Journal of
Economic and Social Thought
www.kspjournals.org
Volume 3 March 2016 Issue 1

What is Sustainability of Farms?

By Hrabrin Ianouchev BACHEV †

Abstract. This paper attempts to give answer to some important questions, on which there is no agreement among researchers, namely: "what is farm sustainability?", "what is the relation between farm and agrarian sustainability?", "which are critical factors of farms sustainability?", and "how to assess farms sustainability level". First, evolution of the "concept" of farm sustainability as alternative ideology, new strategy, system characteristics etc. is analyzed and discussed. On that base is suggested adequate definition of farm sustainability as ability of a particular farm to maintain its governance, economic, social and ecological functions in a long term. The final goal is better define farm sustainability and develop an efficient framework for assessing sustainability level of different type of farms.
Keywords. farm sustainability, governance, economic, social, ecological aspects, framework for assessment.
JEL. Q10, Q56, R33.

1. Introduction

Around the globe the issue of assessment of sustainability of agricultural farms is among the most debated by the researchers, farmers, investors, policy-makers, interest groups, and public at large (Andreoli & Tellarini, 2000; Bachev, 2005; Bachev & Petters, 2005; Bastianoni et al. 2001; FAO, 2013; Fuentes, 2004; Häni et al., 2006; OECD, 2001; Rigby et al., 2001; Sauvenier et al., 2005; UN, 1992). For instance, at the current stage of development of European agriculture the question "what is the level of sustainability of different type of farms during to present programing period of EU CAP implementation?" is very topical.

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 farm", "what is relation between the farm and the agrarian sustainability", and "how to evaluate the sustainability level of agricultural 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, the 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

† Institute of Agricultural Economics, 125 Tzarigradsko shosse Blvd, Blok 1, 1113 Sofia, Bulgaria.
. (3592) 9710014
. hbachev@yahoo.com

indicators for assessing agrarian sustainability at "farm level" and diverse approaches for their integration and interpretation.

However, most of the assessments of agricultural sustainability are at industry, national or international level (FAO, 2013; OECD, 2001), while the important "farm level" is usually missing[1]. 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 individual 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, etc. (Bachev, 2015).

For example, the 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, the sustainable agrarian development is commonly associated with the restructuring and adaptation of farms 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 (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) aspects of farm development are studies (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. 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 (Bachev, 2004; Bachev & Peeters, 2005).

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.). Therefore when assessing sustainability and efficiency of different type of farms (subsistent, member oriented, profit making, part-time employment, conservation, etc.) to take also into account their comparative potential in relation to the alternative market, private, public, etc.

[1] Concequently, the important links between the farm managment and impacts on agro-ecosystmes and their sustainability are not properly studied (Sauvenier et al., 2005).

(including informal) modes of governance of agrarian activity (Bachev, 2004; Bachev & Peeters, 2005).

Besides that the farm is a major production, it is an important governance structure for organization (coordination) of activities and transactions in agriculture, with a diversity of interests (preferences, goals) of participating agents. That requires when assessing sustainability and efficiency of different type of farms (subsistent, member oriented, profit making, part-time employment, conservation of natural environment, etc.) to take also into account their comparative potential in relation to alternative market, private, public, etc. (including informal) modes of governance of agrarian activity (Bachev, 2004; Bachev and Peeters).

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 "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.

A majority of suggested framework 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) 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 paper suggests a framework for assessing sustainability of farms in the condition of EU CAP implementation in Bulgaria. First, evolution of the "concept" of farm sustainability and the main approaches for its assessment is analyzed, and on that base an attempt is made to define more precisely the farm sustainability. After that a system of principles, criteria and indicators for assessing the level of sustainability of farms at the current stage of agrarian development in Bulgarian is proposed. The ultimate objective of this study is to assist farm management and strategies as well as agricultural policies and forms of public intervention in agriculture.

2. Sustainability as alternative ideology and new strategy

Sustainability movements of farmers and consumers initially emerged in the most developed countries (Switzerland, UK, USA etc.) as a response to concern of particular individuals and groups about negative impacts of agriculture on non-renewable resources and soil degradation, health and environmental effects of chemicals, inequity, declining food quality, decreasing number of farms, decline in

self-sufficiency, unfair income distribution, destruction of rural communities, loss of traditional values, etc. (Edwards et al., 1990). In that relation the term "sustainable agriculture"[2] is often used as an umbrella term of *"new" approaches* in comparison to the "conventional" (capital-intensive, large-scale, monoculture, etc.) farming, and includes organic, biological, alternative, ecological, low-input, natural, biodynamical, regenerative, bio-intensive, bio-controlled, ecological, conservative, precision, community supportive etc. agriculture.

After that in the concept of sustainability more topical *"social" issues* have been incorporated such as: modes of consumption and quality of life; decentralization; community and rural development; gender, intra ("North-South") and inter-generation equity; preservation of agrarian culture and heritage; improvement of nature; ethical issues like animal welfare, use of GM crop etc. (VanLoon et al., 2005).

The Rio Earth Summit addressed the *global problemof sustainable development* and adopted the Declaration of its "universal principles" (UN, 1992). They comprise: rights on healthy and productive life in harmony with nature for every individual; protecting the rights of future generation; integration of environmental, social and economic dimensions at all levels; international cooperation and partnerships; new international trade relations; application of precaution approach in respect to environment; polluter liability; environmental impact assessment; recognition of women, youth, and indigenous role and interests; peace protection, etc. In a numerous forums since that these principles have been specified, amplified and enriched. The last UN Conference on Climate Change in Paris concluded with a legally binding agreement on climate between all countries of the planet (UN, 2015).

The emergence of that *"new ideology"* has been also associated with a considerable shift of the "traditional understanding" of the development as a theory and policy. In addition to the economic growth, the later now includes a broad range of social, ethical, environment conservation etc. objectives. The modernization of the policies of EU, and diverse international organizations (World Bank, FAO, etc.), and the (national, international) Programs for Agrarian and Rural Development are confirmation of that. In the official documents the general understanding of sustainability is specified and "translated" into language of practice in the form of laws, regulations, instruction, approaches for assessment, system of "good practices" for farmers, etc.

Apart from that general (declarative) description of the sustainability, there have also appeared more "operational" definitions for sustainability. For instance, sustainability of farm is often defined as *"set of strategies"* (Mirovitskaya & Ascher, 2001). The managerial approaches that are commonly associated with it are: self-sufficiency through use of on-farm or locally available "internal" resources and know how; reduced use or elimination of soluble or synthetic fertilizers; reduced use or elimination of chemical pesticides and substituting integrated pest-management practices; increased or improved use of crop rotation for diversification, soil fertility and pest control; increase or improved use of manures and other organic materials as soil amendments; increased diversity of crop and animal species, reliance of broader set of local crops and local technologies; maintenance of crop or residue cover on the soil; reduces stocking rates for animals; employment of holistic, life-cycle etc. management of farm and resources; full pricing of agricultural inputs and charges for environmental damages, etc. Accordingly, the level of sustainability of a particular farm is measured through changes in the resources use (e.g. application of chemical

[2] The term firstly intronduced by the australian scientists Gordon McClymont (Wikipedia).

fertilizers and pesticides) and the introduction of alternative (sustainable) production methods, and their comparison with the "typical" (mass distributed) farms.

However, interpreting sustainability as "an approach of farming" is not always useful for adequate assessment of sustainability and for "guiding changes in agriculture". Firstly, strategies and "sustainable practices", which emerge in response to problems in some (developed) countries, are not always appropriate for specific conditions of other countries. For instance, a major problem in the Bulgarian farms has been insufficient and/or unbalanced compensation with chemical fertilizers of taken with yields N, K, and P; low rate of farmland utilization and irrigation; widespread application of extensive and primitive technologies (insufficient utilization of chemicals, application of too much manual labor and animal force, gravity irrigation); domination of miniature and extensive livestock holdings, etc. (Bachev, 2010). Apparently, all these problems are quite different from the negative impacts on the natural environment as a result of the over-intensification of farms in the old states of the European Union and other developed countries.

Moreover, the priorities and hierarchy of the goals in a particular country also change in time, which makes that approach unsuitable for comparing sustainability of farms in different subsectors, countries and in dynamic (in time). For instance, in EU until 1990s the food security and maximization of output was a main priority, which was replaced after that by the food quality, diversity and safety; conservation and improvement of natural environment and biodiversity; protection of farmers' income; market orientation and diversification; care for animal welfare; preservation and revitalization of rural communities, etc.

Secondly, such understanding of farm sustainability may lead to rejection of some approaches associated with modern farming but nevertheless enhancing sustainability. For example, it is well-known that biodiversity and soil fertility are preserved and improved through efficient tillage rather than "zero tillage" and bad stewardship to farmland. Application of such approaches in the past led to enormous challenges and even to loosing of the "agrarian" character of many agro-ecosystems in Bulgaria and other countries alike (Bachev, 2010). At the same time, there are many examples for "sustainable intensification" of agriculture in many countries around the world.

Third, such understanding of farm sustainability makes it impossible to evaluate the contribution of a particular strategy to sustainability since that specific approach is already used as a "criterion" for defining sustainability.

Forth, because of the limited knowledge and information during the implementation of a strategy it is likely to make errors ignoring some that enhance sustainability or promoting others that threaten (long-term) sustainability. For examples, the problems associated with the passion on "zero and minimum" tillage in in the past in Bulgaria are well-known. Similarly, many experts do not expect a "huge effect" on environmental sustainability from the "greening" of the EU CAP during the new programing period (Hendricks, 2010).

Fifth, a major shortcoming of that approach is that it totally ignores the economic dimensions (absolute and comparative efficiency of resources utilization), which are critical for determining the level of farm sustainability. It is obvious that even the most ecologically clean farm in the world would not be sustainable "for a long time" if it does not sustain itself economically.

Last but not least important, such an approach does not take into account the impact of other critical (external for the farm) factors, which eventually determine the farm sustainability, namely the institutional environment (existing public standards and restrictions), evolution of markets (level of demand for organic

products of farms), macroeconomic conditions (opening up of high paid jobs in other industries), etc. It is well known that the level of sustainability of a particular farm is quite unlike depending on the specific socio-economic and natural environment in which it functions and evolves. For instance, introduction of the support instruments of the EU CAP in Bulgaria (direct payments, export subsidies, Measures of NPARD) increased further sustainability level of large farms and cereal producers, and diminished it considerably for the small-scale holdings, livestock farms, vegetable and fruits producers (Bachev et al., 2001).

Furthermore, some negative processes associated with the agrarian sustainability in regional and global scale, could impact "positively" the sustainability of some farms in a particular region or country. Example, focusing on harmful emissions of a particular farm does not make a lot of sense in the conditions of a high overall (industrial) pollution in the region (contrary it will be a greater public tolerance toward farms polluting the environment); global worming increases productivity of certain farms in Bulgaria and other Northern countries since it improves cultivation conditions, reduces the risk of frost, allows product diversification, etc. (Bachev, 2013).

3. Sustainability as a system characteristic

Another approach characterizes sustainability of agricultural system as *"ability to satisfy a diverse set of goals through time"* (Brklacich et al., 1991; Hansen, 1996; Raman, 2006). The goals generally include: provision of adequate food (food security), economic viability, maintenance or enhancement of natural environment, some level of social welfare, etc. Numerous frameworks for sustainability assessment of farms are suggested which include ecological, economic and social aspects (Fuentes, 2004; Lopez-Ridaura, Masera, & Astier, 2002; Sauvenier et al., 2005). According to the objectives of the analysis and the possibilities for evaluation, divers and numerous indicators are used for employed resources, activities, impacts, etc.

However, usually there is a "conflict" between different qualitative goals – e.g. between increasing the yields and income from one side, and amelioration of the labor conditions (working hours, quality, safety, remuneration) and negative impact on environment from the other side. Therefore, there is a standing question *which element of the system is to be sustainable* as preference is to be given on one (some) of them on the expense of others[3]. Besides, frequently it is too difficult (expensive or practically impossible) to determine the relation between the farm's activity and the expected effects – e.g. the contribution of a particular (group of) farms to the climate change.

For resolution of the problem of "measurement" different approaches for the "integration" of indicators in "numeric", "energy", "monetary" etc. units are suggested. Nevertheless, all these "convenient" approaches are based on many assumptions associated with the transition of indicators in a single dimension, determining the relative "weight" of different goals, etc. Not rarely, the integration of indicators is based on wrong assumptions that the diverse goals are entirely interchangeable and comparable. For instance, the "negative effects form the farming activities" (environmental pollution, negative effects on human health and welfare, etc.) are evaluated in Euros and Dollars, and they are sum up with the "positive effects" (different useful farm products and services) to get the "total effect" of the farm, subsector, etc. Apparently, there is not a social consensus on

[3] By definition the agricultural production means distruction of natural «sustainability» of natural eco-systems, in particular distruction and demolition of natural biodivercity.

such "trade-offs" between the amounts of farm products and destroyed biodiversity, the number of sick or dead people etc.

Also it is wrongly interpreted that sustainability of a system is always an algebraic sum of the sustainability levels of its individual components. In fact, often the overall level of sustainability of a particular system-the farm is (pre)determined by the level of sustainability of the (critical) element with the lowest sustainability – e.g. if a farm is financially unsustainable it breaks down. Besides, it is presumed that farm sustainability is an absolute state and can only increase or decrease. Actually, "discrete" state of non-sustainability (e.g. failure, closure, outside take over) is not only feasible, but a common situation in farming around the globe.

Another weakness of the described approach is that "subjectivity" of the specification of goals link criteria for sustainability not with the farm itself but with the value of pre-set goals depending on the interests of the and/or stakeholders, the priorities of the development agencies, the standards of the analysts, the understanding of the scientist, etc.). In fact, there is a great variety of (types of) farms as well as preferences of the farmers and farm-owners – e.g. "own supply" with farm products and services; increasing the income or profit of farm households, preservation of the farm and resources for future generations, servicing communities, maximization of benefits and minimization of costs for final consumers, etc.

Besides, at lower levels of the analysis of sustainability (parcel, division, farm, and eco-system) most of the system objectives are exogenous and belong to a larger system(s). For example, satisfying the market demands less depends on product of a particular (group of) farm(s); many ecological problems appear on regional, eco-system, national, transnational or even global scale, etc.

Actually, the individual type of farms and agrarian organizations have their own "private" goals – profit, income, servicing members, subsistence, lobbying, group or public (scientific, educational, demonstration, ecological, ethical, etc.) benefits. These proper goals rarely coincide (and often are in conflict) with the goals of other systems (including the system as a whole). At the same time, the extent of achieving all these specific goals is a precondition (incentive, factor) for the sustainability of the diverse type of organizations of agrarian agents (Bachev, 2004).

Furthermore, different type of farms (individual, family, cooperative, corporative) have quite unlike internal structure as goals of individual participants not always coincide with the goals of the entire farm. While in the individual and family farm there is a "full" harmony (the owner-farmer), in more complex farms (partnership, cooperative, corporation) often there is a conflict between the individual and the collective goals ("division of ownership from farming and/or management"). For instance, in Bulgaria and around the globe there are many highly sustainable organizations with a changeable membership of the individual agents (partners, cooperative members, shareholders, etc.).

Therefore, the following question is to be answered: *sustainability for whom* in the complex social system – the entrepreneurs and the managers of the farm, the working owners of the farm, the farm households, the outside shareholders, the hired labor, the interests groups, the local communities, the society as a whole.

Last but not least important, many of described approaches for understanding and assessing sustainability do not include the essential "time" aspect. However, as rightly Hansen pointed it out: "if the idea for continuation in time is missing, then these goals are something different from sustainability" (Hansen, 1996). The assessment of the sustainability of the farm has to give idea about *future*, rather than to identify past and present states (the achievement of specific goals in a

particular moment of time). For example, the worldwide experience demonstrates that due to the bad management, inefficiency or market orientation of the cooperative and public farms many of their members leave, fail or set up more efficient (and sustainable) private structures (Bachev, 2010). Simultaneously, many farms with low sustainability in the past are currently with an increasing socio-economic and ecological sustainability as a result of the changes in the ownership, strategy, state policy and support, liberalization and globalization of economies, etc.

Another approach interprets sustainability as an "*ability (potential) of the system to maintain or improve its functions"* (Hansen, 1996; Lopez-Ridaura, Masera & Astier, 2002; Mirovitskaya & Ascher, 2001; VanLoon et al., 2005). Accordingly, initially main system attributes that influence sustainability are specified as: stability, resilience; survivability; productivity; quality of soil, water, and air; energy efficiency; wildlife habitat; self-sufficiency; quality of life; social justice, social acceptance, etc. After that, indicators for the measurement of these attributes are identified and their time trends evaluated usually for 5-10 and more years. For instance, most often for the productivity indicators such as yield, product quality, profit, income etc. are used. In the Agricultural Economics they are also widespread models for the "integral productivity" of the factors of production (land, labor, capital, innovation).

The advantage of this approach is that it links sustainability with the system itself and with its ability to function in future. It also gives an operational criterion for sustainability, which provides a basis for identifying constraints and evaluating various ways for its improvement. Besides, it is not complicated to quantitatively measure the indicators, their presentation as an index in time, and appropriate interpretation of sustainability level (decreasing, increasing, unchanged). Since trends represent an aggregate response to several determinant that eliminate the needs to devise complex (and less efficient) aggregation schemes for indicators.

Suggested methods however, have significant shortcomings, which are firstly related with wrong assumption that future state of the system can be approximated by the past trends. What is more, for newly established structures and farms without (long) history is impossible to apply that approach for assessing sustainability. However, in Bulgaria and most East European countries namely such structures dominate which emerged in the last 10-20 years.

Furthermore, the "negative" changes in certain indicators (yield, income, water and air quality, biodiversity, etc.) could be result of the "normal" processes of operation of the farm and larger systems, part of which the evaluated farm is (e.g. the fluctuation of market prices, the natural cycles of climate, the overall pollution as a result of industrial development, etc.) without being related with the evolution of sustainability of the farm. For instance, despite the environmentally friendly behavior of a particular farm, the ecological state of the farm could be worsening, if the needed "collective eco-actions" by all farms in the region are not undertaken.

In order to avoid above mentioned disadvantages, it is suggested to compare the farm indicators not in time, but with the average levels of farms in the sub-sector, region etc. However, the positive deviation from the averages not always gives a good indication for the sustainability of farms. There are many cases when all structures in a particular (sub)sectors and regions are unsustainable (dying sectors, uncompetitive productions, "polluting" environment subsectors, deserted regions, financial and economic crisis, etc.). Also there are examples for entire agro-ecosystems, of which the individual "sustainable" farms are a part, they are with a diminishing sustainability or unsustainable as a result of the negative externalities (on waters, soils, air) caused by farms in other regions and/or sectors of the

economy, the competition for resources with other industries or uses (tourism, transport, residence construction, natural parks, etc.).

In addition, an essential problem of such an approach is that it is frequently impossible to find a single measure for each attribute. The later necessitates some subjective "commensuratement" and prioritizing of the multiple indicators, which is associated with already described difficulties of other approaches for sustainability assessment.

That approach also ignores the institutional and macroeconomic dimensions, the unequal goals of different type of farms and organizations, and the comparative advantages and the complementarity of the alternative governing structures (Bachev, 2004; 2010). Namely these factors are crucial when we talk about the (assessment of) sustainability of micro-economic structures like individual and family farms, agro-firms, and agro-cooperatives.

Therefore, sustainability of the individual type of farms cannot be properly understood and assessed without analyzing their comparative production and governance potential to maintain their diverse functions in the specific socio-economic and natural environment in which they operate (Bachev, 2004; Bachev & Peeters). For instance, the high efficiency and sustainability of the small-scale holdings for the part-time employment and subsistency in Bulgaria and East Europe cannot be properly evaluated outside of the analysis of the household and the rural economy. Similarly, the high efficiency of the cooperative farms during the post-communist transition has been caused not by the superior comparative productivity comparing to the family holdings, but on the possibility to organize activities with a high dependency ("assets specificity") for members in the conditions of a great institutional and economic uncertainty[4].

As a production and management unit, the sustainability of a particular farm will be determined both from its activity and the managerial decisions (efficiency, ability for adaptation to evolving environment), *and* the changes in the external environment (market dynamics and crisis, public support and restrictions, extreme climate, etc.). The later are able to significantly improve or deteriorate the sustainability of individual farms, independent of the management decisions of the individual holdings. Example, direct subsidies from the EU have increased considerably the sustainability of many previously less sustainable Bulgarian farms (Bachev at al., 2014).

Finally, there exists no farm (individual, from a certain type) or any other system, which is sustainable "forever". Therefore, the assessment of the "sustainability" of the farm is also associated with the answer to the question *for how long – for what period of time* we are talking about?

Considering the constant evolution of the features and the concept of sustainability from one side, and the evolution of the entire agrarian system from the other side, the sustainability is increasingly perceived "as a process of understanding of changes and adaptation to these changes" (Raman). According to that new understanding, the agrarian (and farm) sustainability is always specific in time, situation, and component, and characterizes the potential of agricultural systems to exist and evolve through adaptation to and incorporation of the changes in time and space. For example, in the current stage of the development respecting the "rights" of farm livestock and wild animals ("animal welfare") is a substantial attribute of the farm sustainability.

[4] For evaluating the governance efficiency of the farms and the agrarian organisations not always are appropriate the quantitative indicators, but it is also necessary a profound qualitative (comparative, discrete, structural) analisis (Bachev, 2004; 2011).

Moreover, the incorporated internal dynamisms of the system also implies an "end life" (there is no system which is sustainable forever) as a particular agrarian system is considered to be sustainable if it achieves (realizes) its "expected lifespan". For instance, if due to the augmentation of the income of the farm households the number of subsistence and part-time farms is decreasing while the agrarian resources and effectively transferred to other (novel, larger) structures, this process should not be associated with a negative change in the sustainability of farms in the region or subsector. On the other hand, if a particular farm is not able to adapt to the dynamic economic, institutional and climate changes through adequate modernization in technology, product, and organization, it is to be evaluated as low sustainable.

The characterization of sustainability has to be "system-oriented" while the system is to be clearly specified, including its time and spatial boundaries, components, functions, goals, and importance in the hierarchy. That implies taking into account the diverse functions of the agricultural farms at the current stage of development as well as the type and efficiency of the farm, and its links (importance, dependency, complementarity) with the sustainability (economy) of the households, the agrarian organizations, the region, the eco-system and the entire sectors (industry).

It has to reflect both the internal capability of the farm to function and adapt as well as the external impact of constantly evolving socio-economic and natural environment on the operation of individual farm. However, it is to be well distinguished the features of relatively independent systems – e.g. while the "satisfaction from farming activity" is an important social attribute of the farm sustainability, the modernization of social infrastructure and services on rural areas is merely a prerequisite (factor) for the long-term sustainability of the individual farm.

Furthermore, the sustainability approach is to allow a comparative analysis of the diverse agricultural systems – e.g. farms of different type and kind in the country, farms in different countries, etc. Thus all approaches, which associate comparability only with the "continues (quantitative) rather than discrete property" of a system (Hansen, 1996; Sauvenier et al., 2005) are to be rejected. In fact, there is no reason to believe that the sustainability of an agricultural system could only increase or decrease. Discrete features ("sustainable"-"non-sustainable") are possible, and of importance for the farm managers, interests groups, policy makers (Bachev & Peeters, 2005).

Characterization of the sustainability must also be predictive since it deals with future changes rather than the past and only the present. And finally, it should be diagnostic, and to *focus intervention* by identifying and prioritizing constraints, testing hypothesis, and permitting assessments in a comprehensive way.

In addition, the sustainability has to be a criterion for the guiding changes in policies, and farming and consumption practices, agents' behavior, for focusing of research and development priorities, etc. In that sense, analysis of the levels and the factors of "historical" sustainability of farms (the "achieved level of sustainability") in a region, subsector, other countries, etc. are extremely useful for the theory and practice. The assessments of the past states help us both to precise the approach and the system and importance of sustainability indicators as well as identify critical factors and trends of the sustainability level of farms. On the later base, efficient measures could be undertaken by the managers, state authority, stakeholders etc. for increasing the current and the future level through education, direct support, innovation, restructuring, partnerships, etc.

Finally, sustainability is to allow facile and rapid diagnostic, and possibility for intervention through identification and prioritizing of restrictions, testing

hypothesis, and giving possibility for comprehensive assessments. The later suggests that it is easy to understand and practical to use by agents without evaluation to require huge costs (economic "justification" of undertaking assessment or increasing the precision).

Accordingly it is to be worked out a system of adequate principles, criteria, and indicators for assessing the individual aspects and the overall level of sustainability of the farms in the specific conditions of each country, particular subsector, region, ecosystem, etc. Each of the elements of such a hierarchical system is to meet certain conditions (criteria) like: discriminating power in time and space, analytical soundness, measurability, transparency, policy relevance, transferability for all type of farms, relevance to sustainability issue, etc. (Sauvenier et al., 2005).

For instance, in Bulgaria, like in many other countries, there is no such an "issue" nor any institutional restrictions (norms) exists, and when an assessment of the farm sustainability is performed it is not important to include the "contribution" to the greenhouse gas emission of the livestock and machineries[5]. At the same time, the number of animals on unit of farmland is of critical importance since the underutilization or over-exploitation of pastures as well as the mode of storing and utilization of the manure is critical for the sustainable exploitation of natural resources in the country.

We think that definition of the sustainability of the farm has to be based on "literal" meaning of that term and perceived as a system characteristics and "ability to continue through time". It has to characterize the major aspects of the activity of a farm, which is to be *manageriallysustainable*, and *economically sustainable*, and *ecologically sustainable*, and *social sustainable* (Figure 1).

Therefore, the farm sustainability characterized the ability (internal potential, incentives, comparative advantages, importance, efficiency) of a particular farm to maintain its governance, economic, ecological and social functions in a long-term.

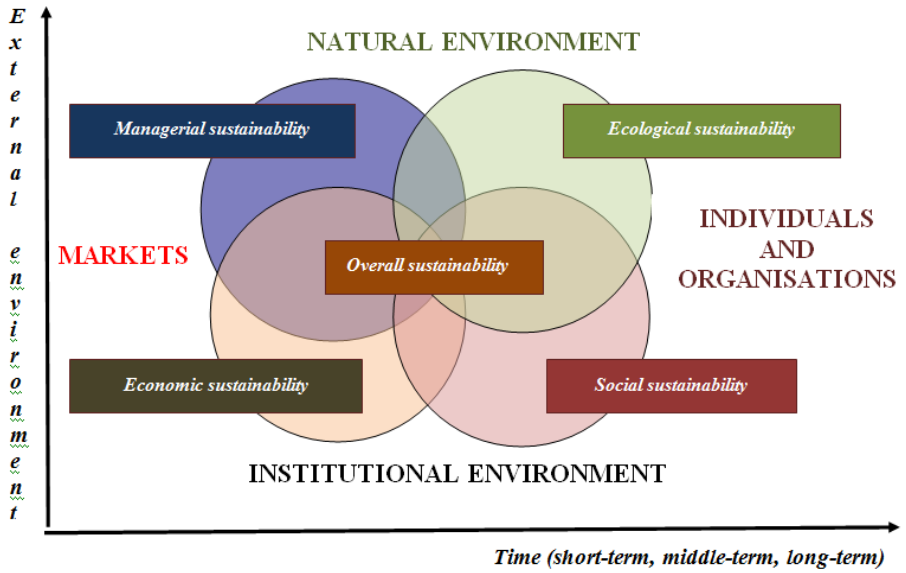

Figure 1. *Sustainability of Farm*

A farm is sustainable if:

- it has a good *governance efficiency* – that is to say it is a preferable for the farmers (owners) form and has the same or greater potential for governing of

[5] Despite the fact that they are a major source of emmissions in the sector (EEA).

activities and transactions comparing to other farms or economic organizations (Bachev, 2004);

- it is *economically viable* and efficient – that is to say it allows acceptable economic return on used resources and a financial stability of the enterprise;
- it is *socially responsible* in relation to farmers, hired labor, other agents, communities, consumers and society, that is to say it contributes toward improvement of welfare and living standards of the farmer and rural households, preservation of agrarian resources and traditions, and sustainable development of rural communities and the society as a whole;
- it is *environmentally friendly* – that is to say its activity is also associated with the conservation, recovery and improvement of the components of natural environment (lands, waters, biodiversity, atmosphere, climate, ecosystem etc.) and the nature as a whole, animal welfare, etc.

Depending on the combination of all four dimensions, the sustainability of a particular farm could be *high*, *good*, *unsatisfactory*, or the farm is *unsustainable*. For instance, the farm may have high governance and economic sustainability, and a low ecological and social sustainability. Nevertheless, in any case, the low or lack of sustainability of the farm in any of the four aspects (pre)determines the overall level of farm sustainability – e.g. inferior governance efficiency means a low overall sustainability of the farm.

The level of sustainability of the farm is to be evaluated in a *short-term* (the programing period), a *midterm* (the current generation of farmers) and a *long-term* (the next generation) scales.

The assessment of the sustainability of the farms has to be always made in the specific socio-economic, ecological, etc. rather than an unrealistic (desirable, "normative", ideal) context. In that sense, the employment of any "Nirvana approach" for determining the criteria for the sustainability (not related to the specific environment of the farm "scientific" norms of agro-techniques; a model of farming in other regions or countries; assumptions of perfectly defined and enforced property rights and institutional restrictions; an effectively working state administration; a situation without missing markets and public interventions, etc.) is not correct.

Taking into account of the external socio-economic and natural factors let also identify the major factors, which contribute to the sustainability of a particular farm – e.g. competitiveness, adaptability, evolution of farmers and agrarian organizations, access to public programs, level of state support, institutional environment, extreme climate, plant and livestock diseases, etc.

In a long-term there exists no economic organization if it is not efficient otherwise it would be replaced by more efficient organization (Bachev, 2004). Therefore, the problem of assessment of the sustainability of the farms is directly related to the assessment of the levels of governance, production and ecological efficiency of farms.

Next, it has to be estimated the potential of the farm for adaptation to the evolving market, economic, institutional, 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 efficiency and sustainability, and eventually would be either liquidated or transformed into another type of organization.

For instance, if a particular farm faces enormous difficulties meeting institutional norms and restrictions (new quality and environmental standards of EU; higher social norms; new demands of rural communities, etc.) and taking advantage from the 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), or supply of needed farmland (big demand for land from other entrepreneurs or for non-agricultural use), or funding activities (insufficient own finance, impossibility to sell equity or buy credit), or marketing output and services (changing demand for certain products or needs of cooperative members, strong competition with imported products); or it is not able to adapt to existing ecological challenges and risks (warning, extreme climate, soils acidification, water pollution, etc.), then it would not be sustainable despite the high historical or current efficiency. Therefore, *adaptability of farm* characterizes to a greater extend the farm sustainability and has to be used as a main criteria and indicator for its assessment.

5. Conclusion

Studying out the farm as a governance (rather than merely as a production) structure becomes a key for understanding the farm sustainability. Accordingly farm sustainability is to incorporate one new important dimension – the governance efficiency and adaptability. In order to access sustainability level of different farms it is necessary to include that new criteria and appropriate indicators for its measurement and analysis. The later would require a new type of microeconomic data on agent's preferences, transaction costs, institutional environment, etc. In a next publication we will suggest such a framework for assessing farm sustainability. The final goal is not only better define farm sustainability but develop an efficient and practically usable framework for assessing sustainability level of different type of farms.

References

Andreoli, M., & Tellarini, V.V. (2000). Farm sustainability evaluation: methodology and practice, *Agriculture, Ecosystems & Environment*, 77(1-2), 43–52. doi. 10.1016/S0167-8809(99)00091-2

Bachev, H. (2005). *Assessment of Sustainability of Bulgarian Farms, proceedings*, XIth Congress of the European Association of Agricultural Economists, Copenhagen.

Bachev, H. (2004). *Efficiency of Agrarian Organizations, in Farm Management and Rural Planning*, No 5, Kyushu University, Fukuoka, 135-150.

Bachev, H. (2010). *Governance of Agrarian Sustainability*, New York: Nova Science Publishers.

Bachev, H. (2011). Needs, modes and efficiency of economic organizations and public interventions in agriculture, *Review of Economics & Finance*, 3, 89-103.

Bachev, H. (2013). Risk management in agri-food sector, *Contemporary Economics*, 7(1), 45-62. doi. 10.5709/ce.1897-9254.73

Bachev, H., & Peeters, A. (2005). *Framework for Assessing Sustainability of Farms, in Farm Management and Rural Planning*, No 6, Kyushu University, Fukuoka, 221-239.

Bachev, H., Koteva, N., & Mladenova, M. (2014). The effects of implementing European policies in agricultiral holdings in the republic of Bulgaria, *Economics* 21, 4(1), 90-106.

Bastianoni, S., Marchettini, N., Panzieri, M., & Tiezzi, E. (2001). Sustainability assessment of a farm in the Chianti area (Italy), *Journal of Cleaner Production*, 9(4), 365–373. doi. 10.1016/S0959-6526(00)00079-2

Brklacich, M., Bryant, C., & Smith, B. (1991). Review and appraisal of concept of sustainable food production systems, *Environmental Management*, 15(1), 1-14. doi. 10.1007/BF02393834

EC, (2001). *A Framework for Indicators for the Economic and Social Dimensions of Sustainable Agriculture and Rural Development*, European Commission.

Edwards, C., Lal, R., Madden, P., Miller, R., & House, G. (1990). *Sustainable Agricultural Systems, Soil and Water Conservation Society*, Iowa.

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., Pintér, L., & Herren, H. (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.

Hansen, J. (1996). Is Agricultural Sustainability a Useful Concept, *Agricultural Systems*, 50(2), 117-143. doi. 10.1016/0308-521X(95)00011-S

Hayati, D., Ranjbar, Z., & Karami, E. (2010). Measuring Agricultural Sustainability, in E. Lichtfouse (ed.), *Biodiversity, Biofuels, Agroforestry and Conservation Agriculture*, 73, Sustainable Agriculture Reviews 5, Springer Science+Business Media B.V., 73-100.

Hendricks, N. (2010): The Effect of Green Payments on the Diffusion of Conservation Technologies, https://www.researchgate.net/publication/254384150_The_Effect_of_Green_Payments_on_the_Diffusion_of_Conservation_Technologies

Lowrance, R., Hendrix, P., & Odum, E. (1986). A hierarchical approach to sustainable agriculture, American Journal of Alternative Agriculture, 1(4), 169-173. doi. 10.1017/S0889189300001260

Lopez-Ridaura, S., Masera, O., & Astier, M. (2002). *Evaluating the Sustainability of Complex Socio-environmental Systems*. MESMIS Framework, Ecological Indicators.

Mirovitskaya, N. & Ascher, W. (2001). *Guide to Sustainable Development and Environmental Policy*, Duke University Press, London.

OECD, (2001). *Environmental indicators for agriculture*. Volume 3: Methods and Results. OECD, Paris.

Raman, S. (2006). *Agricultural Sustainability. Principles, Processes and Prospect*, New York: The Haworth Press Inc.

Rigby, D., Woodhouse, P., Young, T., & Burton, M. (2001): Constructing a farm level indicator of sustainable agricultural practice, *Ecological Economics*, 39(3), 463–478. doi. 10.1016/S0921-8009(01)00245-2

Sauvenier, X., Valekx, J., Van Cauwenbergh, N., Wauters, E., Bachev, H., Biala, K., Bielders, C., Brouckaert, V., Garcia-Cidad, V., Goyens, S., Hermy, M., Mathijs, E., Muys, B., Vanclooster, M., & Peeters, A., (2005). *Framework for Assessing Sustainability Levels in Belgium Agricultural Systems* – SAFE, Belgium Science Policy, Brussels.

UN, (1992). *Report of the United Nations Conference on Environment and Development*, 3-14 June 1992, Rio de Janeiro: United Nation.

van Loon, G., Patil, S., & Hugar, L. (2005). *Agricultural Sustainability: Strategies for Assessment*. London: SAGE Publications.