A Multicriteria Assessment of the Sustainability of Governing Structures in Bulgarian Agriculture

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Abstract
The issue of assessment of absolute and comparative sustainability of major governing structures in agriculture is very topical, both in academic and practical (policy and business) sense. Despite this, there are practically no assessments of the sustainability level of diverse governing structures (like unregistered holding, agri-firms, cooperatives etc.) in Bulgarian agriculture during the implementation of the European Union Common Agricultural Policy. This article applies a holistic framework and assesses the absolute and comparative sustainability of Bulgarian farming enterprises of different juridical type. Initially a new governance aspect (pillar) of farm sustainability is justified and the method of the study is presented. After that, integral, governance, economic, social, and environmental sustainability of the farms of different juridical type is assessed. Next, the structure of farms with different sustainability levels is analyzed. Finally, directions for further research and practices in sustainability assessment are suggested.

Keywords: farm sustainability, governance, economic, social, ecological aspects, Bulgaria.

JEL classification: D23, D24, Q12, Q13, Q18.

Introduction
The issue of assessment of absolute and comparative sustainability of major governing structures in agriculture both in academic and practical (policies and business) sense (Andreoli and Tellarini, 2000; Bachev, 2005, 2013, 2016; Bachev and Petters, 2005; Bachev et al., 2016; Bastianoni et al., 2001; EC, 2001; FAO, 2013; Fuentes, 2004; Häni et al., 2006; OECD, 2001; Rigby et al., 2001; Sauvenier et al., 2005; UN, 2015). Nevertheless, there are practically no assessments of the sustainability level of diverse governing structures (like unregistered holding, agri-firms, cooperatives etc.) in Bulgarian agriculture during the implementation of the European Union (EU) Common Agricultural Policy (CAP).
Despite the enormous progress in the theory and practice in that new evolving area, still there is no consensus on “what is (how to define) sustainability of farms”, “what is the relation between the farm and agrarian sustainability”, and “how to evaluate the sustainability level of farms” in a dynamic world, where hardly there is anything actually “sustainable”.

In academic publications, official documents and agricultural practices there is a clear understanding that “farms’ sustainability and viability” is a condition and an indicator for agrarian sustainability and achievement of sustainable development goals. Also it is widely accepted that in addition to “pure” production and economic dimensions, farm sustainability has broader social and ecological aspects, which are equally important and have to be taken into account when measure the overall sustainability level. There are suggested and used numerous indicators for assessing agrarian sustainability at “farm level” and diverse approaches for their integration and interpretation (Sauvenier et al., 2005).

However, most of the assessments of agricultural sustainability are at the industry, national or international level (EU, 2001; FAO, 2013; OECD, 2001), while the important “farm level” is usually missing. Simultaneously, there are many systems putting individual “parcel” as the lowest level for sustainability assessment. Consequently, the important links between sustainability governance and sustainability levels are not properly studied (Bachev, 2010), neither relations between farm management and impacts on agro-ecosystems and their sustainability are clarified (Sauvenier et al., 2005).

Besides, often the estimates of farms sustainability and agrarian sustainability unjustifiably are equalized. Agrarian sustainability has larger dimensions and in addition to the sustainability of certain type of farms (“family”, “cooperative”, “community” etc. farms) includes: the importance of individual (type of) farms in the overall resources management and the socio-economic life of households, region and industry; and the collective actions of diverse agrarian agents; and the overall (agrarian) utilization of resources and the impacts on natural environment; and the amelioration of living and working conditions of farmers and farm households; and the overall state and development of agriculture and rural households; and the (participation in) overall social governance; and the food security, and the conservation of agrarian capability, traditions, etc. (Bachev, 2016).
For example, experience around the globe shows that there are many “highly” sustainable farms little contributing to agrarian sustainability – numerous “semi-market” holdings and subsistence farms, large enterprise based on leased-in lands, public farms etc. in Bulgaria with “low” standards for environmental protection (Bachev, 2010). On the other hand, sustainable agrarian development is commonly associated with the restructuring and adaptation of farming enterprises to constantly evolving market, institutional, and natural environment. That process (pre)determines the low sustainability (non-sustainability) and the diminishing importance of farms of certain type (public, cooperative, small-scale), and the modernization of another part of them through diversification of activity, transformation of family farms into partnerships, firms, vertically-integrated forms, etc..

Furthermore, in most cases a holistic approach is not applied, and the “pure” economic (income, profitability, financial independence, etc.), “pure” production (land, livestock and labor productivity, eco-conservation technologies, etc.), “pure” ecological (eco-pressure, harmful emissions, eco-impact etc.), and “pure” social” (social responsibility, social contribution) aspects of farm development are studied (assessed) independently from one another. In most of the available frameworks for assessing sustainability level there is no hierarchical structure or systemic organization of the aspects and the components of farm sustainability, which (pre)determines the random selection of sustainability indicators.

Also the critical “governance” functions of the farm, and the costs associated with the governance (known as “transaction costs”), and the relations between different aspects of farm sustainability are mostly ignored (Bachev and Petters, 2005). Nevertheless, very often the level of the managerial (governance) efficiency and the adaptability of farm predetermine the overall level of sustainability independent from the productivity, social or ecological responsibility of activity.

Now it is broadly recognized that the farm “produces” multiple products, “private” and “public” goods such as food, rural amenities for hunting, tourism, landscape enjoyment, environmental and cultural services, habitat for wild animals and plants, biodiversity, including less desirable ones such as waste, harmful impacts, etc. Therefore, all these socio-economic and ecological functions of the farm have to be taken into account when assessing farm sustainability.
The farm is not only a major production but an important governance structure for organization (coordination) of activities and transactions in agriculture, with a great diversity of interests, preferences, goals, skills, etc. of participating agents (owners, managers, workers, etc.) (Bachev, 2004). Therefore, when assessing sustainability and efficiency of different type of farms (subsistent, member-oriented, profit-making, part-time employment, conservation, etc.) it has to be also taken into account their comparative potential in relation to the alternative market, private, public, etc. (including informal) modes of governance of agrarian activity (Bachev, 2004; Bachev and Peeters, 2005).

In each particular stage of the evolution of individual countries, communities, eco-systems, sub-sectors of agriculture and type of farms, there is a specific knowledge for the agrarian sustainability (e.g. for the links between human activity and climate change), individual and social value system (preferences for the “desirable state” and “economic value” of natural resources, biodiversity, human health, preservation of traditions, etc.), institutional structure (rights on food security and safety, good labor conditions, clean nature and biodiversity, of vulnerable groups, producers in developing countries, future generations, animal welfare, etc.), and goals of socio-economic development.

Thus, the understanding, content, and assessment of the agrarian and farm sustainability are always specific for a particular historical moment (period) of time and for a particular socio-economic, institutional and natural environment, in which a farm is functioning. For example, many otherwise “sustainable” farms in East Europe were not able to comply with the high EU standards and restrictions for product quality, safety, ecology, animal welfare, etc. and ceased to exist or entered into “unsustainable” grey sector after the accession of countries to the European Union.

Majority of suggested frameworks for sustainability assessment apply an “universal” approach for “faceless” farms, without taking into consideration the specificity of individual holdings (type, resource endowment, specialization, stage of development, etc.) and the environment in which they function (competition, institutional support and restrictions, environmental challenges and risks, etc.). What is more, usually most systems cannot be practically used by the farms and managerial bodies, since they are “difficult to understand, calculate, and monitor in everyday activity” (Hayati et al., 2010).
This article applies a holistic framework and assesses absolute and comparative sustainability of Bulgarian farms of different juridical type. First, a new governance aspect (pillar) of farm sustainability is justified and the method of the study presented. After that, integral, governance, economic, social, and environmental sustainability of the farms of different juridical type is assessed. Finally, directions for further research and practices in sustainability assessment are suggested.

**A “new” aspect of farms’ sustainability**

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

In the Traditional Economics the farm is presented as a “production structure” and analyses of efficiency is restricted to “optimization of technological factors” (“production” costs) according to marginal rule. However, this approach fails to explain a high sustainability and coexistence of numerous farms of different type (semi-market holdings, cooperatives, small commercial farms, large agri-firms, etc.) with great variation in “efficiency levels” in Bulgaria during last three decades.

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

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

Modes of governance and acceptable (for the owners, community, society) net benefits will vary according to personal preference of individual agents, entrepreneurial capability and experience, risk aversion, opportunity costs of owned resources, institutional restrictions and norms, pressure and opportunities of specific environment (competition, demand, cooperation, support, climate change), etc.

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

Next, it has to be evaluated the farm’s potential for adaptation to constantly evolving market, economic, institutional, social and natural environment through effective changes in governing forms, size, production structure, technologies, and behavior. If the farm does not have potential to stay at or adapt to new more sustainable level(s) it will diminish its comparative advantages and sustainability, and (eventually) will be liquidated or transformed into another type of organization. For instance, if a farm faces enormous difficulties meeting institutional norms and restrictions (imposed and enforced by EU new standards for quality, safety, environmental protection, animal welfare); higher social
norms and requirements (for working conditions, income level, welfare of farmers and farm households; new demands of rural communities), and taking advantage of institutional opportunities (access to public support programs); or it has serious problems supplying managerial capital (as it is in a one-person farm when an aged farmer does not have a successor wishing or capable of taking over the business), or supply of farmland (big demand of farmland by other entrepreneurs or for non-agricultural use), or funding activities (insufficient own finance, impossibility for coalition, selling equity or buying credit), or marketing output and services (changing market demand for certain products or needs of co-owners and buyers, a strong competition with imported products); or it is unable to adapt to existing environmental challenges and risks (warning, extreme climate, soil acidification, waters pollution, etc.), then it will not be sustainable despite the high historical or current efficiency. Therefore, adaptability of farm characterizes to the greatest extent the farm sustainability and has to be used as a main criteria and indicator for sustainability assessment.

**Methods of the study**

In the literature and managerial practice there are diverse approaches for defining of farm sustainability: as alternative ideology (Edwards et al.; VanLoon et al.); as a new strategy (Mirovitskaya and Ascher, 2001); as a characteristic of agrarian system – e.g. „ability for achieving multiple goals” (Brklacich et al., 1991; Hansen, 1996), “capability (potential) of the system for maintain and improve its functions” (Lopez-Ridaura et al., 2002; Lewandowski et al., 1999); as a process of understanding and adapting to changes Raman (2006), etc.

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

Therefore, sustainability characterizes the ability (capability) of a particular farming enterprise to exist in time and maintain in a long-term its governance, economic, ecological and social functions in the specific socio-economic and natural environment in which it operates and evolves (Bachev, 2016). Depending on the combination of all these
dimensions, sustainability of a particular farm could be high, good, unsatisfactory, or farm is unsustainable.

Farm sustainability has four aspects ("pillars"), which are equally important and always have to be taken into account:

- governance sustainability - to have good or high absolute and comparative efficiency in organization and management of activity and (internal and external) relations of the farm, 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 owners of the enterprise;

- economic sustainability – to have good or high productivity of deployed natural, labor, material and financial resources, sufficient ("acceptable") economic efficiency and competitiveness, and needed financial stability of activity;

- social sustainability – to have 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 lifestyle of farm households, and development of rural communities and the society as a whole;

- environmental sustainability – to have good or high eco-efficiency of activity, which is to associated with necessary conservation, recovery and improvement of components of natural environment (landscape, lands, waters, biodiversity, atmosphere, climate, ecosystem services, etc.) and the nature as a whole, respecting welfare of farm and wild animals, etc.

In this study we apply a hierarchical framework including 12 Principles, 21 Criteria, 45 Indicators and Reference Values to assess sustainability level of Bulgarian farms (Figure 1). The content, justification, modes of calculation and integration of sustainability indicators are already presented in details in our previous publication (Bachev, 2016).
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 and the major associations of agricultural producers in the country, which identified the “typical” holdings of different type and location.

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

Source: the author
Fig. 1. Framework for Assessing Sustainability of Bulgarian Farms
For classification of farms according to juridical type (Physical Person, Sole Trader, Cooperative, Company), production specialization (Field Crops, Vegetables, Flowers, and Mushrooms, Permanent Crops, Grazing Livestock, Pigs, Poultry, and Rabbits, Mix Crop-Livestock, Mix Crops, Mix Livestock), geographical and administrative regions (North-West Region, North-Central Region, North-East Region, South-West Region, South-Central Region, South-East Region), and ecological locations (Mountainous or Non-mountainous regions with Natural Handicaps, with Lands in Protected Zones and Territories) the official typology for farming holdings in the country is used. In addition, every manager self-determined his/her farm as Predominately for Subsistence, rather Small, Middle size or Large for the sector, and located mainly in Plain, Plain-mountainous or Mountainous region. The latter approach guarantees an adequate assessment since the farms managers are well aware of the specificity and comparative characteristics of their holdings in relations to others in the region and the (sub)sector.

For the integral assessment of sustainability of a farm for every Criteria, Principle, and Aspect, and Overall level, equal weights are used for each Principle in a particular Aspect, and for each Criterion in a particular Principle, and for each Indicator in a particular Criterion. Sustainability Index for individual Criteria (SI(c)), Principle (SI(p)), and Aspect (SI(a)), and Integral Sustainability Index (SI(i)) are calculated by formulas:

\[
SI(c) = \frac{\sum SI(i)}{n} \quad n \text{ – number of Indicators in a particular Criteria}
\]

\[
SI(p) = \frac{\sum SI(c)}{n} \quad n \text{ - number of Criteria in a particular Principle}
\]

\[
SI(a) = \frac{\sum SI(p)}{n} \quad n \text{ - number of Principles in a particular Aspect}
\]

\[
SI(i) = \frac{\sum SI(a)}{4}
\]

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 (MAF).

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

**Sustainability Level of Farming Structures**

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 2). 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.

![Graph showing sustainability levels](image)

Source: survey with managers of farms, 2016

Fig. 2. Indexes of Integral, Governance, Economics, Social and Environmental Sustainability of Bulgarian Farms

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 3). 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.

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 4) 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 5). 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).

Source: survey with managers of farms, 2016

Fig. 4. Level of Sustainability of Bulgarian Farms for Individual Criteria for Governance, Economics, Social and Environmental Sustainability

Fig. 5. Indicators* of Assessing Sustainability of Bulgarian Farms
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.

**Sustainability Indicators for Farms of Different Juridical Type**

There is a great variation in levels of individual sustainability indicators for farms of different juridical type (Figure 6).

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

At the same time, a number of indicators for environmental sustainability of Physical Persons are with relatively high positive positions within the good level: Nitrate and Pesticides Content in Surface and Ground Waters, Extent of Air Pollution, and Extent of Application of Good Agricultural Practices. All these advantages of Physical Persons are to be maintained and enhanced, while other indicators for eco-efficiency increased in order to preserve and increase aspect and overall sustainability of these types of holdings.
Sole Traders are with low values for governance sustainability in respect to Level of Adaptability to Natural Environment (0.37) and Comparative Efficiency of Supply and Governance of Short-term inputs (0.33), and for social sustainability in respect to their Contribution to Preservation of Rural Communities and Preservation of Traditions (by 0.33).
Simultaneously, Sole Traders have high sustainability for eco-aspects of activity in relation to Type of Manure Storage, Norm of Nitrogen Fertilization, and Extent of Application of Good Agricultural Practices, and marginal to the highest level for implementation of effective Crop Rotation. What is more, enterprises with livestock are with a high sustainability for Livestock Productivity as well as a marginal to the highest level for Extent of Respecting Animal Welfare Standards. Furthermore, many indicators for environmental sustainability of Sole Traders are with high positive values within the borders of good level: Nitrate and Pesticides Content in Surface and Ground Waters, Extent of Air Pollution, Number of Cultural Species, Soil Organic Content, Extent of Wind and Water Erosion, and application of recommended Norms of Potassium and Phosphorus Fertilization. Sole Traders are also with a high position, within the borders of a good level, for Comparative Efficiency of Supply and Governance of Long-term Inputs, Level of Labor Productivity, and Land Productivity. All that also contributes to a growth in their governance and economic sustainability.

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

On the other hand, Cooperatives are environmentally unsustainable in respect to Irrigation Rate (0,2) and with low levels for Comparative Efficiency of Supply and Governance of Short-term Inputs (0,3), Livestock Productivity (0,33), required Number of Livestock per ha (0,31), Type of Manure Storage (0,31), Extent of Respecting Animal Welfare (0,41), and Extent of Water Erosion (0,43). These parts of Cooperatives’ activity have to be considerably improved in order to increase governance, economic, environmental and integral sustainability of these enterprises.
For Companies, within the borders of a good sustainability, the highest are levels for indicators of governance sustainability: Comparative Efficiency of Supply and Governance of Labor Resources, and Comparative Efficiency of Governance of Marketing of Products and Services. In respect to economic sustainability the best levels are for Labor Productivity and Income of Enterprise, while for social sustainability for Compliance with Working Conditions Standards. For environmental suitability superior are indicators for Nitrate and Pesticides Content in Surface and Ground Waters, Extent of Air Pollution, Extent of Application of Good Agricultural Practices, efficient Crop Rotation, Number of Cultural Species, application of Norms of Nitrogen and Phosphorus Fertilization, and Extent of Preservation of Quality of Ecosystem Service.

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

In-depth Analysis of Sustainability of Major Governing Structures

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 7).

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 8). All Physical Persons with Big size for the sector and specialized in Pigs, poultry and Rabbits, and most of these in Mix Crops 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 North-West and South-Wests Regions of the country.

Source: survey with managers of farms, 2016
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 9). 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.

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 10). 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 10. Structure of Sole Traders of Various Type with Different Sustainability Level in Bulgaria (percent)](source: survey with managers of farms, 2016)
Mountainous Regions with Handicaps, and in North-Central region of the country (Figure 11). With the lowest sustainability are cooperatives located in South-West region of the country.

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 12). 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.

Source: survey with managers of farms, 2016

Fig. 12. Structure of Cooperatives of Various Type with Different Sustainability Level in Bulgaria (percent)

There are a significant specificity and variation in sustainability levels of Companies with different size, specialization and location (Figure 13). 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 14). 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.
Our survey includes “typical,” and to a certain extent “sustainable” (perspective) agricultural farms, which means that the sample sustainability level is higher than the real (average) for the country. Despite that first large-scale study on sustainability of Bulgarian farming structures, let us make some important conclusions about the level of holdings sustainability in the country, and recommendations for managerial and assessment practices.

The 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.

The overall sustainability of Bulgarian farms is at a good level, with superior levels for environmental and social sustainability, and inferior levels for governance and economic sustainability. There are great variations in the sustainability levels of farms of different juridical type 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.

Keeping 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, et cetera. 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.

References


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