

SUSTAINABILITY OF BULGARIAN FARMS¹

Hrabrin Bachev

Institute of Agricultural Economics, Sofia, Bulgaria,
Email: hbachev@yahoo.com

Dimitar Terziev

University of National and World Economy, Department of Agribusiness, Sofia,
Bulgaria

Abstract

Assessing sustainability of agricultural farms is among the most topical issues for researchers, farmers, investors, administrators, politicians, interests groups and public at large. In academic publications, official documents and agricultural practices social, economic and environmental aspects (pillars) of sustainability are assessed, while critical “governance” functions of the farm ignored. Nevertheless, comparative governance efficiency often (pre)determines the overall sustainability of a farm despite its (high) productivity, social responsibility or eco-conservation. Most frameworks usually employ “universal” approach for “faceless” farms and “anonymous” environment despite that real socio-economic, institutional and natural conditions are critical for sustainability. Assessment systems are not hierarchical and lack systemic organization of sustainability components leading to arbitrary selection of indicators. Besides, they are too simplified (few indicators), unilateral (“pure” economic, ecological, etc.), or too complicated and impossible to use. In this presentation we suggest a holistic approach for assessing absolute and comparative sustainability of farms of different juridical type, size, product specialization, ecological and geographical location in Bulgaria. It encompass governance, economic, social, and environmental aspects which are analyzed by a hierarchical system of 12 principles, 21 criteria, 45 indicators and reference values. Study, including 190 typical holdings, has found out that the overall sustainability of Bulgarian farms is good, 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 sustainability level. In conclusion, we make recommendations for improvement of sustainability research and managerial practices.

Key words: Governance, economic, social, ecological sustainability

Jel Codes: Q1, Q12, Q18, Q5, Q56, Q57

1. Introduction

Adequate assessment of diverse aspects of sustainability of agricultural farms is among the most topical academic and practical issues (Andreoli and Tellarini, 2000; Bastianoni et al., 2001; Brklacich. and Smith; Csaki et al., 2008; Davidova, 2014; Diazabakana et al., 2014; EC, 2001; FAO, 2013; Fuentes, 2004; Hani et al., 2006 ; OECD, 2001; Rigby et al., 2001; Sauvenier et al., 2005; UN, 2015). Sustainability - absolute and comparative, of deferent type

¹ Research is financially supported by the Bulgarian Science Fund. Initial version of the paper has been presented at the 2nd International Conference on Food and Agricultural Economics, April 29-30, 2018, Alanya, Turkey.

of farms is among main factors for rural development. Despite the importance of sustainability in theoretical and practical aspect, comprehensive studies on sustainability of farms lack in Bulgarian agricultural economics.

In academic publications, official documents and agricultural practices is widely accepted, that in addition to “pure” economic farm’s sustainability has broader social and environmental aspects (“pillars”), which have to be accounted for. However, critical for farm’ sustainability (and) “governance” functions of farm and associated (“transaction”) costs are largely ignored. Nevertheless, often comparative governance efficiency and capacity for adaptation (pre) determine the overall sustainability of a farm despite its (high) productivity, social responsibility or eco-conservation of activity.

Most frameworks for sustainability assessment employ “universal” approach for “faceless” farms and “anonymous” environment. In fact, real socio-economic, institutional and natural conditions in which a farm functions and evolves are critical for its sustainability. Most frameworks are not hierarchical and lack systemic organization of aspects and components of farm’s sustainability determining an arbitrary selection of assessment indicators (Sauvenier et al., 2005). Suggested systems are either too simplified (a limited number of indicators), or unilateral (“pure” economic, “pure” ecological”, etc. aspects), or too complicated and impossible to use by farmers and managerial bodies (Hayati et al., 2010).

In this paper we apply a holistic framework for assessing sustainability of Bulgarian farms, and evaluate absolute and comparative sustainability of holdings of different juridical type, size, product specialization, ecological and geographical location.

2. Methodology

Farm sustainability characterizes the ability (internal potential, incentives, comparative advantages, importance, efficiency) of a particular farm to maintain its governance, economic, social and ecological functions in a long-term in the specific socio-economic and natural environment in which it functions and evolves. It has for aspects (“pillars”), which are equally important and always have to be taken into account:

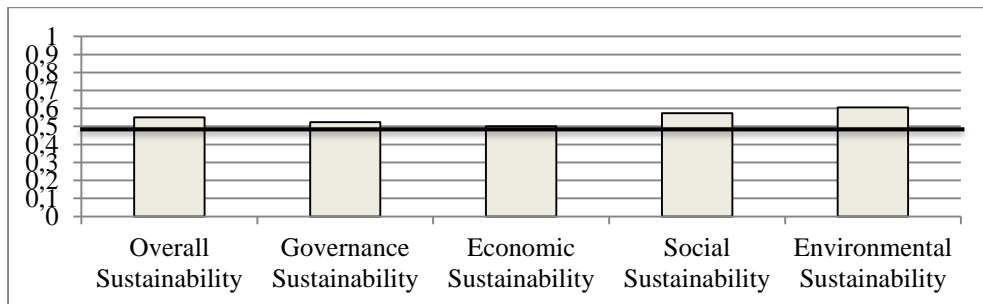
- governance sustainability – a farms has to have a good or high absolute and comparative efficiency in organization and management of activity and (internal and external) relations, and a high adaptability to evolving socio-economic and natural environment, according to specific preferences (type of enterprise, character of production, long-term goals, etc.) and capabilities (education, experience, available resources, connections, power positions, etc.) of the owners;
- economic sustainability – a farm has to have a good or high productivity of deployed natural, labor, material and financial resources, sufficient (“acceptable”) economic efficiency and competitiveness, and appropriate financial stability of activity;
- social sustainability – a farm to have a good or high social responsibility in regard to farmers, hired labor, other agents, communities, and consumers, and contribute to preservation of agrarian resources and traditions, amelioration of wellbeing and life style of farm households, and development of rural communities and the society as a whole;
- environmental sustainability – a farm has to have a good or high eco-efficiency of activity, which is to be associated with necessary conservation, recovery and improvement of components of natural environment (landscape, lands, waters, biodiversity, atmosphere, climate, ecosystem services, etc.) and nature as a whole, respecting welfare of farm and wild animals, etc.

Our specific framework for assessing sustainability of Bulgarian farms includes a hierarchical system of 12 Principles, 21 Criteria, 45 Indicators and Reference values. Specific content, justification, modes of selection, calculation and integration of all elements of that framework are presented in details in another publications (Bachev, 2006, 2018). Assessment

of sustainability level of individual farms is based on first-hand information from managers of 190 “representative” holdings collected with assistance of National Agricultural Advisory Service and major producers associations. Structure and importance of surveyed farms approximately corresponds to the real structure of market-oriented holdings in the country. Sustainability assessment is based on managers estimates for each Indicator in four qualitative levels: “High/Higher or Better than Average in Sector/Region”, “Similar/Good”, “Low/Lower or Worse than Average in Sector/Region”, “Negative/Unsatisfactory/Unacceptable”. Qualitative estimates are quantified and transformed into Sustainability Index for each indicator. Official typology is used for classification of farms according to juridical type, production specialization, ecological and administrative locations. In addition, manager self-determined their farms as Predominately for Subsistence, rather Small, Middle size or Big for the sector, and located mainly in Plain, Plain-mountainous or Mountainous region. For integration 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.

3. Sustainability Level of Agricultural Farms

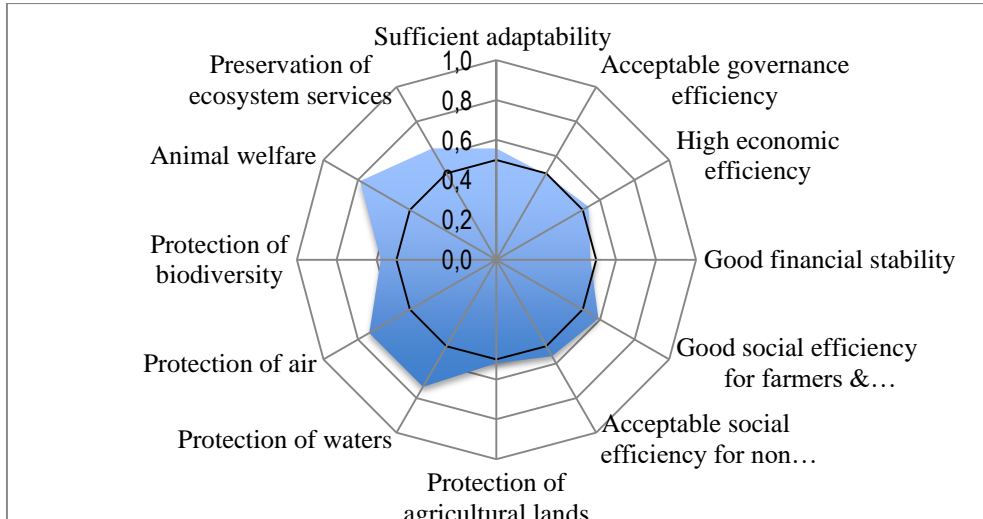
Multi-indicators assessment of sustainability level of surveyed farms found out, that Integral Sustainability Index of holdings is 0,55 indicating a *good* level of sustainability of Bulgarian farms (Figure 1). Environmental (0,61) and Social (0,57) Sustainability of holdings are the highest, while Governance (0,52) and Economic (0,5) Sustainability are at the border with a low level (see Figure 1.). Therefore, improvement of the latter two is critical for maintaining a good sustainability of farming enterprises in the country.



Source: Authors' survey

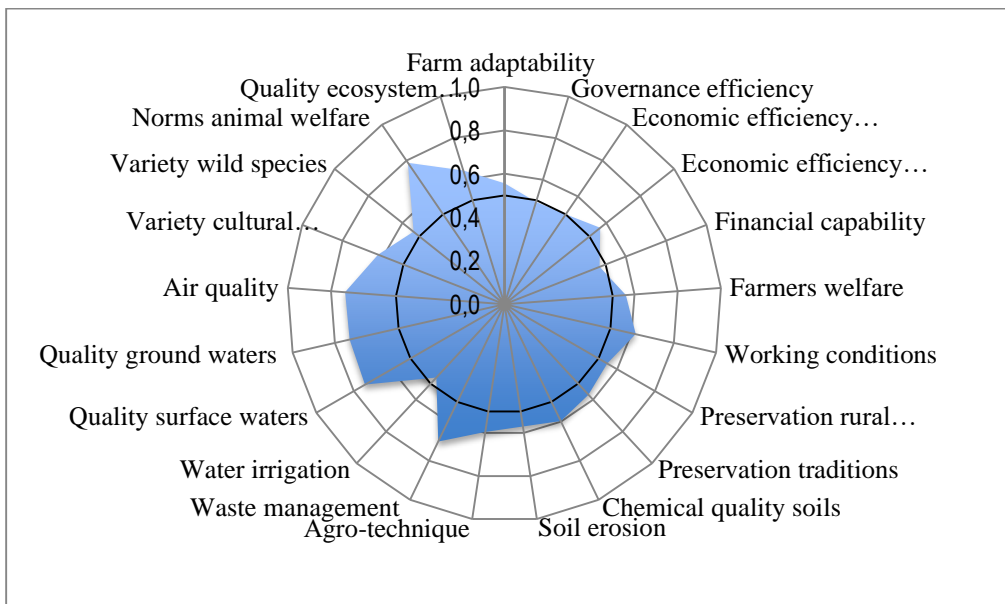
Figure 1. Sustainability Indexes of Bulgarian Farms

Analysis of individual sustainability Indexes for major Principles, Criteria and Indicators specify components contributing to diverse aspects of farms' sustainability. Governance and economic sustainability of Bulgarian farms are relatively low because of the fact that Governance Efficiency (0,49) and Financial Stability (0,47) of holdings are low (Figure 2). Furthermore, despite that overall environmental sustainability is relatively high, Preservation of Agricultural Lands (0,52) and Preservation of Biodiversity (0,56) are relatively low and critical for maintaining achieved level.



Source: Authors' survey

Figure 2. Indexes for Major Sustainability Principles of Bulgaria Farms

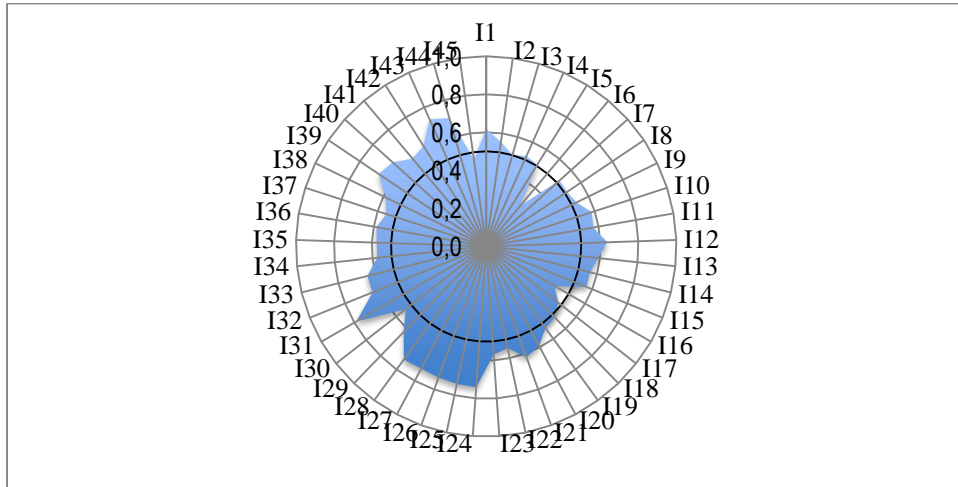


Source: Authors' survey

Figure 3. Indexes for Individual Sustainability Criteria of Bulgarian Farms

In depth analysis for individual Criteria and Indicators further specifies elements, which enhance or reduce farms' sustainability. Insufficient Comparative Governance Efficiency and Financial Capability of Bulgarian farms (Figure 3) 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 4). Similarly, low levels of Preservation of Agricultural Lands and Preservation of Biodiversity are determined 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).



Source: Authors' survey

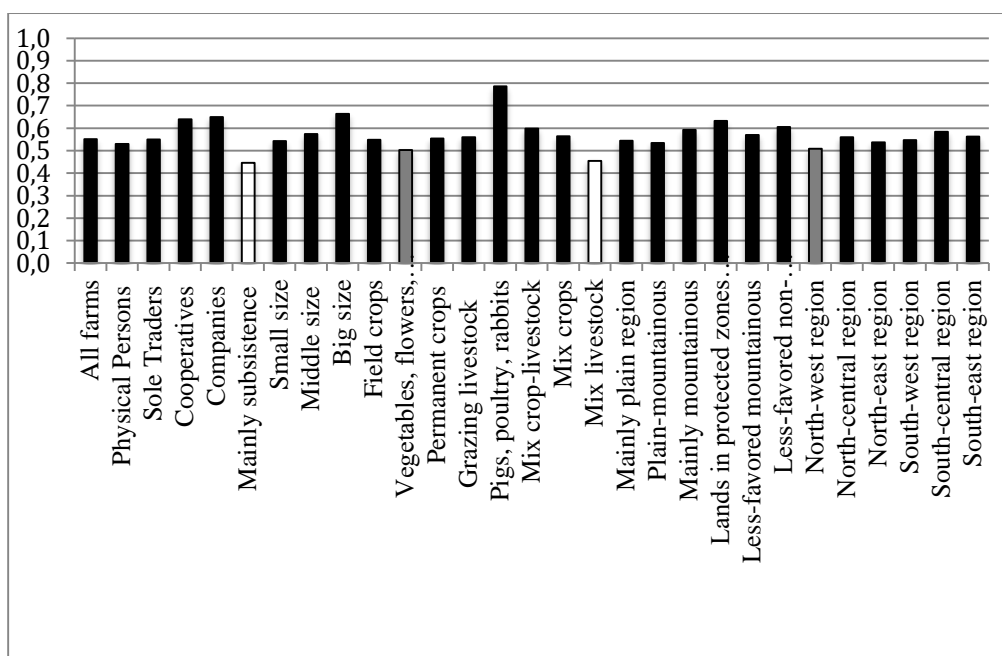
Note: **I1-Level of Adaptability to Market Environment; I2-Level of Adaptability to Institutional Environment; I3-Level of Adaptability to Natural Environment; I4-Comparative Efficiency of Supply and Governance of Labor Resources; I5-Comparative Efficiency of Supply and Governance of Natural Recourses; 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.

Figure 4. Sustainability Indicators* of Bulgarian Farms

Low levels of indicators identify 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), 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 that 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 indicators show absolute and comparative advantages of Bulgarian farms related to sustainable development. At the current stage of development they 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, 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 specifying comparative sustainability of diverse type of farming enterprises (Figure 5). Only holdings Predominately for Subsistence and Mix Livestock are with a low sustainability. Economic, governance, and social sustainability of first ones are particularly low. The second group is with a low economic, environmental and governance sustainability, and a marginal social sustainability.



Source: Authors' survey

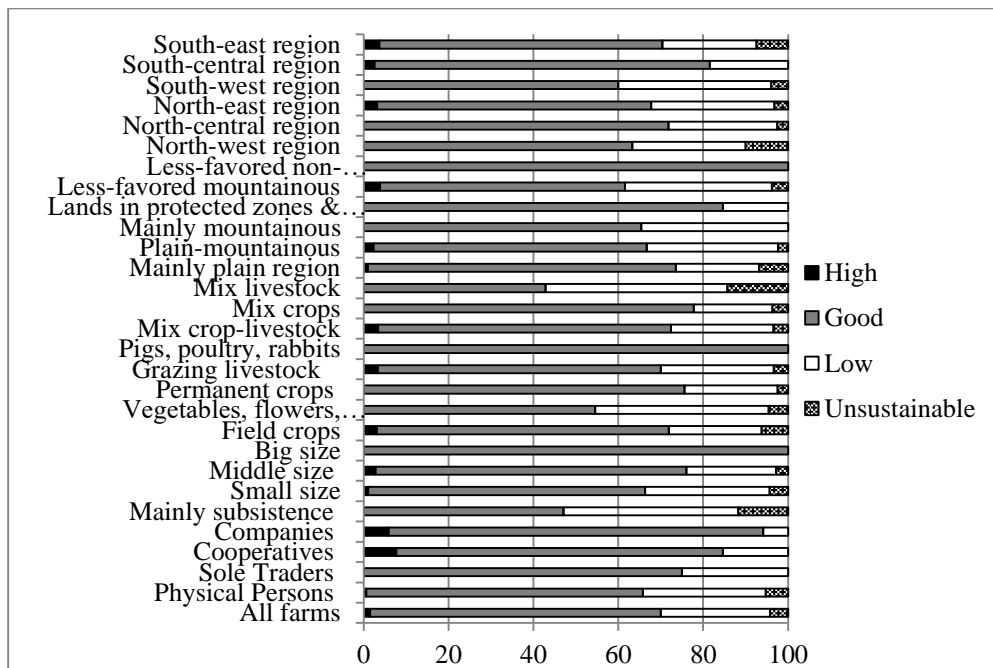
Figure 5. Sustainability of Farms of Different Type and Location in Bulgaria

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 inferior social, governance and environmental sustainability. For all these enterprises effective measures have to be undertaken for improving all aspects of sustainability.

With a low economic sustainability are also farms with a 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 economic sustainability in order to improve overall long-term sustainability. With a low social sustainability are merely farms of Sole Traders for which adequate measures are to be introduced for improvement in that direction 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 only type of farms having a high level of sustainability of a certain aspect. Farms 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 farms are at relatively low levels – accordingly for the former ones economic and social sustainability, and for the latter ones governance and economic sustainability. Other aspects of sustainability of all these categories of holdings are with relatedly low levels – accordingly for the 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 taking adequate measures to improve sustainability in aspects with critical inferior levels for these types of enterprises.



Source: Authors' survey

Figure 6. Structure of Farms with Different Sustainability in Bulgaria (percent)

4. Share of Farms with Different Levels of Sustainability

The overall and partial levels of farms' sustainability do not give a full picture about the state of sustainability of all holdings since there is a great variation in share of farms with unlike sustainability levels. The biggest portion of Bulgarian farms is with a good sustainability and only under 2% with a high sustainability (Figure 6). At the same time, 30% of all agricultural holdings in the country are with a low sustainability or unsustainable at all.

The greatest share of farms with a good and high sustainability is among Companies, following by Cooperatives, and Sole Traders, The smallest fraction of holdings with a good sustainability is among Physical Persons, where merely less than 1% is highly sustainable. Furthermore, more than a third of that holdings are with a low sustainability or unsustainable. Every fourth of Sole Traders is with a low sustainability, like 15% of Cooperatives, and only 6% of Companies.

There are also considerable differences in portions of farms with unlike sustainability depending on the size of holdings. While all farms with a Big size 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 a Small size and almost a quarter of those with Middle size are with a low sustainability or unsustainable.

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 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 one 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 and location in groups with diverse level of sustainability has to be taken into account when forecast the number and importance of holdings of every type, 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 farming structure with different sustainability level for each aspect gives important information about long-term sustainability of farms and factors for improvement. Our assessment shows that 40% of all holdings in the country are with a low governance sustainability or managerially unsustainable. 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(s), and adaptability to evolving socio-economic, institutional and natural environment is insufficient. Furthermore, 42% of all farms are with a low economic sustainability or unsustainable at all. 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 modern management and competition standards.

The biggest share of farms with a good and high governance sustainability is 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. The greatest portion of farms with a low or lack of governance sustainability are among Sole Traders (50%) and Physical Persons (45%), holdings Predominately for Subsistence (65%) and Small size (49%), specialized in Vegetables, Flowers and Mushrooms (50%), and in Plain-Mountainous Regions (48%), and 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 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 a Big size are with good economics sustainability. That proves comparative economic advantages of registered holdings and those with large scale. Relative share of farms with a good and high economic sustainability is also considerable for farms with a Middle size for the sector, specialized in Pigs, Poultry and Rabbits, Mix Crop-Livestock, Field Crops, Mix Crops, and Permanent Crops, 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%), 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 the holdings are currently economically unsustainable, which concerns almost every tenth of Physical Persons, 29% of farms with Mix-Livestock, each fifth located in North-West Region and 12% 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% located in Plain-Mountainous regions of the country. Thus, a great part of Bulgarian farms are currently with a low economic sustainability or economically unsustainable, and most likely will cease to exist in near future or 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 are with a good or high sustainability. Nevertheless, these holdings with a low social sustainability are numerous (almost 18%), and each tenth one is socially unsustainable. That demonstrates that social efficiency of holdings for farmers, communities and society and do not correspond to contemporary requirements and standards. 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 socially sustainable. 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 socially unsustainable. With the greatest fraction of low sustainable in social aspect enterprises are Sole Traders – around 38% of total number. Level of social sustainability increases along with farm size. Every third of enterprises with a Big size are with a high social sustainability, and another major segment is with a good social sustainability. Among holdings with a Middle size dominates those with a good and high social sustainability as almost each fifth is socially low sustainable or unsustainable. Contrary to traditional perception 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. According to specialization the largest share of farms with a good and high social sustainability is 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 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%). The latter 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 above holdings are with a low sustainability (accordingly 24%, 18% and 23%), as every twentieth of Physical Persons is even environmentally unsustainable. All Sole Traders are with a good level of eco-efficiency. The largest portion of farms with a good and high eco-sustainability is among holdings Predominately for Subsistence, with a Small size, 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 in Mix Crops and three-quarters in Crop-Livestock and Permanent Crops are with a good environmental sustainability. At the same time, a considerable portion of farms 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%). Share of environmentally unsustainable farms is also considerable for specialized in Permanent Crops (7%), while most low eco-sustainable are 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 holdings 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.

5. Conclusion

Suggested holistic framework gives a possibility to improve sustainability assessment and management in 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 of farms of different type, subsector of production, geographical region and ecosystem as well as 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. Improvement of the latter two is critical for maintaining sustainability of Bulgarian holdings (Bachev and Terziev, 2018). Governance and economic sustainability of 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 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 in each farm category. These figures give idea about comparative sustainability if diverse type of farms. Distribution of farms of different type in groups with diverse levels of sustainability has to be also 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.

Having in mind the importance of comprehensive assessments of sustainability of farms and 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, 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.

References

Andreoli M. and V Tellarini. (2000). Farm sustainability evaluation: methodology and practice. *Agriculture, Ecosystems & Environment*, Volume 77, Issues 1–2: 43–52.

- Bachev, H. (2017). Sustainability Level of Bulgarian Farms, *Bulgarian Journal of Agricultural Science*, 23 (1), 1-13.
- Bachev, H. (2018). *The Sustainability of Farming Enterprises in Bulgaria*, Newcastle upon Tyne: Cambridge Scholars Publishing.
- Bachev, H. and D. Terziev. (2018). A Study on Agrarian Sustainability Impact of Governance Modes in Bulgaria. *Journal of Applied Economic Sciences*, Volume XIII, Spring, 1(55), 227 – 257.
- Bachev, H. and D. Terziev. (2018). A Study on Institutional, Market and Natural Environment Impact on Agrarian Sustainability in Bulgaria, *Journal of Environmental Management and Tourism*, Volume IX, Issue 3 (27).
- Bastianoni S, N. Marchettini, M. Panzieri, E. Tiezzi (2001). Sustainability assessment of a farm in the Chianti area (Italy). *Journal of Cleaner Production*, Volume 9, Issue 4: 365–373.
- EC. (2001). *A Framework for Indicators for the Economic and Social Dimensions of Sustainable Agriculture and Rural Development*. European Commission.
- FAO. (2013). *SAFA. Sustainability Assessment of Food and Agriculture Systems Indicators*. FAO
- Fuentes M. (2004). *Farms Management Indicators Related to the Policy Dimension in the European Union*. OECD Expert Meeting on Farm Management Indicators and the Environment, 8-12 March 2004, New Zealand
- Häni F., L. Pintér and H. Herren. (2006). *Sustainable Agriculture. From Common Principles to Common Practice*, Proceedings of the first Symposium of the International Forum on Assessing Sustainability in Agriculture (INFASA), March 16, 2006, Bern, Switzerland.
- OECD (2001). *Environmental indicators for agriculture. Volume 3: Methods and Results*. OECD, Paris.
- Rigby D., P. Woodhouse· T. Young, M. Burton. (2001). Constructing a farm level indicator of sustainable agricultural practice. *Ecological Economics*, Vol. 39, Issue 3: 463–478.
- Sauvenier X., J. Valekx, N. Van Cauwenbergh, E. Wauters, H. Bachev. K.Biala, C. Bielders, V. Brouckaert, V. Garcia-Cidad, S. Goyens, M.Hermy, E. Mathijs, B.Muys, M.Vanclooster. and A.Peeters. (2005). *Framework for Assessing Sustainability Levels in Belgium Agricultural Systems – SAFE*, Belgium Science Policy, Brussels
- UN (2015): *Transforming our world: the 2030 Agenda for Sustainable Development*, United Nations Resolution A/RES/70/1 of 25 September 2015.