

**LITHUANIAN FAMILY FARM ECONOMIC SUSTAINABILITY:
DOES THE INDICATOR MATTER?**

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THE TOPICALITY

1. Towards a methodology for the sustainability assessment in agriculture
 - *the analysis of agricultural sustainability at a farm level is suggested to be the most appropriate spatial unit in terms of the implementation of sustainable farm practices (Kelly et al., 2018);*
 - *recently, EU Farm Accountancy Data Network (FADN) has been employed by researchers for farm sustainability analyses across EU countries (Zahm et al., 2008; Barnes & Thomson, 2014; O'Donoghue et al., 2016). However, the devised indicators differ and thus limit the comparison of results derived by different researchers;*
 - *the set of economic sustainability indicators adopted to FADN data was devised by researchers (Vitunskienė & Dabkienė, 2016). To evaluate its validity international expert questionnaire was organized. The implication of additional indicator concerning the farm's income reliance on subsidies as important criteria for farm economic sustainability was advised by experts for further sustainability research.*

THE TOPICALITY

2. Towards the current economic situation of Lithuanian agricultural sector which faces with challenges achieving it's sustainability
- *income instability*: Lithuanian agricultural factor income per annual work unit in 2018 stood at EUR 4.4 thou and was by 30% lower than in 2017;
 - *low labour productivity*: in 2018 the agricultural labour productivity in Lithuania only came to around 26% of the EU-28 level.;
 - *low entrepreneurial income*: in 2018, the entrepreneurial income, per family work unit, in Lithuania amounted to EUR 2.4 thou and it made 17% of the EU-28 level;
 - *the economic situation of Lithuanian family farms' is not even in terms of farm size*:
 - the average value of Lithuanian family farm net income per family work unit was the highest on farms with more than 500 ESU, whereas the lowest income was registered on farms from 2 to 8 ESU (EUR 2.7 thou and EUR 236.7 thou, respectively);
 - the FNI per family work unit was not sufficient on farms in size classes up to 40 ha UAA, as income was lower than average earnings in the whole economy.

THE TOPICALITY

3. Towards the economic sustainability of Lithuanian family farms
 - *Vitunskienė & Dabkienė (2016) conducted the analysis of Lithuanian family farms sustainability using farm relative sustainability index, which reflected all three dimensions of sustainable development, in 2003 and 2012. The results revealed that the economic sustainability of farms was low in both considered years. Two challenging areas that relate to farm risk management were identified;*
 - *Dabkienė (2018) presented the analysis of farms economic sustainability in 2014 with regard to farms' specialization. The findings highlight the need of monitoring farms' economic situation as the economic sustainability index value was estimated lower in 2014 than in 2012;*
 - *Baležentis, Namiotko & Novickytė (2018) conducted the analysis of Lithuanian family farms economic sustainability in terms of farms investments, profitability and growth. It was estimated low level of profitability and growth for the specialist granivores, grazing livestock, specialist dairying and field crops-grazing livestock combined farms and this may negatively affect their economic sustainability in future.*

THE AIM OF PRESENTATION

The need for family farms' economic sustainability monitoring and the results of aforementioned expert questionnaire survey inspired the aim of this paper, which is twofold:

- (1) to assess economic farm sustainability across farm size classes in terms of physical size and by farms specialization in Lithuania;
- (2) to evaluate the contribution of additional indicator, namely farm's income reliance on subsidies, to farms' economic sustainability sub-index value.

MATERIALS AND METHODS

The sustainability construction index method was employed as basis to conduct the research:

- all the indicators were normalized based on minimum and maximum value. The indicators accepted the values ranging from 0 (indicating low sustainability) to 1 (indicating high sustainability);
- the maximum values of indicators e_1 - e_8 and the minimum value of indicator e_9 were considered as positive values in terms of economic sustainability;
- in order to solve problems of outliers, 5th and 95th percentile was used as a minimum and maximum value, respectively. Two economic farms sustainability sub-indices were computed for the evaluation of the impact of the added indicator for the assessment of farms' economic sustainability. The first sub-index consisted of equally weighted 8 indicators (notated as I_{sub8}) and the second comprised of 9 indicators (notated as I_{sub9});
- equal weighting method for aggregation of indicators to sub-index value was used;
- Lithuanian FADN 2016 primary data of 1301 family farms concerning economic activity were utilized.

MATERIALS AND METHODS

The approach based on descriptive statistics proposed by Savickienė & Miceikienė (2018) was utilized to estimate the thresholds values of farms' economic sustainability intervals.

Economic sustainability intervals and farms' sample distribution according to sustainability level

Economic sub-index	Descriptive statistics				Sustainability intervals/sustainability level		
	Minimum	Maximum	Mean	SD	Low (number of farms)	Medium (number of farms)	High (number of farms)
I_{sub8}	0.07	0.67	0.31	0.11	≤ 0.20 (211)	$0.201-\leq 0.42$ (879)	$0.421-\leq 1$ (211)
I_{sub9}	0.06	0.65	0.32	0.11	≤ 0.22 (211)	$0.221-\leq 0.43$ (877)	$0.431-\leq 1$ (210)

MATERIALS AND METHODS

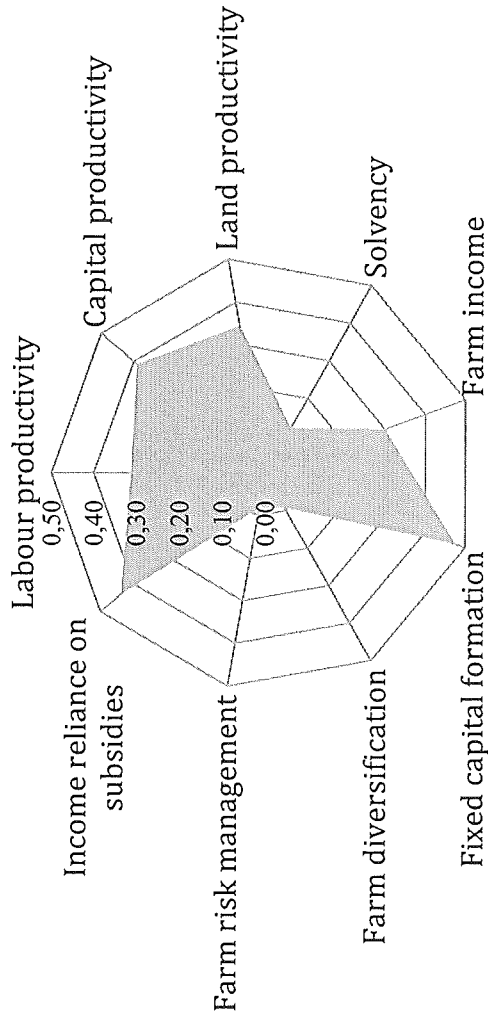
The set of indicators with regard to family farms' economic sustainability assessment developed by Vitunskienė & Dabkienė (2016) was employed.

Based on proposed methodology by European Commission (2018), the family farms' income reliance on subsidies was measured as the ratio of total subsidies excluding on investments over the farm net value added.

Economic sustainability indicators of the family farm

Variable	Indicator	Data source: FADN variables
Labour productivity	<u>Gross value added</u> Annual work unit (AWU)	SE410; SE425
Capital productivity	<u>Gross value added</u> Total assets	SE410; SE436
Land productivity	<u>Gross value added</u> Hectare (ha) of utilized agricultural area (UAA)	SE410; SE025
Solvency	<u>Total assets</u> Total liabilities	SE436; SE485
Farm income	<u>Family Farm income</u> Family work unit	SE430
Fixed capital formation	<u>Gross investment</u> Hectare of UAA	SE516; SE025
Farm diversification	<u>Revenue from other gainful activities (OGA)</u> Total farm revenue	Table 22 in Lithuanian FADN 2016
Farm risk management	<u>Insurance costs</u> Total specific costs	Table 12 in Lithuanian FADN 2016, SE 281
Income reliance on subsidies	<u>Total subsidies excluding on investments</u> Farm net value added	SE605; SE415

THE RESEARCH RESULTS



Sub-index of economic sustainability of Lithuanian family farms in 2016

The lowest values for the whole farms sample were obtained for indicators related to *farm risk management issues*: farmers were not engaged in the diversification of their economic activity and were not interested in using insurance instruments.

**Lithuanian family farms economic sustainability indicators' values
by farm specialization in 2016**

Farm specialization	Labour productivity	Capital productivity	Land productivity	Solvency	Farm income	Fixed capital formation	Farm diversification	Farm risk management	Income reliance on subsidies
COP	0.38	0.33	0.21	0.09	0.28	0.45	0.09	0.11	0.46
General field cropping	0.32	0.34	0.36	0.10	0.31	0.52	0.11	0.04	0.47
Horticulture	0.17	0.52	0.83	0.15	0.32	0.65	0.12	0.00	0.51
Permanent crops	0.23	0.50	0.52	0.26	0.26	0.45	0.10	0.02	0.46
Specialist dairying	0.28	0.46	0.45	0.12	0.31	0.46	0.09	0.10	0.42
Grazing livestock	0.29	0.38	0.35	0.22	0.34	0.53	0.08	0.10	0.38
Specialist granivores	0.36	0.58	0.70	0.03	0.44	0.46	0.07	0.02	0.49
Field crops-grazing livestock, combined	0.32	0.39	0.29	0.12	0.32	0.47	0.10	0.06	0.41
Various crops and livestock combined	0.13	0.41	0.45	0.11	0.21	0.50	0.07	0.03	0.48
CV	30.5	19.7	42.7	52.0	20.2	12.9	18.6	76.7	9.2
Significance	***	***	***	***	***	***	NS	**	***

*Level of statistical significance are *p < 0.05, **p < 0.01, ***p < 0.001 and NS- not significant*

Source: own calculation based on Lithuanian FADN data

Lithuanian family farms economic sustainability indicators' values by farm size classes in 2016

Farm size classes of UAA	Labour productivity	Capital productivity	Land productivity	Solvency	Farm income	Fixed capital formation	Farm diversification	Farm risk management	Income reliance on subsidies
Less than 5 ha	0.08	0.51	0.61	0.14	0.19	0.59	0.11	0.00	0.57
From 5 to 10 ha	0.04	0.30	0.40	0.22	0.19	0.50	0.14	0.06	0.54
From 10 to 20 ha	0.08	0.36	0.42	0.17	0.20	0.51	0.09	0.03	0.44
From 20 to 30 ha	0.13	0.42	0.42	0.15	0.21	0.50	0.07	0.08	0.45
From 30 to 40 ha	0.14	0.38	0.33	0.17	0.23	0.53	0.07	0.03	0.41
From 40 to 50 ha	0.17	0.40	0.30	0.17	0.23	0.45	0.10	0.06	0.40
From 50 to 100 ha	0.28	0.42	0.32	0.16	0.27	0.46	0.11	0.07	0.42
From 100 to 150 ha	0.40	0.43	0.33	0.09	0.31	0.45	0.08	0.11	0.44
From 150 to 200 ha	0.47	0.39	0.32	0.06	0.32	0.45	0.07	0.11	0.45
From 200 to 500 ha	0.56	0.35	0.32	0.04	0.43	0.47	0.10	0.11	0.44
500 ha or over	0.59	0.32	0.29	0.03	0.56	0.48	0.07	0.21	0.46
CV	76.2	14.9	25.1	49.0	40.8	8.8	24.7	71.4	11.5
Significance	***	***	**	***	***	***	NS	***	***

Level of statistical significance are * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ and NS- not significant

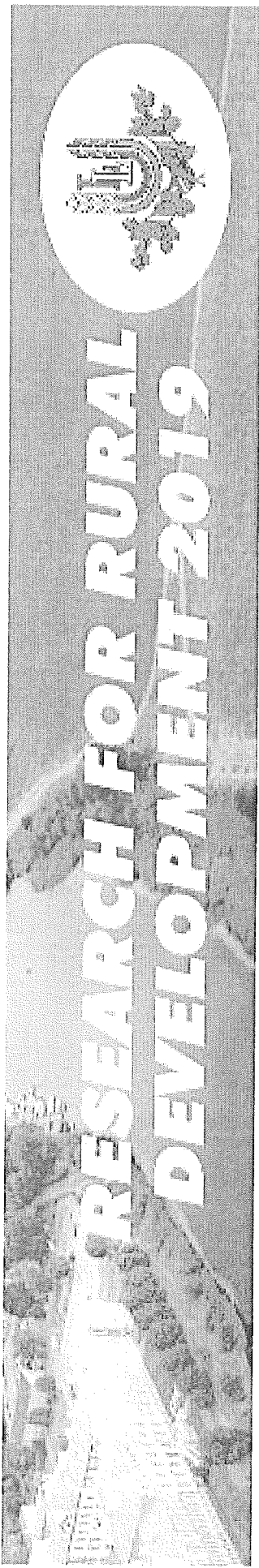
Lithuanian farm economic sub-indices values by specialization and family farm size classes in 2016

Family farm specialization	Economic sub-index (I_{sub8})	Economic sub-index (I_{sub9})
COP	0.29	0.30
General field cropping, mixed cropping	0.32	0.33
Horticulture	0.41	0.42
Permanent crops	0.35	0.36
Specialist dairying	0.32	0.33
Grazing livestock	0.32	0.33
Specialist granivores	0.39	0.40
Field crops-grazing livestock, combined	0.30	0.32
Various crops and livestock combined	0.30	0.32
CV	12.5	11.6
Significance	***	***
Family farms size classes ha of UAA		
Less than 5 ha	0.35	0.37
From 5 to 10 ha	0.29	0.32
From 10 to 20 ha	0.28	0.30
From 20 to 30 ha	0.29	0.31
From 30 to 40 ha	0.28	0.30
From 40 to 50 ha	0.28	0.29
From 50 to 100 ha	0.31	0.32
From 100 to 150 ha	0.31	0.33
From 150 to 200 ha or over	0.32	0.33
From 200 to 500 ha	0.34	0.35
500 ha or over	0.35	0.36
Total	0.31	0.32
CV	8.6	7.6
Significance	***	***

*Level of statistical significance are *p < 0.05, **p < 0.01, ***p < 0.001 and NS- not significant*

CONCLUSIONS

1. The findings of economic sub-index assessment indicates very good level of Lithuanian family farms as 68% of the sample farms were defined by medium level of economic sustainability. The assessment of family farms' economic sustainability by specialization revealed that the horticulture farms performed the highest economic sustainability and, at the other end of spectrum, the COP farms achieved the lowest economic sustainability.
2. As regards the physical size of farms, the best economic sustainability was observed on the smallest-sized farms and on the largest-sized farms, of less than 5 ha and from 500 ha or over, respectively.
3. The contribution of additional indicator, namely farm's income reliance on subsidies, to farms' economic sustainability sub-index value was minimal, though the reason for that could be more addressed to the aggregation method used in the research. Therefore, employing the sustainability index as a policy making decisions tool, the assignment of weights to indicators through methods such as the principal components analysis, expert questionnaire or others should be verified.



THANK YOU FOR YOUR ATTENTION!

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