Journal of Security and Sustainability Issues *www.lka.lt/index.php/lt/217049/*
ISSN 2029-7017/ISSN 2029-7025 online
2014 Volume 3(4): 37–44
http://dx.doi.org/10.9770/jssi.2014.3.4(4)

SUSTAINABLE DEVELOPMENT FACETS: EXPORTING INDUSTRIAL SECTORS FROM INSIDE

Manuela Tvaronavičienė[1], Agnė Šimelytė[2], Natalja Lace[3]

[1,2]Vilnius Gediminas Technical University, Faculty of Business Management, Saulėtekio al. 11, LT-10223 Vilnius, Lithuania
[3]Riga Technical University, 6 Kalnciema Street, Riga LV-1048 Latvia

Emails: [1]manuela.tvaronaviciene@vgtu.lt; [2]agne.simelyte@vgtu.lt; [3]Natalja.Lace@rtu.lv

Received 15 February 2014; accepted 25 May 2014

Abstract. Sustainable development of country economy is being driven by various factors. Economy of each country is comprised of economic sectors. External and internal development drivers differently affect different economic sectors, as a rule. Since economic sectors are not homogeneous, their expanding or contracting depends on behavior of concrete market players; i.e. business companies. The paper aims to reveal factors affecting patterns of development exporting companies attributed to industrial sector and its sub-sectors of Lithuanian economy. Methodology of the investigation is based on development of theoretically grounded questionnaire, targeting revealing factors impacting international competitiveness of industrial companies. Impact of factors, attributed to external business environment, and role of factors attributed to internal development forces are to be indicated. Obtained results, is expected, and would allow to foresee trends and main drivers of further development of exporting Lithuanian industrial sectors.

Keywords: factor analysis, exporting industrial sectors, chemical and chemical products, external and internal drivers

Reference to this paper should be made as follows: Tvaronavičienė, M.; Šimelytė, A., Lace, N. 2014. Sustainable development facets: exporting industrial sectors from inside, *Journal of Security and Sustainability Issues* 3(4): 37–44. DOI: http://dx.doi.org/10.9770/jssi.2014.3.4(4)

JEl classification: C380 F140 O190

1. Introduction: approaches toward characterizing of Lithuanian industry[1]

The first characteristic of any country's industrial development level is percent of value added, created by industry. Hence, industry share in Lithuanian economy is comparatively high in the EU context. It could be as well claimed that the share is high in the context of developed countries (Tvaronavičienė 2014). Since scare resources retard economic development, Lithuania's industrial development prospective, its competitiveness has to be assessed by taking into account its energy security.

Lithuania is exceptionally energy dependent. Import dependency will persist in nearly observed future, and there is low probability that energy prices would decrease significantly (Miškinis *et al.* 2013; Tvaronavičienė 2014). Hence, activity growth trends of industrial sector and its subsectors and respective energy consumption have to be taken into account, energy intensities estimated. Industrial subsectors threatening increasing energy intensity have to be closely observed, and more energy efficient ones supported. It is unanimously agreed, that countries with

[1] Research prepared within framework of Long-term Economic Research Program, topic "Energetically secure and sustainable restructuring of Lithuanian industry sectors in the context of world economy development tendencies" financed by Research Council of Lithuania, IEP-01/2012.

let us glance at sub-sector structure of manufacturing in selected countries (Table 1).

Table 1. Manufacturing sub-sectors contribution to total value added, percent

Manufacturing sub-sectors	Developed countries		Developing countries		Lithuania	
	2000	2009	2000	2009	2000	2009
Food, beverages and tobacco	9,5	8,5	17,2	14,6	25,8	22,9
Textiles and leather	3,8	1,8	9,9	8,4	11,3	4,4
Wood and wood products	2,1	1,4	1,6	1,1	4,1	4,4
Paper and print	8,3	6,3	4,6	3,5	2,2	2,1
Chemical and chemical products	**9,3**	**8,8**	**10,9**	**11,0**	**9,0**	**11,1**
Coke, refined petroleum	2,6	2,2	7,0	5,0	30,2	33,9
Rubber and plastics	3,0	2,4	3,6	3,5	1,8	3,2
Non-metallic minerals	3,3	2,5	5,4	4,9	2,5	2,0
Basic metals	4,5	3,6	7,1	10,1	0,7	0,5
Fabricated metal products	6,2	5,0	4,3	3,5	1,5	2,2
Machinery and equipment (instruments)	34,0	45,6	18,9	24,5	6,3	6,2
Transport equipment	9,9	9,1	7,2	7,5	2,1	1,4
Furniture and other	3,5	2,8	2,3	2,4	2,5	5,7
Total manufacturing	**100**	**100**	**100**	**100**	**100**	**100**

Source: UNIDO (2011), calculations based on the Lithuanian Statistics department (2013) data Dudzevičiūtė (2013)

Coke, refined petroleum products, food, beverages and tobacco, and chemical and chemical products are three main manufacturing sub-sectors generating the highest percentages of total value added in Lithuania. Meanwhile, machinery and equipment contributes the highest percentanges to total value added in both developed and developing countries. Over the period of 2000–2009, sub-sector of chemicals and chemical products was one of the most growing sectors in Lithuania and developing countries. If we take a closer look on the structure of Lithuanian manufacturing industry, we notice that the traditional sectors such as food, beverages and tobacco; textile and leather do not contribute so much value added as it used to be. To determine external and internal drivers of industrial development we apply exploratory factor analysis (EFA). This unique technique summarises the information from set variables into a smaller set of factors. Each factor is composed of variables that correlate highly with each other and interact weakly with the variables present in other factors (Perrobelli, Oliveira 2013).

Let's say we observe k variables X_1, X_2,... X_k then general model (1) is based on an assumption that the behaviour of each variable X_i is determined by m common factors F_1, F_2,..., F_m and a single factor e_k.

$$\begin{aligned} X_1 &= \lambda_{11}F_1 + \lambda_{12}F_2 + ... + \lambda_{1m}F_m + e_1 = \sum_{j=1}^{m} \lambda_{1j}F_j + e_1 \\ X_2 &= \lambda_{21}F_1 + \lambda_{22}F_2 + ... + \lambda_{2m}F_m + e_2 = \sum_{j=1}^{m} \lambda_{2j}F_j + e_2 , \\ &\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \\ X_k &= \lambda_{k1}F_1 + \lambda_{k2}F_2 + ... + \lambda_{km}F_m + e_k = \sum_{j=1}^{m} \lambda_{kj}F_j + e_k \end{aligned} \quad (1)$$

where λ_{km} represents the load factor that is used to linearly combine the common factors F_m and points to the intensity of the correlation between X_k and F_m.

The general model is similar to a multivariate linear regression as knowing F_j and λ_{kj} it would be possible to forecast X_i. However, the purpose of factor analysis is different. Knowing X_i we are able to define and forecast common factors F_j.

The first step for implementing factor analysis is the construction of a correlation matrix of all variables to be analysed, which allows investigating the association between variables (Perrobelli, Oliveira 2013). In this step we perform Kaiser-Meyer-Olkin (KMO) and Bartlett's tests. KMO test is a measure of sampling adequacy. If KMO is >0.5 none of variables are eliminated. The value of Bartlett's test of sphericity, sig. is 0.000, which is also indicates that the data, most likely, fit to to the factor analysis ($p<0.05$) (Ulbinaite *et al.* 2013).

Next step is the extraction of the most significant factors. The factor loading of each variable represents the correlation between the variable and its respective factor. In our analysis, we apply the principle component analysis factor extraction method. Third step is the rotation of factors, which allows better to understand factors and to define correlation between variables and factors. For the rotation we use variamax method with Kaiser normalization. The last step of factor analysis is generation of common factor scores. In this step we apply regression method for calculating common factors. EFA was performed using statistical package for social sciences (SPSS). For the methodological purposes we devide our research into two parts. The first one explores the competitiveness factors of whole Lithuanian manufacturing sectors, and the second one analyses external and internal competitiveness factors of sub-sector of chemical and chemical products.

3. Discussion of the results

3.1. The external and internal development drives of of Lithuanian industrial sectors

Data set was checked for suitability by calculating Cronbach's Alpha, KMO and Barlett's Test of Sphericity (Table 2). The obtained results indicated that data is suitable for further investigation. In all cases values of Cronbach's Alpha and KMO are higher than 0.5.

Table 2. Results of data-fit for factorial analysis

	Lithuanian manufacturing industry		**Chemical and chemical products**	
	Internal factors	External factors	Internal factors	External factors
Cronbach's Alpha	0.821	0.622	0.775	0.563
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.720	0.638	0.708	0.686
Bartlett's Test of Sphericity, Sig.	0.000	0.000	0.000	0.000

Source: authors' calculation

The results of analysis of internal development drivers of Lithuanian manufacturing industry show that the largest part of variance is explained by two factors. The first factor (variables A8, A9, A10, A11, A12) explaines 31,18 per cent and the second one (variables A4, A5, A13, A14) – 13,95 per cent. In total four factors explain more than 62 per cent of the variance. For further analysis, it is recommended (Dumitrescu *et al*. 2013) to retain those factors with the Eigenvalue higher than 1 (the initial variables are standardized, having therefor variantion of 1, thus a factor's Eigenvalue is bigger than 1 explains more than a single's variables variation).

In our case, four factors (Table 3) of which Eigenvalues are higher than 1 have been formed. As it was mention above, the first factor is combined of five variables: expenditure on personnel qualification improvement; innovative production methods; investments into equipment and technologies; expenditure on market research. The second one contains four variables, the third – three (A1, A2, A3) and. The fouth factor is composed of two variables (A7, A8): high level of labour productivity and high qualified labour force.

Table 3. Rotated Component Matrix of Internal Development Drivers of Lithuania's manufacturing industry

Variable	Component			
	1	2	3	4
High production quality (A1)	0.003	0.046	0.546	0.546
Low production costs (A2)	0.110	0.129	0.854	-0.028
Cheap labour force (A3)	0.141	0.266	0.657	-0.126
Low energy intensity (A4)	-0.027	0.776	0.327	0.134
Efficiency of energy consumption (A5)	0.037	0.813	0.077	0.172
High level labour productivity (A6)	0.277	0.411	0.003	0.619
High qualified labour force (A7)	0.255	-0.111	-0.162	0.726

Expenditures on personnel qualification improvement (A8)	0.588	0.126	0.038	0.203
Innovative production methods (A9)	0.690	0.098	0.306	0.233
Investment into equipment and technologies (A10)	0.665	0.109	0.108	0.353
Expenditure on new technologies (A11)	0.818	-0.010	0.065	0.024
Expenditure on market research (A12)	0.661	0.333	-0.058	-0.078
Relatively low demand for energy sources in manufacturing (A13)	0.307	0.777	0.127	-0.040
Low environmental pollution caused by the production (A14)	0.391	0.624	0.119	-0.294

Source: authors' calculation

From five variables defining drivers of the external development drivers of Lithuanian manufacturing industry, two factors of which Eigenvalue is higher than 1 have been formed (Table 4).

Table 4. Total Variance Explained of of External Competitiveness Factors of Lithuania's industry

Component	Initial Eigenvalues		
	Total	% Of Variance	Cumulative %
1	2,035	40,704	40,704
2	1,100	22,004	62,708
3	,770	15,404	78,112
4	,620	12,406	90,518
5	,474	9,482	100,000

Source: authors' calculation

First factor extracted of this research explains 40,704 per cent of total variance. It is composed of three variables (Table 5): the macroeconomical environment (B1), the developement of industry (B2), and the large unsatified demand (B3). Second factor explaines 22,005 per cent of total variance. It is composed of the prices of energy resources (B4) and the availability of financial capital (B5). Following the methodogy, we apply regression analysis to identify an impact of a single factor on the development of exporting Lithuanian industrial sectors.

Table 5. Rotated Component Matrix of External Competitiveness Factors of Lithuania's industry

Variable	Component	
	1	2
Macro-economical environment (B1)	0.692	0.208
Development of industry (B2)	0.861	0.002
Large unsatisfied demand (B3)	0.695	0.131
Prices of energy resources (B4)	0.182	0.795
Availability of financial capital (B5)	0.064	0.838

Source: authors' calculation

We distinguish two dependent variables: the annual revenues (X_1) and the revenues from export (X_2). The multiple regression analysis is performed in two stages. We assume that the linear relationship exists between defined factors and dependent variables.

In the first stage of multiple regression analysis, we caculate factor scores when the development of exporting sectors is based on internal drivers factors. The values of independent variables are entered into the model at the same time. The formulas 2 and 3 are composed of standardized Beta coefficients:

$$X_1 = 0.144F_1 - 0.065F_2 - 0.113F_3 + 0.117F_4 + e_{I1} \quad (2)$$

$$X_2 = 0.198F_1 + 0.076F_2 - 0.121F_3 + 0.073F_4 + e_{I2}. \quad (3)$$

Calculated loading of the factors indicate that annual revenue will grow if factor 1 and factor 4 increases, while the changes of other two factors would have negative influence on annual revenue. Meanwhile, the growth of factor 1, factor 2 and factor 3 will accelerate revenues from export.

Performing the second stage of multiple regression analysis, we follow the same methodology.

$$X_1 = 0.087F_1 - 0.084F_2 + e_{I3} \quad (4)$$

$$X_2 = 0.057F_1 + 0.008F_2 + e_{I4} \quad (5)$$

Calculated loadings of the factors show that annual revenue of exporting Lithuanian industrial sector will increase if factor 1 changes and declines if prices of energy grow and shortage of financial capital arises. However, for both annual revenues and revenues from export the changes of external development factors have lower impact than internal.

3.2. The internal and external development drives of chemical and chemical products sub-sector

The analysis of internal development drivers of chemical and chemical products sub-sector indicated that the largest part of variance is explained by four factors (Table 6). The first factor explains more than 37 per cent.

The second one explains 24,62 per cent of variance. In total four extracted factors explain 85 per cent.

Table 6. Total Variance Explained

Component	Initial Eigenvalues		
	Total	% Of Variance	Cumulative %
1	5,247	37,482	37,482
2	3,448	24,625	62,107
3	1,995	14,250	76,357
4	1,234	8,812	85,170
5	,920	6,574	91,744
6	,649	4,635	96,379
7	,244	1,740	98,119
8	,211	1,504	99,623
9	,053	,377	100,000
10	5,795E-16	4,140E-15	100,000
11	2,981E-16	2,129E-15	100,000
12	-1,093E-16	-7,804E-16	100,000
13	-4,349E-16	-3,106E-15	100,000
14	-4,636E-16	-3,311E-15	100,000

Source: authors' calculation

The first factor is composed of seven variables (A1, A2, A3, A4, A12, A13, A14) (Table 7). Four of these variables are are strongly correlated as their loadings ranged from 0.816 to 0.937. Each of these variables is highly significant as the internal drive for developing chemical and chemical products sub-sector. The second factor comprised of four variables (A7, A8, A10, A11). Two of them have strong positive relationship with factor 2. The third factor composed of one variable (A7), which explains more than 14 per cent of whole variance and its initial Eigenvalue is nearly 2. This result leads to the assumption that the high level of labour productivity is one of the major drivers affecting the development of chemical and chemical products sub-sector. The fourth factor comprised of two variables (A5, A9) and explaines 8,8 per cent of the variance. One of the variables *the innovative production methods* are negative correlated as the loading is -0.859.

Table 7. Rotated Component Matrix

Variable	Component			
	1	2	3	4
High production quality (A1)	0.937	-0.123	0.087	-0.017
Low production costs (A2)	0.679	0.457	0.494	0.144
Cheap labour force (A3)	0.622	-0.650	-0.153	0.085
Low energy intensity (A4)	0.816	-0.002	0.036	-0.112
Efficiency of energy consumption (A5)	0.462	0.174	0.360	0.742
High level of labour productivity (A6)	0.150	0.095	0.937	-0.073
High qualified labour force (A7)	-0.067	0.856	-0.223	-0.146
Expenditures on personnel qualification improvement (A8)	0.093	0.676	-0.518	0.402
Innovative production methods (A9)	0.119	0.132	0.256	-0.859
Investment into equipment and technologies (A10)	0.074	0.884	0.267	0.138
Expenditure on new technologies (A11)	-0.257	0.791	0.136	-0.063
Expenditure on market research (A12)	0.831	-0.385	0.277	0.132
Relatively low demand for energy sources in manufacturing (A13)	0.893	-0.232	0.200	0.104
Low environmental pollution caused by the production (A14)	0.732	0.208	-0.365	0.225

Source: authors' calculation

In the next step we perform the multiple regression analysis. The following formulas were made:

$$X_1 = 0.365F_1 + 0.474F_2 - 0.097F_3 + 0.181F_4 + e_{C1} \quad (6)$$

$$X_2 = 0.423F_1 + 0.297F_2 - 0.171F_3 + 0.659F_4 + e_{C2} \quad (7)$$

The first formula represents relationship between the annual revenue of the companies in the sub-sector of chemical and chemical products and internal development drivers of the chemical and chemical products sub-sector. The obtained loadings show that high-qualified labour force, expenditures on personnel qualificatiom improvement, investment into equipment and technologies, and expenditures on new technologies significantly affect the annual revenue. This impact is expressed as the loading of factor 2 (0.474), which is the highest, compared to others.

Analysing the second mathematical expression we draw conclusion that the revenues from export in

this sub-sector mostly influenced by efficiency of energy consumption and applied innovative production methods. In this case the loading of the most influencing factor is much higher than others (0.659). Two factors of external drivers of the development of chemical and chemical products sub-sectors, which Eigenvalue is higher 1, have been extracted (Table 8)**.** The first factor comprised of four variables out of five explains more than 64.3 per cent of variance. The other factor explains 26.1 per cent of variance. Obtained results reveal that all variables highly correraled with factors as the loading rage from 0.772 to 0.961. Formed equtations (8 and 9) show that the factor 1 has notable affect on the annual revenues. Meanwhile, the second one is irrelevant as it is loading equal to 0.042

Table 8. Total Variance Explained

Component	Initial Eigenvalues		
	Total	% Of Variance	Cumulative %
1	3,216	64,313	64,313
2	1,309	26,184	90,498
3	,319	6,373	96,871
4	,122	2,440	99,311
5	,034	,689	100,000

Table 9. Rotated Component Matrix of External competitiveness factors of chemical industry

Variable	Component	
	1	2
Macro economical environment (B1)	0.961	0.155
Development of industry (B2)	0.772	-0.610
Large unsatisfied demand (B3)	0.912	0.147
Prices of energy resources (B4)	0.291	0.943
Availability of financial capital (B5)	-0.866	-0.182

Source: authors' calculation

$$X_1 = 0.462F_1 + 0.042F_2 + e_{C3} \quad (8)$$

$$X_2 = -0.253F_1 + 0.5F_2 + e_{C4} \quad (9)$$

Hence, the influence of factor 2 on the revenue from export is significant. Concluding, our obtained results revealed that external drivers greater affect subsector of chemical and chemical priducts rather then whole exporting industry.

Conclusions

Sustainable development of the economy is based on various factors, which differ within specific subsectors. The article explored internal and external development drivers of whole Lithuanian industry. Statistical data showed that sub-sector of chemical and chemical products has been the one of the most growing sectors in Lithuania since 2000. For that reason, it was choisen to determine if the same internal and external development drivers affect one of the most growing industrial sub-sector and the whole Lithuanian exporting industry. Fourteen internal and five external development drivers were distinguished. Results revealed that some differences exist.

The analysis of internal development drivers of exporting Lithuanian sector, idicated that two of four factors affect the growth of annual revenues while the growth of factor 1 (five drivers), factor 2 and factor 3 accelerate revenues from export. Meanwhile, in the chemical and chemical products industry annual revenues are determined by three of four factors. The analysis of internal development drivers of chemical and chemical products showed that the same factors affect annual revenues and revenues from export. These results proved that chemical and chemical products sector is highly dependent on export. Exploring external development drivers, we found out that for both annual revenues and revenues from export the changes of external development factors have lower impact than internal in whole exporting sectors.

However, the sub-sector of chemical and chemical products is considerably more dependent of external development drivers than whole exporting industrial sectors.

References

Antanavičienė, J. 2014. Foreign direct investment: driving factors and outcomes for secure and sustainable development, *Journal of Security and Sustainability Issues* 3(3): 55–67. DOI: http://dx.doi.org/10.9770/jssi.2014.3.3(5)

Balkytė, A.; Tvaronavičienė, M. 2011. The role of migration for sustainable developing economy: Lithuania in the EU context, *Journal of Security and Sustainability Issues* 1(2): 133–145. DOI: http://dx.doi.org/10.9770/jssi.2011.1.2(6)

Dudzevičiūtė, G. 2013. Lithuanian manufacturing trends in the context of developed and developing countries, *Entrepreneurship and Sustainability Issues* 1(1): 55–66. DOI: http://dx.doi.org/10.9770/jesi.2013.1.1(6)

Dudzevičiūtė, G.; Tvaronavičienė, M. 2011. Measurement framework of innovation activity: theoretical approaches' analysis, *Journal of Security and Sustainability Issues* 1(1): 61–73.

Dumitrescu, L.; Tichindelem, M.; Vinerean, S. 2013. Using factor analysis in relationship marketing, *Procedia Economics and Finance* 6: 466 – 475.

Lankauskienė, T.; Tvaronavičienė, M. 2012. Security and sustainable development approaches and dimensions in the globalization context, *Journal of Security and Sustainability Issues* 1(4): 287–297. DOI: http://dx.doi.org/10.9770/jssi.2012.1.4(5)

Lankauskienė, T.; Tvaronavičienė, M. 2013. Economic sector performance and growth: contemporary approaches in the context of sustainable development, *Intellectual Economics* 7(3): 355–374.

Laužikas, M.; Krasauskas, A. 2013. Impacts of sustainable structural growth on the economic performance of listed companies, *Entrepreneurship and Sustainability Issues* 1(2): 81–91 DOI: http://dx.doi.org/10.9770/jesi.2013.1.2(2)

Mačiulis, A.; Tvaronavičienė, M. 2013. Secure and sustainable development: Lithuania's new role in taking the Presidency of the EU, *Journal of Security and Sustainability Issues* 3(2): 5–13. DOI: http://dx.doi.org/10.9770/jssi.2013.3.2(1)

Miškinis, V.; Baublys, J.; Lekavičius, V.; Morkvėnas, A. 2013. New changes in Lithuanian energy sector, *Journal of Security and Sustainability Issues* 2(3): 15–28. DOI: http://dx.doi.org/10.9770/jssi.2013.2.3(2)

Perobelli, S. F.; Calheiros de Oliveira C.; C. 2013. Energy development potential: an analysis of Brazil, E*nergy Policy* 59: 683–701.

Tvaronavičienė M.; Lankauskienė, T. 2012. Should consistent patterns be traced: impact of globalization on certain sustainable development facets, *Socialinių mokslų studijos (Societal Studies)* 4(2): 443–468. ISSN 2029-2236 (print), ISSN 2029-2244(online)

Tvaronavičienė M.; Lankauskienė, T. 2013. The impact of production factors and economic structures on economic development, *Verslas: teorija ir praktika* [Business: Theory and Practice] 14(1): 5–16. DOI: 10.3846/btp.2013.01

Tvaronavičienė, M. 2012. Contemporary perceptions of energy security: policy implications, *Journal of Security and Sustainability Issues* 1(4): 235–247. DOI: http://dx.doi.org/10.9770/jssi.2012.1.4(1)

Tvaronavičienė, M. 2014. If industrial sector development is sustainable: Lithuania compared to the EU, *Entrepreneurship and Sustainability Issues* 1(3): 134–142. DOI: http://dx.doi.org/10.9770/jesi.2013.1.3(2)

Tvaronavičienė, M.; Grybaitė, V. 2012. Sustainable development and performance of institutions: approaches towards measurement, *Journal of Security and Sustainability Issues* 1(3): 167–175. DOI: http://dx.doi.org/10.9770/jssi/2012.1.3(2)

Tvaronavičienė, M.; Grybaitė, V.; Tunčikienė, Ž. 2013. Globalization drivers in developed and less developed countries: if consistent patterns can be traced, *Journal of Security and Sustainability Issues* 2(4): 5–11. DOI: http://dx.doi.org/10.9770/jssi.2013.2.4(1)

Tvaronavičienė, M.; Lankauskienė, T. 2011. Plausible foreign direct investment' impact on sustainable development indicators of differently developed countries, *Journal of Security and Sustainability Issues* 1(1): 25–36. DOI: http://dx.doi.org/10.9770/jssi.2011.1.1(3)

Ulbinaite, A; Kucinskiene, M.; Le Moullec, Y. 2013. Determinants of insurance purchase decision making in Lithuania, *Inzinerine Ekonomika-Engineering Economics* 24(2): 144–159.

Vasiliūnaitė, R. 2014. Sustainable development: methodological approaches toward issues, *Journal of Security and Sustainability Issues* 3(3): 69–75. DOI: http://dx.doi.org/10.9770/jssi.2014.3.3(6)

Vosylius, E.; Rakutis, V.; Tvaronavičienė, M. 2013. Economic growth, sustainable development and energy security interrelation, *Journal of Security and Sustainability Issues* 2(3): 5–14. DOI: http://dx.doi.org/10.9770/jssi.2013.2.3(1)