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TREND OF SUSTAINABLE ECONOMIC DEVELOPMENT OF FAMILY FARMS: CASE OF LITHUANIA

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The Common Agricultural Policy post-2020 emphasizes that sustainable economic development is an important factor of family farms. Scientific problem: the trends of sustainable economic development of family farms and the recommendations for promotion of sustainability. Research aim: to provide suggestions on promotion of sustainability upon assessment of the trends of sustainable economic development of the Lithuanian family farms. Family farm sustainable economic development index has been used for identification of the trends. Nine types of sustainable economic development of family farms have been identified. Analysis of the types of sustainable economic development of Lithuanian family farms by specialization has been conducted and the causes which have determined the situation at the farms have been identified.

Key words: family farms, sustainable economic development, development index.
JEL Codes: Q12, Q14.

1. Introduction

The agriculture in the context of the development of sustainable economic development is recognized as a priority because of its importance in various areas of public life such as employment, entrepreneurship, the use and conservation of natural resources, provision with food, etc. Therefore, the promotion of sustainable economic development of farms is one of the underlying objectives of the present-day EU common agricultural policy (hereinafter – CAP). When allocating the support to the EU farms, according to J. Savickienė (2016), E. Scotti, H. Bergmann et al. (2011), J. B. Whitaker (2009), H. Bossel (2001) the renewal of farmer generations, investment opportunities of small and medium-sized farms, more efficient farming through the modernization of farms, creation of new job places on the farms and prevention of the depopulation in countryside and improvement of the quality of life in rural areas, environmental requirements, ensuring biodiversity on the farms, thus promoting the preservation of economic viability of farms, should be taken into account.

The main objective of agri-business is to produce high quality food, to anticipate increasing demand for food security and to meet the growing demand in a sustainable way so as to avoid disturbing the balance, to protect nature and to continue profitable business.

In recent decades, the interest of scientists and agricultural policy-makers in farm sustainable economic development assessment and methodology-related issues has increased. Sustainable economic development of farms is often cited in the objectives of governments, communities and farms. The assessment of trends of sustainable economic development in the objectives of governments is relevant to the allocation of support to the agriculture as well as with the view of purposeful use of support and in taking political decisions. According to A. Adelaja, K. M. Garcia et al. (2007), the persons engaged in farming, who feel responsible and are able to participate in the global economy successfully, contribute to the strengthening of rural areas, create job places in the region, improve the structure of agricultural holdings in the country, development of the competitiveness of agricultural sector and generate more income. J. Scott (2001), J. M. Argiles (2001), M. Singh, A. S. Bhillar (2009), E. Scotti, H. Bergmann et al. (2011), H. C. Vrolijk, C. De Bont et al. (2010), J. B. Whitaker (2009), N. Koleda, N. Lace (2010) accentuate the need of the assessment of the sustainable economic viability and development of farms, since the family farms take decisions related to the preservation of sustainable economic development and determination of activity perspectives. As pointed out by E. Dillon, T. Hennessy, S. Hynes (2010), recently, the number of measures and methods for the assessment of sustainable economic development of agriculture increases. One of the most frequently used methods for the research of sustainable economic development of farms is based on the indicators of sustainable economic development, but the assessment yet shows that the indicators used are not sufficiently practical and do not reflect the prospects of sustainable economic development of family farms. As H. C. Vrolijk, C. De Bont et al. (2010) pointed out the assessment of sustainable economic development of family farms is still developing and has not reached the maturity yet. We also should agree to the thoughts of M. Singh, A. S. Bhillar (2009) that when forming a comprehensive assessment of the sustainable economic development of the family farm, the aspects related to its feasibility and economic validity are essential.

This the scientific problem addressed in this research is: what are the trends of sustainable economic development of the family farm and what recommendations for promoting of sustainable economics development.

Subject of research – assessment of sustainable economic development of family farms.

Research aim: to provide suggestions on promotion of sustainability upon assessment of the trends of sustainable economic development of the Lithuanian family farms.

The above aim was accomplished by fulfilling the following research objectives*:*

- to develop a methodology for the assessment of trend in sustainable economic development of family farms;

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- to assess the tendencies of sustainable economic development in Lithuanian family farms;
- submit recommendations for recommendations for promoting of sustainable economics development.

Research methods.

The methods used to investigate the research problem include analysis and synthesis of scientific literature, deduction, induction, and other general research methods. The family farm sustainable economic development index was produced on the basis of previous scientific research, operationalization, content validation, and descriptive statistics. The data of the empiric research were interpreted by type of sustainable economic development using the method of comparative analysis. *SPSS* software was used to process the research data. The research used data from Lithuanian family farms' reports for 2013–2015.

2. Methodology for the assessment of the tendencies of sustainable economic development of family farms

In recent decades, the interest of scientists and agricultural policy-makers in farm sustainable economic development assessment and methodology-related issues has increased. Sustainable economic development of farms is often cited in the objectives of governments, communities and farms. The assessment of sustainable economic development in the objectives of governments is relevant to the allocation of support to the agriculture as well as with the view of purposeful use of support and in taking political decisions. According to A. Adelaja and K. M. Garcia et al. (2007), the persons engaged in farming, who feel responsible and are able to participate in the global economy successfully, contribute to the strengthening of rural areas, create job places in the region, improve the structure of agricultural holdings in the country, development of the competitiveness of agricultural sector and generate more income. J. Scott (2001), J. M. Argiles (2001), M. Singh and A. S. Bhillar (2009), E. Scotti and H. Bergmann et al. (2011), H. C. Vrolijk and C. De Bont et al. (2010), J. B. Whitaker (2009), N. Koledan and N. Lace (2010) accentuate the need of the assessment of the sustainable economic development of farms, since the family farms take decisions related to the preservation of economic viability and determination of activity perspectives. As pointed out by E. Dillon, T. Hennessy and S. Hynes (2010), recently, the number of measures and methods for the assessment of sustainable economic development of agriculture increases. One of the most frequently used methods for the research of sustainable economic development of farms is based on the indicators of sustainable economic development, but the assessment yet shows that the indicators used are not sufficiently practical and do not reflect the prospects of sustainable economic development of family farms. As H. C. Vrolijk and C. De Bont et al. (2010) pointed out the assessment of sustainable economic development of family farms is still developing and has not reached the maturity yet. We also should agree to the thoughts of M. Singh and A. S. Bhillar (2009) that when forming a comprehensive assessment of the sustainable economic development of the family farm, the aspects related to its feasibility and economic validity are essential.

The methodologies previously applied to assess the sustainable economic development of family farms were not suitable for taking the decisions relating to the management of farms and predicting the perspectives of the activities. The use of different interpretations of the concepts of sustainable economic development, emphasis on different priorities determines the multi – sided attitude to the assessment of sustainable economic development of farms, explains the use of different indicators and methods to determine the sustainable economic development of farms, and the assessment objectives include specific assumptions and methods.

N. Koleda and N. Lace (2010) state that the groups of sustainable economic development assessment indicators and evaluation methods developed so far were not entirely suitable for taking the management-related decisions and predicting of perspectives of activities. To assess the farm economic viability, J. M. Argiles (2001), J. Scott (2001), M. Singh and A. S. Bhillar (2009), N. Koleda and N. Lace (2009), N. Koleda and N. Lace (2010) et al. present many and various relative indicators characterizing the sustainable economic development and suggest their different classifications. Classification of indicators into groups facilitates their examination, but different authors classify the same indicators differently, as well as the number of indicators forming the groups is different. The application of the groups of relative economic indicators is the easiest way to assess the sustainable economic development of farms, but the data interpretation is difficult, because different limits of indicators are pointed out. The analysis of the groups of sustainable economic development indicators reveals two research areas. Some scientists (Scott, 2001; Long, 2012) provide the indicators for the assessment of farm sustainable economic development and justify their limits by empirical research grouping the farms into two (weak and strong) or three (weak, moderate and strong) sustainable economic development levels. Other scientists (Argiles, 2001; Belanger, 2012) confine just providing the indicators, assessing the advantages of practical application, long-term trends, comparing the indicators of family farms with the indicators of other family farms without indication of specific limits of economic farm lifecycle stages. The methods for the assessment of sustainable economic development include monitoring of the object and assessment results of its state. According to the particularity level of the information and assessment as well as the time and cost expenses corresponding it, it was determined that the methods for the assessment of sustainable economic development are suitable for the identification of individual factors of economic farm sustainable economic development and the assessment whether the farm is viable or not.

As a general rule, research of family farm sustainability assessment is based on economic indicators (Koleda, 2010; Argiles, 2001; et al). Scientists emphasise the importance of indicators in sustainability assessment. N. Koleda and N. Lace (2009) argue that an indicator is a practical instrument used to describe and simplify complex systems. According to V. Belanger, A. Vanasse et al (2012), an indicator performs three functions: it simplifies, measures and facilitates communication. J. Wu and T. Wu (2012), V. Dabkienė (2015) note that there are numerous definitions

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of indicators and point out that and indicator may be a sign, symptom or signal, however in scientific literature an indicator refers to a variable or complexly related variables, the values whereof can provide information on the conditions or trends of a system. C. Tisdell (1996) argues that farm sustainability indicators include those that provide information related to the condition and dynamics of a farm. H. Bossel (2001) observes that sustainability indicators directly and indirectly provide information about future economic development and the levels of social objectives, such as material welfare, environmental quality and natural amenities.

The main focus of this research is a methodology for designing a complex indicator for assessment of sustainable economic development of family farms that will allow farms to be grouped by economic sustainability levels (weak, moderate or strong). According to E. Scotti, H. Bergmann, R. Henke et al. (2011), a complex indicator for assessment of farm sustainability should be designed with regard to the selection criteria of the indicators it comprises. The above scientists highlighted that attention must be paid to the sustainability indicator selection principles, such as clear goals, sustainability assessment elements, issues related to the assessment process and follow-up, conservation and development. The issues related to the assessment process include such elements as openness and efficient communication. It was noted that methods and data should be generally available, they should meet users' needs and encourage decision-making by politicians and other actors. Furthermore, the desired characteristics of farm sustainability indicators must be taken into account, while J. Scott (2001), J. M. Argiles (2001) argue that indicators must be reliable, comprehensible, responsive to changes, adaptable to future information, aimed at the long term, warning and relevant to local needs, but nevertheless they must have impact in a broader context.

The process of methodology development included identification of indicator relevance criteria. The authors offered theoretical insights into family farm economic sustainability assessment and their aim was to develop a complex indicator of family farm sustainable economic development presupposing its key criteria: scientifically sound indicators, stakeholder involvement, user friendly results, and local relevance including international applicability. The assessment of farm sustainable economic development based on economic sustainability levels of a farm (weak, moderate or strong) requires uniform treatment.

Scientists point out (Tisdell, 1996; Savickienė, 2015), that the farm's total value of output to total value of input ratio is relevant for all farm levels and it indicates the state resulting from operational activities of the farm. Consequently, the selected components play an important role in analysing farm sustainable economic development by levels. C. Tisdell termed the indicator of economic efficiency (EE) the sustainability indicator.

Thus analysis of farm's total value of output to total value of input ratio performed by C. Tisdell (1996) revealed its long-term prognostic potential, which was defined as sustainability in 1996. However nowadays owing to a relatively better understanding of the sustainability concept, sustainability as a term has acquired an extended contextual meaning that goes beyond a simple total value of output to total value of input ratio. Due to this, it would make sense to replace this term in the context of this research. However there is also another no less compelling argument in support of the need to make such changes. That is the ability of the total value of output to total value of input ratio to be predictive of the future. From statistical perspective, this indicator is rather resultative than factorial because it depends on the existence of the total value of output to total value of input ratio. Furthermore, the income and costs are taken for a certain period of time, which is rather representative of a structure than dynamics. Consequently, this indicator is a retrospective relative result of a structure describing the current state of a farm rather than a long-term continuity of such state, which is called sustainability. Therefore, the operationalization method-based sustainability indicator used by C. Tisdell (1996) represents an additional variable of assets and liabilities, which reflects a long-term perspective of a farm (Savickiene, 2015).

The ratio of the family farm sustainable economic development index reflects the efforts of making money and generating assets to ensure farm sustainability in the future. The numerator of the formula is reflected by the cumulative factor (ability to create added value), while the denominator is defined by consumption factors (efforts required to create the value). The coefficient of farm economic efficiency is important for all types of farm sustainable economic development (weak, moderate and strong) and it indicates the state resulting from the operational activities of a farm (Tisdell, 1996). The farm perspectives are reflected by the assets owned by a farm that belongs to a certain sustainable economic development type. The assets of a family farm can be mortgaged/pledged or not. The pledged/mortgaged assets should ensure the economic growth of the farm, while the share of unpledged/unmortgaged assets demonstrates the farm's ability to borrow and create added value.

Accordingly, the methodology for producing a theoretical complex family farm sustainable economic development index includes the following stages:

- *firstly*, we performed analysis of family farm sustainability indicator variable assessment and determined indicators that are most commonly used in scientific literature to assess farm sustainable economic development;
- *secondly*, the selected indicator variables (total output at basic prices, costs/expenses, assets, and liabilities) were used to develop the family farm sustainable economic development index;
- *thirdly*, we proposed justification for the use of the sustainable economic development indicator variables to create the family farm sustainable economic development index.

Mathematical methods are used to test the theoretical family farm sustainable economic development index. That aims at verifying the ability of the family farm sustainable economic development index and its component – economic efficiency of a farm – to express mathematically their theoretical characteristics and establishing it as a new index of family farm sustainable economic development.

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Description of the testing process

Since the family farm sustainable economic development index has an integrated component – a farm economic efficiency coefficient – the testing is performed on two levels. The first level involves calculation of the initial family farm economic efficiency coefficient, which is integrated in the family farm sustainable economic development index, and the second level deals with calculation of the family farm sustainable economic development index. That is appropriate because both the integrated farm economic efficiency coefficient and the complex family farm sustainable economic development index, which the coefficient is integrated into, theoretically are informative and capable of providing important information regarding the economic efficiency of a family farm, reflecting the relationship between the farm's total value of output to total value of input ratio and the farm sustainable economic development index, which performs a correction function by adjusting the farm economic efficiency coefficient by means of the assessment of the farm state from the perspective of the farm assets and liabilities. Introduction of this perspective gave a theoretical possibility to set the state resulting from the operational activities of a farm apart from its ability to survive and develop, which is expressed as a complex family farm sustainable economic development index.

The methodology of family farm sustainable economic development index testing consists of four logical constructs: content validation of the family farm sustainable economic development index, methods of descriptive statistics, examination of the typological model of the family farm sustainable economic development index characteristics in Lithuanian farms, and the methodology of assessment of Lithuanian family farm characteristics and family farm assignment to a sustainable economic development type.

Stage 1. Justification of the defined content of the family farm sustainable economic development index.

The content validation was performed using three different complementary methods, which explained different aspects of the same phenomenon. The methods included: Kruskal-Wallis test, hierarchical cluster analysis, and interpretation using linear diagrams (Fig. 1).

The content validation of the constructs of the family farm sustainable economic development index and the economic efficiency coefficient was aimed to assess the content measured thereby and the range of the empiric definition of their theoretical interpretation. The point of the content validation was to measure whether or not the family farm sustainable economic development index and the economic efficiency coefficient actually characterise the situation of a sustainable farm differently, whether or not the theoretically created family farm sustainable economic development index measures the development of the family farm sustainability, while the integrated farm economic efficiency coefficient reflects the state of a farm.

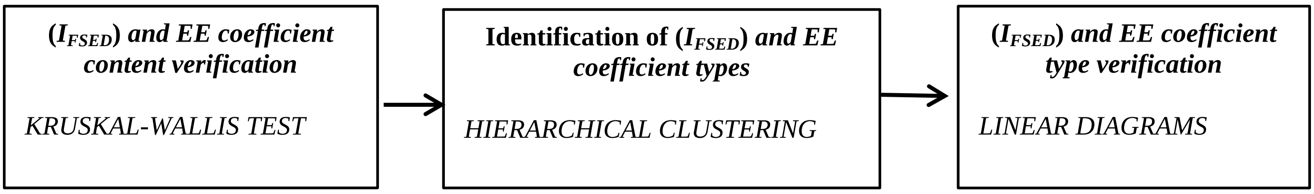

Fig. 1. Family farm sustainable economic development index and economic efficiency coefficient content validation stages

Furthermore, this stage enabled to identify the empirical contents of the family farm sustainable economic development index and the farm economic efficiency coefficient that were highly important in establishing the limits of the theoretical definition of the family farm sustainable economic development index (I_{FSED}) and the economic efficiency (EE) coefficient.

In the *first* family farm sustainable economic development index content validation stage, the Kruskal-Wallis test was used to identify the sensitivity of farm sustainable economic development and economic efficiency scales. It was aimed to assess whether there is a difference between levels (weak, moderate or strong) with reference to family farm sustainable economic development and between low, average and high farm economic efficiency. The hypothesis that is tested is that such difference exists. With reference to both family farm sustainable economic development and farm economic efficiency, the hypothesis was confirmed and the obtained result indicates that both family farm sustainable economic development and farm economic efficiency scales have adequate sensitivity required to identify family farm differences according to their sustainable economic development and economic efficiency levels.

The Kruskal-Wallis test used a sample of 88 farms within a period of five years (2011–2015). The selected sample of family farms included farms that, by a theoretical calculation, made a shift to different levels of their sustainable economic development and farm economic efficiency over the analysed period, i.e., for instance, moved from the weak level of farm sustainable economic development to the strong level or from the high economic efficiency level to the low level, etc. (Table 1). The analysis was aimed to estimate the differential sensitivity of the created index and the economic efficiency coefficient. The research was performed in the context of seven factors: farm size (UAA ha), contributions by farm members, farmer's age, land productivity, revenue from other sources, personal expenses, and scope of work by family members.

The sample of changing farms represents 440 (88*5) cases and in this context it is called an experimental sample. It is reasonable to have the same farm included in the sample five times because in a dynamic perspective one farm produces five unique cases essentially different from one another with respect to the size of the coefficient determining the qualitative variability of a farm type. Considering only a one-year farm case would entail the risk that in a relatively small sample (88 cases) a random selection of one year out of five might affect the level of index homogeneity.

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For instance, there is a higher likelihood for an equation in the testing algorithm to be missing. Whereas five-year data make sure that the farm data cover all levels and thus the risk of a certain year having a specific structure incomparable to other years can be avoided.

Family farm sustainable economic development was rated as weak, moderate or strong, while farm economic efficiency was classified as low, average or high. Furthermore, this stage of family farm sustainable economic development index and economic efficiency assessment explored whether the levels of family farm sustainable economic development and economic efficiency are affected by the above factors (Table 1). The rank-based Kruskal-Wallis test was used to determine the effect of the factors by rank-ordering from lowest to highest.

Table 1. Factors affecting the family farm sustainable economic development and economic efficiency levels according to the Kruskal-Wallis test

Factors	Development level		Number of farms	Mean rank		Significance level, *p*	
	I_{FSED}	FEE		I_{FSED}	FEE	I_{FSED}	FEE
farm size (UAA ha)	weak	low	145	177.81	158.01	0.000	0.035
	moderate	average	150	221.64	127.58		
	strong	high	145	262.01	124.46		
contributions by farm members	weak	low	145	205.47	147.65	0.018	0.072
	moderate	average	150	236.55	150.73		
	strong	high	145	216.13	192.08		
farmer's age	weak	low	145	210.66	147.00	0.514	0.334
	moderate	average	150	226.68	164.19		
	strong	high	145	223.95	166.88		
land productivity	weak	low	145	192.24	151.17	0.619	0.815
	moderate	average	150	250.17	147.16		
	strong	high	145	218.07	164.23		
revenue from other sources	weak	low	145	238.13	152.55	0.007	0.584
	moderate	average	150	227.31	141.93		
	strong	high	145	195.83	161.69		
personal expenses	weak	low	145	163.34	146.34	0.000	0.353
	moderate	average	150	207.04	165.04		
	strong	high	145	289.52	151.46		
scope of work of family members	weak	low	145	244.01	168.27	0.002	0.000
	moderate	average	150	237.86	154.69		
	strong	high	145	207.71	126.17		

The family farm sustainable economic development data calculated using the Kruskal-Wallis test (Table 1) show that statistically significant differences are characteristic of farms with the highest sum of the ranks and significance level (***p*** value) = 0.000 < 0.05. The factors of the farmer's age and land productivity score are statistically insignificant. All the other tested factors are statistically significant. The obtained results show that the highest rank of weak family farm sustainable economic development with respect to the distribution of mean ranks in the groups is found in the factor structures of revenue from other sources and farm work by family members. The lowest rank was reflected in the factor structures of the farm size (UAA ha), contributions by farm members, and personal expenses. The highest factor rank of moderate family farm sustainable economic development was observed in the structure of contributions by farm members. The five factors described in the theoretical part do not affect the rating of the farm economic efficiency levels (low, average, high) as the ***p*** values are higher than 0.05 whereas the farm size (UAA ha) and the number of family members employed on the farm represent statistically significant factors.

The results of the Kruskal-Wallis test suggest that the scales of both farm sustainable economic development and farm economic efficiency demonstrated differential sensitivity and enabled to identify factors that are potentially related to family farm sustainable economic development and farm economic efficiency. Consequently, the obtained scales are appropriate for assessing family farms by their sustainable economic development and farm economic efficiency characteristics in narrower contexts, such as farm size, contributions by farm members or scope of farm work by family members, etc.

In the *second* stage of content validation, hierarchical cluster analysis was used to measure the classification capacity of the family farm sustainable economic development and farm economic efficiency. In this stage, this method was used to determine whether family farm sustainable economic development and farm economic efficiency are alternatives of one another or are they mutually complementary and contextually supportive indicators. An advantage of this method is that it allows working with relatively large data samples and rather precisely differentiates various categorical constructs, the visual identification whereof in many cases would be hardly workable. Furthermore, a hierarchical cluster analysis in SPSS is a convenient tool thanks to the methodological support and methods relevant to this research that allowed to properly assess the classification characteristics of an object.

The experimental sample of the empirical research into classification capacity comprised 440 farmer farms. This sample was supposed to enable grasping the maximum diversity of potential types in the process of classification and assessment of the classification capacity of indicators. In an experimental sample, this diversity occurs through the natural variation of an observed object during the time period concerned.

The research used the *average linkage* hierarchical clustering method. An average linkage cluster includes a set of elements rather than one and the distance between two clusters can be computed in various ways. The method of average linkage calculates the average distance between all pairs of clusters.

The dendrogram displays five clusters that are analysed in greater detail in the third stage of the content validation. Analysis of family farms attributed to each of the clusters allows to identify the main variables describing the differences between the clusters with regard of the weak, moderate and strong sustainable economic development levels.

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In the *third* stage, linear diagrams were used as a tool visualising the distribution of cluster characteristics, which were intended to effectively define the characteristics of each cluster. Content verification of the empirical farm sustainable economic development assessment type validation is based on linear diagrams, which reflect data variations over time. The time axis highlights the variation rate rather than its size. The linear diagrams show the types of the established clusters, which fall into five types. That highlights the classification capacity of the family farm sustainable economic development, which is essential for characterisation of the index ability to estimate the intensity (high/low) and type (stable/growing/etc.) of the characteristic it is measuring, either taken separately or jointly (high, growing, etc.). The above characteristics of family farm sustainable economic development were displayed graphically (Fig. 2–6) to facilitate their qualitative interpretation.

A comparison of farm cluster types revealed that the z-values of all points in Fig. 2 are larger than the farm sample mean and this clearly distinguishes a type of clusters from other cluster types. Thus, although the declining trend of growth in the dynamics of this farm cluster is apparent when we compare the points of the beginning of the period (year 2011) and the end of the period (year 2015), the cluster can nevertheless be described as a cluster containing farms, which are characterised by an average growth rate, whereas the observed fluctuation in the growth of this value of the family farm sustainable economic development index is to be treated as trivial.

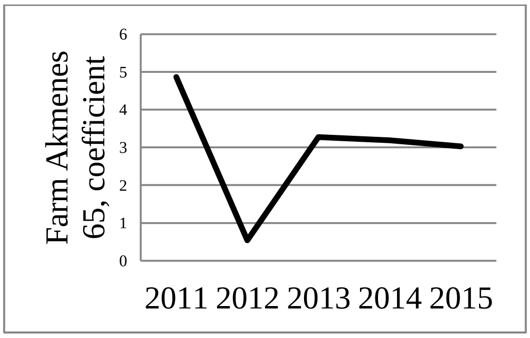

Fig. 2. Farm cluster type with a stable level of sustainable economic development, N=48 (54%)

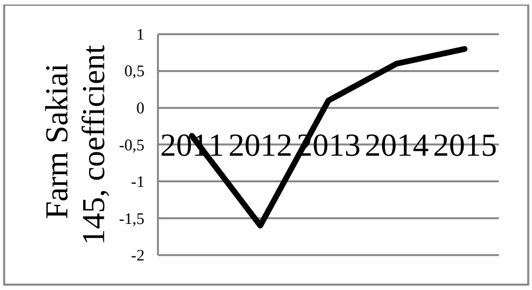

Fig. 3. Farm cluster type with an increasing level of sustainable economic development, N=17 (19%)

In 2011–2013, the second farm cluster type is similar to the third one: both of them experienced a fall in the family farm sustainable economic development index z-value in 2011–2012, and an increase in this value in 2012–2013 (see Fig. 3 and 4). However in 2013–2015 they differ, as in this period the farms of the second cluster maintained an upward trend, whereas the growth of the family farm sustainable economic development index in the third cluster started declining.

In 2011–2013, the farms of the fourth cluster faced a fall in the family farm sustainable economic development index value, however, it was gradually losing its intensity. That is illustrated by the family farm sustainable economic development index values in 2014–2015, which reveal a consistently positive trend in this cluster (Fig. 5).

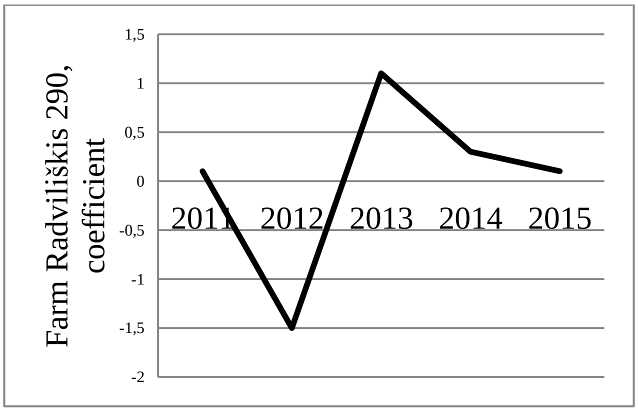

Fig. 4. Farm cluster type with an unstable level of sustainable economic development, N=16 (18%)

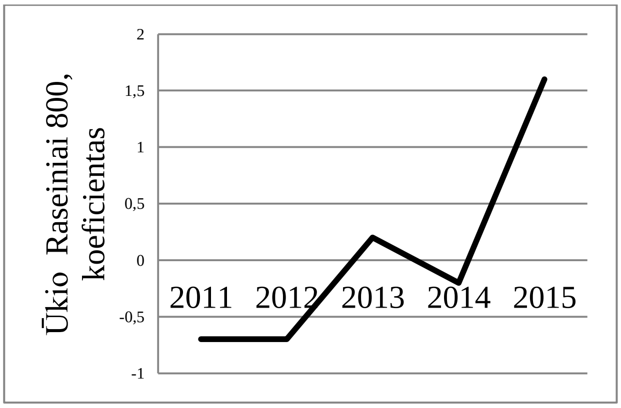

Fig. 5. Farm cluster type with a strongly increasing level of sustainable economic development, N=3 (3%)

In 2012–2015, the fifth farm cluster ran at the sample average and this clearly distinguishes it from other clusters. That suggests that this cluster includes farms that in the perspective of sustainable economic development essentially neither grow nor decline. As a general rule, they are identified as farms that create as much added value as they consume. Thus, they do not feature either potential growth or decline (Fig. 6).

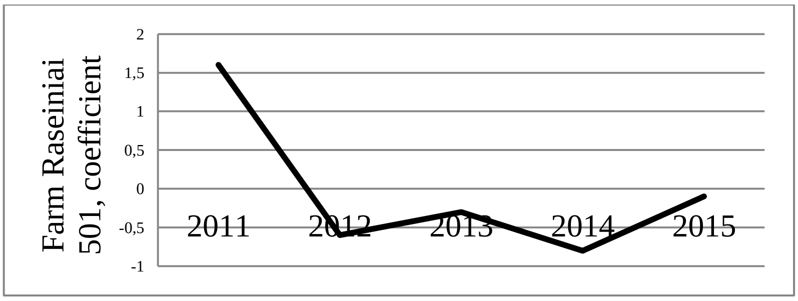

Fig. 6. Farm cluster type with an decreasing level of sustainable economic development, N=4 (5%)

The assessment of the classification capacity revealed that the family farm sustainable economic development index has a discriminatory capacity and therefore it should be analysed in more detail in the context of the identification of family farm sustainable economic development typological models. The research results will be presented in Stage 2.

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Stage 2. Identification of family farm sustainable economic development index range and economic efficiency coefficient thresholds

The models for family farm sustainable economic development classification types were created using the k-means clustering. Descriptive statistics methods were used to analyse family farm sustainable economic development assessment data, which were organise and displayed graphically. The method of descriptive statistics was used to compute variables and to set thresholds of indicators in the family farm sustainable economic development assessment methodology (Table 2).

Table 2. Descriptive statistics results on family farm sustainable economic development index range and economic efficiency coefficient

Indicators	Indicator values				
	Number of farms	Minimum value	Maximum value	Average	Standard Deviation
Family farm sustainable economic development index	3917	> 0.72	20.27	3.64	1.78
Economic efficiency coefficient		> 0.17	9.76	1.33	0.49

The method of descriptive statistics led to reasoned conclusions on the assessment of sustainable economic development in family farms as the variables were computed using a large amount of data. Table 3 illustrates identification of family farm sustainable economic development index range and economic efficiency coefficient thresholds based on standard deviation.

Table 3. Identification of family farm sustainable economic development index range and economic efficiency coefficient thresholds based on the standardisation equation

Indicators	Indicator thresholds		
	weak	*moderate*	*strong*
Family farm sustainable development assessment index	< 1.86	≥ 1.86-5.42	≥ 5.42
Economic efficiency coefficient	*low*	*average*	*high*
	< 0.84	≥ 0.84-1.82	≥ 1.82

In the present case, the breakdown is methodologically relevant, however in view of its compliance with the interpretative logics of family farm sustainable economic development and economic efficiency the said intervals were assigned qualitative interpretation values. In terms of family farm sustainable economic development, an index value that was lower than 1.86 was regarded as weak sustainable economic development, a value ranging from 1.86 to 5.42 was considered moderate, and a value higher than 5.42 was interpreted as strong family farm sustainable economic development.

Stage 3. Identification of family farm classification types

The k-means clustering method was used to assess the discriminatory capacity of family farm sustainable economic development and economic efficiency. It was chosen for its ability to reconstruct the classification structure of a phenomenon and to answer the question what types are specific to this phenomenon. This method is suitable for classification of continuous variables in large research samples, therefore the research sample and the family farm sustainable economic development index and economic efficiency coefficient meet the research method requirements concerning the same.

The models for family farm sustainable economic development classification types are created using the k-means clustering. The family farms were classified into nine types.

Most farms attributed to the moderate sustainable economic development type have an average economic efficiency level. This is quite logical, as given that the sample size is relatively large, theoretically the distribution of farm types should show a tendency toward a normal distribution. Certainly this should not be required from a selected sample, but such result nevertheless suggests that the existence of outliers in both rejection regions shows that most of the analysed farm population fall within farms that can be ranked as average both from the logical and mathematical perspective. From modelling, which resulted in creating the family farm sustainable economic development index with the integrated farm economic efficiency coefficient, to the empiric research, where analysis of the sample revealed that the research result is consistent with the assessment logic, the investigation can be considered successful.

Stage 4. Methodology of assessment of family farm characteristics and assignment to a sustainable economic development type: Lithuanian case.

The purpose of the methodology for assessment of family farm characteristics and farm assignment to a sustainable economic development type is to empirically identify Lithuanian family farms by established farm sustainable economic development types and type interactions.

The performed analysis of the typological models of the characteristics of the farm condition and family farm sustainable economic development indicators in Lithuanian farms designated nine farm types, which, for the purpose of a more accurate farm comparison, were classified into three FSED-FEE assessment levels: the first with the same FSED-FEE level, the second with the maximum difference in the FSED-FEE levels, and the third with the minimum difference in the FSED-FEE levels.

The farm types, which will be used in the empirical part, and farm distribution by farm types are presented in Table 4. The sample consisted of 3917 farms, i.e. the same number of farms that was used as a basis for creating the FSED-FEE typological model. Each type was investigated with respect of the farm specialisation. Different areas of farm specialisation were examined in the context of the following factors: number of farms, farmer's age, farm size, land productivity score, contributions by farm members, revenue from other sources, personal withdrawals, scope of work by family members.

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Table 4. FSED-FEE type assessment levels and farm distribution, *N*=3917

FSED-FEE types	FSED-FEE type assessment levels	Number of farms	
		n	%
FSED-FEE types with the same FSED and FEE levels			
Type 1	Weak sustainable economic development level, low economic efficiency	49	1.25
Type 2	Moderate sustainable economic development level, average economic efficiency	2590	66.12
Type 3	Strong sustainable economic development level, high economic efficiency	145	3.7
FSED-FEE types with the maximum difference in the FSED and FEE levels			
Type 4	Strong sustainable economic development level, low economic efficiency	38	0.97
Type 5	Weak sustainable economic development level, high economic efficiency	5	0.13
FSED-FEE types with the minimum difference in the FSED and FEE levels			
Type 6	Moderate sustainable economic development level, high economic efficiency	218	5.57
Type 7	Strong sustainable economic development level, average economic efficiency	289	7.38
Type 8	Moderate sustainable economic development level, low economic efficiency	267	6.82
Type 9	Weak sustainable economic development level, average economic efficiency	316	8.07

In the typological FSED-FEE model, there are three farm types *(Types 1–3)* with the same FSED-FEE levels. Those farm types account for 71 percent of analysed farms, where most of the farms in the sample are Type 2 farms with a moderate sustainable economic development level and average economic efficiency. There are 2590 farms in this type and they account for 66.12 percent of all analysed farms (see Table 4). The key identifying feature of this type of farms is that their FSED level is on a par with the FEE level irrespective of the FSED and FEE level combination. It was expected that the comparative analysis of these groups would answer the question how farm indicators are affected by situations when the FSED and FEE are on the same level, whether it is weak, moderate or strong.

In the FSED-FEE typological model, there are two farm types with the maximum difference in the FSED-FEE levels. The first farm type *(Type 4)* is characterised by a strong sustainable economic development level and a low economic efficiency level. The second farm type *(Type 5)* is characterised by a weak sustainable economic development level and a high economic efficiency level. The critical distinguishing feature of those two types is the maximum difference between their FSED and FEE levels. The first case *(Type 4)* shows that the survival of a farm depends on relatively large assets, while in the second case *(Type 5)* it is determined by exceptionally high net revenue of the farm. It was expected that the comparative analysis of these groups would answer the question how farm indicators differ in the light of different farm development factors.

The third farm group is similar to the second in that the farm indicators were analysed in farms with different FSED and FEE levels.The only difference is that the scope of the difference is minimal. The total number of types in this group is four (Types 6–9). Two of them are dominated by the assets value while in the other two the dominant value is the net revenue. Farms dominated by the assets value and farms dominated by the net revenue value are different from one another by the FSED and FEE scope, which allows assessment of the farm economic indicator trends, when the level of farm characteristics changes but their configuration remains unvaried.

Five farm specialisations were selected for the purpose of sustainable economic development assessment analysis. The specialisation of a farm is determined on the basis of the farm revenue structure in the year under consideration, where the dominating source of income is identified (Table 5).

Table 5. Research sample of farms by specialisation, *N=3917*

Farm specialisation criteria	Number of farms	
	n	**%**
The total output from crop production accounts for more than 50 percent of the total output of the farm.	1324	33.80
The total output from animal production accounts for more than 50 percent of the total output of the farm.	686	17.51
The total output from crop production and animal production is almost the same.	1790	45.70
The total output from horticulture accounts for more than 50 percent of the total output of the farm.	94	2.40
Other (poultry, bee, rabbit farming, etc.)	23	0.59
Total	3917	100

The method of comparative analysis was used to identify the distinguishing features of Lithuanian family farms by sustainable economic development types. It examined whether or not farms in different farming areas are essentially different from one another with respect to the farmer's age, the total farm size (UAA ha), the land productivity score, contributions by farm members, revenue from other sources, personal expenses, and the scope of work by family members. The empirical research reveals the applicability of the family farm economic sustainability development index.

2. Empirical Research into Farm Sustainable Economic Development Assessment

Table 8 presents sustainable economic development types of farms with different specialisations and the *same level of FSED and FEE* and mean values of the factors. The presented data show that *Types 1–3* are dominated by mixed farms (47%). Most of the mixed types belong to *Type 2*, accounting for more than 96 percent of all farms. The average farm size in this type is 104 ha, the farmer's age is one of the oldest (46), and the family members work the largest number of hours. Farm members' contributions, revenue from other sources and personal withdrawals are below the

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mean indicator values. From a comparison of *Type 1* with *Type 2* it can be inferred that farms of the first type are 21 percent smaller in size, whereas contributions of farm members and revenue from other sources are respectively 214% and 92% higher in *Type 2*. The above indicators show that farms are not able to survive without financial assistance, and therefore they need both internal and external assistance to maintain economic sustainability.

Farms specialising in crop production, which have the same FSED and FEE levels, account for more than 31 percent of all farm types *(Types 1–3)*. Those farms are dominated by large farms with more than 150 UAA ha. Here the smallest total land area (177 UAA ha) is found in *Type 3* and the largest (250 UAA ha) in *Type 2*. Analysis of crop production farms *Type 1–3* showed that the largest total land area (UAA ha), land productivity score and personal withdrawals are in *Type 2,* where those indicators are higher than the mean values. In crop farms, contributions by farm members and revenue from other sources are highest in *Type 3* and lowest in *Type 1* . Furthermore, the youngest farmers' age is in *Type 1*. The above factors could give rise to *Types 1 and 2*. The farms in *Type 1* are forced to resort to external sources of financing, since, as the results show, own funds of the farm are not sufficient in the constantly changing business environment.

As shown by the investigation, the total land area (UAA ha) in *Type 1–3* farms with the same FSED and FEE levels varies only slightly from specialisation to specialisation. The largest differences in crop farms were found between the first and the third types and those were in the total land area (UAA ha) and family work hours, which could exercise a decisive influence on the emergence of the first type (Table 6). In the *first type,* the total land area and the family work hours exceed those in *Type 3* by 123% and 40%, respectively. The results show that large farms mainly pursue crop production or mixed farming activity. It appeared that the activities of husbandry farms should be diversified, the farms need to be modernised or, to maintain their sustainability, husbandry farms need increased financial assistance. There is a strong probability that diversification of activities or increased level of support will bring changes to *Type 1* although farms of this type amount to only approximately 2 percent. In husbandry farms, the number of hours worked by family members is among the largest. It should be noted that the said farms require much manual work, which takes a lot of working hours of the farmer's spouse or other family members. However this indicator also demonstrates that new jobs are being created on the farm, which is a positive development, since the more new jobs are created, the more revenue is generated by the population of rural areas.

Among horticultural farms in Types 1–3 , the largest total land area was found in *Type 1.* The said farm type has the largest land productivity score, the lowest personal withdrawals and no revenue from other sources. This was in contrast with the situation in farms of other specialisation (poultry, bee, rabbit farming) where the analysed *Type 1* exhibited the largest contributions by farm members, revenue from other sources and family work hours but the smallest total land area (UAA ha).

Table 6. Indicator values of Type 1–3 farms with the same FSED and FEE levels, by farm specialisation

Farm specialisation	Farm type	Number of farms	Farmer's age	Farm size UAA, ha	Land productivity score	Contributions by farm members, EUR	Revenue from other sources, EUR	Personal withdrawals, EUR	Scope of work of family members, hrs.
Crop production	*1*	20	43	231	46	1007	1911	23315	2596
	2	786	44	250	46	3486	2442	43629	2850
	3	71	44	177	43	5028	3793	42209	2644
Husbandry	*1*	11	46	214	41	1126	510	19746	4023
	2	509	44	120	39	3191	2134	28949	3385
	3	19	47	96	40	2554	446	31341	2878
Mixed production	*1*	11	44	82	45	6145	3727	26764	3215
	2	1256	46	104	41	1952	1942	23884	3354
	3	33	46	119	41	1032	958	30134	2835
Horticulture	*1*	3	43	66	47	2528	0	5648	2940
	2	31	42	43	43	450	2458	21971	3070
	3	23	42	54	44	9287	1460	57721	2307
Other	*1*	4	62	23	42	9576	9341	8577	2504
	2	8	41	41	43	724	2679	25591	2267
	3	–	–	–	–	–	–	–	–
Average			45	149	42	2732	2157	31169	3170

The results of the empirical research based on farm specialisations showed that the greatest family workload and the largest number of new jobs are in *Type 1*: as shown by the investigation, farming is mainly based on the work by family members. The highest level of personal withdrawals was found in *Levels 2 and 3*. Personal withdrawals are used for personal needs of a farmer (fuel, electricity, heating, and other personal consumption). The highest values of this indicator were found in *Type 3*, as compared to the average indicator value, and in horticultural farms. The farmers' age in horticultural farms is one of the youngest, while the oldest farmers are in farms of other specialisations (poultry, bee, rabbit farming). In horticultural farms and farms with other specialisations the total land area is the smallest. That suggests that the choice of farm specialisation was correct.

The *maximum difference in the FSED-FEE levels* is also found in family farm sustainable economic development *Types 4 and 5*, which are presented by specialisation in Table 7. The data show that the number of farms attributed to those types is not large and they account for only 1 percent of all analysed farms when the farm sustainable economic development is strong and the economic efficiency level is low, and vice versa. There are no horticultural farms or farms with other specialisations with the maximum difference in the FSED-FEE levels classified as Types 4 or 5.

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The *fourth farm type* is dominated by farms with mixed specialisation (58%) and here the farmers' age is among the oldest. This leads to the conclusion that those are lifestyle farms as the farm development depends on relatively large assets. In this type, the farms are not large (17 UAA ha), while the contributions by farm members, revenue from other sources and personal withdrawals are the lowest. Crop production farms account for about 26 percent. The average farm size is about 50 UAA ha and the revenue from other sources and personal withdrawals are the largest. The size of husbandry farms is about 36 UAA ha, the farmers' age is the oldest and the contributions by farm members are the biggest.

Type 5 is dominated by large or small crop, animal and mixed production farms. In mixed farms, the farmers' age is the youngest, while personal withdrawals are the largest and they are 1.4 times higher than the mean value of the indicator. In this farm type, there were no contributions by farm members or revenue from other sources. The largest number of family work hours was found in husbandry farms (4556 hrs). This farm specialisation requires exceptionally many working hours of the farmer and other family members. The development of *Type 5* is determined by exceptionally high net revenue of the farm. This farm type accounts for 0.13 percent of the total sample.

It was found that the fourth and fifth farm types with the maximum difference in the FSED-FEE levels are dominated by crop and mixed production farms. Small mixed farms dominate in *Type 4* and large crop and mixed production farms prevail in *Type 5*. *Type 5* demonstrates the largest revenue from other sources in crop production farms and the largest contributions by farm members in husbandry farms. The largest personal withdrawals are in mixed farms of *Type 5*.

Table 7. Indicator values of Type 4–5 farms with maximum FSED and FEE levels, by farm specialisation

Farm specialisation	Farm type	Number of farms	Farmer's age	Farm size UAA ha	Land productivity score	Contributions by farm members, EUR	Revenue from other sources, EUR	Personal withdrawals, EUR	Scope of work of family members, hrs.
Crop production	*4*	11	43	50	41	6927	14843	21264	2416
	5	2	46	179	48	–	–	15091	2075
Husbandry	*4*	2	49	36	37	7436	12813	7782	1603
	5	1	41	15	39	-	-	417	4556
Mixed production	*4*	25	46	17	38	1719	3606	5981	2580
	5	2	40	147	44	-	-	40975	3700
Average			45	40	39	3117	6490	11896	2564

The *minimum difference in the FSED-FEE levels* is found in four family farm sustainable economic development types *(Types 6–9)* which are presented by specialisation in Table 8. The data show that there are about 28 percent of farms attributed to those types with an even distribution among all farm types. The only difference is that the variance of the level scopes is minimal. *Types 7 and 8* are dominated by the assets value, while in *Types 6 and 9* the dominant value is net revenue.

Analysis of all family farm types found that crop production farms (40%) and mixed farms (43%) account for the major part. Crop production farms are dominated by large farms *(Types 6 and 9)*, which are respectively 70% and 130% higher than the mean indicator values, while personal withdrawals in the said farms are respectively 96% and 80% higher. The family workload is slightly lower than the average value of the indicator. In *Types 7 and 8*, the total land area is smaller than the average value of the indicator and the farmers' age in the said farm types is one of the youngest (39). Those farms are dominated by the assets value. The largest contributions to farm activities were found in *Type 7* and the smallest in *Type 8.*

A comparative analysis of all farm types *(Types 6–9)* found that the largest crop production farms are in *Type 9.* Their average farm size is 349 UAA ha. Large farms come up to about 15% of all analysed farm types. *Type 9* demonstrates a weak FSED level due to farm liabilities growing faster than assets. In large farms, own funds of the farm are not sufficient (although in this farm type crop production farms have the largest revenue from other sources), thus they are forced to resort to borrowing and to find sources to cover accumulated losses.

The results of the analysis of all farm types *(Types 6–9)* reveal that mixed farms are dominated by small farms: in *Types 7 and 8* they are 68 UAA ha and 23 UAA ha, respectively. In those farm types the farmers' age is the oldest. In *Type 8*, contributions by farm members are the smallest and the revenue from other sources is the highest. Here mixed farms account for about 35 percent. The smallest number (12%) of farms with mixed specialisations are in *Type 6*. Their average farm size is 136 UAA ha and personal withdrawals are the biggest, exceeding the average value of the indicator by 65 percent.

The largest revenue from other sources was found in husbandry farms. Husbandry farms represent around 13 percent of farms in the four analysed farm types with a minimum difference in the FSED-FEE levels. As shown by the investigation, *Type 9* demonstrates the largest total land area, revenue from other sources, personal withdrawals, family workload, and the oldest farmers' age(46). The smallest number of husbandry farms is in *Type 6.* In this type, the average farm size is about 100 UAA ha, it has the highest land productivity score, the smallest contributions by farm members, and the smallest family workload.

Type 6–9 horticultural farms are not large. The farm size ranges from 35 to 56 UAA ha. Those farms account for more than 3 percent of all analysed farms. The largest personal withdrawals are in horticultural farms. In all farm types, except *Type 8,* this indicator exceeds the average value. Results show that in *Type 9* personal withdrawals are three times higher than the mean value of the indicator, and the farmers' age (35) is the youngest among all four analysed farm types with a minimum difference in the FSED-FEE levels. It is reasonable to suppose that if the personal withdrawals remain at the same high level and the farmers make no investment in their business, it is hardly credible to expect a transition to a higher sustainable economic development level, as the said type is dominated by net revenue rather than asset value.

Farms of other specialisations represent only 1 percent of all analysed farm types with a minimum difference in the FSED-FEE levels, where we find *Types 6, 8 and 9*. Their results show that the largest total land area, contributions by farm members, personal withdrawals and family workload in the farm are demonstrated by *Type 9*. Here the family workload in the farm (5003 hrs) is the largest among the four analysed types. The value of this indicator is 63 percent higher than the mean value of the indicator. In *Type 8*, the total land area is 9 UAA ha and the farmers' age is the oldest (65) among all four types. In this farm type there is revenue from other sources, while there is no revenue from other sources in farms of other types. Small farms are incapable to survive in the market. Consequently they need financial assistance from EU programmes, contributions by farm members and revenue from other sources not relating to farming.

Table 8. Indicator values of Type 6–9 farms with minimum FSED and FEE levels, by farm specialisation

Farm specialisation	Farm type	Number of farms	Farmer's age	Farm size UAA ha	Land productivity score	Contributions by farm members, EUR	Revenue from other sources, EUR	Personal withdrawals, EUR	Scope of work of family members, hrs.
Crop production	6	128	45	259	46	4346	1280	64572	2915
	7	90	39	97	40	6105	2966	21205	2460
	8	56	39	105	41	1915	2870	14870	2983
	9	160	44	349	47	5612	7573	58709	2751
Husbandry	6	18	43	100	45	696	3815	33514	2588
	7	49	41	68	38	4758	2679	13417	2999
	8	42	43	54	38	5808	3709	7531	3215
	9	35	46	270	40	5196	9219	45568	3711
Mixed production	6	56	42	136	41	884	1311	54101	3046
	7	138	46	68	39	2455	2596	15197	3068
	8	162	48	23	42	851	3498	8004	3421
	9	108	44	196	43	4541	2092	32077	3434
Horticulture	6	13	49	36	40	-	2680	40340	3009
	7	12	48	56	41	7266	1507	50179	2911
	8	6	42	35	43	5039	2105	11245	3893
	9	6	35	42	41	217	–	127234	3135
Other	6	3	41	44	44	–	–	11680	2572

Farm specialisation	Farm type	Number of farms	Farmer's age	Farm size UAA ha	Land productivity score	Contributions by farm members, EUR	Revenue from other sources, EUR	Personal withdrawals, EUR	Scope of work of family members, hrs.
	7	–	–	–	–	–	–	–	–
	8	1	65	9	34	1025	2085	3021	2100
	9	7	49	72	46	3724	-	22617	5003
Average			44	152	42	3630	3479	32685	3065

As shown by the investigation, the four farm types with the minimum difference in the FSED and FEE levels contain predominantly mixed and crop production farms. *Type 9*, dominated by large farms and characterised by the highest revenue from other sources, prevails among crop production farms. The majority of farms with mixed specialisation belong to *Type 8*. Here the average farm size is 23 UAA ha. Husbandry farms are dominated by *Type 7* and the average farm size is 68 UAA ha. The majority of horticultural farms are *Type 6* farms with an average size of 36 UAA ha. *Type 9* includes the largest number of farms with other specialisations. Their farms size is 72 UAA ha and the farmers' age is among the oldest (Table 9).

A comparison of all farm types classified into three FSED and FEE levels revealed the dominance of mixed production farms. However, it was observed that with a moderate or strong FSED and a high farm economic efficiency *Types 3 and 6* are dominated by horticultural farms. The findings by specialisation reveal another type group with weak FSED levels and low, average or high farm economic efficiency *(Types 1, 5, 9)*, which is dominated by crop production farms.

Table 9. Comparative analysis of farm sustainable economic development types by FSED-FEE levels

Indicators	The same FSED-FEE level *(Types 1–3)*	Maximum difference in the FSED-FEE levels *(Types 4–5)*	Minimum difference in the FSED-FEE levels *(Types 6–9)*
Number of farms, *n* (%)	2784 (71%)	43 (1%)	1090 (28%)
Farm specialisation	*Type 2* – Mixed production *Type 2* – Dominating in all specialisations	*Type 4* –Mixed production *Type 4* – Dominating in all specialisations	*Type 6* – Horticulture
			Type 7 – Husbandry
	Type 3 – Horticulture	*Type 5* – Crop production, Mixed production	*Type 8* – Mixed production
	Type 1 - Crop production		*Type 9* – Crop production, other
	Type 2 – Mixed production	*Type 4* –Mixed production	*Type 8* – Mixed production

The empirical research if family farm economic sustainability development allows for the conclusion that:

- *firstly*, complex family farm sustainable economic development index produced by the research allows identification of the farm sustainability level, comparison of family farms, and identification of the key determinants and reasons;
- *secondly*, this index can be used to compare family farm economic sustainability development between different countries and to identify the good practice and problems in those countries;
- *thirdly*, the research results can be used to improve the common agricultural policy and instruments of sustainable development promotion.

3. Recommendations on promotion of sustainable economic development of family farms

Upon completion of the research, the following recommendations have been generated in relation of promotion of economic sustainability of family farms:

1) the methodology applied in the research may be used in adoption of sustainability promotion decisions at the political level, as it enables determination of the predominant levels, factors and causes of economic sustainability at the farms;
2) empirical research results have demonstrated that mixed production farms generating revenues from other sources are the most sustainable; therefore, diversification of farm operations should be promoted for higher economic sustainability of a family farm;
3) older farmers are predominant at livestock farms, have relatively large number of working hours, and are characterised by lower economic sustainability compared to crop growing farms. The post-2020 agricultural policy should therefore include more promotional measures addressing livestock farms.

4. Conclusions

1. Methodology for the assessment of the tendencies of sustainable economic development of family farms consists of four logical constructs: content validation of the family farm sustainable economic development index, methods of descriptive statistics, examination of the typological model of the family farm sustainable economic development index characteristics in Lithuanian farms, and the methodology of assessment of Lithuanian family farm characteristics and family farm assignment to a sustainable economic development type.

2. Empirical testing of the relevance of the methodology for sustainable economic development assessment in family farms on the example of Lithuania revealed that the highest level of economic development sustainability is found among farms with mixed type of production. However, it was observed that farms with a moderate or strong FSED and high farm economic efficiency (*Types 3 and 6*) are dominated by horticultural farms. The findings by specialisation reveal another type group with weak FSED levels and low, average or high farm economic efficiency *(Types 1, 5, 9)*,

which is dominant by crop production farms. The empirical research into family farm economic sustainability development allows identification of the farm sustainability level, comparison of family farms, and identification of the key determinants and reasons. This index can be used to compare family farm economic sustainability development between different countries and to identify the good practice and problems in those countries. The research results can be used to improve the common agricultural policy and instruments of sustainable development promotion.

3. The following measures for economic sustainability of family farms are recommended: promotion of diversification of operations, greater attention to promotion of operations of livestock farms. The methodology used in the research may contribute to adoption of sustainability promotion decisions at the political level, as it enables determination of the predominant levels, factors and causes of economic sustainability at the farms.

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ŠEIMOS ŪKIŲ DARNAUS EKONOMINIO VYSTYMOSI TENDENCIJOS: LIETUVOS ATVEJIS

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Santrauka

Žemės ūkio politikos gairėse po 2020 m. akcentuojamas svarbus šeimos ūkių veiksnys – darnus ekonominis vystymąsis. Mokslinė problema – kokios yra šeimos ūkio darnaus ekonominio vystymosi tendencijos ir kokios rekomendacijos darnumui skatinti? Tendencijų nustatymui buvo naudotas šeimos ūkių darnaus ekonominio vystymosi indeksas. Šio indekso tinkamumas šeimos ūkių darnaus ekonominio vystymosi vertinimui patikrintas naudojant Kruskal-Wallis testą bei hierarchinę klasterinę analizę. Naudojant standartizacijos lygtį nustatytos indekso ribos. Indekso savybės leidžia sudartyti šeimos ūkio darnaus ekonominio vystymosi klasifikavimo tipų modelius, kurie suformuoti k-vidurkių klasterio metodu. Nustatyti devyni darnaus ekonominio vystymosi šeimos ūkių tipai. Atlikta Lietuvos šeimos ūkių darnaus ekonominio vystymosi tipų analizė pagal specializaciją, nustatytos priežastys lėmusios tokią situaciją ūkiuose ir pateikti pasiūlymus darnumui skatinti.

Reikšminiai žodžiai: šiemos ūkiai, darnus ekonominis vystymasis, vystymosi indeksas.
JEL kodai: Q12, Q14.