возможностей конкурентоспособности, завоевание и укрепление позиций в соответствующем сегменте рынка, минимизация расходов.

Выводы. В заключение можно выделить такие основные экономико-организационные стадии перехода к экологически чистому сельскому хозяйству:

1. Добровольный переход к экологическому хозяйствованию, сопровождаемый сложными и противоречивыми экономическими, морально-этическими и другими процессами. Стимулирование этих процессов в пользу экологического хозяйствования зависит от успешности поисков точек пересечения интересов на всех уровнях. Выявление возможностей увязки критериев экологической и экономической целесообразности при хозяйствовании, поиск путей их реализации должны быть предметом будущих добровольных решений.

2. Наблюдение за производством и переработкой сельскохозяйственной продукции, в том числе продовольствия, субъектами экологического хозяйствования, доведение аналитической информации до соответствующих органов и до самих хозяйственных субъектов. Полученные данные предполагают устойчивый характер позитивных тенденций экологического характера.

3. Документирование (сертификация), осуществляемое соответствующей инстанцией на подготовленной органом экологического наблюдения информационной базе.

4. Подтверждение соответствия стандартам экологической чистоты продовольствия и другой сельскохозяйственной продукции.

5. Присвоение национальных товарных знаков экологически чистому продовольствию и другой сельскохозяйственной продукции с целью реализации.

Список использованных источников

1. Закон Азербайджанской Республики «Об экологически чистом сельском хозяйстве». – Баку, 13 июня 2008, статья 1.

2. *Аташов Б. Х.* Национальная стратегия продовольственной безопасности / Б. Х. Аташов // Актуальные проблемы аграрной экономики : материалы научно-практич. конф. – Баку: Аз.НИИ экономики и организации сельского хозяйства, 2012. – С. 316-318.

3. *Нуриев А. Х.* Региональная политика и основы управления / А. Х. Нуриев. – Баку: «Элм», 2007. – 428 с.

Статья получена редакцией 23.02.2015 г.

*

UDS 631.1.016(474.5)

VIDA DABKIENĖ, post-graduate student*
Institute of Economics, Accounting and Finance,
Aleksandras Stulginskis University, Lithuania

Factors affecting the farm sustainability in Lithuania

Scientific problem. Agriculture plays an important role in many countries economy in terms of its potential to influence a wide range of issues that are related to sustainable development, including the economy, employment, food security, trade flows, poverty, human health, climate change, the use of natural resources (especially land and water), and biodiversity. As noted, current situation in agriculture is characterized by declining rates of growth in productivity, a decreasing share of global agricultural exports from developing countries, an increase in the use of agrochemicals, resulting in negative impacts on human health, ecosystems, and biodiversity, increasing levels of greenhouse gas emissions and, the inequitable distribution of benefits among countries and among different segments of societies within countries [17]. According to FAO [5] the family and the farm are linked, coevolve and combine economic, environmental,

* Scientific supervisor – V. Vitunskienė, doctor of economic sciences, professor.

social and cultural functions. The focus of international organisations on agricultural sustainability has prompted emergence of studies in this area and, as noted by C. Schader et al. [15], sustainable development has become one of the most frequently used frameworks for analysing the agricultural and food sector in a comprehensive and holistic way. However, as argued by M. Astier et al. [1], most formal sustainability analyses are only applied to regional, national, or global scales. Moreover, indicators used for assessment are not applicable enough to initiate changes in farms that would lead to mitigation of negative impact on natural resources by farms, improve social responsibility, etc. The most commonly-used data source for evaluation of farms economic, social and environment sustainability is farmers questionnaire, employing structured questionnaire or/and in-depth interview (e.g. X. Sauvenier et al. [14]; V. Urutyan and C. Thalman [18]; J. Jalilian [10]; etc.). Studies of this kind, however, are difficult to repeat and compare, as they are time and money intensive, involving only a small number of farms studied simultaneously. In the recent years, researchers (e.g. D. Longhitano et al. [11]; H.A.B. Van der Meulen et al. [19]; A.P. Barnes and S.G. Thomson [2]; M. Ryan et al. [13]; etc.) suggested employing the available databases as information sources, such as the EU Farm Accountancy Data Network (FADN). Analysis of literature on application of FADN data to farms sustainability assessment showed that D.B. Westbury et al. [22] emphasized the importance of this database on formation of the environmental indicators; to the contrary, M. Ryan et al. [13] narrowed the approach towards environmental assessment; S. Van Passel and M. Meul [20] did not develop the social indicators; H.A.B. Van der Meulen et al. [19], A.P. Barnes and S.G. Thompson [2] used FADN data only for a certain farming type of farms sustainability assessment; D. Longhitano et al. [11] emphasized regional context in the study.

Empirical studies on farm sustainability have been conducted in Belgium [14], Spain [8], Iran [10], the Netherlands [19], Armenia [18], Greece [4], Tuscany region in Italy [11], Scotland [2], Ireland [13] and etc. In Lithuania, farm sustainability has been analysed from the perspective of ecological farming only [3; 16].

The objectives of the article. The aim of the article is to perform factors affecting the farm sustainability in Lithuania. Objectives of the study are to frame an assessment methodology based on FADN data; to assess family farm sustainability and to reveal the relationship between calculated farm relative sustainability index and factors influencing it.

Methodology. The farm relative sustainability index (FRSI) has been developed for this study following the OECD handbook for constructing composite indicators [12]. The set of guidelines, the succession of stages and methods used are universal and applicable for analysis at micro-level. The principles of Bellagio, SMART and other indicator selection principles have been considered during formation of the set of indicators. Based on the sets of indicators and the rationale behind their selection in earlier studies of farm sustainability and the analysis of FADN variables, the final sets of indicators were identified (Table 1).

Table 1. Farm sustainability indicators and their weights based on factor analysis

Economic indicators	**FA weight**
Labour productivity: farm gross value added per annual work unit (EUR/AWU)	0.15
Capital productivity: ratio of farm gross value added (at basic price) to the capital	0.09
Land productivity: farm gross value added (at basic price) per hectare of UAA (EUR/ha)	0.16
Solvency: ratio of farm total assets to total liabilities	0.09
Farm income: family farm income per family work unit (EUR/FWU)	0.09
Fixed capital formation: investment in long-term assets per hectare of UAA (EUR/ha)	0.15
Farm diversification: ratio of revenue from other gainful activities to total farm revenue (per cent)	0.15
Farm risk management: ratio of agricultural insurance premiums (for animals, crops, technique and farm buildings) to variable costs (per cent)	0.12
Environmental indicators	
Use of chemical fertilizers: amount of chemical fertilizers per hectares of UAA (kg/ha UAA)	0.24
Use of pesticides: costs of pesticide per hectares of UAA (EUR/ha)	0.22
GHG emission: GHG emission per farm (t CO_2-eq.)	0.12
Energy intensity: ratio of cost of electricity, equipment, heating, transport fuel and oil to of farm gross value added	0.08

Extension table 1

Biodiversity in a farm: Simpson diversity index	0.07
Meadows and pastures: share of meadows and pastures (per cent of UAA)	0.06
Livestock density: livestock units per hectare of UAA (LSUs/ha)	0.12
Environment-friendly farming: organic farming, participation in agri-environmental and food quality schemes (score)	0.09
Social indicators	
Family work: ratio of family members worked hours to all worked hours on farm (per cent)	0.24
Jobs on farm: total annual hours worked on farm converted into full-time equivalents (FTE)	0.20
Wage ratio on farm: ratio of average annual wages paid for hired workers on farm to average gross annual earnings in whole economy (per cent)	0.18
Pluriactivity: income from off-farm activities (score)	0.08
Workload exceeded: annual hours worked on farm by each family member exceed 1.5 AWU (score)	0.06
Continuity of farming: risk of abandonment of agricultural activity (score).	0.12
Farmer's age: less than 35 years old, between 35 and 65 years old and 65 years and over old (score)	0.12

The min-max approach was employed to normalise the selected indicators expressed in variety dimensions for their need to be put on a common basis. In this research, FRSI has been scaled into three intervals, assuming that the closer to 1 were the values of the index and sub-indices the higher was relative sustainability of the farm:

– low sustainability score [0; 0.33], meaning that the farm is unsustainable or of low sustainability;

– medium sustainability score [0.34; 0.66] as considered to be the medium level of farm sustainability,

– high sustainability score [0.67; 1], meaning that the farm is either fairly sustainable or sustainable.

The factor analysis was used to estimate weights for selected indicators constructing sub-indices (see Table 1) and then sub-indices (economic, environmental and social) were aggregated into farm relative sustainability index, i.e. FRSI. The weights to the sub-indices are based on the triple bottom line approach of sustainability, i.e. sub-indices are weighted equally for the calculation of FRSI. (The detailed methodology for constructing family farm relative sustainability index is presented in V. Vitunskienė and V. Dabkienė [20]).

The research of family farm sustainability in Lithuania is based on survey sample composed of randomly selected 450 family farms in Lithuania in the year 2003, 2008 and 2012 and based on multivariate regression analysis, one-way ANOVA and t- test. A p value of less than 0.05 ($p<0.05$) is considered to indicate a statistically significant difference between the groups. The statistical package for social science (SPSS 21) was employed for processing and analysis of collected data.

Statement of the main results of the study. The spider diagrams presented in Figure 1 facilitates examination of the family farms relative sustainability by comparing the average values of economic, environmental and social indicators in the year 2003, 2008 and 2012. The results of the research showed that economic sustainability was low. The average values of economic sub-indices were 0.21, 0.26 and 0.30, in 2003, 2008 and in 2012, respectively. It was determined by very low average values of normalized indicators like farm diversification and farm risk management in the considered years of analysis. It can be concluded that in 2012 the economic sustainability has increased in comparison to 2003 due to better productivity, solvency and family farm income results. Established family farms relative social sustainability was medium, the average values did not differ significantly, varied from 0.50 in 2003 to 0.52 in 2008 and 2012. Analysis showed that social normalized indicators *jobs on farm* and *wage ratio on farm* average values were the lowest in the years of study. The observed values of environmental sustainability sub-indices were 0.69, 0.71 and 0.67, in 2003, 2008 and in 2012, respectively. Indicated high environmental sustainability was accompanied by lower use of chemical fertilizers, pesticides, lower GHG emission and lower livestock density on farms. It should be noted that GHG emission assessment has been based on the breed animals on the farms. GHG emissions from chemical fertilizers have not been estimated, as fertilizer quantities are currently not reported in the Lithuanian FADN. Average values of the FRSI for the years fell within the medium sustainability interval and concentrate just below its middle (i.e. 0.46 and 0.49, in 2003 and 2008, 2012, respectively).

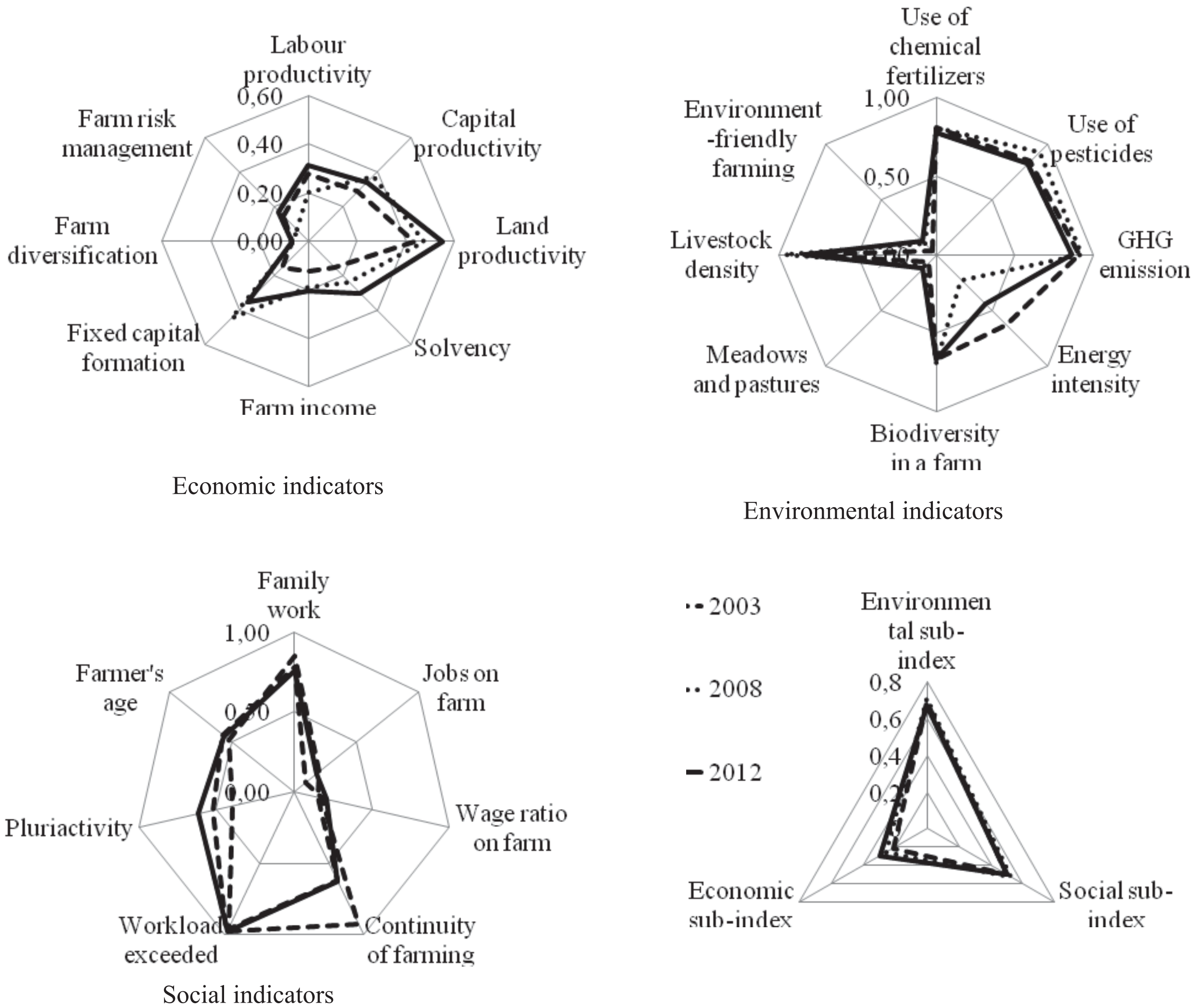

Figure 1. Family farm sustainability results in 2003, 2008 and 2012

The multivariate regression analysis was chosen to analyse the relationship between calculated FRSI and relevant variables as it is provided in OECD [12] guidelines. Family farm FADN database in 2012 was employed for the multivariate regression model. Here the dependent variable was FRSI, while as independent variables were chosen related to family farm: (i) *social aspects* (farmer's age, family annual work units per ha UAA, hired labour annual work units per ha UAA); (ii) *environmental aspects* (the amount (kg) of chemical fertilizers per ha UAA, costs of pesticide, thousand EUR/ha UAA); (iii) *economic aspects* (production-linked payments, thousand EUR/ha UAA), agro-environmental payments, thousand EUR/ha UAA, income from sales of agricultural products, thousand EUR/ha UAA); (iv) farm structural characteristic (farm size ha UAA). Farm size as independent variable was included due to ambiguous results in farm sustainability studies. D.B. Westbury et al. [22] estimated the significant effect of farm size on the environmental performance of lowland livestock holdings in United Kingdom. This supports H.A.B. Van der Meulen et al. [19] who also found significant effect of farm size on dairy farms in Netherlands. The results revealed that large–scale dairy farms had a higher labour productivity and net farm income, lower solvency ratio and higher pesticide use. While a farm size had no effect on nitrogen use, energy use and GHG emission in dairy farms. Though G. Herzog et al. [9] concluded that no relationship exists between farm intensity and farm size (cited in D.B. Westbury et al. [22, p. 908). As well, T. Dantsis et al. [4] indicated economic sustainability of farms was not determined by bigger holding size. J.A. Gomez-Limon and L. Riesgo [7] explored farm sustainability in Spain and concluded that small to medium-sized holdings and sowing higher value-added crops ran most sustainable farms. J.A. Gomez-Limon and G. Sanchez-Fernandez [8] employed double censored Tobit regression analysis to investigate the factors determining farm sustainability and stated that farm sustainability increases as the area of the farm increases. The authors the greater sustainability of large farms explained by: (i) the existence of economies of scale in agricultural production, which makes for more efficient production and thus, greater economic sustainability; (ii) the generation of sufficient income to permit the continuity of agricultural activity among farm owners (greater social sustainability); and (iii) higher generation of environmental benefits (large farms are better able to implement techniques that allow them to cut costs and that are ecologically compatible, they can develop a more diversified and extensive range of agricultural products, in view of the need to spread the work-load over the year and they can participate to a greater extent in agro-environmental programmes) [8].

Pearson's correlation coefficients of independent and dependent variables revealed that interaction between FRSI and family farm size (ha UAA) was not significant (p=0.590, p>0.05), therefore the size of farm was excluded from regression model. The strong relationship (correlation coefficient equal to 0.85) between *use of chemical fertilizers kg per ha UAA* and *costs of pesticide thousand EUR per ha UAA* was estimated. To avoid the multicollinearity these two variables were transformed *into costs of chemical fertilizers and pesticides thousand EUR per ha UAA*. Evaluated regression model is statistically important and significant (R^2 > 0.20=0.669). Regression analysis results are presented in Table 2.

Table 2. Multivariate regression analysis results

Independent variables	Unstandardized β coefficient	Standardized β coefficient	Sig. (p value)	VIF
Constant	0.535	-	0.000	-
Farmer's age	-0.001	-0.297	0.000	1.046
Family AWU/ha UAA	-0.266	-0.267	0.000	1.358
Hired labour AWU/ha UAA	-0.345	-0.143	0.004	1.760
Costs of chemical fertilizers and pesticides thou. EUR/ha UAA	-0.111	-0.468	0.000	1.897
Production –linked subsidies thou. EUR/ha UAA	-0.014	0.220	0.000	1.136
Agro-environmental payments thou. EUR/ha UAA	0.255	0.346	0.000	2.143
Sale of agricultural products thou. EUR/ha UAA	0.019	0.312	0.000	3.011

Based on observed unstandardized beta coefficient the relationship between farmer‘s age and FRSI was negative and significant. J. Jalilian [10], T. Dantsis et al. [4] and etc. emphasized the impact of farmer‘s age to farm sustainability. To disclose this impact one-way ANOVA test was employed, scaling farmer‘s age into three categories, using FADN database in 2003, 2008 and 2012 (Table 3).

Table 3. Family farms distribution according to farmer's age

Farmer‘s age category	2003	2008	2012
>35years old	50	93	84
35 ≤65 years old	371	330	337
>65 years old	29	27	29
Total	450	450	450

Table 4 shows the results of one-way ANOVA test between three categories of farmer' age and the established farm economic, environmental, social sub-indices and FRSI. The results revealed that economic and social sub-indices values were greater in farmer's age category under 35 years old and the value of environmental sub-index was determined greater in the age category of farmer's over 65 years old in 2003 and 2008. While in 2012, economic, environmental and social values were observed greater in farmer's age category under 35 years old. Such result is explained by lower use of fertilizers and pesticides, greater labour and capital productivity by younger farms owners. J.A. Gomez-Limon and G. Sanchez-Fernandez [8] indicated greater farm sustainability results by younger owners and concluded that they are less likely to abandon agriculture in the short term (greater social sustainability) and are more sensitive to ecological problems of agriculture, more actively participate in agri-environmental programmes (greater environmental sustainability. J. Jalilian [10] posits that younger farmers handle farming activities more efficiency. Moreover M. Ryan et al. [13] confirmed that better performing farms from an economic perspective tend to have a younger age profile. While D.B. Westbury et al. [22] found no differences with respect to farmers' age and farm performance in England.

Table 4. Relative farm sustainability index and sub-indices by farmer‘s age category in 2003, 2008 and 2012

Farmer‘s age category	Sub-index			Sustainability index
	Economic	Environmental	Social	
2003				
>35years old	0.22 *(0.20;0.24)*	0.69 *(0.66;0.71)*	0.54 *(0.52;0.55)*	0.47 *(0.46;0.49)*
35 ≤65 years old	0.21 *(0.21;0.22)*	0.69 *(0.68;0.70)*	0.48 *(0.47;0.49)*	0.46 *(0.45;0.46)*
>65 years old	0.19 *(0.16;0.23)*	0.73 *(0.70;0.76)*	0.37 *(0.35;0.40)*	0.43 *(0.41;0.45)*
Total	0.21 *(0.20;0.22)*	0.69 *(0.69;0.70)*	0.48 *(0.47;0.49)*	0.46 *(0.45;0.46)*
$F_{(4.444)}$	1.280	3.214	69.864	14.499
Significance	****	*	***	***
2008				
>35years old	0.28 *(0.26;0.29)*	0.71 *(0.69;0.73)*	0.58 *(0.57;0.59)*	0.52 *(0.51;0.53)*
35 ≤65 years old	0.26 *(0.25;0.27)*	0.70 *(0.69;0.71)*	0.51 *(0.50;0.52)*	0.49 *(0.48;0.49)*
>65 years old	0.24 *(0.21;0.27)*	0.75 *(0.72;0.78)*	0.42 *(0.40;0.44)*	0.47 *(0.45;0.48)*
Total	0.26 *(0.26;0.27)*	0.71 *(0.70;0.71)*	0.52 *(0.51;0.52)*	0.49 *(0.49;0.49)*
$F_{(4.444)}$	2.519	4.503	101.380	27.218
Significance	****	*	***	***
2012				
>35years old	0.29 *(0.27;0.31)*	0.71 *(0.69;0.74)*	0.56 *(0.55;0.57)*	0.51 *(0.51;0.52)*
35 ≤65 years old	0.30 *(0.29;0.31)*	0.66 *(0.65;0.68)*	0.50 *(0.49;0.50)*	0.48 *(0.48;0.49)*
>65 years old	0.27 *(0.24;0.30)*	0.68 *(0.62;0.73)*	0.40 *(0.39;0.42)*	0.45 *(0.43;0.46)*
Total	0.30 *(0.29;0.30)*	0.67 *(0.66;0.68)*	0.50 *(0.50;0.51)*	0.49 *(0.48;0.49)*
$F_{(4.444)}$	1.321	4.628	84.254	30.132
Significance	****	**	***	***

Note: 1) *p<0.05; **p<0,01; ***p<0.001; ****p>0.05; 2) Bootstrapped 95% confidence intervals based on 1.000 replications are reported in parentheses.

The results of multivariate regression indicated negative statistically significant interaction between FRSI and the other two chosen social dependent variables, i.e. *family annual work units per ha UAA* and *hired labour annual work units per ha UAA*. It can be stated that farms sustainability increases when the labour inputs are reduced. As J.A. Gomez-Limon and G. Sanchez-Fernandez [8] states, this negative interaction is caused by low productivity of labour factor. The labour inputs, in spite of its contribution to social sustainability, have a negative global effect in terms of sustainability.

Based on observed standardized beta coefficient *the costs of chemical fertilizers and pesticides thousand EUR per ha UAA* is the most effective on farm sustainability. The relationship has a negative sign and it is statistically significant. The results supports J.A. Gomez-Limon and G. Sanchez-Fernandez [8] who also indicated negative relationship as a reflection of the fact that increases in the use of these inputs translates into negative environmental effects which, in terms of evaluations of sustainability, are greater than increases the profitability obtained from their use.

Dependent variables related to farm economic aspects *production-linked payments, thousand EUR per ha UAA, agri-environmental payments, thousand EUR/ha UAA* and *income from sales of agricultural products, thousand EUR per ha UAA* are statistically significant in the multivariate regression model. The dependent variable *production –linked subsidies, thousand EUR per ha UAA* are the only one with negative sign. The other two variables have positive effect on FRSI. J.A. Gomez-Limon and G. Sanchez-Fernandez [8] found that the agri-environmental payments are the only ones that are really useful as a means of improving all three aspects (economic, environmental and social) of sustainability.

E. Ghadban et al. [6] examined the differences between organic and conventional farming systems in Lebanon and found that the components of agroecological and socio-territorial scales contributed to the better sustainability of the organic system versus the conventional one, while no significant difference was revealed under the economic scales. D.B. Westbury et al. [22] studied farm‘s environmental sustainability using FADN data concluded that participation in agri-environmental scheme was an important factor only when considered with region for arable holdings. It can be determined by not appropriate FADN data to detect the differences in environmental performance, or that scheme participation was not always associated with an enhanced environmental performance. To reveal the differences between organic and conventional farming system independent t-test was employed. Farms distribution according to farming system using FADN database in 2003, 2008 and 2012 is presented in Table 5.

Table 5. Family farms distribution according to farming system

Farming system	2003	2008	2012
Organic	20	58	69
Conventional	430	392	381
Total	450	450	450

The results of the independent t-test in Table 6 revealed that there was a statistically significant difference for organic farming system only in environmental performance. Moreover, the results of the independent t-test confirmed the results of multivariate regression analysis. The sustainability index value was greater in organic farms, i.e. participating in agri-environmental schemes was an important factor for farm sustainability. Calculated farm environmental sub-index value for conventional farms was 0.65 and 0.82 for organic farms, reached medium and high sustainability level, respectively.

Table 6. Relative farm sustainability index and sub-indices by farming system in 2003, 2008 and 2012

Farming type	Sub-indices			Sustainability index
	Economic	Environmental	Social	
2003				
Organic	0.20 *(0.16;0.24)*	0.85 *(0.83;0.87)*	0.47 *(0.44;0.50)*	0.50 *(0.48;0.52)*
Conventional	0.21 *(0.21;0.22)*	0.69 *(0.68;0.69)*	0.48 *(0.47;0.49)*	0.45 *(0.45;0.46)*
Total	0.21 *(0.21;0.22)*	0.69 *(0.68;0.69)*	0.48 *(0.47;0.49)*	0.46 *(0.45;0.46)*
t-value	-0.594	9.686	-0.533	5.498
Significance	****	***	****	***
2008				
Organic	0.28 *(0.27;0.30)*	0.83 *(0.82;0.84)*	0.53 *(0.51;0.55)*	0.54 *(0.53;0.55)*
Conventional	0.26 *(0.25;0.27)*	0.69 *(0.68;0.70)*	0.52 *(0.51;0.52)*	0.48 *(0.48;0.49)*
Total	0.26 *(0.26;0.27)*	0.71 *(0.70;0.72)*	0.52 *(0.51;0.52)*	0.49 *(0.49;0.49)*
t-value	1.405	13.772	0.978	11.105
Significance	****	***	****	***
2012				
Organic	0.29 *(0.27;0.31)*	0.82 *(0.80;0.83)*	0.50 *(0.48;052)*	0.53 *(0.52;0.54)*
Conventional	0.30 *(0.29;0.31)*	0.65 *(0.64;0.66)*	0.51 *(0.50;0.51)*	0.48 *(0.47;0.48)*
Total	0.30 *(0.29;0.31)*	0.67 *(0.66;0.69)*	0.50 *(0.50;0.51)*	0.49 *(0.48;0.49)*
t-value	-0.243	16.976	-0.427	9.726
Significance	****	***	****	***

Note: 1) *p<0.05; **p<0.01; ***p<0.001; ****p>0.05; 2) Bootstrapped 95% confidence intervals based on 1.000 replications are reported in parentheses.

The main findings of the multivariate regression revealed that farm sustainability increases when: (i) the age of farmer is lower; (ii) the family annual work units/ha UAA and hired labour annual work units/ha UAA are reduced; (iii) the costs of chemical fertilizers and pesticides are reduced; (iv) the agro-environmental payments increase; (v) the income from sales of agricultural products increases; (vi) agricultural subsidies are reduced.

Conclusions. Agriculture plays an important role in many countries economy in terms of its potential to influence a wide range of issues that are related to sustainable development. Sustainable development has become one of the most frequently used frameworks for analysing the agricultural and food sector in a comprehensive and holistic way. However, on the one hand, most of the methods to assess the sustainability of agriculture are applied at a higher level than the farm, and, on the other hand, the indicators used to assess the sustainability of a farm are not enough practical, promoting changes in the farms that reduce farms pressures on natural resources, increase social farms responsibility and so on.

References

1. *Astier M., García-Barrios L., Galvan-Miyosh, Y., Gonzalez-Esquivel C.E., Masera O.R.* (2012): Assessing the sustainability of small farmer natural resource management systems. A critical analysis of the MESMIS program (1995-2010). Ecology and Society, 17: 25.
2. *Barnes A.P., Thomson, S.G.* (2014): Measuring progress towards sustainable intensification: How far can secondary data go? Ecological Indicators, 36: 213– 220.
3. *Čiegis R.* (2009): Development of sustainable agriculture in Lithuania. Management theory and studies for rural business and infrastructure development. 16: 30-37. [in Lithuanian].
4. *Dantsis T., Douma C., Giourga Ch., Loumou A., Polychronaki E. A.* (2010): A methodological approach to assess and compare the sustainability level of agricultural plant production systems. Ecological Indicators, 10 (2): 56–263.
5. FAO (1989): Sustainable development and natural resources management. The state of food and agriculture. FAO Agricultural series, 22: 69-99.
6. *Ghadban E.* (2010): Adapting a European Sustainability Model to a local context in semi arid areas of Lebanon. In 9th European IFSA Symposium, 4 7 July 2010, Vienna.
7. *Gomez-Limon J. A., Riesgo L.* (2009): Alternative approaches to the construction of a composite indicator of agricultural sustainability: An application to irrigated agriculture in the Duero basin in Spain. Journal of Environmental Management, 90: 3345–3362.
8. *Gomez-Limon J.A., Sanchez-Fernandez G.* (2010): Empirical evaluation of agricultural sustainability using composite indicators. Ecological economics, 69: 1062-1075.
9. *Herzog, F. et al.* (2006): Assessing the intensity of temperate European agriculture at the landscape scale. European Journal of Agronomy, 24: 165-181.
10. *Jalilian J.* (2012): Sustainability assessment of wheat-sugar beet agroecosystem (Case study: Piranshahr County). International Journal of Agriculture and Crop Sciences, 4 (10): 609-615.
11. *Longhitano D., Bodini A., Povellato A., Scardera A.* (2012): Assessing farm sustainability. An application with the Italian FADN sample. 1st AIEAA Conference 'Towards a Sustainable Bio-economy: Economic Issues and Policy Challenges. Italy: Trento.
12. OECD (2008): Handbook on Constructing Composite Indicators. Methodology and user guide. Available at http://www.oecd.org/std/42495745.pdf. (accessed February 2010).
13. *Ryan M., Buckley C., Dillon E.J., Donnellan T., Hanrahan K., Hennessy T., Moran B.* (2014): The development of farm-level sustainability indicators for Ireland using the Teagasc National Farm Survey. In the 88th Annual Conference of the Agricultural Economics Society, AgroParisTech. April 9-11: Paris.
14. *Sauvenier X. et al.* (2006): Framework for Assessing Sustainability Levels in Belgian Agricultural Systems. Agriculture, Ecosystems and Environment, 120: 229-242.
15. *Schader C., Grenz J., Meier M.S., Stolze M.* (2014): Scope and precision of sustainability assessment approaches to food systems. Ecology and Society, 19: (3).
16. *Skulskis V.* (2009): Modelling the determinants of organic farming. Available at http://vddb.laba.lt/fedora/get/LT-eLABa-0001:E.02~2010~D_20101007_170447-93771/DS.005.0.01.ETD (accessed May 2010) [in Lithuanian].
17. UNEP (2012): Agriculture and the green economy. Available at: http://www.unep.ch/etb/publications/Agriculture/flyer%20UNEP%20FOAM.pdf
18. *Urutyan V., Thalmann C.* (2011): Assessing Sustainability at Farm Level using RISE Tool: Results from Armenia. In 2011 International Congress, August 30-September 2, 2011, Zurich, Switzerland (No. 114820). European Association of Agricultural Economists.
19. *Van der Meulen H.A.B., Dolman M.A., Jager J.H., Venema G.S.* (2013): The impact of farm size on sustainability of Dutch dairy farms. 19th International Farm Management Congress, SGGW, Warsaw, Poland.
20. *Van Passel S., Meul M.* (2012): Multilevel and multi-user sustainability assessment of farming systems. Environmental Impact Assessment Review, 32: 170-180.
21. *Vitunskienė V., Dabkienė V.* (2014): Comparative assessment of farm sustainability in Lithuanian regions. Economics and Management: Current Issues and Perspectives, 3 (35): 51-65 [in Lithuanian].
22. *Westbury D.B., Park J.R., Mauchline A.L., Crane R.T., Mortimer S.R.* (2011): Assessing the environmental performance of English arable and livestock holdings using data from the Farm Accountancy Data Network (FADN). Journal of Environment Management, 92: 902-909.

The article has been received 12.03.2015

* * *