

Evaluation of social sustainability of Bulgarian agriculture

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Abstract

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Sustainable development is listed as one of the key objectives of the Millennium, and in this light, achieving sustainable agriculture is a top priority of the EU's CAP. An integral part of the sustainability model in the agricultural sector is social sustainability. Over the last decades, the importance of social sustainability has been expanding and growing, and this trend will continue in the future, making it particularly relevant for research.

The role of the individual person as part of a group or of the civil society stands out more clearly. Social sustainability is linked to ensuring greater security of farm employment; undertaking practical actions to ensure equal opportunities for individuals to develop in the field of agricultural labor; providing education for the employees on the farm; fair distribution of income; strengthening the role of the right to work regardless of gender, etc.

The purpose of the article is to present the main results and the conclusions of a scientific study on the level of social sustainability in agriculture, which is part of the scientific project "Sustainability of Agriculture in Bulgaria" (2017-2018). A methodical approach that takes into account the general concepts of social sustainability, specific features of the agricultural sector and the results of years of research by the Institute of Agricultural Economics (IAE) in this area are used. The results obtained show that social sustainability in agriculture is linked to the satisfactory level of the prevailing part of its principles.

Keywords: social sustainability; principles; criteria; indicators

Introduction

The theme of social sustainability in the context of total sustainability in agriculture is the subject of research interest by a number of authors Bachev et al. (2017); Hodgson (2002), Hansen (1996), Cornellissen, A., Jvan den Berg, W. Jkooops, M. Grossman, H.M.Udoa. (2001); Sen (1999); Bashev, H. (2006a); Bashev, H. (2006b) etc. The numerous studies and publications on social sustainability, it has been suggested that this type of sustainability is one of the most difficult areas for research. Most authors state that social dimension is often neglected because it is difficult to measure (Hani et al. (2006).

According to the Nobel Prize laureate Amartya Sen (1999) and Hodgson, N. (2002) social sustainability has five dimensions. These are the minimum number of factors that need to be considered independently of the hierarchical level when determining the social impact: equity, diversity, social cohesion, quality of life, democratic government. Around this understanding of the essence of social sustainability is united most scientists. Differences are limited to the indicators used to measure it and the subsequent calculation procedures. Hani, F., Stämpfli, A., Gerber, T., Porsche, H., Thalmann, Ch. & Studer, Ch. (2006); Bötsch & Jung (2006); Bachev et al. (2017); Velkovska (2014).

In Bulgaria, as a result of mistakes made in the implementation of the agrarian reform, there are unfavorable

consequences such as: worsening of the demographic characteristics; increasing polarization of incomes; increasing job insecurity; unfair competition etc.

In an attempt to minimize at least some of these negative effects, the problems of establishing the level of social sustainability in the industry are particularly relevant.

This article aims at presenting results and lessons learned from using Bachev et al. (2017) methodology to measure social sustainability, taking into account the specific conditions of Bulgarian agriculture.

Material and Methods

The development of a methodical approach to measuring social sustainability has taken into account the common concepts of social sustainability and, on the other hand, the peculiarities of the agricultural sector as well as the results of years of research by the Institute of Agrarian Economics (IAE) in this field. The developed and applied methodological approach is a continuation of the methodology for measuring social sustainability in the work of Bachev et al. (2017). The need for its upgrading and refinement stems from the insufficient scope of the principles, criteria and indicators that are of particular importance to our country. This does not allow a more comprehensive coverage of the many aspects of social sustainability in agriculture. Additionally, principles, criteria and indicators related to the demographic potential of the villages and the development of the agricultural labor market are included. Mainly officially published data from National Statistical Institute (NSI) has been used in the research.

The developed methodological toolkit includes a system of principles and criteria with their respective indicators that are relevant to the essential elements of social sustainability. Elements of the system for assessing social sustainability in the sector are tailored to the specific features of Bulgarian agriculture. For example, the employment potential in agriculture as an element of social sustainability can not be measured without considering the basis for its formation, more precisely quantity and quality of the demographic resource. The level and dynamics of employment in agriculture are largely determined by the changes exactly in the demographic processes. If there is a stable demographic situation, then there are good prerequisites for the formation of stable employment potential. Conversely, under conditions of unstable and strongly negative demographic processes, it is difficult to achieve a sustainable work environment. Because of the severe demographic situation in the Bulgarian villages, we have included the social basis for the formation of the labor potential in the sector as a principle.

The arguments for the inclusion of the principle “Adaptability to the social environment” when measuring social sustainability is similar to the ones mentioned above. In today’s rapidly changing technical, technological, institutional and economic conditions of work and life, inevitably the social environment to which the individual seeks the most beneficial way to adapt. The achieving of a high level of social stability in both the agricultural sector and in the villages depends largely on the ability to adapt.

Visually the included principles of social sustainability in agriculture are presented in Figure 1.

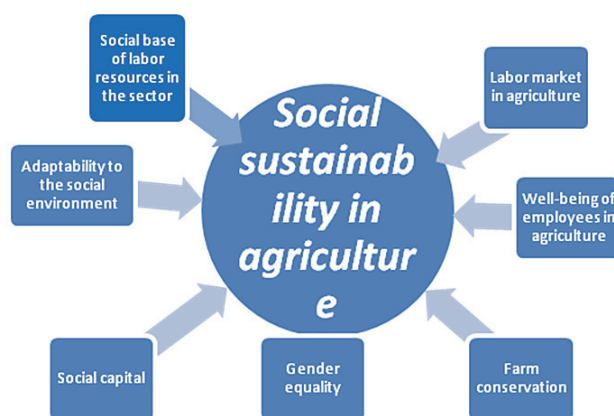


Fig. 1. Basic Principles of Social Sustainability in Agriculture

Source: Author graph

Each one of the defined principles determines different criteria and after that specific indicators for each one of these criteria are determined. In this way, it gradually moves from the more general field of research to the more specific dimension of the social sustainability. They are generally 7 principles; 17 criteria and 37 indicators used. For each indicator a reference frame is defined, within which the values of the relevant indicators are contained. The quantitative expression of this framework depends on the perceived basis of comparison of the individual indicator as well as the meaning and the essential characteristic of the index. In order to achieve greater accuracy and objectivity of the reference values it is good to determine them on the basis of expert assessment. In this work it is necessary a sufficient number of experts and specialists in the relevant field to participate.

The reference frame is presented in Table 1.

Table 1. Reference Frame of Selected Indicators for Measuring Social Sustainability in Bulgarian Agriculture

Indicators	Reference values	Indicators	Reference values
1. Total number of rural population, including by age	/	19. Relative share of persons in the previous indicator compared to the total number of employees in the agriculture	<0.10 (H) ≥ 0.50 (L)
2. Ratio of the chain index to a reduction in the total number of rural population in the last year of a selected period to the chain index of a decrease in the total number of rural population in the first year of the same period	<0.06 (H) ≥ 1 (L)	20. Comparison of the previous indicator with the same indicator in other branches	<0.25 (H) ≥ 0.75 and ≤ 1.35 (L)
3. Index of the age dependency ratio relative to the base year	<0.06 (H) >= 1 (L)	21. Relative share of the family labor force in the agriculture	<0.1 (L) ≥ 0.9 and ≤ 1 (H)
4. Total number of employees in the agriculture	/	22. Average age of the managers in the agriculture	<35 (H) ≥ 65 (L)
5. Employment rate in the agriculture	/	23. Share of managers with secondary and higher education	<0.06 (L) ≥ 0.9 and ≤ 1 (H)
6. Index of change of the employment rate relative to the base year	<0.25 (L) ≤ 1 (H)	24. Number of farm courses conducted by the NAAS	/
7. Structure of employed in the agriculture by age	15-24 25-34 35-44 45-54 ≥ 55	25. Output (share) of farmers in NAAS training courses	<0.06 (L) ≥ 0.9 and ≤ 1 (H)
8. Integral coefficient of changes in the age structure of the employed in agriculture compared to the base year	<0.06 (L) ≥ 0.9 and ≤ 1 (H)	26. The share of women managers of farms	<0.1 (L) ≥ 0.9 and <1 (H)
9. Number of leased persons in the agriculture	/	27. Relation of the salary received by women to the salary received by men	<0.05 (L) ≥ 0.9 and ≤ 1.5 (H)
10. Relative share of the leased persons to the total number of employees	<0.25 (L) ≥ 0.9 and <1 (H)	28. Relation to the number of leased women in the number of leased men in the agriculture	<2 and > 1 (L) = 1 (H)
11. Ratio of the previous indicator to the one-tier indicator in other branches	<0.25 (L) ≤ 1.35 (H)	29. Number of branch organizations operating in the agriculture	/
12. Coefficient of turnover (KT)	<0.25 (H) ≥ 0.75 (L)	30. Index of changes in the number of branch organizations per base year	<1 (L) and ≥ 2.5 (H)
13. Index of change of KT relative to the base year	<0.25 (H) ≥ 0.75 and ≤ 1.5 (L)	31. Share of farmers members in branch organizations	<0.1 (L) ≥ 0.9 and ≤ 1 (H)
14. Ratio of KT in the in agriculture to KT. in other branches	<0.25 (H) ≥ 0.75 and ≤ 1.5 (L)	32. Index of the activities carried out by the branch organizations compared to the base year	<0.1 (L) and ≥ 1.2 (H)
15. Average annual salary in the agriculture	/	33. Representatives of farmers in state and local authorities	<0.1 (L) ≥ 0.9 and <1 (H)
16. The ratio of the average annual salary in the agriculture to that in other branches	<0.25 (L) ≥ 0.75 and ≤ 1.5 (H)	34. Number of farmers participating in local action groups (LAG) and other localities	<0.1 (L) ≥ 0.9 and <1 (H)
17. Payment of labor per working hour	/	35. Index of displacements from villages relative to base year	<0.06 (H) ≥ 1.5 (L)
18. Number of persons exposed to risk factors on physical health	/	36. Index of change in the unemployment rate compared to the base year	<0.06 (H) ≥ 1.5 (L)
		37. Relation of the coefficient of unemployment in the villages to the unemployment coefficient in the cities	<0.3 (H) ≥ 2 (L)

Source: Author's table

The calculation procedure for determining the appropriate measures is based on the following equations:

$$M_{p,i} = I(\mathcal{I})|01, \quad (1)$$

where $M_{p,i}$ is the measure of i^{th} indicator whose value has previously brought to the unit metric scale;

$$M_{kp,(j,i)} = (\sum_{i=1}^k w_i \cdot M_{p,i}) / \sum w_i, \quad (2)$$

where $M_{kp,(j,i)}$ is the measure of the j^{th} criterion, which includes measures of k number of indicators; w_i is a weighting factor which expresses the significance of i^{th} indicator for the criterion j ;

$$M_{pr(i)} = (\sum_{j=1}^s w_j \cdot M_{kp,j}) / \sum w_j, \quad (3)$$

where $M_{pr(i)}$ is the measure of the l^{th} principle which contains measurements of s numbers of criteria; w_j – represents a weighting factor which expresses the significance of j^{th} criteria for principle l ;

$$(4) M_{SS} = (\sum_{i=1}^n w_i \cdot M_{pr(i)}) / \sum w_i, \quad (4)$$

where M_{SS} is a general measure of social sustainability; w_i – a weighting factor to the significance of l^{th} principle in the total measure.

The values of the weighting factors in the above formulas, which are calculated measures of criteria, principles and overall measure of social sustainability are moving in the range of 0 to 1. The significance of each indicator, criteria and principle can be presented by a specific numeric expression within these limits. The comparison of the relevant elements in groups of indicators, criteria and principles and deciding the degree of significance of each one of them is a very complex task, inevitably accompanied by a certain amount of subjectivity. Therefore, it is advisable to use methodological tools that are considered independent to a certain extent and the results obtained from their application should be as objective as possible. Such tools are, for example, the various methods in image recognition theory. This requires a sufficient volume of empirical information of the values of the relevant indicators collected from the units of the same large sample (more than 100).

At present, it is accepted that all indicators, criteria and principles are equivalent to each other in terms of their significance and respectively with equal weighting ratios equal to 1.

Results and Discussion

The results obtained from the use of methodological tools for complex measuring of the social sustainability in agricultural are presented in Figure 2. By using the same weights

in the formula to determine the values of the principles, 6 of the 7 principles are obtained with satisfactory sustainability. This basically forms a complete picture of the social sustainability in agriculture.

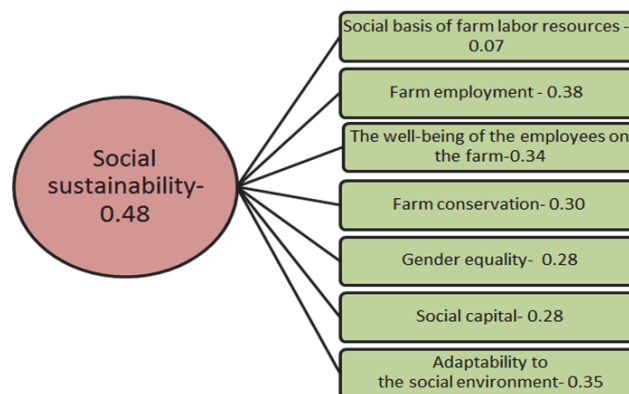


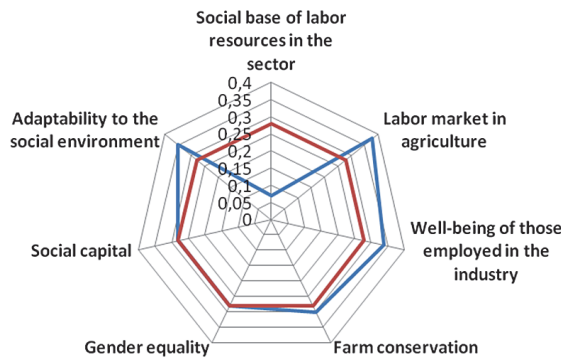
Fig. 2. Complex assessment of social sustainability in agriculture and values of its constituent principles

Source: Author graph

Analysis of the data presented in the diagram above shows a satisfactory level of the social sustainability. The complex estimate of 0.48 is possibly one of the lowest values for this category in the single measurement scale. This shows that the social sustainability in agriculture is almost on the “edge” between unsatisfactory and satisfactory assessment. In certain circumstances, it can very easily be with a lower level of qualification.

Decomposing the overall assessment of the social sustainability of its constituent principles outlines those of them that deviate most from its value. This applies with full force to the principle “Social base of labor resources in the sector” respectively, the criteria “demographic potential”, whose value amounts only to 0.07. This is mainly due to the permanent decline in the total number of rural population. It is measured by the chain index whose value remains constant and equals 0.98 (for 2016 compared to 2015 and 2010 compared to 2009). An additional negative impact has the process of the continuing deterioration of the age structure of the population in the villages. It is measured by the index “the age dependency ratio”, whose value in 2016 compared to 2010 amounts to 1.06. It can be concluded that the demographic crisis in the villages, which has been going on for decades, is one of the key factors which determines the final, not very satisfactory, outcome of social sustainability in the sector.

The extent to which the different principles deviate from the general assessment of social sustainability can be seen in Figure 3.



— Evaluation of farmer's social sustainability in permanent crops

Fig. 3. Value of the complex assessment of social sustainability in agriculture and values of its respective principles measured in the single scale

Source: Author graph

The coefficient of variation (98%) shows the existence of significant differences between the different principles. In fact, the greatest contribution to this result is the first principle related to the available human potential in the villages as a basis for the formation of labor resources in the sector. For the other principles, the coefficient of variation is 12.6%, indicating a significant decrease in the differences between these principles.

The values of all the principles except „Social base of labor resources in the sector“, „Gender equality“ and „Social capital“ are satisfactory. The last two principles have an equally low degree of sustainability equal to 0.28.

From the principles with satisfactory sustainability the one with the highest value is „Labor market in agriculture“, which reaches 0.38. The comparatively better state of the agricultural labor market is due to the fact that in recent years the total employment in the sector has increased. The index of the change in the employment rate in 2016 compared to 2010 is equal to 1.127. Positive moment in the development of the labor market in agriculture in the period 2010-2016 is the increase of total employment. In general, the turnover in agriculture is relatively good, which reflects to the value of the labor mobility criterion, calculated at 0.49. Obviously, this criterion is at the boundary between satisfactory and good level of sustainability. The values of the criteria included in the relevant principles are shown in Figure 4.

The sustainability in 9 of the criterias is satisfactory, and in the rest it is unsatisfactory. Unsatisfactory is the stability of the following criteria: “Working conditions (mainly ergonomic)”; “Gender equality in the management of the farm and the recruitment employment”; “Professional (branch) integration” and “State of unemployment in the villages.” The information of ergonomic working conditions in the sector is based on empirical data collected by National Statistical Institute (NSI) in 2013. NSI carried out a study about the working conditions associated with the risk factors for



Fig. 4. Values of criteria to relevant principles regarding social sustainability in agriculture

Source: Author graph

physical health of employers. The research examined the following factors: Noise and vibrations; Carrying heavy loads; Chemicals, Dust, Vapors and Gases; Awkward working postures and movements; Risk of accident; Performing activities requiring a strong visual concentration (tension). According to these data, more than half of those employed in agriculture, forestry and fisheries are at risk from the said factors. Their number amounts to 63% and exceeds that of the other sectors by 24%. It is obvious that agriculture continues to be one of the sectors with the most unacceptable working conditions which makes it less attractive especially to younger people.

The unsatisfactory level of "Gender equality" in agriculture is the result of two variables: the low participation of women in governance of the agricultural sector and low rental female employment. Only 22% of all farm managers in 2016 are women. The second factor is related to the fact that hiring labor preferences in favor of men. Only 28% of all employees in 2016 agriculture are women. It can be concluded that the ability of women to successfully manage farms and their ability to fully participate in the production process are undervalued and undeservedly neglected.

The information about the criterion which is included in the principle "Social capital" is very insufficient. The required data is available only for the "Professional or also known as Branch Integration" criterion. It is estimated that the level of this criterion and respectively of the "Social capital" is satisfactory (0.28) based on the indicators: Number of branch organizations in the sector in 2018; Index of change in the number of branch organizations compared to 2013 and Share of farmers which are members of agricultural organizations. Obviously, this is one of the lowest values in the category with satisfactory level, almost approaching the group with unsatisfactory level. The conclusion is that the listed criteria of social capital now can not be used due to lack of necessary information and another suitable criteria should be used.

The last criterion with an unsatisfactory evaluation is "Acceptable unemployment in villages" and it is the second component of the principle "Adaptability to the social environment." Its value is estimated at 0.24. Although in recent years the unemployment rate in rural areas decreased by 16% in 2016 compared to 2010, the general criterion associated with the rural unemployment remains unsatisfactory. This is due to the second indicator which is used to calculate the "Acceptable unemployment in villages". It is compared with the unemployment in the town. The value of this indicator shows that rural unemployment is almost twice as high (1.97) than in urban areas, and this inevitably reflects on the unsatisfactory level of sustainability of rural unemployment.

The appraisal of "Level of territorial mobility", whose value amounts to 0.47 almost coincides with the category of good sustainability. By itself, this fact is good, which indicates to the beginnings of positive changes in the spatial movement of the rural population in recent years. Moreover, the increasingly tangible aging of the population in the villages demotivates the emigration from them. This result once again confirms the thesis that the main reason for the continuing trend of permanent decline of the rural population is connected primarily to the negative natural growth. The processes of outflow of people from the villages to the towns and abroad continue nowadays, but compared to the natural movement of the rural population, they remain in second position. The influence of "negative growth" is far greater than the influence of migrating population. For the period 2010-2016 the importance of the natural increase of demographic decline in rural areas is nearly 8 times higher than that of mechanical movement.

Conclusions

There is a satisfactory level of social sustainability, which is very close to the boundary of unsatisfactory evaluation;

Differences between the sustainability levels of all principles except for providing of a sufficient social base for the agriculture are moderate;

The appearance of social sustainability is formed by a relatively satisfactory level of the majority of its principles;

The most satisfactory assessment highlights the principle of labor market developments in the sector and, in particular, the reduction of labor mobility;

From all of the criteria concerning the social sustainability with a good level stands out only the criterion related to the preservation of the number of family farms;

The demographic principle has a very high degree of unsatisfactory sustainability;

From all of the criteria with unsatisfactory level except the demographic at the foregrounds stands out the one associated with low educational qualification status of farmers and insufficient knowledge transfer in the agricultural field;

Unsatisfactory working conditions in the sector also contribute to the low level of social agricultural sustainability;

There is a discrepancy between the ability of women to occupy leadership positions and their deserved place in the field of agricultural labor;

The available data related to the degree of development of social capital in the sector are particularly insufficient which prevents the full measure of this principle.

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