

## A STUDY ON SUSTAINABILITY OF AGRICULTURAL FARMS IN BULGARIA

*The issue of assessment of sustainability of agricultural farms 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 farm 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 agricultural 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. 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.*

*JEL: Q12, Q18, Q56, Q57*

### 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 and Tellarini, 2000; Bachev, 2005, 2006, 2016; Bachev and Petters, 2005; 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). In the last years that problem has been also studied in Bulgaria (Башев, 2016а, 2016b; Иванов и др., 2009; Йовчевска, 2016; Котева, 2016; Кънева, 2015; Хаджиева и др, 2005.; Bachev, 2005, 2010, 2013, 2016; Bachev et al., 2016, 2017). Nevertheless, practically there are no comprehensive assessments on sustainability level of Bulgarian farms in 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. The framework for assessing farms sustainability includes 12 Principles, 21 Criteria, 45 Indicators and Reference values, which content, justification,

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modes of calculation and integration are presented in details in our previous publication in this journal (Башев, 2016a).

Assessment of sustainability of farms in the country is based on a 2016 survey with the managers of “representative” market-oriented farms of different type. The survey was carried out with the assistance of the National Agricultural Advisory Service (NAAS) and the major associations of agricultural producers in the country, which identified the “typical” agricultural holdings of different type and location. The managers of selected agricultural holding were instructed and consulted by the regional staff of NAAS, filled in a structured questionnaire, and send it to the regional office of NAAS.

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 than the Average in the Sector/Region”, “Similar/Good”, “Low/Lower or Worse than the Average in the Sector/Region”, “Negative/Unsatisfactory/Unacceptable”. That approach is the only feasible to get necessary data for assessing sustainability of Bulgarian farms for a number of reasons: (1) level of most governance and social indicators is practically “known” only by farm managers - e.g. satisfaction of activity, acceptable income, available alternative for supply of inputs, etc.; (2) precise data for most ecological indicators on farm levels are not available and they can only be gathered through costly laboratory tests; and (3) our pilot study has proven that the majority of farm manager are well familiar with comparative production, economic and financial indicators of their farms in relation to the industry average, as well as with most available environmental indicators.

After that the qualitative estimates of farm managers have been quantified, and for integration equal weights are used for each Indicator in a particular Criterion, and for each Criterion in a particular Principle, and for each Principle in a particular Aspect, and for each Aspect in the Integral Index. Integral assessments for farms as a whole or of a particular group are arithmetic average of individual assessments of each participating holding.

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.

Initially, an overall characteristics of the surveyed farms is made. 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 amelioration of farm management and public intervention in the sector suggested.

## 1. 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<sup>2</sup>. 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
Mountainous regions with natural handicaps	15,13	0,00	7,69	11,76	13,68
Non-mountainous regions with natural handicaps	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

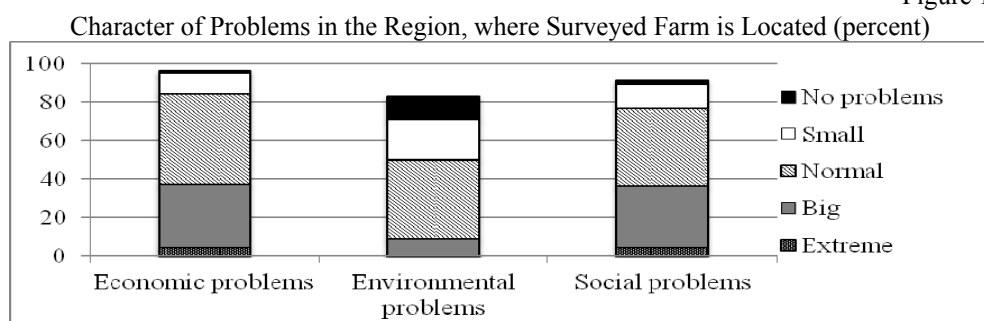
\*\* mainly Corporations and 5,88% Partnerships.

Source: survey with managers of farms, July 2016

<sup>2</sup> 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 July 2015 reached 94815 (Agrarian Report, 2015).

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 the 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



Source: survey with managers of farms, July 2016

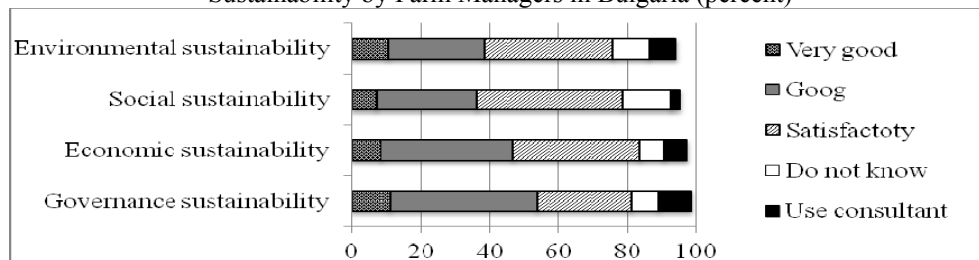
The owners and/or managers of three-quarter of surveyed farms are male, and around 60% are of up to 55 old. Such gender and age structure of managers (owners) will manage the majority of Bulgarian farms in coming 10-15 and more years and contribute to one or another sustainability level of holdings.

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 entirely Absent.

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 sustainability principles 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%).

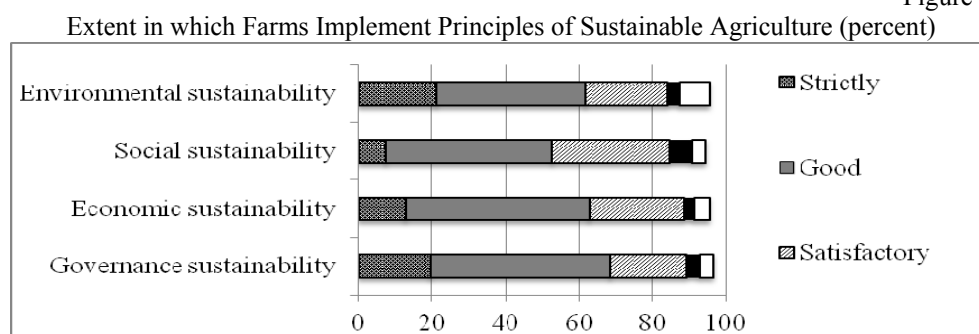
Competency of sustainability principles increase along with the size of farms and larger holdings tend to know better governance, economic, social and environmental sustainability. There is also a differentiation of competency according to specialization of holdings as those in Field Crops, Grazing Livestock, 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 to 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



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. Around 8% 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.

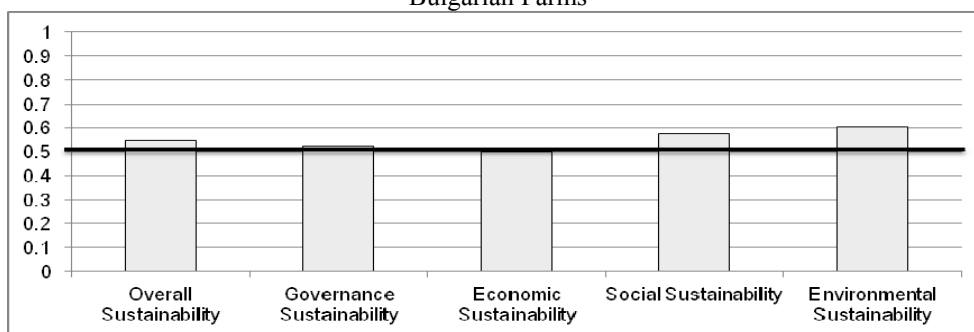
Application of sustainability principles increases along with the size of holdings and as a rule larger farms respect better governance, economic, social and environmental sustainability. Regarding principles of sustainability is most common for farms specialized in Field Crops, Grazing Livestock, Mix 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.

## 2. Overall and Multi-aspect 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.

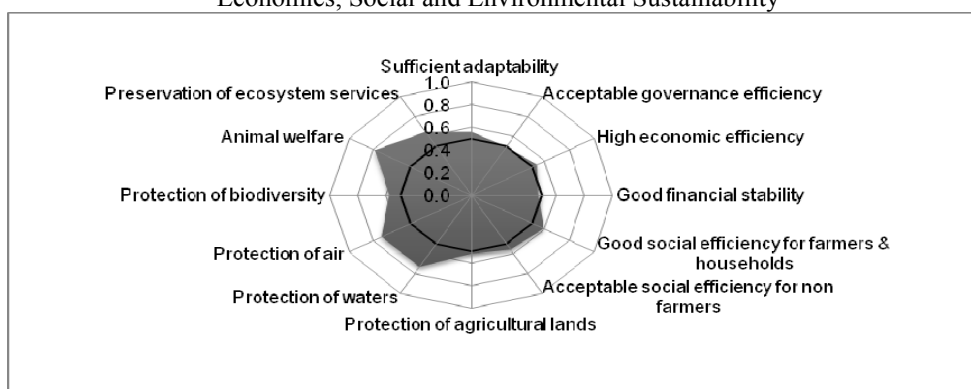
Figure 4  
Indexes of Integral, Governance, Economics, Social and Environmental Sustainability of Bulgarian Farms



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.

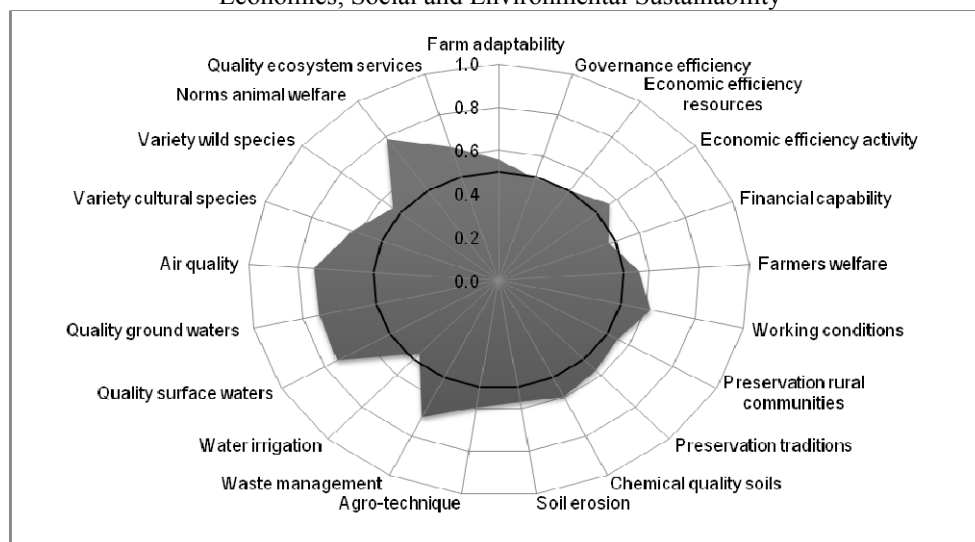
Figure 5  
Index of Sustainability of Bulgarian Farms for Major Principles for Governance, Economics, Social and Environmental Sustainability



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



Source: survey with managers of farms, July 2016

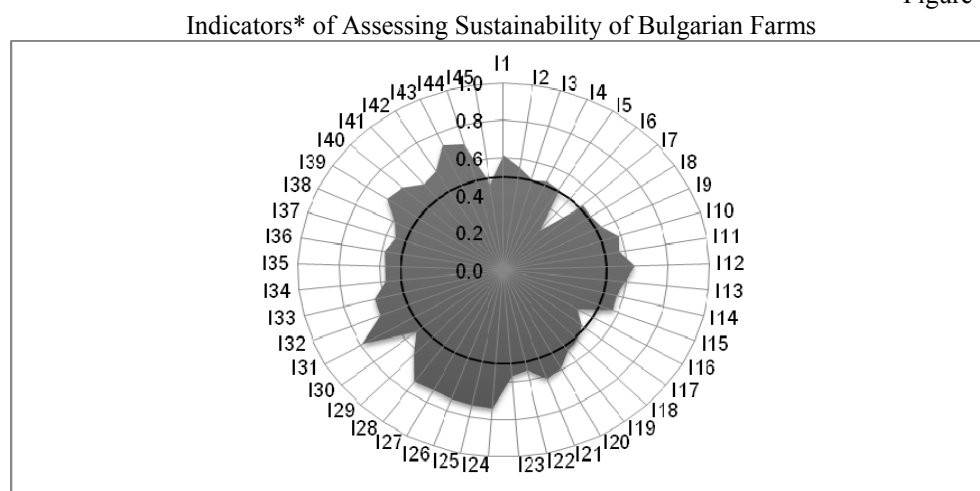
Low levels of indicators identify the specific areas for improvement of sustainability of farms through adequate changes in management strategy and/or public policies. For instance, despite that the overall Adaptability of Farms is relatively high (0,56), the Adaptability of Farms to Changes in Natural 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.

Figure 7



\*\*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; I17-Overall Liquidity; I18-Financial Autonomy; I19-Income per Farm-household Member; I20-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; I29-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

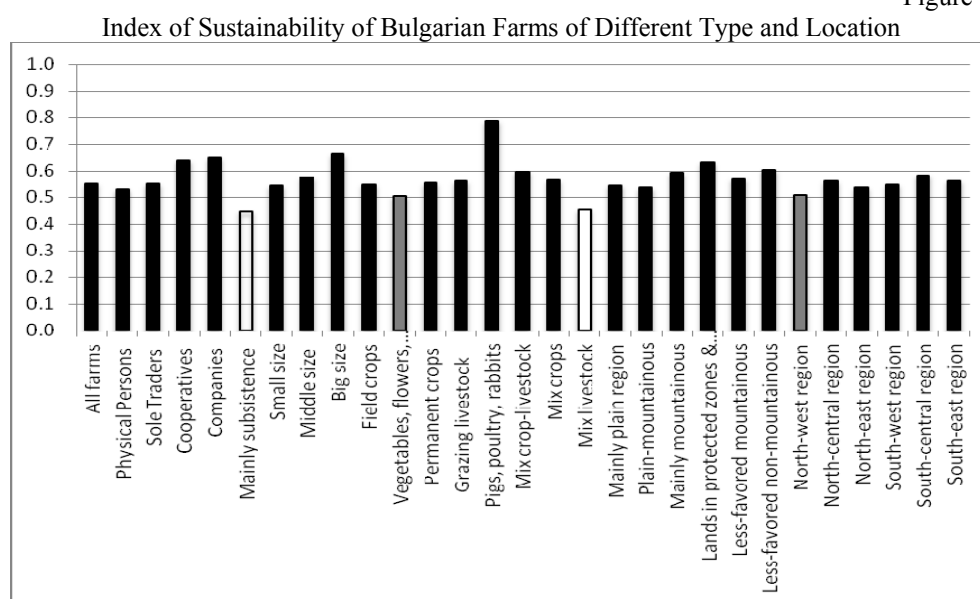
Source: survey with managers of farms, July 2016

All results of assessment of overall and multi-aspect sustainability level of Bulgarian farms are in lines with another study focusing on assessing sustainability of Bulgarian agriculture, based on more “objective” information and available aggregate data from EUROSTAT, DG Agriculture and rural development, National Statistical Institute, Department

“Agrostatistics” at the MAF, Ministry of environment and waters (Bachev et al., 2017). The later proves that similar assessments based of opinions and estimates of farm managers are reliable and should be used in research and managerial practice.

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.

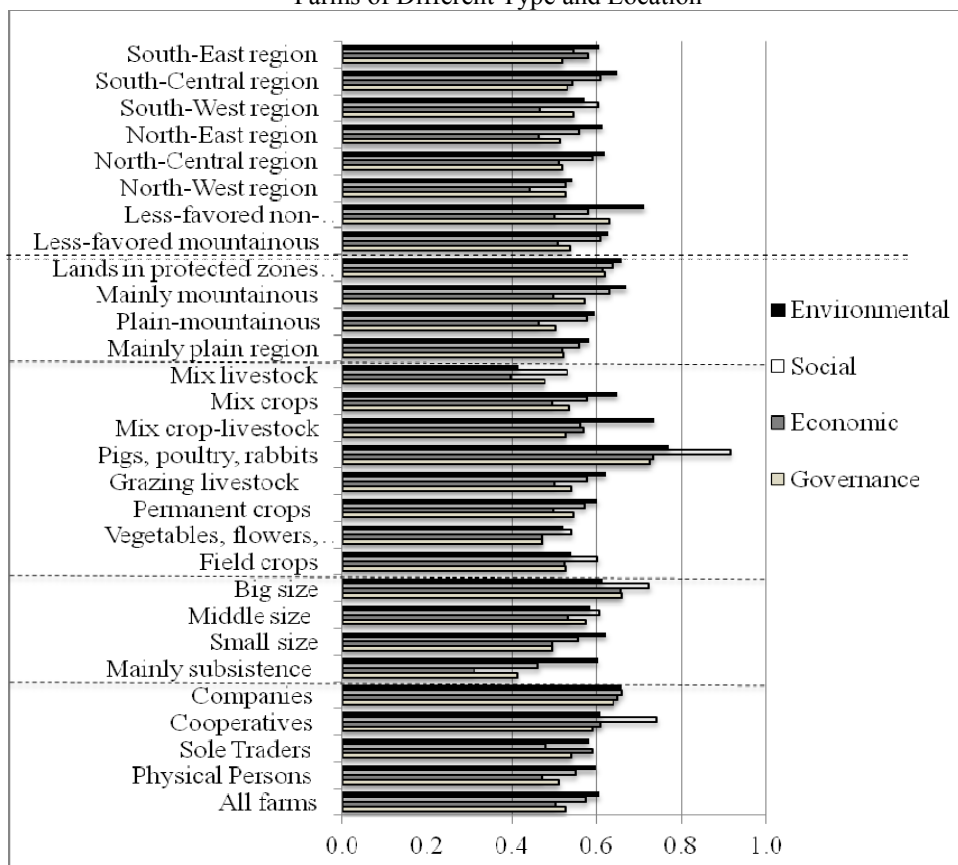
Figure 8



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, Poultry 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.

### **3. Structure of Farms with Different Sustainability Levels**

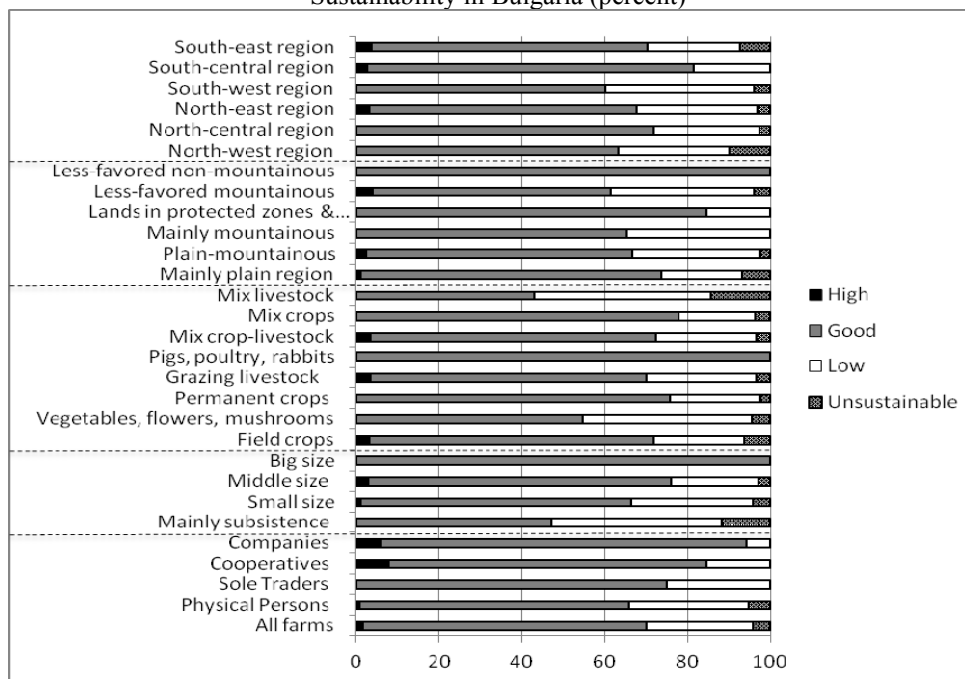
The overall and partial levels of farms' enterprises do not give a full picture about the state of all holdings since there is a great variation in the share of farms with different sustainability levels. The biggest portion of Bulgarian farms is with a good sustainability and only under 2% with a high sustainability (Figure 10). 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 10

Structure of Farms of Various Type and Location with Different Levels of Overall Sustainability in Bulgaria (percent)



Source: survey with managers of farms, 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%).

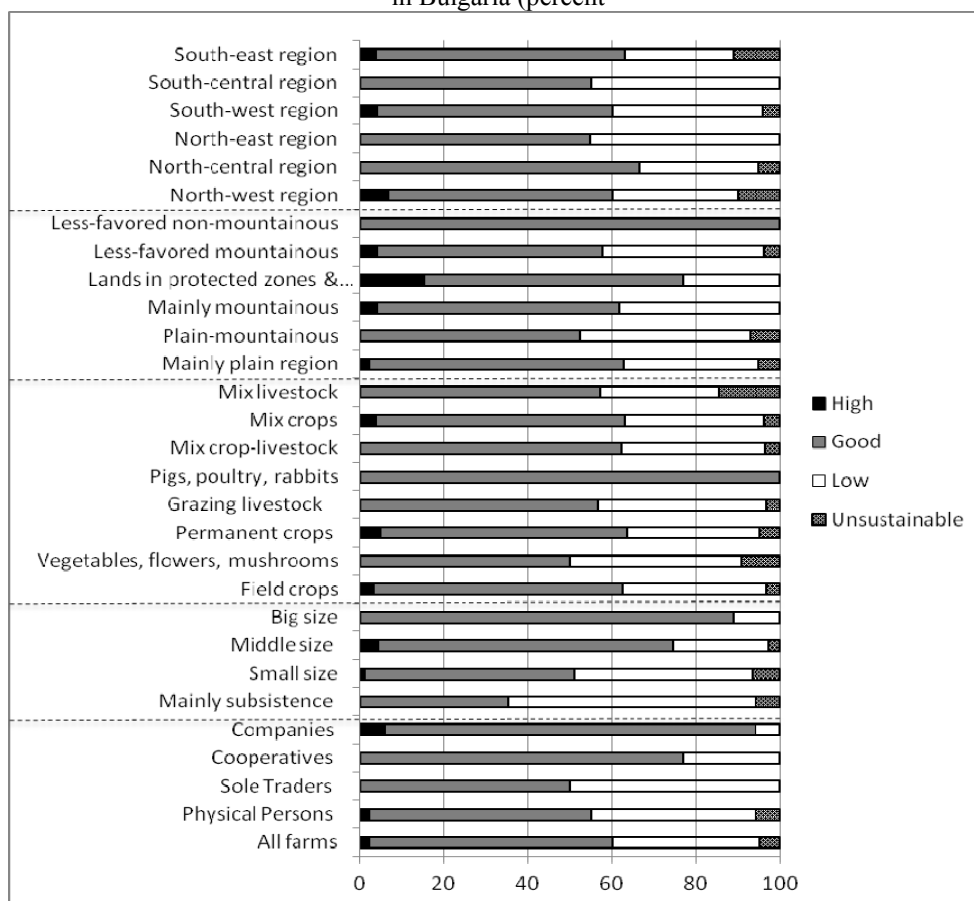
The share of farms with a good and high sustainability is significant among those located in Non-mountainous Regions with Natural Handicaps, with Lands in Protected Zones and Territories, in Plain Regions, in South-Central, North-Central, and South-East Regions of the country. Simultaneously, 40% of 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 11). 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.

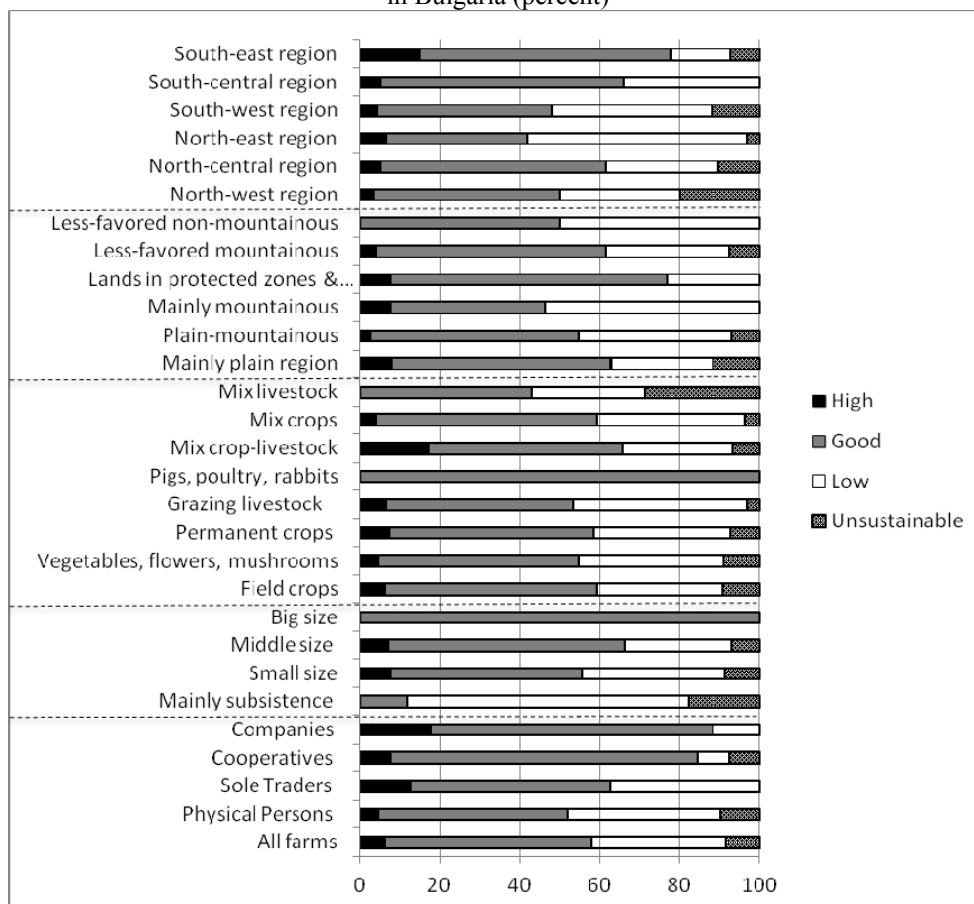
Figure 11  
Structure of Farms of Various Type and Location with Different Governance Sustainability in Bulgaria (percent)



Source: survey with managers of farms, July 2016

Furthermore, 42% of all farms are with a low economic sustainability or unsustainable at all (Figure 12). 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 12  
Structure of Farms of Various Type and Location with Different Economics Sustainability in Bulgaria (percent)



Source: survey with managers of farms, 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 exist 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.

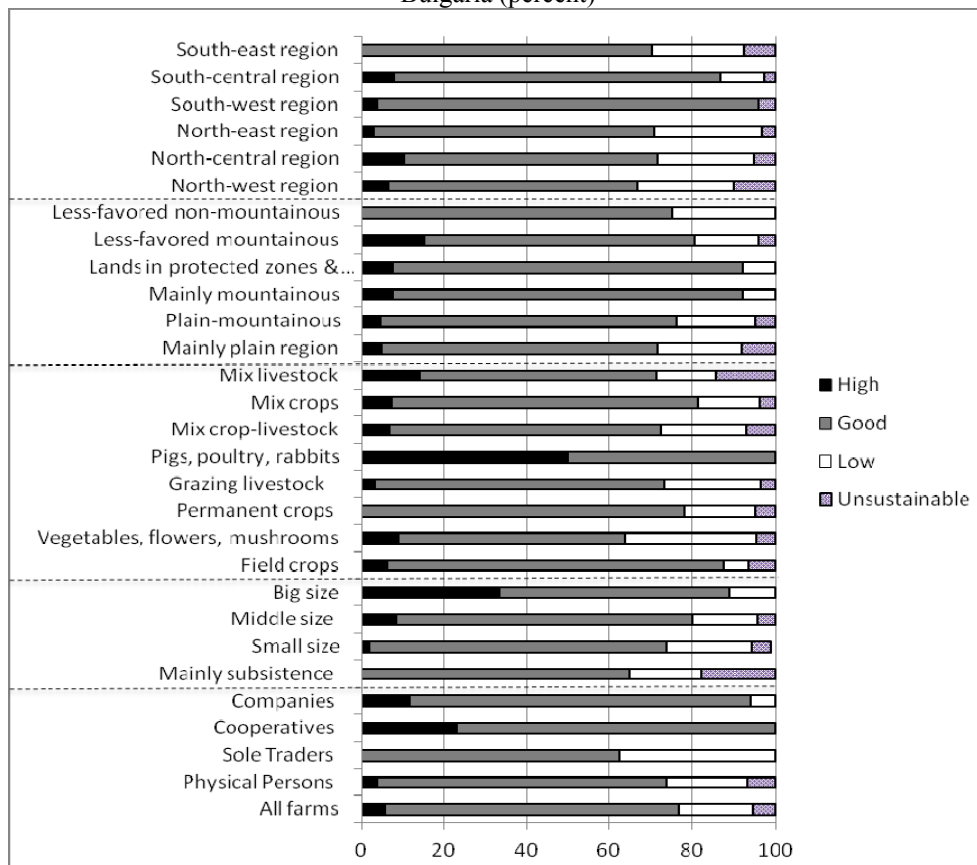
All these indicates that, a great part of Bulgarian farms currently are with low economic sustainability or economically unsustainable, and most likely they will cease to exist in near future or in coming years, unless effective measures are taken (public support regulations, etc.) for improving their 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 13). 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 13

Structure of Farms of Various Type and Location with Different Social Sustainability in Bulgaria (percent)



Source: survey with managers of farms, 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 14). 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.

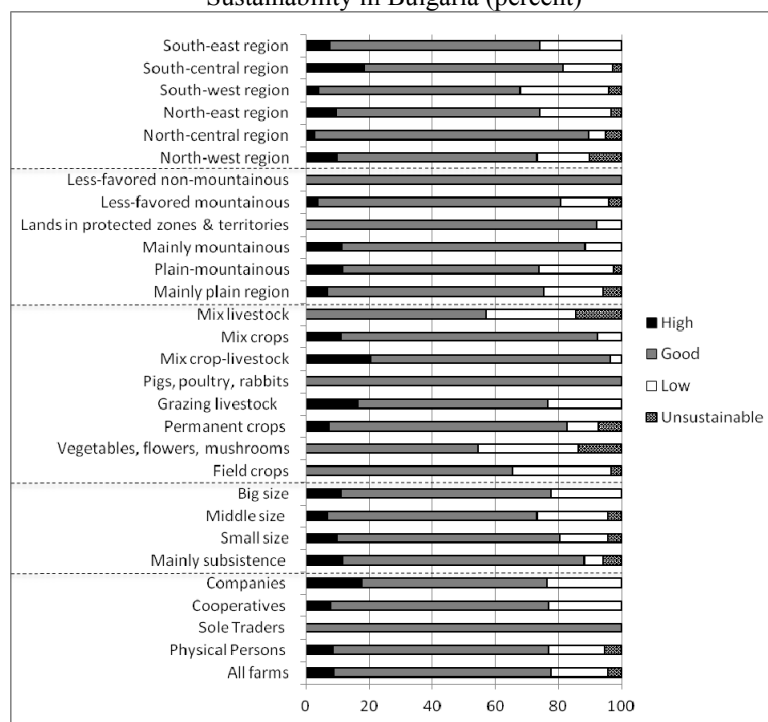
At the same time a considerable portion of enterprises specialized in Vegetables, Flowers, and Mushrooms are with a low eco-sustainability (32%) or eco-unsustainable (14%), similarly to those in Mix Livestock (accordingly 29% and 14%) and Field Crops

(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.

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.

Figure 14  
Structure of Farms of Various Type and Location with Different Environmental Sustainability in Bulgaria (percent)



Source: survey with managers of farms, July 2016

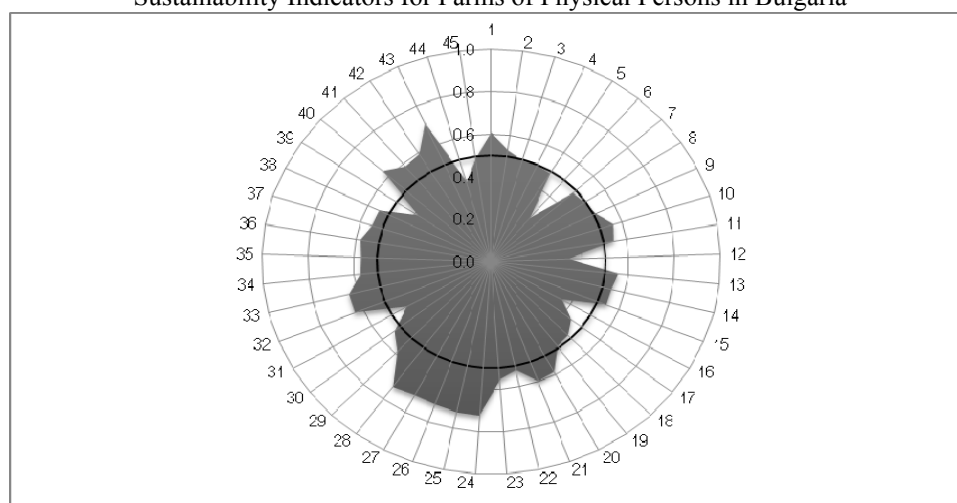
#### 4. Sustainability of Farms of Different Juridical Type

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

Most sustainability indicators of Physical Persons are low and lead to a decrease in sustainability for individual aspects and the overall level (Figure 15). In governance aspect of sustainability of these holdings are inferior the Level of Adaptability to Natural Environment, and Comparative Efficiency of Supply and Governance of Labor Resources, Natural Resources, Long-term Inputs, and Innovations, and extremely low the Comparative Efficiency of Supply and Governance of Short-term Inputs.

Figure 15

Sustainability Indicators for Farms of Physical Persons in Bulgaria



Source: survey with managers of farms, July 2016

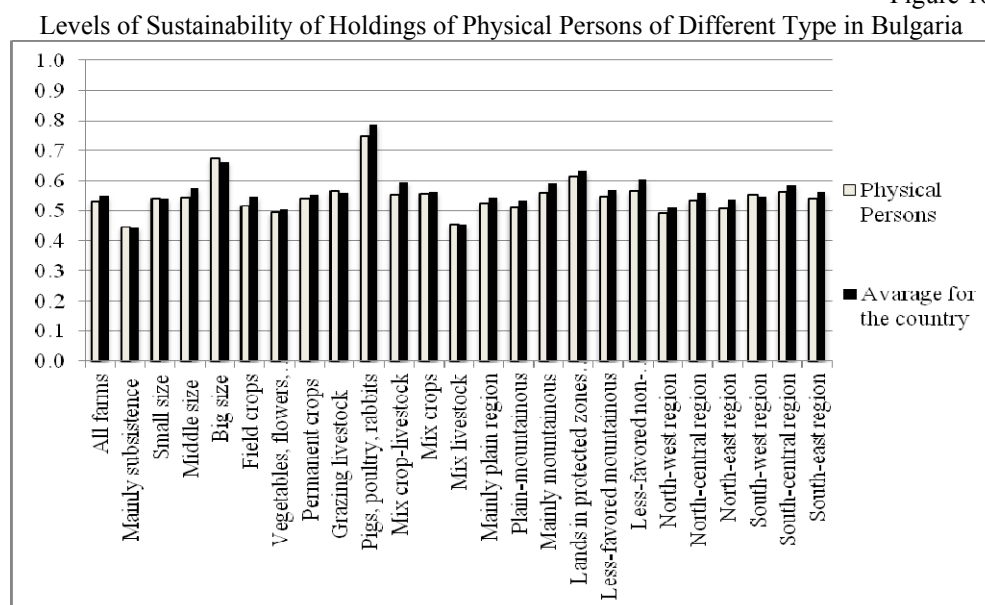
In the economics aspect sustainability of Physical Persons is particularly low in respect to Livestock Productivity, Rate of Profitability of Own Capital, Overall Liquidity, and Financial Autonomy. In social aspect sustainability of these farms is only low in relation to Income per Farm-household Member, while in environmental plan in respect to complying with norms for Number of Livestock per ha, Type of Manure Storage, Extent of Respecting Animal Welfare, and Irrigation Rate. In all these directions adequate measures have to be taken by farm managers and state authority in order to improve aspect and overall sustainability of that type of holdings.

At the same time, a number of indicators for environmental sustainability of Physical Persons are with relatively high positive positions within a 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.

Holding of Physical Persons are the most numerous and to a great extent they (pre)determine the “average” sustainability level of all farms in the country. Consequently, the level of integral sustainability of Physical Persons of different type deviates insignificantly from the average sustainability levels of respective categories in the country (Figure 16).

Figure 16



Source: survey with managers of farms, July 2016

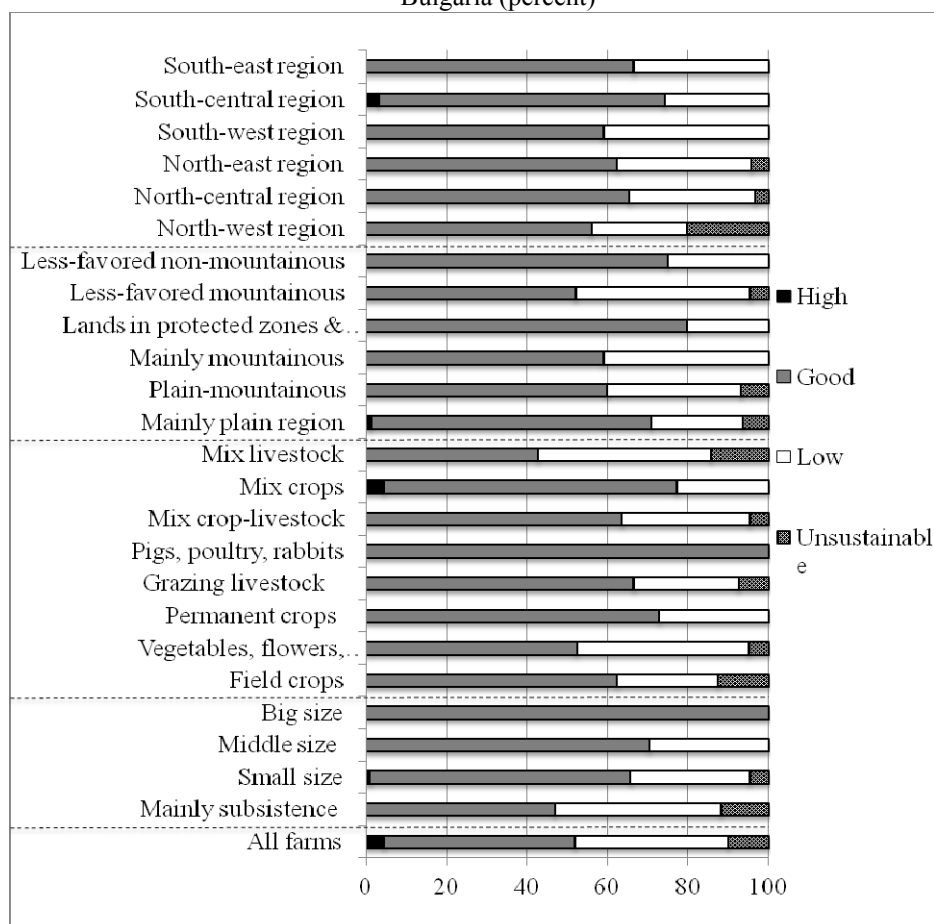
There are significant variations in sustainability of Physical Persons depending on their size, specialization, ecological and geographical location. That indicates that the size, product specialization and location of Physical Persons are more important factors for their sustainability than their juridical status.

With the best sustainability, within a good level, are holdings of Physical Persons with Big size, specialized in Pigs, poultry and Rabbits, these with Lands in Protected Zones and Territories, and located in the South-Central region of the country. At the same time, with low sustainability are Physical Persons which are Predominately for Subsistency, those specialized in Mix-Livestock and in Vegetables, Flowers and Mushrooms, and located in the North-West region of the country. According to the ecological location, the lowest (within a good level) is sustainability of Physical Persons situated in Plain-mountainous regions of the country.

There is also a significant differentiation in the share of farms with different level of sustainability for the major type of Physical Persons (Figure 17). All Physical Persons with Big size for the sector and specialized in Pigs, poultry and Rabbits, and most of these in Mix Cops and Permanent Crops, and located in Non-mountainous Regions with Natural Handicaps and with Lands in Protected Zones and Territories are with a good and a part with a high sustainability. On the other hand, majority of Physical Persons, which are Predominately for Subsistence and these with Mix Livestock are with low sustainability or unsustainable. The portion is also considerable of low sustainable or unsustainable Physical Persons in groups with Vegetables, Flowers and Mushrooms, Grazing Livestock, and Crop-Livestock specialization, those located in Mountainous Regions with Natural Handicaps, in Plain-Mountainous Regions, and in NorthWest and South-Wets Regions of the country.

Figure 17

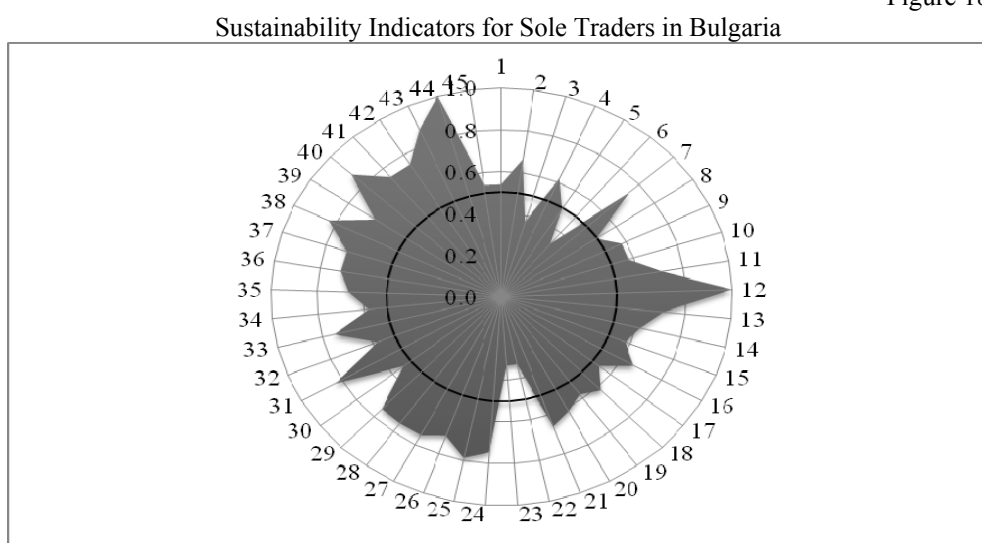
Structure of Physical Persons of Various Type with Different Sustainability Level in Bulgaria (percent)



Source: survey with managers of farms, July 2016

Sole Traders are with low values for governance sustainability in respect to Level of Adaptability to Natural Environment, and Comparative Efficiency of Supply and Governance of Short-term inputs, and for social sustainability in respect to their Contribution to Preservation of Rural Communities and Preservation of Traditions (Figure 18).

Figure 18



Source: survey with managers of farms, July 2016

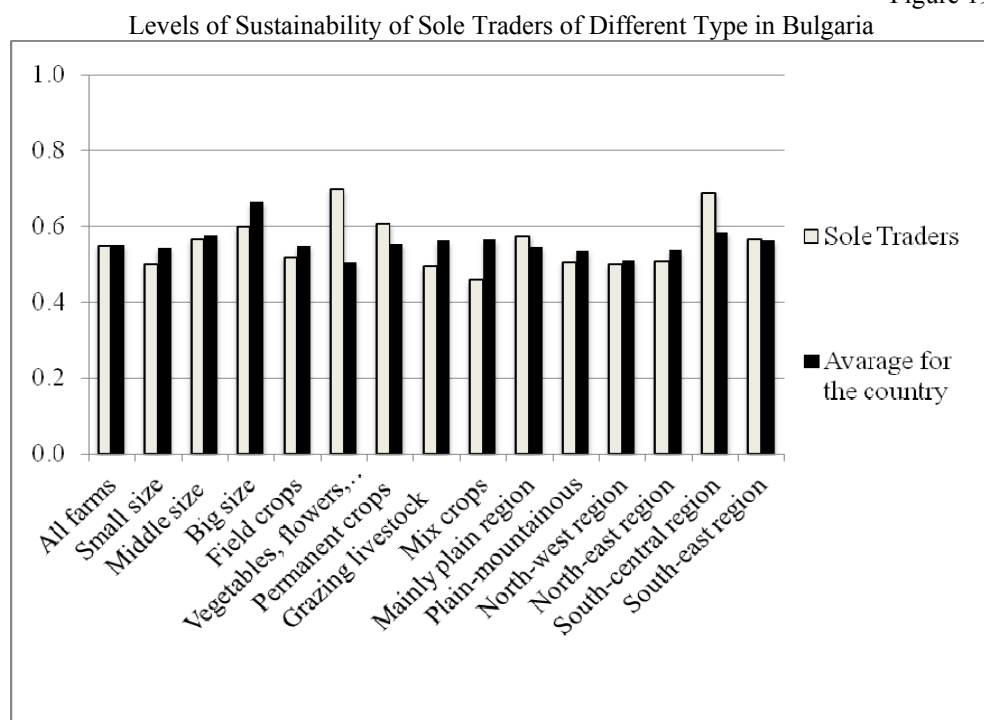
Simultaneously, Sole Traders have high sustainability for eco-aspects of activity in regards to Type of Manure Storage, Norm of Nitrogen Fertilization, and Extent of Application of Good Agricultural Practices, and marginal to the highest level for implementation of effective Crop Rotation. What is more, 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 a 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 Sole Traders there is also variation in sustainability level dependent on size, specialization, ecological and geographical location. With the highest sustainability are Sole Traders with Big size for the sector, specialized in Vegetables, Flowers and

Mushrooms, and located in Plain regions, and in South-Central region of the country (Figure 19). Simultaneously, with a low sustainability are Sole Traders specialized in Mix Crops and in Grazing Livestock, and in the border with the inferior level those with Small size, and located in Plain-mountainous and North-West region of the country.

Figure 19



Source: survey with managers of farms, July 2016

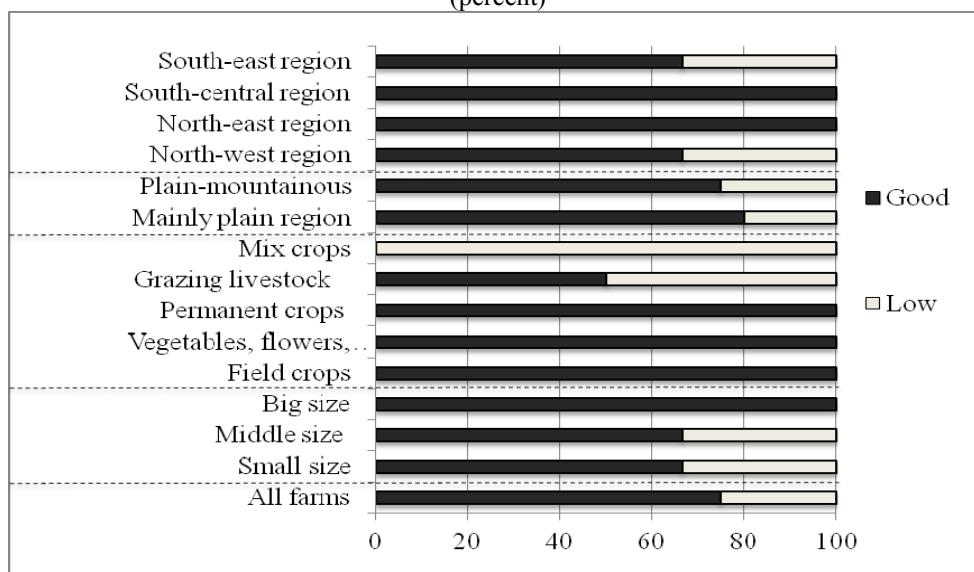
In Sole Traders' groups with the lowest and the highest sustainability levels there are significant deviations from the average levels of sustainability in respective categories of farms in the country. That demonstrates that the specific juridical status of Sole Trader is a critical (and more important) factor determining the level of sustainability in this group, rather than belonging of holdings to a certain type. On the other hand, in other groups of Sole Traders the levels of sustainability are close to the average in the country, which shows that for these Sole Trades the size, specialization and location are dominating for formation of one of another sustainability level.

There are significant variations in the share of Sole Traders of different type with unlike sustainability levels (Figure 20). All farms with Big size, specialized in Field Crops, Vegetables, Flowers and Mushrooms, Permanent Crops, and those located in North-East and South-Central Regions of the country are with a doo sustainability. On the other hand, all holdings with Mix Crops, every other specialized in Grazing Livestock, and one third of



these with Small and Middle size as well as situated in North-West and South-East Regions of the country are low sustainable.

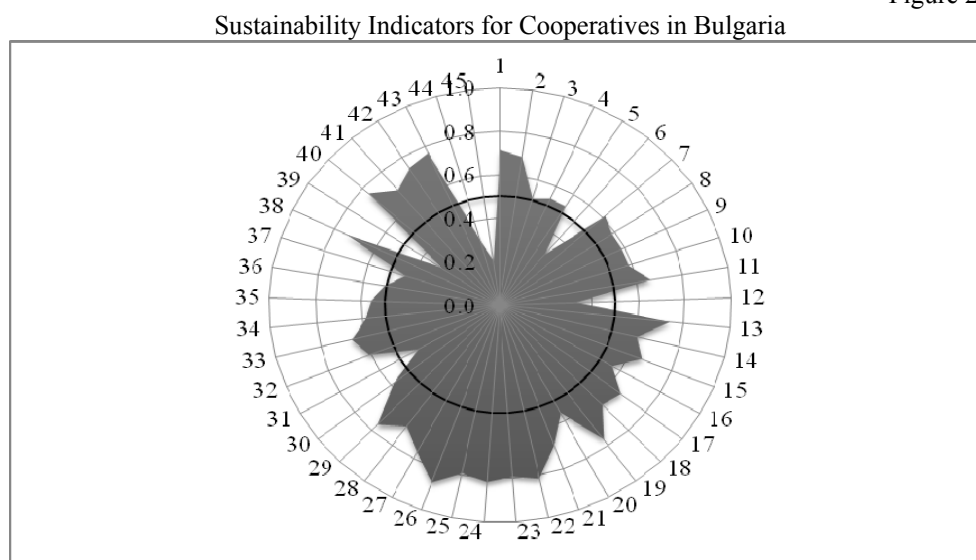
Figure 20  
Structure of Sole Traders of Various Type with Different Sustainability Level in Bulgaria  
(percent)



Source: survey with managers of farms, July 2016

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 (Figure 21). Numerous environmental indicators of Cooperatives 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 are to be maintained and expended.

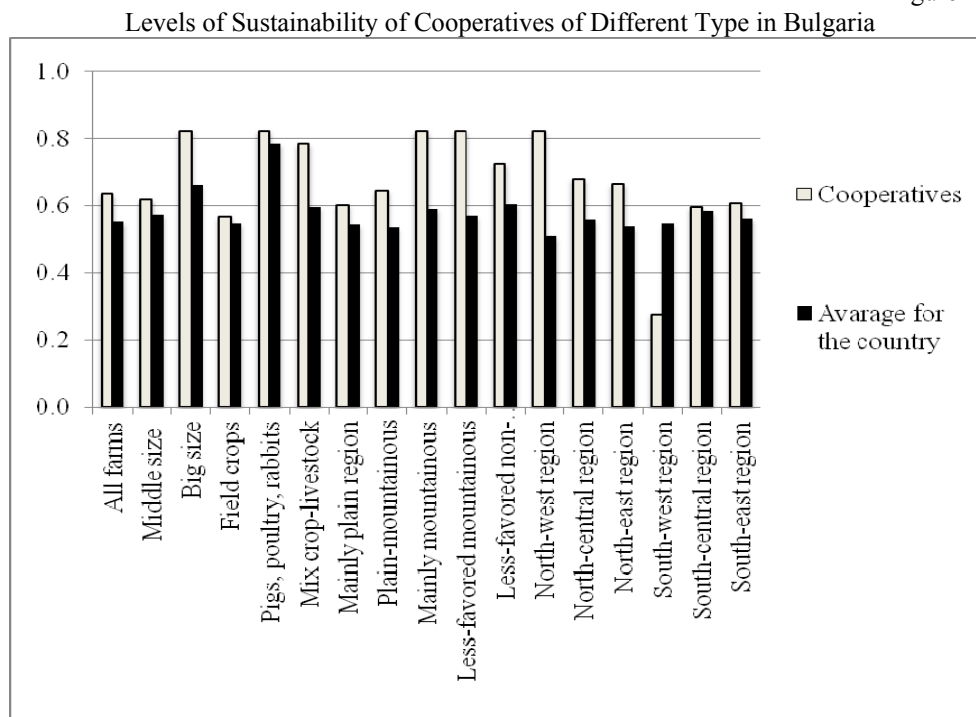
Figure 21



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

For Cooperatives there exists considerable differentiation in sustainability level depending on the size, specialization and location of the farms. With the best sustainability (close to the border with a high level) are cooperatives with Big size for the sector, those specialized in Pigs, Poultryes and Rabbits, located in Mountainous regions, Mountainous Regions with Handicaps, and in North-Central region of the country (Figure 22). With the lowest sustainability are cooperatives located in South-West region of the country.

Figure 22

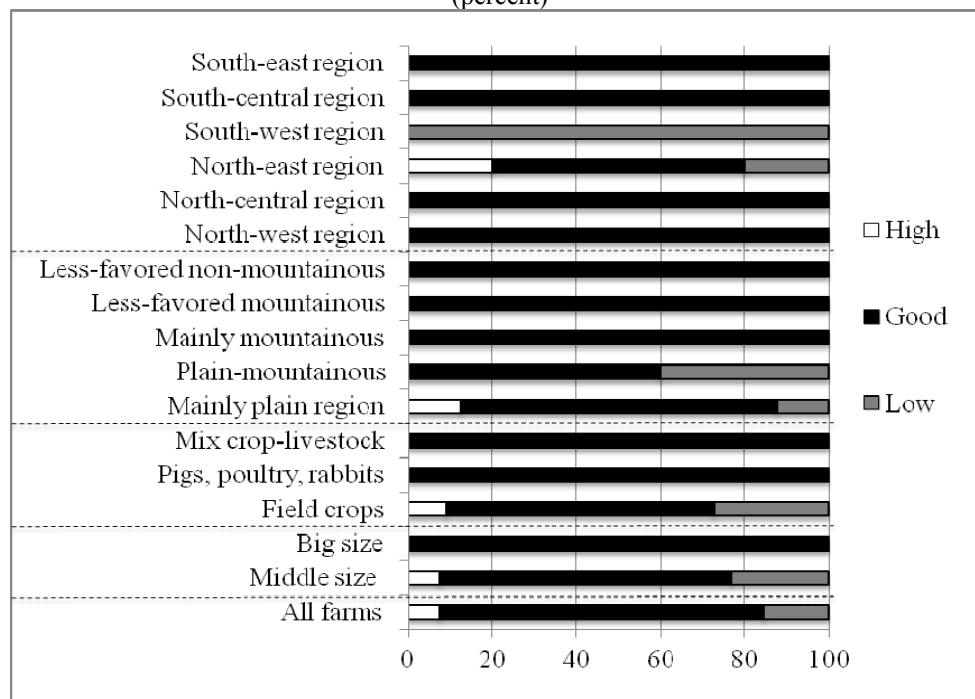


Source: survey with managers of farms, July 2016

The levels of sustainability of most Cooperatives of different type deviate considerably from the average levels for sustainability in these groups of holdings in the country. That proves that specific “Cooperative forms” (the juridical status of Cooperative) is critical factor determining sustainability levels of cooperative farms of a particular type, rather than their belonging to certain category of holdings in the country.

There are significant variations in the share of Cooperatives with different sustainability level for individual type of farms (Figure 23). All Cooperatives with Big size, specialized in Pigs, Poultry and Rabbits, Crop-Livestock, and those located in Mountainous Regions, Mountainous and Non-mountainous Regions with Natural Handicaps, and in North-West, North-Central, South-Central and South-East Regions of the country are with a good sustainability. The greatest portion of highly sustainable Cooperatives are among located in North-East Region, and Plain Regions of the country as well as specialized in Field Crops. At the same time, each of Cooperatives in South-West Region and 40% of located in Plain-Mountainous Regions of the country are low sustainable.

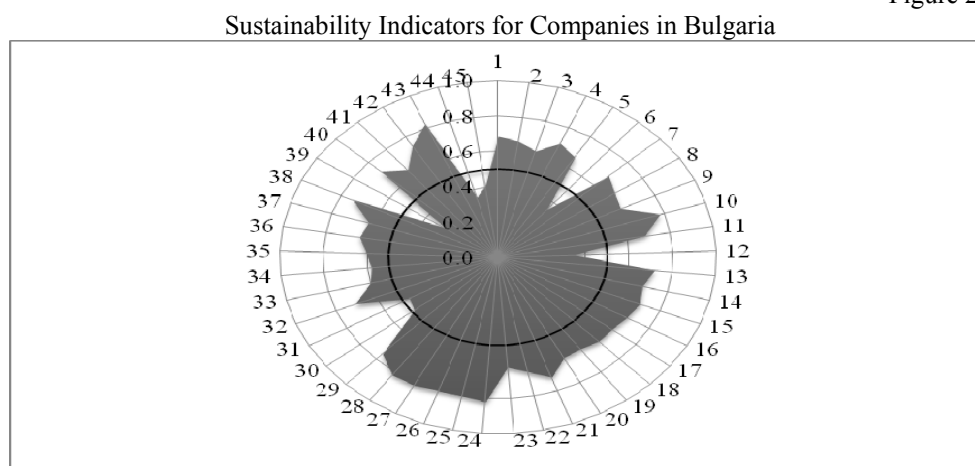
Figure 23  
Structure of Cooperatives of Various Type with Different Sustainability Level in Bulgaria  
(percent)



Source: survey with managers of farms, July 2016

For Companies the highest levels, within the borders of a good sustainability, are 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 (Figure 24). 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.

Figure 24



Source: survey with managers of farms, July 2016

With the lowest values for Companies are indicators for governance and economic sustainability: Comparative Efficiency of Supply and Governance of Short-term Inputs, and Livestock Productivity as well as indicators for eco-sustainability: permissible Number of Livestock per ha, Type of Manure Storage, Extent of Respecting Animal Welfare, Irrigation Rate, and Number of Wild Species on the Territory of Farm. These sides of activity of corporative enterprises have to be improved in order to increase their governance, economic, environmental and integral sustainability.

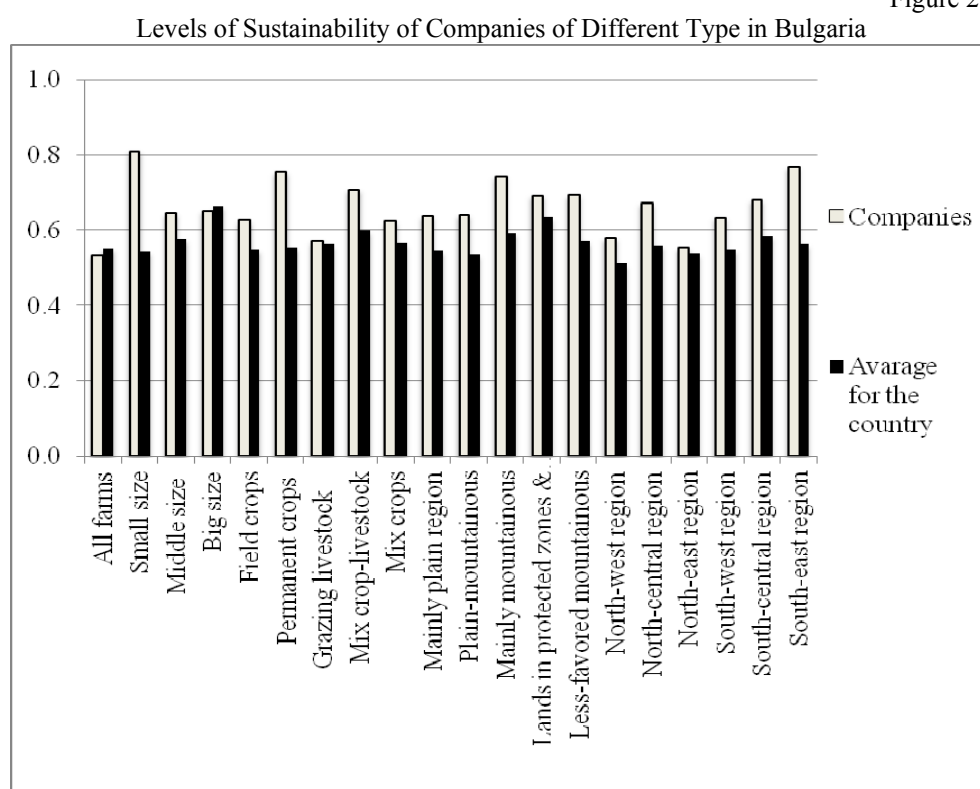
There are a significant specificity and variation in sustainability levels of Companies with different size, specialization and location (Figure 25). With the highest sustainability are Companies with Small size for the sector, specialized in Permanent crops, located in Mountainous regions, and in South-East region of the country. Simultaneously, farms of that juridical type specialized in Grazing Livestock, and located in North-West region of the country are with the lower levels of sustainability.

There are great elevations in sustainability levels of Companies of all type with an exception of firms with Big size for the sector, specialized in Grazing Livestock, and located in North-East Region of the country. That means that for most categories of Companies the specific juridical status is critical for one or another level of sustainability. Sole exceptions are mentioned above three groups of firms, where belonging to farms with a particular (Big) size, specialization (Grazing Livestock) and location (North-East Bulgaria) is an important factor for sustainability formation.

In Companies also there is a great differentiation in fractions of holdings with one or another level of sustainability in each particular group (Figure 26). All farms with Crop-Livestock specialization, and those located in Mountainous Regions in Natural Handicaps as well as the vast majority of those with Big size for the sector and Mix Crops are highly

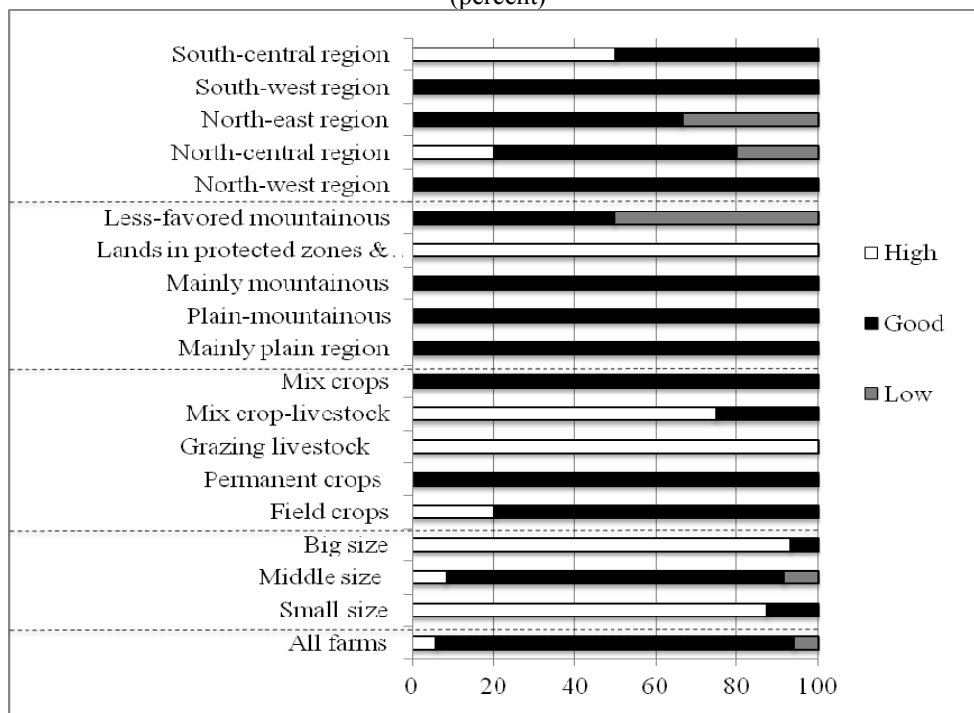
sustainable. At the same time, a half of the Companies in North-West Region of the country and every third of those in South-West Region are low sustainable.

Figure 25



Source: survey with managers of farms, July 2016

Figure 26  
Structure of Companies of Various Type with Different Sustainability Level in Bulgaria  
(percent)



Source: survey with managers of farms, July 2016

## 5. 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 27).

Factors which to the greatest extent stimulate actions of most farms for improving economic sustainability are: Market Demand and Prices, Received Direct State Subsidies, Market Competition, Financial Capability, Participation in Public Support Programs,

Possibilities for Benefits in Present Moment, Possibilities for Benefits in Near Future, Tax Preferences, Possibilities for Benefits in Long-term, and Integration with Buyer of Product.

For the biggest part of farms the factors which to the greatest extent stimulate their actions for enhancing social aspect of sustainability are: Personal Conviction and Satisfaction, Social Recognition of Contribution, Immediate Benefits for Other Persons and Groups, Community Initiatives and Pressure in Region, Access to Advisory Services, Policies of European Union, and Existing Problems and Risks in the Region.

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 of public policies and programs for sustainable development.

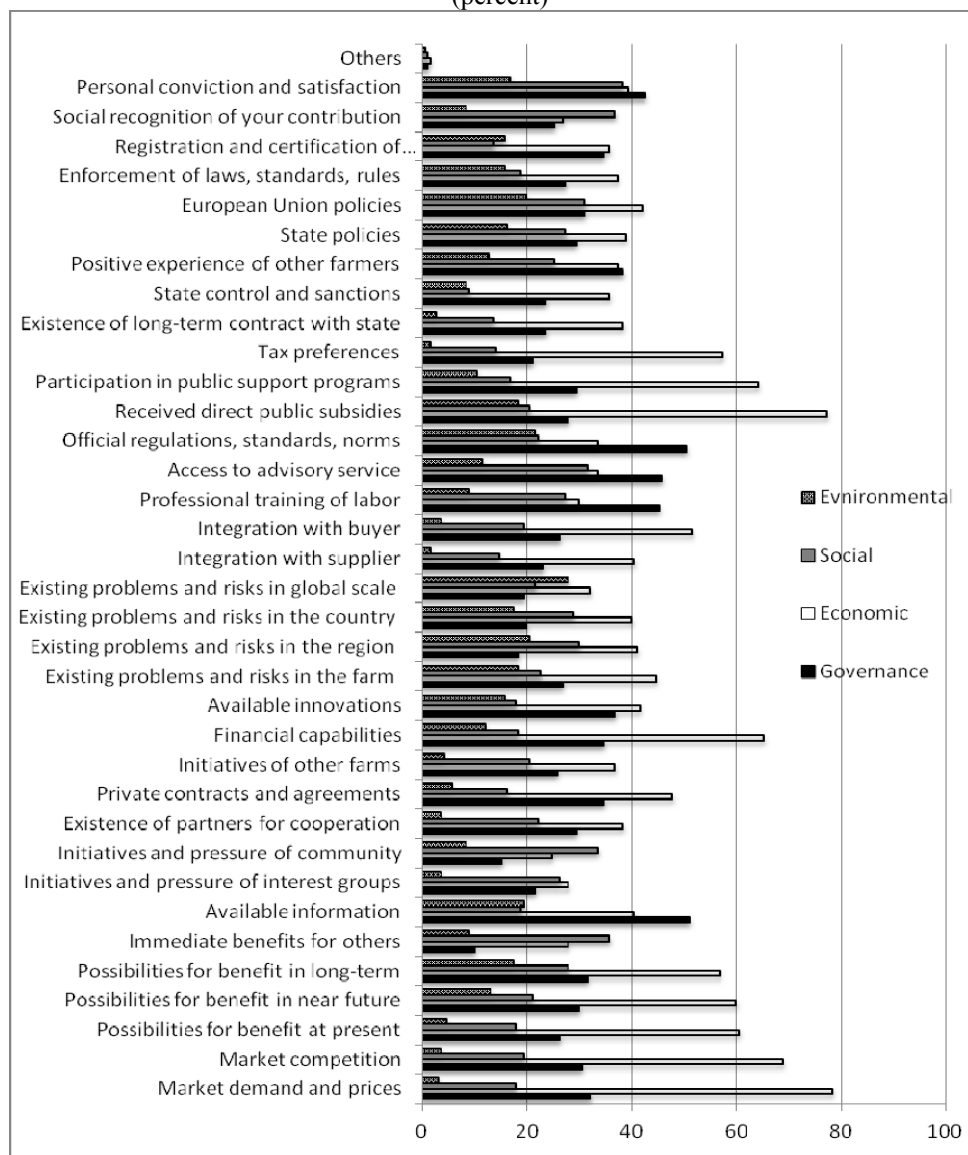
Our survey has found out that public policies relatively weakly affect governance sustainability of Bulgarian farms (Figure 28). National and European Union mechanisms of regulation and support, which to the greatest extent increase governance sustainability of surveyed holdings are: Professional Training 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.

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.



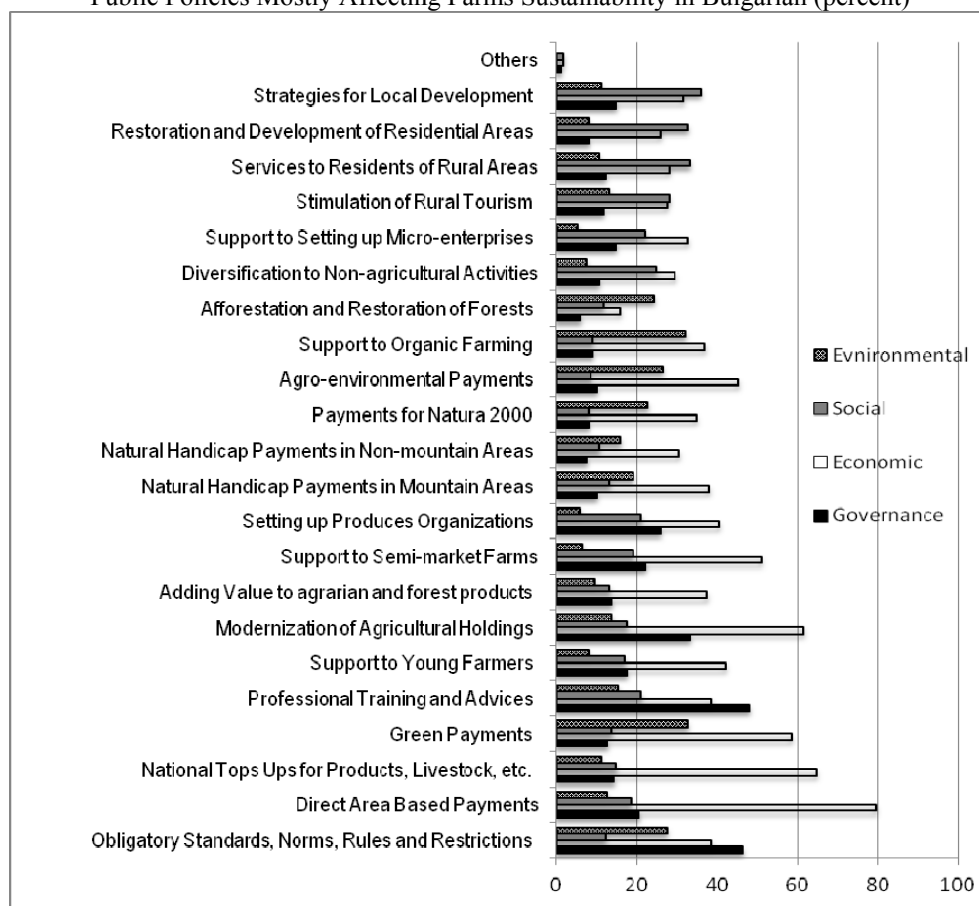
Figure 27  
Factors Mostly Stimulating Farms Actions for Improving Sustainability in Bulgaria  
(percent)



Source: survey with managers of farms, July 2016

Figure 28

Public Policies Mostly Affecting Farms Sustainability in Bulgarian (percent)



Source: survey with managers of farms, July 2016

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 (66,7%) and environmental sustainability of enterprises specialized in Pigs, Poultry and Rabbits (100%); Direct Area Based Payments for economic sustainability of Sole Traders (87,5%), Cooperatives (84,62%), Companies (82,4%), holdings with Small size for the sector (81,5%), enterprise specialized in Pigs, Poultry and Rabbits (100%), Mix Crops (88,9%) 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 (92,3%), in Mountainous Regions with Natural Handicaps (88,5%), South-West (88%) and South-Central (84,2%) regions of the country; National Tops Ups for Products, Livestock, etc. in regard to economic sustainability of Companies (82,4%), holdings Predominately for Subsistence (76,5%), and those specialized in Grazing Livestock (80%), mainly in Mountainous Regions (88,5%) and with Lands in Protected Zones and Territories (76,9%), and located in North-Central (74,4%) 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 (66,7%); Modernization of Agricultural Holdings in relations to economic sustainability of Sole Traders (87,5%), Companies (76,5%), and specialized in Mix Livestock (71,4%) and Mix Crops (70,4%), and located in Mountainous Regions (76,9%), and North-Central (76,9%) and South-Central (71,1%) regions of the country; Support to Semi-market Farms and Setting up Produces Organizations for economic sustainability of holdings Predominately for Subsistence (accordingly 76,5% and 70,6%); Natural Handicap Payments to Farmers in Mountain Areas for economic sustainability of farming enterprises located in such areas (73,1%).

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 farm managers (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 (57,9%). 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 (83,3%) and younger than 40 (82,4%). 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 (94,1%) sustainability, Adding Value to Agricultural and Forests Products for governance sustainability (92,3%), Diversification to Non-agricultural Activities for governance (90%) and environmental (85,7%) 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 (85,2%).

## **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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