impossible. Therefore, the initial distribution of property rights between individuals and groups, and their good definition and enforcement, are critical for overall efficiency and sustainability. For example, if the "right to a clean environment" is not well defined, that creates great difficulties for the effective supply of ecosystem services - costly disputes between the pollutant and affected agents; disregard for the interests of particular groups or generations, etc. Moreover, even when rights are well-defined, the eco-management is usually associated with significant transaction costs. For instance, the agents have the cost of identifying different rights and effectively protecting them (unwanted appropriation by other agents); to study and comply with the various institutional restrictions (rules, standards, rules); to collect the necessary technological, eco- and other information; to find the best partners and prices; to negotiate the terms of the exchange; for writing and registration of contracts; to enforce exchange terms through monitoring, control, measurement and safeguards; to dispute rights and agreements in court or otherwise; for adaptation or termination of agreements along with the evolution of conditions of production and exchange, etc.

Therefore, in the real world with incompletely defined and/or enforced rights and positive transaction costs, *the form*

[11]At present stae, there is a *principled agreement* (a "social contract") for a global sustainable development.

of agro-environmental governance becomes critical and (pre)determines the extent of degradation, conservation and enhancement of (agro) ecosystems and their services (Башев, 2010). This is because different governance structures have *unequalefficiency* (effect, costs) in organizing the same activities related to the production and consumption of ecosystem services in the specific socio-economic and natural environment. Often, the high transaction costs make it very difficult and even block the organization of otherwise efficient (mutually beneficial) activities and exchanges for all participants[12].

Transactional costs are to be well distinguished from the "production" (agronomic, opportunity [13], etc.) costs for environmental protection. In the contemporary environment, the latter are an important economic cost that is to be recovered similarly to other "technological" costs from the beneficiaries of the preserved /improved nature. Often, that is the farmer who invests to maintain the productivity of natural resources (land fertility, water cleanliness, ecosystem services), and reimburses these costs like other investments through a stream of future benefits (productivity, profitability, market positions, etc.). Increasingly, however, these are other agents who pay for the used eco-services either directly (through the purchase of eco-products and services) or indirectly (through collective organizations, taxes and fees, etc.).

The effective forms for governing of ecosystem services optimize *the overall* (transaction *and* production costs) of

[12]Most often, the supplier and the user of agro-ecosystem services are different agents, which implies a transaction (desired or unwanted exchange) between them.

[13]As "opportunity costs" for the current eco-costs can be used the missed income from the traditional or other feasible activities, while for the eco-investments- the long-term investments for restoration of natural resources or for replacement with other natural, material etc. resource.

agricultural activity - minimizing transaction costs and allowing (otherwise mutually beneficial) eco-exchange to be realized on a socially desirable scale; allowing the achievement of the minimum/optimal environmental requirements and/or the exploration of purely technological economies of size and scale in farming, eco- and other activities.

The "production costs" for the "provision" of agro-eco-services are relatively easy to measure. However, much of the associated transaction costs are difficult or impossible to measure. Therefore, the (most) effective form of governance is determined through *Discrete Structural Analysis*, according to the (combination of) *critical dimensions*[14] of activity and transactions (Башев, 2012; Williamson, 1985). In a previous publication, we have identified the most effective market, contractual and internal forms of eco-management, depending on the critical factors of transactions and activity (Башев).

The "rational" agents tend to use and/or design such forms for governing their diverse activities and relationships that are *the most effective* for the specific institutional, economic and natural environment - modes that maximize their *overall* (production, environmental, financial, transactional, etc.) *benefits* and minimizing their *overall* (production, eco-maintaining, transaction, etc.) *costs* (Башев, 2012). However, the result of this *private (and market)* optimization of the management and the activity is not always the most efficient allocation of resources at a social scale and socially desirable (maximum possible) environmental conservation activity. Agricultural activity is often accompanied by significant undesirable negative eco-

[14] Честота, неопределеност, специфичност на активите (Williamson, 1985), и присвояемост (Башев, 2012) - факторите, които причиняват вариация на транзакционните разходи между алтернативните форми за управление.

effects - soil degradation, water pollution, biodiversity destruction, air pollution, significant greenhouse gas emissions, etc., including in Bulgaria (*ИАОС*). The market and the private sector *"fail"* in effective governance of a significant proportion of transactions associated with agro-ecosystem services with low appropriability, high and unilateral specificity of investment, high uncertainty, and low repetition/frequency. There is a need for a *public intervention (government, international aid) as a third party* to make such eco-activities and transactions possible or more efficient. However, public intervention in (eco-)governance is not always more effective, since *public failure* is actually possible. In the country and around the world, there are many examples for inappropriate, excessive, insufficient, untimely or too expensive public intervention at all levels. Often, public intervention either fails to correct market and private sector failures or "corrects" them at the price of more overall costs.

*The criterion* for assessing the efficiency of the agro-environmental governance is to be whether the *socially desirable and practically feasible eco-goals (e.g. amount of agro-ecosystem services) are achieved with the lowest possible total cost* (direct, indirect, private, public, production, environmental, transactional etc.). Accordingly, inefficiency is manifested in the *failure to achieve the really possible* (technical, political, economic) *ecological objectives* (overcoming certain eco-problems, minimizing existing eco-risks, reducing eco-losses, restoring and improving the natural environment, increasing agro-ecosystem services, etc.) *or* in achieving the set up goals with *excessive cost compared to another feasible form of governance*.

## Stages in the analysis and improvement of the governance of agro-ecosystem services

The *analysis* and *improvement* of the system of governance of agro-ecosystem services should include the following steps (Figure 5):

*First*, the trends, factors and risks associated with (agro) ecosystems and the "supply" of agro-ecosystem services must be identified. Modern science provides sufficiently precise methods for assessing the state of ecosystems of different kind, and for identifying existing, evolving and likely problems - climate change, degradation and destruction of natural resources and ecosystems, eco-risks, etc. (MEA). Moreover, it offers reliable tools for assessing the (positive and negative) impact of agriculture on the ("health") state of nature, its main components, and ecosystem services of various types, including at different spatial and temporal scales. For example, systems of multiple eco-indicators for pressure, state, response, and impact, volume and structure of ecosystem services, integrated assessment of agro-ecosystem services, eco-sustainability of agriculture, etc. are widely applied. The absence of *serious eco-problems, conflicts and risks* is an indicator that an *effective system for governance of agro-ecosystem services exists*. In most cases, however, significant or increasing eco-problems and risks related to agricultural development are observed, as is the case with Bulgaria (*И*АОС).

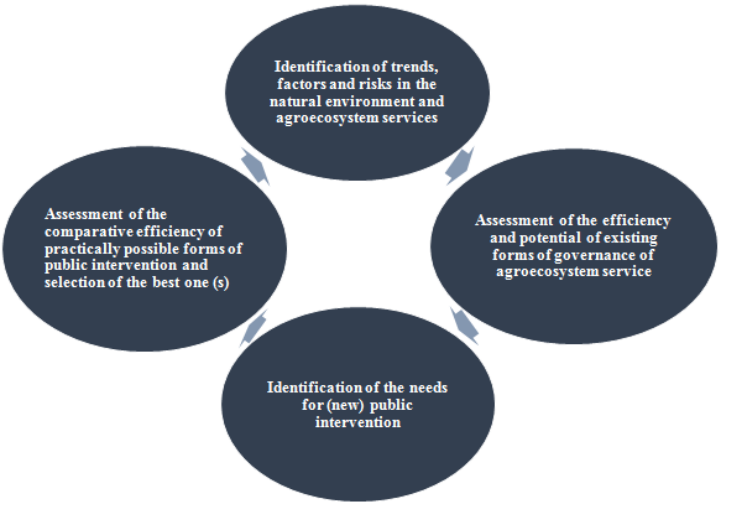


**Figure 5.** *Stages in the Analysis and Amprovement of the System of Governance of Agroecosystem services*
**Source:** author

*Second,* the efficiency of *existing* and *other possible* forms and mechanisms of governance for overcoming existing, evolving and possible eco-problems and risks associated with the services of agroecosystems of every type are to be evaluated. The analysis is to cover the agro-eco-management system and its individual elements - *institutional environment* and *diverse* (formal, informal, market, private, contract, internal, external, individual, collective, public, simple, complex, etc.) *forms* for governing the activities and relationships of related agents.

It is necessary to analyze the *"de facto"* rights over tangible and intangible assets (material and intellectual agrarian and eco-products and services), natural resources, certain activities, clean nature, food and eco-security, internal and inter-generational justice, and etc. that are relevant to the services of agro systems. The efficiency of the system of enforcement of rights and rules by the state, public pressure,

trust, reputation, private and collective forms, or by agents themselves have to be also analyzed. The extent to which the institutional environment creates incentives, constraints and costs for individual agents and society to preserve, restore and improve agro-ecosystems and their services, to intensify eco-exchange and cooperation of related agents, to increase the productivity of resource use, to induce private and collective eco-initiatives and investments, to develop new eco-rights, to reduce disparities between different (agro) ecosystems, to overcome the socio-economic and environmental problems, conflicts and risks, etc.,all are to be assessed.

The assessment of the efficiency of individual market, private, collective, public and hybrid forms of governance is to incorporate their *absolute* and *comparativepotential* for protection and development of eco-rights and investments of agents, to promote the socially desirable level of environmental behavior and activity (agro-ecosystems services), rapid identification of eco-problems and risks, cooperation and resolution of eco-conflicts, and minimization and recovery of total eco-costs (for conservation, restoration, improvement, transaction, direct, indirect, private, public, etc.). The *complementarity* and/or *contradiction* of different modes of governance are to also be assessed - for example, the high complementarity between (some) private, market and public eco-governance forms; the contradiction between the "gray" and "light" sectors; conflicts between the agrarian and non-agrarian sectors regarding natural resources and ecosystem services, etc.

Most of applied forms of agro-management of*activity* affect more than one aspect of agriculture and agro-ecosystem services. In addition, improvement of one type of agro-ecosystem services (e.g. food production) through a particular form is often associated with negative effects on another type (e.g. conservation of natural biodiversity).

Therefore, the *overall efficiency* of a given form, of a particular "package" of instruments or of the system of governance as a whole must always be taken into account.

The analysis and evaluation of the system of governance of agroecosystem services is a complex, multidimensional and interdisciplinary process that requires in-depthknowledge of the advantages and disadvantages of specific forms of governance and a detailed characterization of their efficiency (benefits, costs, effects) in the specific conditions of each agricultural agent, agricultural farm, type of farms, ecosystem, sub-sector, region, etc. Quantitative indicators are of little use here and most often a *qualitative* analysis of comparative advantages, disadvantages and net benefits is needed. Even when the system of agro-eco-management and agro-ecosystem services management *"works well"*, periodic *performance (efficiency) checks* have to be made. This is because good environmental protection may have been achieved with *excessive* public expenditures, or it may have been missed a *further improvement* of agro ecosystem services with the *same* social costs. In both cases there is an alternative *more effective* organization of the management of agro-ecosystem services. For example, a costly for the taxpayerpublic eco-governance (in terms of incentives, overall costs, adaptation and investment potential) can be replaced by a more effective private, market or hybrid form (public-private partnership).

*Third*, the *inefficiency* ("failure") of dominating market, private and public forms is to be detected, and the *needs for new public intervention* in the management of agro-ecosystem services of each kind identified. They may be related to the inability to achieve the socially desirable and practically possible eco-goals, the significant transactional difficulties (costs) for participating agents, the inefficient use of public funds, etc.

*Finally*, the *alternative* forms *of new public intervention* that can overcome existing (market, private and public) failure are to be identified; and their *comparative efficiency and complementarityevaluated*, and the *most effective one(s) selected*. It is important to compare only *practically* (technically, economically and politically) *possible* forms of new public intervention in the management of agro-ecosystem services of every kind in the specific socio-economic, organizational and natural environment.

The public forms not only support (market *and* private) transactions, but they also associated with significant (public and private) costs. Estimates have to include *all* costs of implementation and transaction - direct costs (of taxpayers, supporting institution), *and* transaction costs (of coordination, stimulation, control of opportunism and mismanagement) of bureaucracy, *and* the costs of individuals' participation in the public forms (for adaptation, information, paperwork, fees), *and* the costs of social control over and reorganization (modernization, liquidation) of public forms, *and* (opportunity) "costs" of public inaction[15].

The proposed analysis is to be made *at different levels of agro-ecosystems* (farm, area, micro-region, macro-region, national, international), depending on the *type of eco-challenge* and the scale of the *collective action needed* to eliminate the specific problems and risks associated with the agroecosystems and their services. Identification and evaluation of the dominating specific forms of governance of agro-ecosystem services of a given type in a particular

[15] The value of some *eco-losses* can be expressed in economic terms (reduction of income in related industries, replacement and recovery costs, negative impact on human well-being, etc.), while a significant part of the social costs cannot be expressed in monetary terms (the negative impact on biodiversity, other ecosystems, human health and life, future generations, etc.).

country, macro and micro-region, etc. is to be a subject to special "micro" multidisciplinary study. They require a multidisciplinary approach and use of diverse information for the eco-state, risks, public programs and measures, scientific, statistical and forecast data for the development of ecosystems, etc., as well as the collection of new micro and macro information on forms, the costs, factors, effects and intentions of the agents involved in the managing the services of agro-ecosystems at the relevant hierarchical levels.

The analyses and improvement of the governance of agroecosystem services is not a one-off act that ends with a perfect system for governance of agroecosystem services at the final stage. Rather, it is a permanent *process* that should improve the eco-governance along with the evolution of the natural environment, individual and collective (social) knowledge and preferences, and the modernization of technology and the institutional environment. Moreover, the *public* (local, national, international) *failure* is possible (and often prevail), leading us again to the next cycle of improving the eco-governance in agriculture. In some cases, it is not at all impossible to "affect" the natural environment through (agro) management and the *effective adaptation* is the only possible strategy for overcoming environmental consequences for agricultural and other sectors of human activity.

The proposed comparative institutional analysis also allows us to *anticipate* the probable cases of *new* public (local, national, international) as a result of the inability to mobilize sufficient political support and the necessary resources and or ineffective implementation of otherwise "good" policies insocio-economic conditions of a particular country, macro or micro agroecosystem. As public failure is a *practically feasible option*, its timely detection allows to anticipate the existence or deepening of certain environmental problems

and to inform the (local, international) community about the risks involved.

## Conclusions

The study of the forms, factors and efficiency of the governance of agro-ecosystem services in Bulgaria is at an early stage. In this "new" area, many traditional economic approaches and models are "not working" well, and multidisciplinary and interdisciplinary analysis is needed in which economists have to contribute. "Empirical" research is also to be initiated to "test" and improve the theory, and effectively support policies and farming strategies and practices. This requires the collection of new types of micro and macro information on the personal characteristics of participants in the "production" and consumption of agro-ecosystem services, for the type and forms of their relationships, for the specific socio-economic and institutional environment, and for the agro-ecosystems of different types. and their diverse "services" at different levels and horizons of management.

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