The General Jonas Žemaitis
Military Academy of Lithuania
Ministry of National Defence
Republic of Lithuania

Journal of
SECURITY AND SUSTAINABILITY
ISSUES
International Entrepreneurial Perspectives and Innovative Outcomes

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Dear scientists, practitioners, politicians and other interested readers,

It is my greatest pleasure to introduce the new issue of international peer-reviewed journal, which tackles issues related to sustainable development. Rapid globalization and communication make our planet smaller. Alas, on the other hand, competition becomes tougher, conflicts in various spots seem to be not affected by common sense and overwhelmingly strive towards sustainable future.

In that context, discussions regain their importance since they serve as international ground for indicating urgent issues and suggesting possible ways of their tackling. Let us foster this activity, contribute and participate in various ways and forms in order all of us lived in sustainably developing countries flourishing in secure environments.

Let our societies be interested in innovative solutions and engaged in entrepreneurial activities rather than worrying about security of their families and future generations.

Best regards,

ALGIS ŽVALIAUSKAS
Vice-Minister
of Transport and Communications
of the Republic of Lithuania
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ENERGY EFFICIENCY AS PRECONDITION OF ENERGY SECURITY

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Abstract. Increase of energy efficiency remains as one of the major strategic objectives in Lithuania. Effective use of existing energy saving potential increases energy security and reduces emissions of greenhouse gas and other pollutants. In order to meet the growing energy demand and to reduce the negative impact of the energy sector on environment, increase of the role of renewable energy sources in the country’s primary energy balance, as well as larger deployment of energy-efficient and smart technologies in all areas, including military structures, are required. When analysing energy security and energy efficiency, as the two interrelated aspects of the Lithuanian energy policy, assessment of the global energy trends in the world, the EU and neighbouring countries, expected developments in the modern technologies, as well as global aspirations to neutralize the threat of climate change was performed. The paper provides an overview of energy consumption trends in the European Union and Lithuania, energy policy in the NATO alliance, as well the current status of energy consumption in the Lithuanian National Defence System.

Keywords: energy security, energy efficiency, energy intensity, energy policy, energy strategy

Reference to this paper should be made as follows: Baublys, J.; Miškinis, V.; Konstantinavičiūtė, I.; Lekavičius, V. 2015. Energy efficiency as precondition of energy security, Journal of Security and Sustainability Issues 4(3): 197–208. DOI: http://dx.doi.org/10.9770/jssi.2015.4.3(1)

JEL Classifications: F5, F16, F18, F64, L94, R10

1. Introduction

The Lithuanian energy sector was surviving dramatic changes over the last few years. Due to the closure of Ignalina Nuclear Power Plant with electricity generation cost, which was much lower than in any thermal power plant using fossil fuels, dependence on energy imports increased very significantly. On the one hand, use of local energy resources (peat, local oil, energy from chemical processes) and renewable energy sources over the period 2000-2012 increased by 35.1% and their share in the country’s primary energy mix has increased from 15.9% in 2000 to 20.9% in 2012. Conditions for primary energy and electricity supply have been radically changed due to the closure of the main electricity generation sources. Ignalina Nuclear Power Plant could be replaced in principle by Lithuanian Power Plant and nuclear fuel as the main fuel for electricity generation – by natural gas.

Electricity generated by units at Lithuanian Power Plant, which were commissioned in 1960-ies and 1970-ies and are fired by expensive natural gas, is not competitive in the market. To enhance the efficiency of Lithuanian Power Plant and to reduce the price of electricity generation, a modern combined cycle gas turbine unit was commissioned in 2012. However, due to the very high price of natural gas, cost of electricity generated
at the majority of power plants in the country, including the ninth unit at Lithuanian Power Plant, is too high to compete with imported electricity price. Therefore, Lithuania since 2010, has become the electricity importing country – 5.99 TWh were imported in 2010, 6.74 TWh in 2011 and 6.62 TWh in 2012.

The Lithuanian energy policy should be shaped taking into consideration the complicated geopolitical situation, which is important not only in the historical context of the Lithuanian nation, but has a number of factors influencing the future of international political relations. Being in the center of Europe, Lithuania still faces many difficult challenges, in particular in cases where, for various reasons, the political-militaristic equilibrium in neighbouring countries is becoming unstable and unpredictable. Integration of Lithuania into the EU created favourable preconditions for introduction of legal basis of the EU regulatory and public administration system and has opened up new opportunities. In addition, Lithuania, being a small country, can quickly adapt to the rapidly changing trends of economic globalization and take advantage from the development of information technologies. To use successfully these advantages close regional cooperation and harmonization of the country’s foreign policy with Poland, Latvia, Estonia and Scandinavian countries is required. Currently, the biggest challenges in the energy sector remain the dependency on a single supplier of natural gas and still limited possibilities to import electricity from the Nordic electricity market.

The aim of this paper is to discuss trends of primary energy consumption in the EU-28 countries, to focus on comparative analysis of energy efficiency in the Baltic States and the EU-28 countries, to discuss the possibility to comply with the country’s international obligations, as well as the current status of energy use in the Lithuanian National Defence System.

2. Trends of energy consumption in Lithuania and EU-28

During the last few years conditions and options for electricity supply in Lithuania, as well as volume of primary energy consumption and structure of the country’s energy balance have changed significantly owing to the closure of Ignalina NPP. Fluctuations in primary energy consumption over the period 2000-2008 were caused by variation in electricity export – the more electricity was exported the more nuclear fuel was consumed for its generation (Figure 1). However, the primary energy consumption in Lithuania over this period in principle was increasing on average by 3.5% per year. Owing to the closure of Ignalina NPP and the very high prices of natural gas, electricity generated by major power plants, including combined cycle gas turbine unit at Lithuanian Power Plant, is not competitive electricity market.

Due to the dramatic decline in the volume of electricity production and at the same time significant reduction of losses in the energy transformation sector, total primary energy consumption over the past three years has been on average by 17% less compare with the 2009 level, but dependence on energy imports from Russia increased significantly. While consumption of local and renewable energy sources increased over the period 2000-2012 by 35.1%, the share of all local energy sources in the country’s primary energy mix in 2012 accounted for only 20.9%.
As one can see from the data presented in Table 1, currently natural gas and petroleum products dominate in the Lithuanian primary energy consumption. At present natural gas is technologically and ecologically the most effective imported fossil fuel. In 2012, total consumption of natural gas amounted to 2654.7 thousand toe, and the share of gas in the primary energy balance amounted to 35.9%. Natural gas dominates in the balance of fuel, which is consumed for electricity and district heat production. A large portion of the gas (about 40%) is used for non-energy purposes and about 20% of the gas is consumed directly by final consumers.

Lithuania possesses all the technical capabilities for importing oil and petroleum products from different countries. Thus it has achieved diversification in the supply of petroleum products and is technically secured against possible disruption of supply from any one country. In 2012, total consumption of petroleum products including biofuels amounted to 2590.1 thousand toe, and their share in the primary energy balance amounted to 35.1%. The majority (about 60%) of petroleum products is consumed in the transport sector, about a quarter is used by oil refinery and for non-energy needs, and about 6% are consumed by final consumers. During this period consumption of oil products for electricity and district heat production was continuously decreasing. In 2012, only 6.3% of all petroleum products were used for this purpose.
Table 1. Primary energy consumption in Lithuania, thousand toe

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Electricity import</td>
<td>-114.9</td>
<td>-255.1</td>
<td>-36.8</td>
<td>-118.0</td>
<td>-82.3</td>
<td>-252.1</td>
<td>515.1</td>
<td>579.5</td>
<td>569.3</td>
</tr>
<tr>
<td>Coal</td>
<td>80.0</td>
<td>168.2</td>
<td>233.0</td>
<td>222.8</td>
<td>189.1</td>
<td>145.0</td>
<td>182.5</td>
<td>210.3</td>
<td>200.2</td>
</tr>
<tr>
<td>Peat</td>
<td>12.5</td>
<td>17.4</td>
<td>18.8</td>
<td>27.9</td>
<td>24.4</td>
<td>25.2</td>
<td>27.1</td>
<td>32.0</td>
<td>36.9</td>
</tr>
<tr>
<td>Wood, wood waste and biogas</td>
<td>645.8</td>
<td>836.7</td>
<td>875.0</td>
<td>864.6</td>
<td>912.4</td>
<td>945.3</td>
<td>949.9</td>
<td>926.2</td>
<td>1014.9</td>
</tr>
<tr>
<td>Natural gas</td>
<td>2064.3</td>
<td>2476.9</td>
<td>2454.5</td>
<td>2892.1</td>
<td>2596.0</td>
<td>2181.6</td>
<td>2492.0</td>
<td>2718.8</td>
<td>2654.7</td>
</tr>
<tr>
<td>Oil products</td>
<td>2166.8</td>
<td>2691.3</td>
<td>2710.9</td>
<td>2779.1</td>
<td>3017.4</td>
<td>2547.6</td>
<td>2599.4</td>
<td>2512.8</td>
<td>2590.1</td>
</tr>
<tr>
<td>Nuclear</td>
<td>2193.9</td>
<td>2694.0</td>
<td>2254.5</td>
<td>2562.4</td>
<td>2578.3</td>
<td>2828.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy from chemical processes</td>
<td>130.5</td>
<td>167.2</td>
<td>173.7</td>
<td>211.0</td>
<td>199.9</td>
<td>214.6</td>
<td>209.4</td>
<td>244.3</td>
<td>235.9</td>
</tr>
<tr>
<td>Hydroenergy</td>
<td>29.2</td>
<td>38.8</td>
<td>34.2</td>
<td>36.2</td>
<td>34.6</td>
<td>36.5</td>
<td>46.4</td>
<td>41.3</td>
<td>36.3</td>
</tr>
<tr>
<td>Geothermal energy</td>
<td>2.9</td>
<td>1.7</td>
<td>1.5</td>
<td>0.6</td>
<td>5.1</td>
<td>4.5</td>
<td>3.2</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>Wind and solar energy</td>
<td>0.2</td>
<td>1.2</td>
<td>9.1</td>
<td>11.3</td>
<td>13.6</td>
<td>19.3</td>
<td>40.9</td>
<td>46.7</td>
<td></td>
</tr>
<tr>
<td>Total consumption</td>
<td>7208.3</td>
<td>8838.2</td>
<td>8720.4</td>
<td>9488.4</td>
<td>9481.4</td>
<td>8690.4</td>
<td>7045.2</td>
<td>7309.0</td>
<td>7388.4</td>
</tr>
<tr>
<td>Total internal production</td>
<td>3340.7</td>
<td>4001.7</td>
<td>3584.7</td>
<td>3910.4</td>
<td>3982.3</td>
<td>4346.3</td>
<td>1522.7</td>
<td>1537.5</td>
<td>1558.5</td>
</tr>
<tr>
<td>Energy dependence</td>
<td>53.7</td>
<td>54.7</td>
<td>58.9</td>
<td>58.8</td>
<td>58.0</td>
<td>50.0</td>
<td>78.4</td>
<td>79.0</td>
<td>78.9</td>
</tr>
</tbody>
</table>

Source: Statistics Lithuania (2013, 2014)

Role of wood, wood waste and biogas is increasing – in 2012, their total consumption amounted to 1014.9 thousand toe, and the share of bioenergy in the primary energy balance accounted for 13.7%. Consumption of this fuel is growing rapidly in boilers and power plants – in 2012, consumption of bioenergy for district heat and electricity production increased by 7.9 times compared with the 2000 level. However, the main part of the wood fuel is still consumed by households that are not connected to the district heating systems.

Contribution of other renewable energy sources (hydropower, solar, wind energy and geothermal energy) for electricity and heat production is still comparatively low – in 2012, total consumption of these energy sources was 86.9 thousand toe, and their share in the primary energy balance was 1.2%. Consumption of other local energy sources (peat and energy from chemical processes) amounted to 272.4 thousand toe in 2012, and the share of these sources in the country’s energy balance was 3.7%. Consumption of coal and other solid fuels is also low – in 2012, total volume was 200.2 thousand toe, and their share in the primary energy balance amounted to 2.7%. And vice versa, contribution of electricity imported from neighbouring countries is comparatively high – in 2012, it amounted to 569.3 thousand toe and the share in the country’s energy balance was 7.7%.

Growth or decline of primary energy demand is influenced by many factors: the change in the energy transformation sector, the energy consumption in the energy sector and non-energy use and volumes of energy consumption by end-users. Economic activity in the Baltic States has been growing very rapidly over the period 2000-2008, and energy demand was increasing in all sectors of the economy. This factor has led to a trend of primary energy consumption growth in Estonia, Latvia and Lithuania. As shown in Figure 2, growth of the primary energy demand in the Baltic countries was similar and significantly higher than the average in the EU-28. In 2007, primary energy consumption in Lithuania was by 31.7 %, in Latvia by 26.5%, and in Estonia by 23.7% higher than in 2000. Meanwhile, rate of economic growth in the EU-28 countries was significantly lower and the primary energy consumption increased during this period by only 4%. In 2009, global economic crisis has resulted in reduction of primary energy consumption in Estonia by 10%, in Lithuania by 8.7%, in the EU-28 countries on average by 5.8%, and in Latvia by 4%. In 2010, due to recovery of economy energy consumption in most countries has been growing, and in Lithuania owing to closure of Ignalina NPP decreased by 20%.
The European Union is facing challenges resulting from increased dependence on energy imports, comparatively limited energy resources, as well as ambitious objectives to stabilize climate change and to overcome the economic crisis (Lankauskiene, Tvaronavičienė 2012; Tvaronavičienė 2012; Balkienė 2013; Mačiulis, Tvaronavičienė 2013; Vosylius et al. 2013; Balitskiy et al. 2014; Peker et al. 2014, Scaringelli 2014; Tvaronavičienė 2014; Vasiļiūnaitė 2014). Energy efficiency achieved through innovative technological solutions is assumed as a valuable means to address these challenges (Balkienė 2013; Laužikas, Mokšeckienė 2013; Ala-Juusela et al. 2014; Guruz, Scherer 2014; Cuneo et al. 2014; Barberis et al. 2014; Figurska 2014; Lankauskiene 2014; Raudeliūnienė et al. 2014; Tarabkova 2014; Tvaronavičienė et al. 2014). Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on Energy Efficiency was approved with an objective of saving 20% of the EU primary energy consumption by 2020 compared to projections in 2007 (Directive 2012/27/EU 2013). All Member States have now notified their national indicative targets. However, European Commission is concerned from preliminary assessment of national obligations – „the national indicative energy efficiency targets, taken collectively, suggest that the Member States aim to achieve only about 16.4% primary energy savings and 17.7% final energy savings by 2020“ (Communication 2013).

Lithuania and the other Baltic countries have a vision of rapid economic growth in the medium and long-term period, which allow reaching an average of economic development in the EU-28 countries in terms of GDP per capita measured in Purchasing Power Standards. The economic growth in this case will be followed by increase of final energy consumption, which provides appropriate conditions for the development of economic activities in all branches of the national economy (Balkienė 2013; Tvaronavičienė 2012; Vosylius et al. 2013; Balitskiy et al. 2014; Peker et al. 2014, Scaringelli 2014; Tvaronavičienė 2014; Vasiļiūnaitė 2014). Enhancement of energy efficiency will guarantee slower pace of energy demand growth. However, commitment to reduce primary energy consumption in absolute terms may limit economic growth of the Baltic States. To solve this challenge, Lithuania can take advantage from Article 3 of the Directive, which provides that “each Member State shall set an indicative national energy efficiency target, based on either primary or final energy consumption, primary or final energy savings, or energy intensity” (Directive 2012/27/EU). Implementation of energy efficiency measures in all chain of energy transformation, distribution and final consumption may slow down or partially compensate growth of primary energy demand.
3. Changes in energy efficiency

Lithuania inherited from the Soviet past powerful energy sector, much larger than the domestic requirements, and energy-intensive economy which was oriented to Eastern market and inappropriate in terms of the country’s size, access to raw materials and primary energy (Valentukevičius, Miškinis 2001; Tvaronavičienė 2014). Therefore, energy efficiency in the National Energy Strategy (National Energy Strategy 1999), approved by the Parliament in 1999, and in the National Energy Strategies updated in 2002, 2007 and 2012 has been and remains one of the most important strategic goals.

Energy efficiency in Lithuania increased significantly over the period 2000-2012. This increase is confirmed by reduction of energy intensity indicator (Dudzevičiūtė 2013; Vosylius et al. 2013; Lankauskienė 2014; Raudeliūnienė et al. 2014; Prause 2014). This indicator is used for comparative analysis of energy efficiency very often; in particular in a case there is no possibility to describe the energy consumption by technical and physical parameters. Energy intensity is usually defined as the ratio of gross primary energy consumption (measured in units of energy) and the GDP, gross value added or other indicator of economic activity (calculated in national currency or a common currency) (e.g. Vosylius et al. 2013).

Primary energy intensity was decreasing over the period 2000-2012 in all EU-28 countries. As one can see from Table 2, energy efficiency according to this indicator increased over this period in Lithuania by 70.2%, in Poland by 43.1%, in the Czech Republic by 35.6%, in Latvia, by 30.7%, in Estonia by 30.3%. In developed countries energy efficiency was increasing much more slowly – in 2012, primary energy intensity in Germany decreased compare with the 2000 level by 23.1%, in Finland by 16.7%, in Denmark by 16.5%, in France by 13.8%, while energy intensity on average in the EU-28 countries decreased by 19.3%. Such significant reduction of primary energy intensity in Lithuania was stipulated by dramatic changes in the electricity sector and by the above discussed changes in the country’s primary energy balance. Electricity production at the existing Lithuanian thermal power plants fired by natural gas or oil products can increase owing to provisions of energy security, limited possibility to supply electricity at reasonable price from neighbouring countries or other reasons. This increment of fossil fuel consumption for electricity production will cause corresponding increase of primary energy intensity.

Table 2. Primary energy intensity indicators in EU countries, kgce/thousand EUR

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<tbody>
<tr>
<td>ES-28</td>
<td>170.8</td>
<td>164.0</td>
<td>159.3</td>
<td>151.9</td>
<td>151.0</td>
<td>149.0</td>
<td>151.5</td>
<td>144.0</td>
<td>143.2</td>
</tr>
<tr>
<td>Estonia</td>
<td>627.3</td>
<td>502.5</td>
<td>446.1</td>
<td>465.3</td>
<td>469.0</td>
<td>491.6</td>
<td>551.0</td>
<td>505.9</td>
<td>481.5</td>
</tr>
<tr>
<td>Latvia</td>
<td>429.4</td>
<td>355.2</td>
<td>332.0</td>
<td>309.6</td>
<td>305.9</td>
<td>357.1</td>
<td>382.4</td>
<td>333.5</td>
<td>328.6</td>
</tr>
<tr>
<td>Lithuania</td>
<td>496.3</td>
<td>415.4</td>
<td>377.8</td>
<td>374.6</td>
<td>363.0</td>
<td>389.3</td>
<td>306.8</td>
<td>297.8</td>
<td>291.6</td>
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<td>Czech Republic</td>
<td>481.9</td>
<td>431.2</td>
<td>413.5</td>
<td>391.0</td>
<td>370.8</td>
<td>363.9</td>
<td>374.5</td>
<td>355.4</td>
<td>355.4</td>
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<td>Poland</td>
<td>427.7</td>
<td>378.6</td>
<td>374.3</td>
<td>350.3</td>
<td>336.9</td>
<td>319.8</td>
<td>328.0</td>
<td>314.7</td>
<td>298.8</td>
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<td>Slovakia</td>
<td>593.4</td>
<td>494.4</td>
<td>452.6</td>
<td>387.6</td>
<td>375.7</td>
<td>362.2</td>
<td>369.3</td>
<td>349.3</td>
<td>329.3</td>
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<td>Denmark</td>
<td>101.6</td>
<td>94.4</td>
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<td>94.3</td>
<td>92.6</td>
<td>94.1</td>
<td>97.5</td>
<td>89.7</td>
<td>87.2</td>
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<td>Germany</td>
<td>159.1</td>
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<td>140.1</td>
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<tr>
<td>Finland</td>
<td>238.1</td>
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<td>148.9</td>
<td>150.7</td>
<td>142.6</td>
<td>142.9</td>
</tr>
</tbody>
</table>

*Source: Eurostat (2014)*

Application of the primary energy intensity indicator gives a possibility to assess overall energy efficiency of all energy sources in all stages of energy consumption starting from extraction or import of primary energy...
sources, their transformation, transmission, distribution and final consumption. Changes in primary energy intensity reflect trends in the actual changes of energy efficiency in each country. Therefore, this indicator is used in many studies prepared by the International Energy Agency, the European Commission, etc. and is regularly published in statistical publications and periodically updated in the Eurostat database. The comparative analysis of primary energy intensity is often used to evaluate the energy saving potential of individual countries. Based on the data presented in Table 2, a conclusion about very large energy saving potential in Lithuania and in other Central and Eastern European countries could be made. For example, in 2012, primary energy consumption per unit of GDP (measured in thousands of euros) in Estonia was by 3.4 times, in the Czech Republic by 2.5 times, in Latvia by 2.3 times, in Poland by 2.1 times, in Lithuania by 2.0 times, in Finland by 1.5 times higher than the average in the EU-28 countries. However, these energy intensity indicators are defined in different countries applying the principle of established exchange rates between national currencies and the euro. High energy intensity in Central and Eastern European countries is determined to a large extent by the low level of GDP compared with developed EU countries. Therefore, such an assessment of the potential savings is not correct because the real possibility for reduction of relative primary energy consumption per unit of GDP is much lower (Miškinis et al. 2013).

When comparing indicators of primary energy intensity in various countries, it is necessary to pay attention on two important aspects: 1) the size of this indicator is determined not only by the amount of energy consumed but also by the value of national GDP, 2) the indicator of primary energy intensity is highly dependent on the specific features of the country’s energy sector, structure of energy transformation sector, own use of the energy sector, ratio of electricity import and export and non-energy consumption.

Method of Purchasing Power Parity is used when seeking to compare correctly levels of GDP per capita in the industrialized and developing countries. These indicators are based on capability to purchase the same amount of goods and services in different countries. This principle should be certainly applied to the determination of energy intensity indicators, i.e. GDP in all countries should be converted from national currency into a single international currency (euro or U.S. dollars at constant prices) using estimates of Purchasing Power Parity. Differences of the national GDP using exchange rates and GDP using Purchasing Power Parities in industrialized countries are comparatively small. Meanwhile, GDP in developing countries, given in Purchasing Power Parities, are by 1.5-2.5 times higher compared with GDP using exchange rate. Therefore, indicators of the primary energy intensity determined applying these two methods in developing countries are very different (Table 3).

<table>
<thead>
<tr>
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<th>kgoe per thousand 2005 USD, exchange rate</th>
<th>kgoe per thousand 2005 USD, using PPP</th>
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<tbody>
<tr>
<td>World</td>
<td>254.1</td>
<td>251.0</td>
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<tr>
<td>OECD</td>
<td>164.2</td>
<td>154.0</td>
</tr>
<tr>
<td>EU-28</td>
<td>137.5</td>
<td>132.3</td>
</tr>
<tr>
<td>Estonia</td>
<td>508.0</td>
<td>404.2</td>
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<tr>
<td>Latvia</td>
<td>357.8</td>
<td>287.0</td>
</tr>
<tr>
<td>Lithuania</td>
<td>396.8</td>
<td>335.0</td>
</tr>
<tr>
<td>China</td>
<td>709.4</td>
<td>702.0</td>
</tr>
<tr>
<td>USA</td>
<td>203.7</td>
<td>184.6</td>
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</tbody>
</table>

Source: International Energy Agency (2012, 2013a,b)

The data shown in the Figure 3 illustrates changes in the primary energy intensity in China, the world, the United States, the EU-28 and Lithuania over the period 2000-2011. Presented indicators demonstrate really
existing differences of energy efficiency in various regions. In 2011, primary energy consumption per unit of GDP in Lithuania was by about 10% higher than the average in the EU-28 countries, but by about 40% less than the global average, and twice less than in China.

![Fig.3. Indicators of primary energy intensity](image)

*Source: International Energy Agency (2012, 2013a,b)*

Further reduction of primary energy intensity in Lithuania in medium-term period depends very much on common efforts in all sectors of the national economy directed to reduction of the final energy intensity, i.e. depends on real implementation of energy efficiency measures at consumer side. Significant effect in energy saving can be achieved by modernization of: multifamily houses and public buildings, individual buildings that not connected to district heating systems, individual solid fuels boilers, internal domestic heating systems in households, etc.

4. Energy in the National Defence System

Modern energy security is one of the constituent parts of the worldwide security. Energy security is a possibility to guarantee an uninterrupted energy supply to consumers at affordable prices, maximum energy efficiency and a rational balancing of the activity of separate energy systems (Lankauskiene, Tvironaviciene 2012; Vosylius et al. 2013).

During the recent years, energy security issues have been included into many agendas of world-level debates as particularly important due to several factors posing a threat of armed attacks on the supply of energy resources and their sources. Physical disturbances in the energy supply can be caused by terrorism, pirate attacks at sea, political instability in the countries having large energy resources as well as attempts of individual countries to employ the supply of energy resources for political blackmail (Uberman, Zikovic 2014; Wahl, Prause 2013; Lankauskiene, Tvironaviciene 2012; Vosylius et al. 2013; Garškaitė-Milvydienė 2014). All these factors are not a direct military threat but they pose a danger for the independence of the states having scarce domestic energy resources.

The NATO alliance incorporates diverse countries with the total population of about 900 million. The document of particular importance “Strategic Concept for the Defence and Security of NATO Countries” (NATO
All countries are increasingly reliant on the vital communication, transport and transit routes on which international trade, energy security and prosperity depend. They require greater international efforts to ensure their resilience against attack or disruption. Some NATO countries will become more dependent on foreign energy suppliers and in some cases on foreign energy supply and distribution networks for their energy needs. As a large share of world consumption is transported across the globe, energy supplies are increasingly exposed to disruption. Conflict-type situations are triggered by tensions related to an excessively great dependence of individual states or regions on the supply of strategic raw materials and energy sources from countries which are politically unstable or are ruled by non-democratic regimes. Threats to energy security can be posed by both restrictions on meeting increasing energy needs because of dwindling global oil and gas resources and the increased geopolitical role of states exporting energy sources as well as leverages to dictate terms to energy importing countries. When threats emerge in any country of the NATO alliance, they are comprehensively analysed and a common position for their neutralization is prepared.

The NATO alliance is determined to develop capabilities and contribute to energy security, including the safeguarding of the critical energy infrastructure, transit zones and lines, cooperation with partners and consultations among the members of the Alliance concerning the strategic assessment of the emerged problems and, in a case of genuine threats, preparation of defence plans. Active and efficient policy of the EU also significantly contributes to common security within the Euro-Atlantic area.

In many EU states, the Army, among other state sectors, is attributed to the structures consuming the most of energy resources. According to the data by European Defence Agency, the Armed Forces of a single state consume on average as much electricity as one large city. The total energy consumption for military purposes of all the states participating in the activity of this agency equals that of a small EU state (Energy efficiency 2013). Because of the dwindling traditional fossil fuel resources alongside the simultaneously increasing strictness in the requirements which are applied to all technological structures concerning their harmonious functioning with the nature, increase in the energy efficiency is becoming one of the most important directions in the sustainable energy development (Baublys et al. 2011; Juozaitis 2013).

Energy efficiency is very important for both the NATO alliance countries and also their military structures. At present, a detailed analysis is being conducted concerning the possibility of military structures to contribute to the effective use of energy sources by introducing smart technologies, improving the accounting for energy consumption, investing in various energy-effective appliances and transport, decreasing energy losses in buildings as well as more extensively using renewable energy sources. Until 2010, the issues of the effectiveness of the consumption of energy sources, their prices, supply and security in essence were not properly analysed in the NATO alliance countries, among them in the Lithuanian National Defence System. However, the recently published NATO documents and the mentioned energy efficiency study, prepared in 2013, testify that issues pertaining to the increase in the energy efficiency are not only attributed to the most important directions of harmonious energy development but their significance is also highlighted in defence documents, plans and further research in this area is planned.

The purpose of the recently established in Lithuania NATO Energy Security Excellence Center is to organize research on issues of energy supply security and energy efficiency in military structures. On the initiative of this Center and under the commission of the National Defence Ministry of Lithuania, the first energy efficiency study was carried out (Energy efficiency 2013). On the basis of this study it is planned to conduct research concerning investments and other long-term decisions, ensuring a consistent increase in efficiency of energy consumption within the National Defence System.

The Lithuanian National Defence System has other organizational and technical problems associated with the exploitation of energy objects, saving of energy sources, their systematic accounting and effective consumption. It is equally important to improve the qualification of the personnel dealing with the management and exploitation of energy objects.
In order to eliminate the present shortcomings in the Lithuanian National Defence System, it is necessary:
1) To create an organizational group with the aim of formulating provisions for rational use of energy sources and to define the goals and tasks for the increase in the effectiveness of energy consumption.
2) To establish and truly implement the energy consumption management system, i.e. to organize and execute the planning of energy consumption, the preparation, checking and monitoring of action plans, the creation of energy accounting data base as well as the assessment of the achieved goals.
3) To differentiate energy accounting according to the categories of the end-users of the National Defence System. This will create conditions to determine more accurately the effectiveness of the final energy consumption and choose adequate energy saving measures.

Conclusions

Lithuania and other Baltic countries have a vision of rapid economic growth for the medium and long-term period, and the desire to reach in terms of GDP per capita in Purchasing Power Standards the current EU-28 average. Economic growth may cause a moderate growth of primary energy demand in the Baltic countries. Energy demand growth rates could be reduced by modernization of: multifamily living houses and public buildings, individual buildings which are not connected to district heating systems, individual solid fuels boilers and internal domestic heating systems in households, as well as by implementation of other energy efficiency measures in all sectors of the economy.

Energy efficiency is very important for both the NATO alliance countries, as well as their military structures. Military structures can contribute to energy efficiency by implementing smart technologies, by improving accounting for consumption of energy sources, by investing in various energy effective appliances and transport, by reducing energy losses in buildings, by more extensive use of renewable energy sources.

References


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.2014.1.3(2)


security, ability, competence, assessment model, multi criteria evaluation, naval officer, ship’s officer

Reference to this paper should be made as follows: Prakapienė, D.; Petronis, V. 2015. Security enhancement factors: Naval force’s officers’ professional competence, Journal of Security and Sustainability Issues 4(3): 209–220. DOI: http://dx.doi.org/10.9770/jssi.2015.4.3(2)

JEL Classifications: M10

1. Introduction

Security of countries and regions, their sustainable and secure functioning and development is affected by a whole interrelated system of factors (Smaliukienė et al. 2011; Stańczyk 2011; Vosylius et al. 2013; Čepėnaitė, Kavaliūniūtė 2013; Tvaronavičienė, Grybaitytė 2012; Laužikas Mokšeckienė 2013; Raudeliūnienė et al. 2014; Ciemleja et al. 2014; Smaliukiene 2014; Caurkubule, Rubanovskis 2014; Figurska 2014). One strand of these factors is related to behavioral patterns (Raudeliūnienė et al. 2014; Tarabkova 2014; Caurkubule Rubanovskis 2014; Figurska 2014; Įstoratė et al. 2014; Prause, Hunke 2014; Bileišis 2014; Wahl, Prause 2013; Laužikas, Mokšeckienė 2013; Korsakienė et al. 2011; Radović Marković 2011), which ultimately impact work efficiency.

Work optimization means that optimal results are obtained by using the minimum resources within a set timeframe. This is the improvement of the relationship between the effectiveness of processes and the efficiency of resource utilization. The utilization of the resources in each organization (material, financial and human) should be highly effective and optimized in order to achieve the organization’s objectives, i.e. product development, production and marketing while assuring maximum profits. The less resources are used in order to achieve the maximum results, the less are the costs to compensate them; consequently, the profit is higher. One of the most important resources is human resources; as a result, their competences and
skills must be cultivated for them to adapt to constant change more easily. It is said that there is a direct correlation between rapid adaptation and better performance, i.e. the faster the employee adapts due to his/her development or self-development in the work environment to the changed circumstances, the faster the results of the employee and the organization are optimal. Although adaptation consists of several components, the employee’s development is one of its most important parts which can give the best results only when it is targeted. Therefore, in order to optimize the performance of the employee in the organization, it must be customized for each of them.

The employee’s development is a continuous process in the organization. It does not end with the recruitment of the employee or with the end of the adaptation period which is specifically designed to adapt to a new workplace. Broadly speaking, this period never ends because the employee works in a constantly changing work environment where the environment has to adapt to the person and vice versa. Moreover, work as well as the requirements of individual job performance are also constantly changing and this inevitably leads to the need of adaptation. The review of scientific publications only confirms the fact that there are a lot of individual, organizational and environmental factors that affect the staff’s ability and willingness to adapt to the work environment (Yeatts et al. 2000).

Individual development is favorable in that it distinguishes missing or the most vulnerable competences; therefore, developing them the employee adapts to the work environment and gets familiar with work processes more quickly. For instance, a naval officer after starting to work on a warship must understand the technology as soon as possible, the specifics of navigating the ship, managerial functions and personnel management for optimal performance of the tasks. Thus, the identification of the weakest competences and skills and their subsequent development is particularly important when improving work optimization. However, scientific literature does not fully and unambiguously analyze which method should be employed to identify weak competences and which of the competences are more significant than others. For example, many authors, such as Vaicekauskienė (2007), Adamonienė et al. (2010), Diskienė et al. (2010), Liučvaitienė and Paunksnienė (2011), Raudeliūnienė (2012), have described competences and qualifications; however, there is no unified and comprehensive opinion about the set of competences for a commanding officer. In addition, there is no model to identify weak competences or important and less important ones in the specific place, at a particular time, for a particular commanding officer. Therefore, after reviewing a number of scientific articles and publications on skills and targeted development, the main problem of this article is that neither a list with the competences and skills of a commanding officer nor a model how to assess or develop them exist.

As for the practical side of individual development, it should be noted that to optimize the commanding officer’s performance, organizations do not use any models of competence development when the need for certain development is determined on the basis of his/her lacking competences. However, in each separate case, the employee, his/her competences and the situation itself are unique and individual; therefore, it is necessary for the professional development to be related to the job, the person and his/her competences.

The purpose of this article is to determine groups of competences and skills of a commanding officer which could be used at work of a naval officer. This article identifies important competences and skills of an officer as the commanding officer for working as a ship’s officer.

2. The summary of competences and their deciding factors in scientific literature

The term competence has been used since the fourteenth-fifteenth century; however, so far there is no single definition. The concept in scientific literature (Lepaitė 2003; Jucevičienė 2007; Lobanova 2009, etc.) is interpreted in very different ways. Some authors use it to describe the abilities to perform certain activities which are based on the individual’s knowledge, skills, attitudes, experience, tendencies, personality traits and values while others describe competence as skills, abilities, knowledge and characteristics that manifest themselves when dealing with people in certain circumstances (Rodzevičiūtė 2006). Examining the definition of the concept, a number of scientific works (see Table 1) see it as a combination of human knowledge, skills and ex-
perience. A dictionary of international words (2001) defines competence as ‘a functional ability to adequately perform certain activities’.

**Table 1. Definitions of the concept competence in scientific literature in Lithuania**

<table>
<thead>
<tr>
<th>Author</th>
<th>Conception</th>
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<tbody>
<tr>
<td>Rimkevičienė 1998</td>
<td>it is an ability to apply knowledge, skills and understanding while doing the job in accordance with the standards required by the employers</td>
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<tr>
<td>Kasiulis and Barvydienė 2001</td>
<td>it is a combination of knowledge and skills as well as the ability to adapt them to specific circumstances; it is the performance of management functions, taking into account environmental and situational constraints</td>
</tr>
<tr>
<td>Adamonienė and Ruibytė 2001</td>
<td>it is unique self-expression at work, based on professional and personal skills</td>
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<tr>
<td>Daukëlas 2002</td>
<td>it is a domain which a certain person has knowledge and experience of</td>
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<tr>
<td>Stasiūnaitė et al. 2005</td>
<td>it is an ability to perform a certain function, the quality and use of the ability in practice</td>
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<tr>
<td>Jucevičienė 2007</td>
<td>it is an ability to assess a new situation, select appropriate methods as well as always integrate subject and professional knowledge</td>
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<tr>
<td>Lobanova 2009</td>
<td>it is a functional human ability to perform a certain part of professional activities in a real or simulated situation</td>
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<tr>
<td>Laužackas 2008</td>
<td>it is a combination of knowledge, skills and abilities that are required for the performance of certain activities or tasks</td>
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<tr>
<td>Skaržauskienė 2009</td>
<td>it is a set of abilities that in one way or another are related to excellence, specialization, problem solving</td>
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<tr>
<td>Jucevičienė 2010</td>
<td>it is a combination of personal knowledge, skills, abilities, attitudes, values that emerge in a form of successful work performance</td>
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</table>

*Source: authors*

Classification of competences in scientific literature is not unanimous and clear either. Many scientists classify competences rather individually. For example, Raudeliūnienė et al. (2012) distinguishes social, personal, methodical, professional, and managerial competences. Diskienė et al. (2010) talks about strategic, functional, social, professional, and managerial ones. Kazlauskienė (2003) highlights performance, functional, content, social, subject, communication, and professional competences. Stanišauskienė (2004) offers the following ones: personal, social, educational, and professional. Pikūnas and Palujanskienė (2000) distinguishes physical, intellectual, emotional, social, work, moral, and religious competences. Building on the concept of theoretical classification of competencies into knowledge, skills, abilities, and attributes advanced by Mühlbacher et al. (2009), the current paper presents five competence classes in sequence and hierarchical form: functional competencies, generic management competencies, social skills, cognitive skills and personal characteristics. These five competence classes represent wide range of skills, knowledge, and attributes from personal to social aspects (Janjua et al. 2012).

As stated by Diskienė et al. (2010), competences of a commanding officer consist of 27 competences altogether, including such as strategic, market, essential, functional, cognitive, productivity ones. However, different scientists distinguish a different number of required competences. Most often scientists name competences on the basis of the type of skill. For instance, management skills are reflected in a form of managerial competence while the ability to integrate socially, knowing how to present themselves are reflected in the form of social competence, etc. After analyzing the types of competences that prevail in scientific articles and their multifaceted classification, a generalized table of competence classification based on the occurrence was compiled (see Table 2).
Table 2. A generalized table of competence classification based on the occurrence

<table>
<thead>
<tr>
<th>Authors</th>
<th>Managerial</th>
<th>Technological</th>
<th>Physical</th>
<th>Professional</th>
<th>Social</th>
<th>Personal</th>
<th>Emotional</th>
<th>Cognitive</th>
<th>Educational</th>
<th>Learning</th>
<th>Methodical</th>
<th>Intercultural</th>
<th>Intellectual</th>
<th>Religious</th>
<th>Moral</th>
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<td>Reetz (1990)</td>
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<td>Barnett (1992, 1997)</td>
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<td>Pikūnas and Palujanskienė (2000)</td>
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<td>Kasilius, Barvydiene (2001)</td>
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<td>Adamonienė et al. (2001)</td>
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<td>Danilevičius (2002), Laužackas (2005)</td>
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<td>Stanišauskienė (2004)</td>
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<td>Diskienė and Marčinskas (2007)</td>
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<td>Mühlbacher et al. (2009)</td>
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Source: authors

The table above shows that such competences as managerial, professional, social or personal occur in many scientists’ works; thus, there are fewer objections or disagreements regarding them. However, they are not as valuable when trying to reveal a variety of competences. Compiling the table above (see Table 2), the focus was on less referred competences, which scientists classify their own way, as when there are more competence groups, strong and weak competences of the employee can be expressed in more detail.

In order to compile a comprehensive list of competences distinguished by scientists, an initial list of competences of a commanding officer and their constituent factors was composed. The list of competences was drawn using a bracketing method, i.e. the types of competences which had already been mentioned in other scientific articles and already included in the list were no longer put on it whereas the absent ones were. The names of competences differ in works by different authors; however, the essential criteria remain adequate. Therefore, if competences had different names but meant the same, they were included in the same category and named the same way.

Determining the types of competences and their deciding factors, scientific theories (Rychen and Salganik 2003; Jokinen 2005; Cardy and Selvarajan 2006; Suter et al. 2009; Diskienė et al. 2010; Raudeliūnienė et al. 2012 and etc.) and most often recurring groups of factors in the said theories were taken into consideration. The factors were applied to encourage optimization of a commanding officer’s performance while causality (directly or indirectly) was analyzed in relation to its improvement. The main criterion in choosing the factors of competences was the factors determining the improvement of a commanding officer’s performance. Compiling the initial list, 15 types of competences (managerial, strategic, technological, professional, social, personal, emotional, cognitive, learning, methodical, linguistic-communicative, intercultural, intellectual, ethical and physical) were distinguished, supplemented by 79 factors.
3. The research of a ship’s officer’s competences and their deciding factors

Methodology of the research. Based on the initial list of competences and factors, a study evaluating competences and their deciding factors of a ship’s officer of the Lithuanian Naval Force was carried out. The study aimed to distinguish a ship’s officer’s competences and factors that determine the efficiency of his/her performance, to create an evaluation tool as well as to perform the assessment of some ship’s officers’ competences and factors of a selected warship. Chosen correct and rational methods as well as identification of the strongest and weakest competences of an officer lead to preconditions to create an adapted and individual development program for each officer separately. Therefore, the relevance of the study is based on this assumption.

A case study was used in this research in order to clarify and understand processes and causes found in the development of a naval officer. Its purpose was to narrow down the number of the subjects of the study and to understand the relevance of its raised problem regarding them. One of the ships of the Lithuanian Naval Force - Džūkas (a Flyvefisken class patrol vessel) - was chosen for the case study. The study used in-depth, semi-structured interviews. As a result, 5 officers of the ship were interviewed. A complex multi criteria assessment method, consisting of an expert assessment, in-depth group interview and mathematical analysis, was used to, firstly, identify competences and factors determining efficiency of the ship’s officer’s performance and, consequently, to compile a list of them. This method belongs to a group of decision-making methods and is used to evaluate complicated and complex phenomena or processes. Most commonly used multi criteria methods are a combination of expert assessment and mathematical analysis. They are based on professional competences of the experts and the use of mathematical analysis methods (Raudeliūnienė 2012).

The aim of this method is to identify sub-indicators of the research object, calculate their values and significance, then integrate them into a summative criterion which also integrates a set of sub-criteria. The criterion is calculated by the following formula:

$$ R = \sum_{i=1}^{n} \omega_i \cdot R_i $$

(1)
here $R_i = \text{normalized values of sub-criteria}; \omega_i = \text{significance of sub-criteria}; n = \text{a set of sub-criteria};$

Determining the significance of the assessment criteria shows the importance of each criterion in relation to other criteria. In order to determine the significance, differentiation of the significance of the criteria was carried out. Moreover, to get more objective and accurate assessment, the criteria was differentiated according to the specifics of the organization as well as to the context of the problematic domain, the subject of the study.

$$ \sum_{i=1}^{n} \omega_i = 1. $$

(2)
Determining the significance of the criteria on the basis of the criteria significance scale, different size scales were used ([0,1], [0,100], etc.); however, in this stage to determine the significance of the criteria, the most common criteria significance scale in the interval [0,1] was used instead (Ginevičius 2006):
here $\omega_i = \text{significance of sub-criteria}; n = \text{a set of sub-criteria};$

Expert assessment method is a survey of a specially selected group of people who are experts of a certain area. This method is widely used in sociological research to obtain empirical data of the relevant field. In this study, 7 experts were selected that met special requirements: to have worked for at least 7 years, to have served on a warship for at least 5 years, to have experience as a commanding officer of no less than 5 years, etc. Their function is to evaluate the list of competences and skills and to determine their significance.

On the basis of the adapted list of a ship’s officer’s competences and factors, the experts were asked to identify the quantitative criteria and their significance of the factors. It was agreed that the factor values would be assigned to the scale interval from 1 to 3. Values of the adapted factors would be evaluated as follows: 1 - low
(ability), 2 - medium, 3 - high. Certain criteria of the factors could not be evaluated on the basis of such scale; therefore, they were adapted to the assessment interval taking their context into consideration.

In order to check if the evaluation tool and the values of the adapted criteria were adequate, officers of one warship of the Lithuanian Naval Force were assessed according to the adapted list of competences and factors. Therefore, one of the warships of the Lithuanian Naval Force - Aukštaitis (a Flyvefisken class patrol vessel) - was chosen after applying a stochastic method. The management of the ship consists of two commanding officers while 3 officers belong to a group of lower-rank management. The assessment of the officers was based on the set of criteria of competences and factors determined by the experts (see Table 3). In addition, an evaluation form was made. Also, the officers’ assessment was carried out using a 360 ° feedback approach, i.e. the assessed one was evaluated by everyone related to his/her work: commanding officers, subordinates and colleagues who work with him/her in close proximity. This assessment method was used to collect optimally objective data. Officers x1 and x2 were assessed by 4 colleagues, officer x3 - by 7 colleagues while officers x4 and x5 - by 11 colleagues.

The assessment data were summed and for each competence and factor arithmetic mean was found. Firstly, the results of each officer’s assessment were calculated separately, then all the data were summed up and the cumulative result of the ship Aukštaitis was generated.

**Interpretation of research findings.** The results acquired during the interview coincided with the problems analyzed in scientific literature. The ship’s officers agreed with the presented ways to solve these problems. Interviews revealed a similar ship’s officers’ approach and their understanding of the development problems. Also, the interviews revealed examples of practical problems and possibilities to solve them. Summing up the results, the following can be noted:

- The development of competences is an integral part of the work optimization. The development also directly affects work results. While developing missing competences, productivity increases and work is optimized.
- The ship’s officers’ efficiency would improve if their development was targeted and customized rather than formulaic. Every ship’s officer needs such development.
- The weakest competences and factors must be taken into account while customizing their development.
- At a ship’s officer’s work there are competences and factors that are more significant than others. None of the interviewed officers know or have seen the list setting out competences and factors according to their significance.

After the assessment of competences and their constituent factors of a ship’s officer of the Lithuanian Naval Force, all the experts provided their significance that was calculated finding the arithmetic mean for each criterion separately (see Table 3).

**Table 3.** The table of significance of a ship’s officer’s competences and their constituent factors

<table>
<thead>
<tr>
<th>Competences</th>
<th>Significance</th>
<th>Skills</th>
<th>Significance of factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managerial</td>
<td>0,16</td>
<td>ability to manage</td>
<td>0,28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ability to organize</td>
<td>0,22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ability to plan</td>
<td>0,15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ability to be a leader, authority</td>
<td>0,23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ability to solve conflicts</td>
<td>0,12</td>
</tr>
<tr>
<td>Strategic</td>
<td>0,05</td>
<td>global thinking</td>
<td>0,11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>systemic thinking</td>
<td>0,31</td>
</tr>
<tr>
<td></td>
<td></td>
<td>rational thinking</td>
<td>0,26</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ability to predict</td>
<td>0,09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ability to focus on the goal</td>
<td>0,23</td>
</tr>
<tr>
<td>Technological</td>
<td>0,08</td>
<td>technical and technological skills</td>
<td>0,25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ability to use databases</td>
<td>0,3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>digital literacy</td>
<td>0,45</td>
</tr>
</tbody>
</table>
Based on the evaluation criteria and their values attributed to a ship’s officer competences and factors, a list of the most significant factors leading to work optimization was compiled (see Table 4). For the rating to be optimal and objective, values of factor significance were equalized. The values then were added up with the maximum values of the competences.

Table 4. A list of the most significant values leading to work optimization

<table>
<thead>
<tr>
<th>Place</th>
<th>Factor</th>
<th>Counting the value of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>initiative</td>
<td>0,88+0,39=1,27</td>
</tr>
<tr>
<td>2.</td>
<td>professional knowledge</td>
<td>0,69+0,54=1,23</td>
</tr>
<tr>
<td>3.</td>
<td>ability to manage</td>
<td>0,7+0,48=1,18</td>
</tr>
<tr>
<td>4.</td>
<td>professional experience</td>
<td>0,6+0,54=1,14</td>
</tr>
<tr>
<td>5.</td>
<td>honesty</td>
<td>0,74+0,39=1,13</td>
</tr>
<tr>
<td>6.</td>
<td>higher education</td>
<td>0,54+0,54=1,08</td>
</tr>
<tr>
<td>7.</td>
<td>ability to be a leader, authority</td>
<td>0,58+0,48=1,06</td>
</tr>
<tr>
<td>8.</td>
<td>professional curiosity</td>
<td>0,51+0,54=1,05</td>
</tr>
<tr>
<td>9.</td>
<td>ability to organize</td>
<td>0,55+0,48=1,03</td>
</tr>
<tr>
<td>10.</td>
<td>systemic thinking</td>
<td>0,78+0,15=0,93</td>
</tr>
</tbody>
</table>

Source: authors
Analyzing the findings that were based on the expert assessment method, a set of the most remarkable features of an efficient ship’s officer - initiative, honesty, professional - were distinguished. Professional experience which takes the 4th place in the table above would further strengthen the officer’s work optimization. Initiative, which takes the leading position in the experts’ assessment, highlights one important aspect. As ship’s officers’ level of intelligence and education is high; moreover, they complete a number of job-related professional courses and trainings, initiative is the single most important factor of personal competence that directs work optimization to one side or the other. An initiative ship’s officer, who meets other necessary requirements for a ship’s officer, contributes to increasing work efficiency more greatly than that who does not show any initiative at all. Therefore, this factor is closely linked to personality, experience and personal psychological state.

During the assessment of competences and their factors using the questionnaire, a dual assessment system (method) can be applied:

a) adding up the total amount of points, using a value point for a separate criterion value, for instance: low ability - 1 point, average ability - 2 points, high ability - 3 points.
b) finding the average score of a common assessment of competences and factors, on the basis of the evaluation scale used in this study ranging from 1 to 3, wherein 1 means low, 2 - average, 3 - high.

Assessing Aukštaitis’ ship’s officers separately, both assessment methods were used. The assessment (without integrated criteria values) is presented in Table 5.

<table>
<thead>
<tr>
<th>A ship’s officer</th>
<th>Total amount of points (max. 153)</th>
<th>Average score on a scale from 1 to 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Officer x1</td>
<td>143</td>
<td>2,8</td>
</tr>
<tr>
<td>Officer x2</td>
<td>133</td>
<td>2,6</td>
</tr>
<tr>
<td>Officer x3</td>
<td>140</td>
<td>2,7</td>
</tr>
<tr>
<td>Officer x4</td>
<td>100</td>
<td>2,0</td>
</tr>
<tr>
<td>Officer x5</td>
<td>98</td>
<td>1,9</td>
</tr>
</tbody>
</table>

Source: authors

After the assessment of the competences and their factors of Aukštaitis’ ship’s officers, a calculation of integrated criteria value was done by combining the values into a single generalized value. Subsequently, the obtained value was integrated into the general coefficient of competence significance. The maximum sum of coefficients of competence significance is equal to 3. The overall assessment of competences of Aukštaitis’ ship’s officers is 2.33 out of 3 - slightly higher than average. Now we can distinguish their weakest competences and skills (see Table 6).

<table>
<thead>
<tr>
<th>No</th>
<th>Missing skills</th>
<th>Missing competence</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>professional knowledge and experience</td>
<td>professional</td>
<td>23%</td>
</tr>
<tr>
<td>2.</td>
<td>ability to be a leader, to manage and solve conflicts</td>
<td>managerial</td>
<td>15%</td>
</tr>
<tr>
<td>3.</td>
<td>English comprehension, awareness of other cultures</td>
<td>intercultural</td>
<td>15%</td>
</tr>
<tr>
<td>4.</td>
<td>initiative, self-confidence</td>
<td>personal</td>
<td>12%</td>
</tr>
<tr>
<td>5.</td>
<td>digital literacy, work with computers</td>
<td>technological</td>
<td>9%</td>
</tr>
<tr>
<td>6.</td>
<td>emotional strength</td>
<td>emotional</td>
<td>9%</td>
</tr>
<tr>
<td>7.</td>
<td>fitness and physical self-improvement</td>
<td>physical</td>
<td>6%</td>
</tr>
<tr>
<td>8.</td>
<td>ability to integrate and work in a team, responsibility to the others</td>
<td>social</td>
<td>5%</td>
</tr>
<tr>
<td>9.</td>
<td>ability to organize and evaluate one’s own learning</td>
<td>learning</td>
<td>3%</td>
</tr>
<tr>
<td>10.</td>
<td>ability to manage stress</td>
<td>methodical</td>
<td>3%</td>
</tr>
</tbody>
</table>

Source: authors
Based on these improvable skills, the perspective of competence development and measures for developing individual competences or skills were revealed. Considering the results, a list of the measures was drawn up according to the work environment, costs of time, human and financial resources. Among the offered training tools there are individual classes, English courses, seminars, psychologist-led classes, computer literacy courses, sports activities. The use of these measures is likely to increase the ship’s officers’ quality of work and results; however, it requires more research and observations.

Conclusions

After analyzing the latest theories on training human resources, it became clear that the concept competence in scientific literature is interpreted in very different and conflicting ways. It is hard to find one comprehensive definition or classification of the competences. In this study to define the concept, Jucevičienė’s (2010) definition, saying that it is personal knowledge, skills, abilities, attitudes and values that emerge in a form of successful work performance, was used.

The analysis of scientific literature revealed the lack of consensus on the classification of competences and their factors. Therefore, the study authors, using the expert assessment method, identified the following core groups of competences and factors: managerial (ability to manage, organize, plan, solve conflicts), strategic (global, systematic, rational thinking, ability to predict and focus on the goal), professional (professional knowledge, curiosity, experience, knowledge of legislation, higher education), social (ability to express thoughts and opinions clearly, work in teams, listen to and understand one’s interlocutor, follow the universal ethical principles), personal (honesty, initiative, diligence, a sense of duty, self-confidence), emotional (emotional strength), intercultural (foreign language acquisition, tolerance of culture differences), learning and methodical (ability to systemize information, acquire knowledge, make decisions, manage stress), physical (fitness, hygiene habits, physical self-improvement), technological (technological skills, digital literacy, ability to use databases), linguistic-communicative (literacy, verbal and nonverbal communication skills).

After the research, it became clear that competence development directly affects work results. Developing missing competences, work efficiency increases along with work optimization. A ship’s officer’s efficiency would improve if his/her training was targeted and customized rather than formulaic. All ship’s officers need individual training that would focus on their weakly expressed competences. Selecting individual training in the workplace, the process is optimized which ensures the optimal performance of the tasks of the ship.

After the multi criteria assessment of a ship’s officer’s competences and factors, it was found out that different competences and their factors are not equally important to a ship’s officer’s work. Based on the most significant factors for a ship’s officer identified in the study, the most desirable ones are: initiative, honesty, ability to be a leader, great working experience. Improvement of these forms the core training objectives of ship’s officers of the Lithuanian Naval Force and, therefore, forms the basis in their training program.

The assessment of competences and skills of Aukštaitis’ officers showed that their professional, managerial and intercultural competences are the weakest. The officers must improve their English skills and knowledge. The study found that the graduates of foreign military academies have more pronounced skills and stronger abilities.

Individual classes in the workplace would allow the ship’s officers to improve professional knowledge, leadership skills, teamwork skills, leadership formation, computer work, the ship’s technical knowledge. Psychologist-led classes would allow them to strengthen personal qualities, develop emotional strength, curiosity, improve time and stress management. English courses would allow them to improve English skills. Sports activities would lead to physical development and a better officers’ physical shape.
References


Jucevičienė, P. 2010. Teoriniai požiūriai į kompetenciją ir jų naudojimo praktikos sankirtos: įvadas į argumentavimo kompetenciją [Theoretical approaches to competence and their practical usage intersections: an introduction to the competence of argumentation].


Security Implementation Facets: Peculiarities of Execution of the Sentence of Imprisonment in Respect of Convicted Minors

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Abstract. Consequently, as a result of implemented criminal policy liberalization in the last few years the number of convicts in Latvia has fallen sharply. Despite the fact that the range of the criminal punishment applied for adults and minors does not have a significant difference, the sharp decline in proportion of imprisonment can be explained by compulsory education measures and by forced labor, which are broadly used as criminal punishment in legal procedure of convicted minors. After conducting the analysis of criminal offences committed by minors, it can be concluded that the large amount of these criminal offences are property-related criminal offences, i.e. theft and robbery. However, the amount of violent criminal offences committed by minors, which are directed against human life and health, i.e. infliction of great bodily injuries, smurders, etc., increases with every year. The analysis of the components of crime of the criminal offences committed by minors shows that the criminal offenses committed by minors are becoming more aggressive, more brutal and better planed, which are often directly or indirectly related to alcohol, psychotropic or narcotic substance abuse or domestic violence. This article identifies and analyses the results of the conducted study on peculiarities of execution of the sentence of imprisonment in respect of convicted minors in Latvia. This study examines the peculiarities of execution of the sentence of imprisonment in respect of convicted minors, identifies specific issues and suggests possible solutions. International standards provide that minor prisoners while being in a closed prison environment are defenseless and are at particular risk; therefore, the study obtains the status of vitally important topicality. Based on the study there has been developed a series of recommendations for the staff (of places of confinement) working with minor prisoners, as well as pointed out the necessity to make amendments to the norms of The Sentence Execution Code of Latvia.

Keywords: security, imprisonment, execution of the sentence, minors, reintegration, human rights

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JEL Classifications: K1, K14, N43

1. Introduction


United Nations Standard Minimum Rules for the Administration of Juvenile Justice (“The Beijing Rules”) puts an emphasis on the fact that an adolescent is a child or a young person who (in case of offence) according to the relevant legal systems, can be treated differently as compared to adults. Provisions suggest that in those legal
systems, which recognize the Convention on the age of criminal responsibility, that age shall not be fixed “too low”, taking into account the fact of emotional, mental and intellectual maturity. The paragraph 13.5. of The Beijing Rules stresses the threat of minors to criminalize themselves while being detained pending trial, therefore during the time of custody they should receive care, protection and all types of necessary individual assistance – social, educational, profession related, psychological, medical and physical, which they may require considering their age, gender and personality traits. The paragraph 18.1. of The Beijing Rules recommends: A large variety of disposition measures shall be made available to the competent authority, allowing for flexibility so as to avoid institutionalization to the greatest extent possible.

According to the second part of Section 6 of the Protection of the Rights of the Child Law: in all activities in regard to a child, irrespective of whether they are carried out by State or local government institutions, public organizations or other natural persons and legal persons, as well as courts and other law enforcement institutions, the ensuring of the rights and interests of the child shall take priority. The particular nature of the detention of the minors and criminally-remedial condition are determined by the status of the child’s legal subject. The second part of Section 37 of The United Nations Convention on the Rights of the Child provides that no child shall be deprived of his or her liberty unlawfully or arbitrarily. The arrest, detention or imprisonment of a child shall be in conformity with the law and shall be used only as a measure of last resort and for the shortest appropriate period of time. According to the second principle of the UN Declaration of the Rights of the Child the child shall enjoy special protection, and shall be given opportunities and facilities, by law and by other means, to enable him to develop physically, mentally, morally, spiritually and socially in a healthy and normal manner and in conditions of freedom and dignity. In the enactment of laws for this purpose, the best interests of the child shall be the paramount consideration.

The amount of the minor prisoners in places of confinement of Latvia is rather small, and in recent years, it has fallen significantly. After conducting the analysis of criminal offences committed by minors, it can be concluded that the large amount of these criminal offences are property-related criminal offences, i.e. theft and robbery. However, the amount of violent criminal offences committed by minors, which are directed against human life and health, i.e. infliction of great bodily injuries, murders, etc., increases with every year. The analysis of the components of crime of the criminal offenses committed by minors shows that the criminal offenses committed by minors are becoming more aggressive, more brutal and better planed, which are often directly or indirectly related to alcohol, psychotropic or narcotic substance abuse or domestic violence.

This article identifies and analyses the results of the conducted study on peculiarities of execution of the sentence of imprisonment in respect of convicted minors in Latvia. This study highlights the peculiarities of execution of the sentence of imprisonment in respect of convicted minors, identifies specific issues and suggests possible solutions. International standards provide that minor prisoners while being in a closed prison environment are defenseless and are at particular risk; therefore, the study obtains the status of vitally important topicality. It is no secret that the crime is closely linked to the social problems and it is also a reflection of the social problems. The people who objectively need help, and who most of the time are unable to solve their own problems are placed in places of confinement. This particularly applies to minor prisoners (Judins 2005).

The aim of the authors of this study is to conduct the analysis of the existing norms of The Sentence Execution Code of Latvia concerning convicted minors and implementation of these norms in practice, as well as their compliance with generally accepted human rights, international and the Council of Europe norms and standards. Based on the study there have been developed a series of recommendations for the staff (of places of confinement) working with minor prisoners, as well as there has been pointed out the necessity to make amendments to the norms of The Sentence Execution Code of Latvia. The authors suggest that the drawbacks and issues discovered within the framework of this study, as well as proposed solutions, will make a significant contribution to development of the penalty execution theory in Latvia. It will be possible to improve the sentence of imprisonment execution legal framework by using new scientific cognitions stated in this study.
2. Minors in Places of Confinement of Latvia

According to the third part of Section 13 of The Sentence Execution Code of Latvia: *persons of legal age who have been sentenced with deprivation of liberty shall serve their sentence in a closed prison, a partly-closed prison or an open prison, or in the isolation sections or the maintenance service of investigation prisons, but male minors so convicted shall serve their sentence in juvenile correctional institutions and female minors – in separate sections of women’s prisons which have been arranged as juvenile correctional institutions.* In Latvia, male minors serve their sentence in Cesis correctional institution for juveniles, and female minors serve their sentence in Juvenile Department of Ilguciems Prison. According to paragraph 11.1. of European Prison Rules: *children under the age of 18 years should not be detained in a prison for adults, but in an establishment specially designed for the purpose,* and according to paragraph 11.2.: *if children are nevertheless exceptionally held in such a prison there shall be special regulations that take account of their status and needs.*

Modern science and practice has shown little evidence that the correctional institutions would give better results. Many of the adverse effects to individuals, which are inevitable in any penitentiary institution environment, cannot be neutralized neither by inner order nor by re-socialization programs. This is particularly true in respect of adolescents, who are vulnerable to negative influence.

The famous German scientist, the professor of University of Berlin, Franz von Liszt already at the beginning of the XIX century has warned about a negative effect of the sentence of imprisonment on adolescents in the context of likelihood of repeat offending: *the earlier a person commits a crime (for which he will be punished by deprivation of liberty), the greater the likelihood of repeat offending, taking into account the fact that prisons are crime factories. The society should not delude itself that the deprivation of liberty educates or reeducates criminals. Such an objective cannot be achieved by applying such method as isolation of individual from society. Isolation of the person from society is always an experience of stressful situation.* (List 2004).

Consequently, as a result of implemented criminal policy liberalization, the number of convicts in Latvia has fallen sharply in the last few years. By the end of 2014, there were 39 minors in juvenile correctional institutions (0.8% of the total amount of prisoners). It should be noted that, for example, the proportion of the minor prisoners in 2002 was 3% of a total amount of imprisoned persons in Latvian prisons. Despite the fact that the range of the implemented criminal punishment for adults and minors does not have a significant difference, the sharp decline in proportion of imprisonment can be explained by compulsory education measures and by forced labor, which are broadly used as criminal punishment in legal procedure of convicted minors.

According to the data of the 2013 public report of the administration of places of confinement, the repeated offences (after execution of the first sentence) are committed by 37,5% of minors. These figures are much higher than for adults. Repeated offences (after execution of the first sentence) are committed by 20, 6% of adults. *The fact of the repeated criminal offences indicates the failure of the state in response to the previously committed criminal offences. It demonstrates that state efforts to achieve the objective of the criminal punishment did not show any results.* (Judins 2011). By conducting statistical analysis of criminal offences, the authors have come to conclusion that after execution of the sentence, the repeat criminal offences are committed by those minor individuals, who (in places of confinement) have faced the traditions of criminal world subculture. According to European Parliament Resolution of 21 June 2007: *juvenile delinquency is inherently more dangerous than adult offending as it affects a particularly vulnerable section of the population during the formative years of personal development, exposing juveniles at a very early stage to the risk of social exclusion and stigmatization. Implementation of the humane criminal policy requires civil society support* (Zahars 2014).

The protection of the children’s rights often suffers from state’s alleged lack of financial resources. However, such pretense most of the time does not stand up to scrutiny, because children are the future of every country and, therefore, they should have advantage in terms of the available resources. It is in the interests of the state itself. In order to protect children’s rights there have been established global (UN), regional (Council of Europe) and national protection mechanisms. Authors strongly agree with the Latvian human rights experts’ insight...
that the international children’s rights were adopted in 1924, and it should have been a significant event, but unfortunately, this legislative branch did not receive wide support immediately. Although the children’s rights began to “breath” only in 1950s and 1960 of the 20th century, they were thoroughly developed only in 1980s, when it was high time to stop asking the question “Does a child have any rights?”; and yet the children’s rights are being violated every day in various ways all around the world, because it is so easy to offend a weaker person. In view of such situation, public authorities have a special responsibility to create a law and institutional framework that would be able to help and protect a child. (Ziemele 2000).

3. Settlement via Mediation

Since 2003, a settlement via mediation has become quite popular. Section 1 of the State Probation Service Law defines the term of mediation as follows: a process of negotiations in which the victim and probation client shall participate and in which the help of a mediator shall be used, in order to rectify the consequences of a criminal offence and to reach a settlement between a victim and a probation client.

The settlement is based on the idea of restoration of justice, which in many parts of the world is used as a way to reduce or to eliminate the harm caused by a criminal offence. The criminal offence is not viewed as offence against society, but rather as conflict between members of society. This approach seeks to provide the parties the opportunity to discuss the consequences of the criminal offence, in order to minimize its impact on their lives in the future. The particular importance in the process of settlement has the participation of the young people, because the meeting with a victim is an effective behavioral modification tool, which can prevent repetition of the criminal offence. Participation in the process of settlement gives the young people the opportunity to assess the consequences of their behavior and to take responsibility for their actions. A settlement helps the victim to maintain a neutral relationship with the offender, which generally contributes to social stability and security. The desired result of mediation is the so-called win-win solution, which satisfies both parties, and which has been unanimously formulated by both parties (Trosens, Vanaga 2006) – this way the experts of this field explain the positive aspects of mediation.

It should be reminded that the concept and experience of restorative justice has already been known from antique times, but it was forgotten at the final phase of medieval times, during the establishment of the official justice system, which put offender’s responsibility in front of the king or lord, and later in front of the state, unduly neglecting the interests of the victim and compensatory mechanisms. A major part in the revival of the concept of restorative justice play women’s movements, also peace, and social justice movements (Harris 1993). Restorative justice in cases of minors is based not only on its effectiveness, but also by recognition of the fact of absence of appropriate sanctions in the criminal punishment paradigm, inability to find individualized approach to each offender, as well as the remoteness of these models from the victim, offender and society problems (Christie 1982). The majority of the world-renowned scientists (Howard Zehr, Nils Christie, Daniel Van Ness, etc.) have recognized the crisis of modern juvenile justice and encourage to introduce the model of the restorative justice more actively. American scientist Leslie Wilkins rightly considers that nowadays everyone recognizes the fact that the crime problem should not be reduced to the offender’s problem, because thus we are unduly narrowing comprehensive problem-solving capabilities (Wilkins 1991). Howard Zehr, the British scientist, one of the founders of the idea of restorative justice, in his turn believes that the concept of crime should be looked at from a different perspective, and that it is necessary to develop new principles in rational search for solution. Security and respect of human dignity should go hand in hand. Threats, needs and obligations should be viewed by taking into account their interconnection, and these issues need to be addressed in the most rational way possible (Zehr 2002).

4. Involvement of Convicts in Education Programs

According to the seventh principle of the UN Declaration of the Rights of the Child: the child is entitled to receive education, which shall be free and compulsory, at least in the elementary stages. He shall be given an education, which will promote his general culture and enable him, on a basis of equal opportunity, to develop
his abilities, his individual judgment, and his sense of moral and social responsibility, and to become a useful member of society. The child shall have full opportunity for play and recreation, which should be directed to the same purposes as education; society and the public authorities shall endeavor to promote the enjoyment of this right. According to paragraph 28.3. of European Prison Rules: particular attention shall be paid to the education of young prisoners and those with special needs.

According to the first part of Section 62 of The Sentence Execution Code of Latvia: training shall be ensured within the scope of resocialization at the deprivation of liberty institution in order to ensure that convicted young persons may acquire general education, and according to the second part of this section, general education of convicted persons sentenced with deprivation of liberty shall be stimulated and taken into account when determining their resocialization level.

According to the seventh part of Section 50.7 of The Sentence Execution Code of Latvia: the education process in juvenile correctional institutions shall be approximated to the requirements for general educational institutions and it shall be governed by an instruction approved by the Minister for Justice which has been harmonized with the Minister for Education and Science.

By conducting the analysis of the norms of The Sentence Execution Code of Latvia, the authors have come to conclusion that the Code does not define the levels of resocialization, as well as there are no instruction approved by Minister of Justice, which is harmonized with the Minister of Education and Science on arrangement of the learning process in correctional institutions for minors. The education plays the key role in children and adolescents development process. Parents and professionals, including teachers, have a determinative influence in the educational process, while a family constitutes the most important social “protective net” for life in society, because it passes social values to the younger generation, and it accompanies the children on their way to independence and responsibility (Kronberga, Zarmatens 2012).

5. Sentence Execution Regime

According to the Section 42 of The Sentence Execution Code of Latvia, in deprivation of liberty institutions there are determined and strictly regulated internal procedures, which provide for: procedures for receiving convicted persons in deprivation of liberty institutions; regulations regarding the behavior of convicted persons during work and rest; a list of work and trades in which it is prohibited to employ convicted persons; a list and the number of objects and possessions which they can keep in their possession; procedures for removal of objects prohibited for use; regulations for inspections and meetings; regulations by which consignments, parcels, printed matter and correspondence for convicted persons shall be accepted and issued, and a list and the number of food products and basic necessity goods which are permitted to be sold to convicted persons.

According to paragraph 25.1. of European Prison Rule: the regime provided for all prisoners shall offer a balanced programme of activities, and according to paragraph 25.3.: this regime shall also provide for the welfare needs of prisoners. The regime of execution of the sentence of imprisonment must serve to ensure the resocialization process (Stivrenieks 2013).

According to the third part of Section 50.7 of The Sentence Execution Code of Latvia: according to a decision of the administrative committee of a deprivation of liberty institution, convicted minors who have attained eighteen years of age may be transferred to deprivation of liberty institutions for adult convicted persons, if the behavior of the convicted person rules out the possibility of leaving him or her in a juvenile correctional institution or releasing him or her from the serving of sentence before the end of the term. In such a case, the convicted person shall be transferred to the highest level of a partly-closed prison, and according to the fourth part of this Section, in order to strengthen the results of resocialization and provide the possibility of acquiring a general education or vocational preparedness, convicted persons who have attained eighteen years of age may, according to a decision of the administrative committee of a deprivation of liberty institution, be left in a juvenile correctional institution until the end of the academic year or the end of the sentence term, but not longer than until they attain twenty-one years of age. In exceptional cases, with a decision of
the administrative committee, the convicted person who has attained twenty-one years of age may be left in the juvenile correctional institution until the end of the academic year. The best investment in prevention of crimes committed by minors should be improvement of the educational and social field and implementation of youth policy (Zahars 2003).

According to the fifth part of Section 50.7 of The Sentence Execution Code of Latvia: the regime, working conditions, standards for food, financial and living conditions determined for convicted minors shall apply to convicted persons who have attained eighteen years of age and in accordance with Paragraph three of this Section have been left in a juvenile correctional institution. Levels of the sentence serving regime shall not be determined for convicted male minors and convicted female minors.

By conducting the analysis of Section 50.7 of The Sentence Execution Code of Latvia regarding the regime of execution of sentence of imprisonment in respect of convicted minors, the authors have come to conclusion that the fifth part of Section 50.7 of The Sentence Execution Code of Latvia has an incorrect reference to the third part. In view of the foregoing, the authors suggest to make amendment to the fifth part of Section 50.7 of The Sentence Execution Code of Latvia, and to define this part as follows: the regime, working conditions, standards for food, financial and living conditions determined for convicted minors shall apply to convicted persons who have attained eighteen years of age and in accordance with Paragraph four of this Section have been left in a juvenile correctional institution. Levels of the sentence-serving regime shall not be determined for convicted male minors and convicted female minors. The sentence enforcement regime plays a special role in juvenile correctional institutions. Regime and internal procedures for convicts should be provided taking into consideration reasonable supervision, where the supervisory functions are in cooperation with educational, efficient, and friendly relations.

With amendments, which will come into force on February 1, 2015, the norms of The Sentence Execution Code of Latvia provide to read the Section 50.18 in another edition. The Section 50.18 of The Sentence Execution Code of Latvia determines decision-making procedure of the Evaluation Commission. The first part of this Section determines what kind of decisions may adopt the Evaluation Commission with regard to mitigation of the sentence enforcement regime, where, inter alia, paragraph 5 states: to leave the convicted person, who has attained eighteen years of age be left in a juvenile correctional institution until the end of the academic year or the end of the sentence term, but not longer than until they attain twenty-five years of age; and the paragraph 6 of this Section provides that the convicted person who has attained twenty-five years of age may be left in the juvenile correctional institution until the end of the academic year. The seventh paragraph of the part 1 of the Section 50.18 provides to transfer the convicted person (who has been mentioned in the Paragraph 5 and 6) from the juvenile correctional institution to the higher level of penal regime of the partly-closed prison. By conducting correlation of the sentence enforcement regime, provided by norms of The Sentence Execution Code of Latvia, in juvenile correctional institution and in the partly-closed prison, the authors consider that under no circumstances the transferal of the convicted person from the juvenile correctional institution to the partly-closed prison should be considered as mitigation of the sentence enforcement regime. In view of the foregoing, the authors suggest to strike the seventh paragraph of the part 1 of the Section 50.18 of The Sentence Execution Code of Latvia.

The seventh paragraph of the part 1 of the Section 70. of The Sentence Execution Code of Latvia provides placing convicted persons who are serving their sentence in juvenile correctional institutions in a disciplinary isolation cell for a time period up to ten days and nights. Based on the above, in connection with committed gross and systematic disciplinary violations, prison administration has the right to place convicted minors into solitary confinement. As well as according to paragraph 4 and 5 of the part 1 of the Section 70. of The Sentence Execution Code of Latvia: the prohibition to the current telephone call or the prohibition of the current visit can be applied as disciplinary punishment. In view of the of the foregoing, the authors believe that placing the convicted minors into solitary confinement for a long period of time may have an irreparable psychological impact and traumatize the convicted minor, because the existing regulation allows to place the convicted minors multiple times into solitary confinement. It is not allowed to restrict or prohibit convicted minors from having
contact with the outside world as a form of disciplinary punishment. By denying the convicts the opportunity to communicate with their parents and relatives, the minors may lose useful social contacts. In view of the foregoing, the authors suggest to strike the seventh paragraph of the part 1 of the Section 70. of The Sentence Execution Code of Latvia, and not to apply paragraph 4 and 5 of the part 1 of the Section 70. of The Sentence Execution Code of Latvia in regard to convicted minors.

6. The Safety Aspects of Juvenile Correctional Institutions

According to Section 13. of The Sentence Execution Code of Latvia: the allocation of a convicted person in a specific deprivation of liberty institution shall be determined by the head of the Latvian Prison Administration taking into account medical, security and prevention of crime criteria, and the first part of the Section 18. provides that in deprivation of liberty institutions men and women, as well as minors and adults shall be held separately. Convicted persons whose personal characteristics and criminal experience negatively affect other convicted persons or who oppress and exploit other convicted persons shall also be held separately.

According to paragraph 52.1. of European Prison Rules: as soon as possible after admission, prisoners shall be assessed to determine whether they pose a safety risk to other prisoners, prison staff or other persons working in or visiting prison or whether they are likely to harm themselves. In particular, this assessment is relevant in respect of convicted minors. In a well-managed prison, where prison staff is in close contact with prisoners, and where between staff and prisoners there are positive business relationships, security threat is usually low (Koil 2002). The second part of Section 15. of the Protection of the Rights of the Child Law provides that a child has the right to be protected from physical and mental exploitation, from sexual exploitation and seduction, and from any other forms of exploitation, which may in any way harm the child. Therefore, it very important for convicted minor (while being in the juvenile correctional institution) to feel safe and to have the opportunity to participate in all resocialization activities; and no one should jeopardize it. It is necessary to provide such technical possibilities, so that the convicted minor would be able to communicate with the staff of place of confinement at any time. By conducting risk and needs assessment, it is necessary to determine resocialization needs of a convicted person, as well as the risk level of anti-social behavior and repeated criminal offence in the place of confinement (Zahars, Stivrenieks 2014).

Paragraph 53.1. of European Prison Rules provides that special high security or safety measures shall only be applied in exceptional circumstances. In most cases, the severity of committed offences is not the reason for the children to be isolated from society. By executing directions of the law, which do not allow any other state’s response to the committed offence, most part of the children is punished with deprivation of liberty (Judins 2011).

7. The Staff of the Places of Confinement

International standards and norms provide that prior to implementation of their official duties the staff of places of confinement has to undergo an adequate training in order to execute both general and specific tasks, as well as to pass the final examination. It is also important to ensure that all employees preserve and improve their professional knowledge and skills, during their entire professional life, by attending training courses and professional development courses. According to paragraph 81.3. of European Prison Rules: staff who are to work with specific groups of prisoners, such as foreign nationals, women, juveniles or mentally ill prisoners, etc., shall be given specific training for their specialized work. The training of staff of places of confinement should include guidance on international and domestic legislation standards in field of human rights, and placing a particular emphasis on The European Convention on Human Rights and The European Convention for the Prevention of Torture and Inhuman or Degrading Treatment or Punishment. The third Paragraph of the Section 3 of The United Nations Convention on the Rights of the Child provides that states Parties shall ensure that the institutions, services and facilities responsible for the care or protection of children shall conform with the standards established by competent authorities, particularly in the areas of safety, health, in the number and suitability of their staff, as well as competent supervision.
The Section 5 of the Protection of the Rights of the Child Law provides the persons who shall require special knowledge in the field of protection of the rights of the child, and the sixth part of this Section provides that an employee of a place of confinement, who works with minors, shall also require the special knowledge in the field of protection of the rights of the child. By conducting the analysis of international and Latvian legal provisions, the authors have come to conclusion that:

1) in recent years the staff of educational institutions has not been provided with special training and opportunity to develop their professional skills;
2) 20th part of the Section 5 of the Protection of the Rights of the Child Law provides that special training in the field of protection of the rights of the child should be provided to any other person if the rights and legal interests of a child are or may be affected by an administrative decision (particularly administrative act) taken thereby, actual action or performance of work or service duties of another kind. It should also be provided to the staff of the central administration of the places of confinement, who makes any decisions in respect to convicted minors.

The staff of the places of confinement should understand (when working with convicted minors) that deprivation of liberty is not a punishment, but rather a social inclusion, the acceptance of new challenges, opportunities and methods. Any profession requires constant improvement of qualification (Koil 2002). Any officials, who makes any decisions regarding minors, must be able to take responsibility for their actions. Currently, The Sentence Execution Code of Latvia provides that in each place of confinement only the head of the place of confinement shall be responsible for enforcement of the sentence of imprisonment. In view of the above, it is necessary to introduce the reasonable decentralization of power (rights) and delegation of responsibilities.

8. Development of Juvenile Justice in Latvia

As previously mentioned, the indications of the crisis of the juvenile justice in the modern legal systems have already been defined in 90s of the 20th century, and there was a road paved towards widespread recognition and enforcement of the Restorative Justice model. In this field there has been obtained a major progress in Australia, New Zealand, Canada and in other countries with Anglo-Saxon legal systems, as well as in Europe, for example Germany, Denmark and the Netherlands. However, according to the well-known American legal expert Dan Van Ness: the restorative justice method is still being left “on the side of the tracks” in favor of the criminal justice or therapy (rehabilitation) methods. Furthermore, in order for these tasks to become the first-rate tasks, and in order for them to be included into restorative justice system, and also after establishing the offender’s guilt, and to allow to involve into legal proceedings the injured party and representatives of society, it is necessary to make radical changes of policy and management priorities in the system of juvenile justice (Van Ness 2006).

Juvenile justice is the system of legal provisions and state institutions, which has been established in order to deal with cases related to minors. Prevention of the “child offences” is also a part of the juvenile justice. Juvenile justice system works in order to ensure children’s rights and legal interests, taking into account the special legal status of a child (Grāvere 2013). The juvenile justice system of Latvia has not yet been established. The applicable range of criminal punishments for adults and minors is practically the same. The main differences are the severity of the applicable penalties, the different criminal punishment enforcement procedure and increasing possibility of application of supervisory actions in regard to convicted minors without isolation from society. There is every reason to say that there has been formed a huge gap between our juvenile justice system, which is currently is under a process of transformation, and a Western culture juvenile justice system with its offender reasonable, safe, accountability promoting and humane control. The authors of the article consider the reconciliation via mediator, which is increasingly being used in trials related to offences committed by minors, as a strong bridge over the gap, which still exists between the traditional criminal justice with respect to offences committed by minors and the sprouts of restorative justice in Latvia.

In view of our present problematic aspect concerning the adequate protection of children’s rights in criminal
justice institutions, it is important to raise the matter of urgent development and adoption of the special juvenile delinquent justice law and creation of juvenile courts, with special emphasis on prevention of offences committed by minors and protection of rights of these individuals. However, due to dogmatic beliefs and deep-seated stereotypes, the above-mentioned measures have not yet gained an adequate support in Latvia and other Baltic countries. The authors show solidarity with Lithuanian scientists’ S.Yustickaya, R. Giedryte and A. Mickevich’s authoritative opinion, which is based on the research of the theoretical and practical basis in relation to minor offenders and state’s reaction to them: Because the implementation of measures is often only declarative, the planned measures often do not reach the target group of minors. In other words, they fail to provide the preventive effect. This declarative nature of the implementation of measures is the main reason why the recommendations supplied by criminological research are, in fact, inefficient. This may lead to a further negative phenomenon. On the one hand, the public can only see the façade of crime prevention and is unable to see the actual situation, believing that intensive prevention measures for juvenile delinquency are being undertaken and that juvenile delinquency rates are positively affected by these measures. On the other hand, the public also observes any unfavorable trends in criminal and juvenile delinquency statistics and concludes that these measures have no effect. This creates a false impression that crime prevention cannot be effective and that preventative measures do not have any impact on crime. Maybe it is the reason why society more prone to support a strict penal policy (Justickaja et al. 2014).

Due to issues found in the field of protection of rights of minor offenders, the authors believe that it is necessary to make the appropriate conclusions and to put forward proposals:
- the development of policies and practices for dealing with young offenders is in the wider context of promotion of children’s welfare more generally;
- educative or welfare measures are seen to form an appropriate basis for dealing with the majority of young offenders;
- punitive sanctions are to be used only in exceptional circumstances and only for a minority of offenders;
- waiving prosecution or keeping juveniles out of court proceedings, is an appropriate strategy for the majority of young offenders;
- custody is generally used for young offenders only as an “ultima ratio” measure;
- there is acceptance of the value of preventive measures though the lack of resources and trained personnel again impedes the development of effective strategies;
- there is a concern to promote the rights of young offenders in the court setting in accordance with the principles enshrined in the UN Convention, Beijing Rules and Riyadh guidelines, and of course with Recommendation No. R(87)20 of the Council of Europe;
- a special juvenile offenders law should be adopted and a special juvenile court should be established.

References


SUSTAINABLE DEVELOPMENT AND TAX SYSTEM: IT’S IMPACT ON ENTREPRENEURSHIP

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Abstract. This article analyses the concept of tax system in terms of entrepreneurship promotion given the fact that more and more attention is recently paid to entrepreneurship and promotion of it precisely through the national tax system. This article seeks to prove that: tax system is one of the economic entities’ operating conditions enabling to promote or suppress entrepreneurship in the country; both self-employed persons and companies can be entrepreneurial entities; in any case, a state, in promoting or suppressing their entrepreneurship, thus, influences the national economy and its changes.

Keywords: tax system, entrepreneurship, promotion of entrepreneurship

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JEL Classification: H25, L26

1. Introduction

Sustainable development of countries, industries, incentives and styles of entrepreneurship of organizations and natural persons is affected by taxation (Bikas et. al. 2014; Caurkubule, Rubanovskis 2014; Giriūnienė 2013; Giriūnas, Mackevičius 2014; Dzemyda, Raudeliūnienė 2014; Figurska 2014; Garškaitė-Milvydienė 2014; Prause 2014; Tarabkova 2014; Raudeliūnienė et. al. 2014).

It should be noted that various tax systems function in each country, which are different in the entire tax base, i.e., tax composition, structure, rates, tax incentives, whereas a structure of the tax system depends on how successfully taxation objectives are dealt with and tax principles are implemented. However, it should be emphasised that entrepreneurial entities, which are the driving force of all processes in each economy, are burdened not so much by tax rates as by ambiguity in establishing the legal base, complexity in tax accounting procedures, legislative contradictions, inconsistencies, and instability. For this reason, as A. Shah (2004) argues, a country, by employing the tax system entrepreneurship promotion policy, carries out the planned social, economic, and political measures in order to directly influence entrepreneurial entities, as well as the national level of entrepreneurship through various methods and means. It should be pointed out that main relations of a state with entrepreneurial entities are built up namely by virtue of tax system, which enables the state to directly control and influence entrepreneurial entities, the success of their development and growth opportunities. So, it can be said that the tax system, by promoting the selected priorities, accordingly, has an effect on entrepreneurial entities – self-employed persons or companies – thus, influencing the functioning of the national economy, and this
influence may vary depending on the types of taxes, the size, as well as on which entities and what amounts of taxes are collected from. However, it should also be stated that, despite the impact of the tax system on national entrepreneurship, determination of its role in entrepreneurship is an ambiguously defined object of research. Among scientists, who have studied the tax system and its role in terms of the promotion of entrepreneurship, there is worth mentioning Rin et al. (2010, 2011), Lee and Gordon (2005), Kanniainen and Panteghini (2013), Gentry (2000, 2004, 2005, 2010), Bruce and Deskins (2004, 2012). Meanwhile, researchers have not focused on this problem to deal with it in Lithuania yet.

The object of research – tax system.

The goal of research – to identify the role of tax system in promotion of entrepreneurship.

The following objectives have been set for successful and credible research:
- After examination of the concept of tax system, to provide the generic definition of it;
- To define the role of tax system in entrepreneurial economy;
- To propose an effect of the tax system’s elements on entrepreneurship.

The paper comprises an analysis of Lithuanian and foreign scientific works, empirical research, and economic literature, as well as a practical study on the tax system and its role in the entrepreneurial economy.

### 2. Scientific discussion and findings

It is worthy of note that that all Lithuanian and foreign researchers and experts unanimously agree that the tax system has a direct impact on entrepreneurship, however, they fail to reach consensus when seeking to find out if existing high tax rates of a country promote or, nevertheless, inhibit entrepreneurship. For example, Carroll (1998), Edwards (1982) argue that higher income tax rates, existing in a country, may even enhance entrepreneurship as business entities in this case are more likely to intensify the use of a variety of tax incentives. Nonetheless, findings of empirical studies, conducted by Hansson (2012), Kim et al. (2012), McGowan and Kneller (2012), allow stating that a country’s high taxes inhibit entrepreneurship. This argument is supported by Fölster (2002) who has proved that there is a strong negative correlation between the tax burden and the self-employed persons’ entrepreneurship level and that the reduction in their tax burden by ten percentage points in a country results in an increase in the number of self-employed persons as many as three times. However, it should be noted that some countries with the overall high level of entrepreneurship, such as Denmark or Sweden, impose relatively high tax rates and extremely low levels of self-employed persons’ entrepreneurship. So, in order to objectively assess a national tax system in terms of entrepreneurship promotion, a prerequisite would though be a justification of its role in the development of entrepreneurial economy.

### Table 1. Variation of tax system concepts

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<th>Author</th>
<th>Concept</th>
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<tr>
<td>D.B. Suits (1977)</td>
<td>Tax system – a whole of one or more taxes existing in a country, expressed in certain percentage or absolute terms.</td>
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<tr>
<td>K. Šinkūnienė (2010), E. Buškevičiūtė (2007)</td>
<td>Tax system – a whole of legislated, closely inter-related types of taxes and charges payable to a state or a territorial unit.</td>
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<tr>
<td>A. Smith (1937)</td>
<td>Tax system – a systematic collection of a share of earned income from self-employed persons.</td>
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Findings of the carried out comparative analysis of concepts of the tax system provided in the scientific literature enable the suggest that the term ‘tax system’ directly depends on its usage context – while all authors speak about the tax system as a whole of national existing taxes, the emphasis is, however, on one or another of its aspects – economic, social, or fiscal. Despite the fact that the concept of tax system is defined differently, with more emphasis on one or the other aspect, the majority of the scientists highlight the economic aspect of this concept. It should be pointed out that although different authors suggest different concepts of the tax system, the vast majority of scientists, however, reach consensus and agree that the tax system is a whole of interdependent, mutually complementary, restricting, and influencing taxes, collectable in a country in accordance with the general principles of taxation including administration of taxes as constituent elements of it. However, it should also be stated that the concept of tax is also presented and treated by different authors in a different way. According to Užubalis (2012), taxes can be treated as a reward for the services provided by the state, unable to be provided by the market because of its imperfection. In the scientific literature, this principle is called the benefit principle of taxation, which is not applied in contemporary tax systems but is important in the theory as a logical construct, which was the beginning for development of other theories of the modern taxation concept. Primarily, the benefit principle, as Užubalis (2012) says, has been the basis of the theory of public goods, which analyzes differences between private and public services and searches for the best correlation. Second, the benefit principle theory has developed into the public choice theory which is based on the assumption that consumers are electors, and entrepreneurs, offering them relevant goods – policy-makers. Despite the difference in prevailing theories, that describe the essence of taxes, there is a unanimous opinion that there are three theories of the taxation concept:

- Taxes – the means of payment for services rendered by the government;
- Taxes - the means of economic stabilization;
- Taxes - the means of income equalisation.

Supporters of the first theory state that taxes are the reward for a state’s political, economic, and social activities. This perception of such a taxation concept was largely shaped by the author of the classical tax theory A. Smith, yet, similarly active philosophising about taxes refers to J. Buchanan, J. Hicks, and other scientists. According to Buškevičiūtė (2007), they believed that a state implemented its politics with regard to the interests of the population, while taxes were the price for the government’s actions, the inner peace and security. The first theory of the tax concept emphasises that taxes are not just a source of budget revenue, as had been thought to date, but also have clearly defined areas of target use. It should be, though, noted that, upon the rapid development of economic relations, market globalization, the first tax theory had no longer satisfied economists who analyzed them; therefore, there has emerged a need to change the classical theory of taxation. Proponents of the second, neoclassical and Keynesian economic idea justify the inequality of taxation and, through tax measures, seek to increase the pace of economic growth and to transform the structure of social production. A large amount of savings is hampering the national economic growth, thus, the excess amount of money is necessary to collect by means of taxation, thereby, stimulating their circulation in the domestic market. Meanwhile, the third tax defining theory, according to Stačiokas snd Rimas (2004), is aimed to highlight the social and economic nature of taxes, to justify an unequal increase in taxes, to justify specific tax measures, which enhance the pace of economic growth, and to reform the structure of social production. It is important to underline that the third tax theory, unlike the first two ones, separates the concepts of payment and reward, since a taxpayer, having paid taxes, not necessarily receives the tax benefit of the same value. When studying the tax system in terms of entrepreneurship promotion, it is appropriate to refer to the concept of tax, which reflects macro-approach to the tax, i.e., to treat it as a monetary liability in respect of the state imposed on the taxpayer by the tax law, and the tax system – as a whole of taxes collected in a country, including their accounting and administration.
Bygrave and Zacharakis (2010) argue that many countries implement a combined principle of economy regulation, where the free market mechanism is more or less influenced by the state through the tax system as one of major market regulation measures. All of this takes place by means of three tax functions – fiscal, redistribution, and regulatory. Fiscal tax function indicates that taxes are the main and crucial source of formation of state resources. As Užubalis (2012) states that national budget and target funds’ main revenue accumulation means, other than tax revenues, are emission and borrowing. It should be noted that the money emission itself does not generate more value, since the increase in their amount in the market results in their value decline, while borrowing allows supplementing revenues just for a temporary time as debts need to be repaid. All that has a direct impact on the need to increase tax revenue in a further period. So, taxes can be stated to be the major means of a state’s revenue accumulation. Redistribution function is often defined as social function in the recent scientific literature since taxes redistribute economic wealth between the population and economic entities. A social legal state respects for the social equality aspect, thus, when distributing tax payment liability between members of society, the liability is differentiated in the tax law according to the actual capacity of a taxpayer. The redistribution function can be argued to be inextricably linked to the fiscal one – taxes carry out the fiscal function, thus, ensuring funding of socio-economic rights, as well as other functions of the state. The third, regulatory function indicates that, by adopting relevant tax laws, a state may promote the country’s more rapid economic growth, combat inflation, unemployment, etc. It is worth mentioning that taxes can be no only the means of economic regulation – they can be used to influence the behaviour of individuals, such as discouraging the use of alcohol or tobacco, as well as determine other consumer choices or solve, e.g., problems of the country’s energy independence, through excise taxation of petroleum products and promotion of bio-fuel production and use. So, it can be said, that taxes as a fiscal instrument may be aimed to regulate undergoing economic, social processes in the state, to promote beneficial economic areas, to support economic development priorities, to attract capital, investment, or, on the contrary – to inhibit undesirable socio-economic trends (Puzinskaite and Klišauskas 2012).

It should be noted that, despite the existing differences among prevailing tax systems of various countries, they, nevertheless, have common features which are defined in the scientific literature as tax instrumentation. As stated by James (2009), Meade (2011), tax instrumentation indicates that each tax must be allocated to an entity, object, source, taxation unit, rate, tax incentives, collection method, and determination method. Thus, every tax is paid by a natural or legal person, also known as tax entity or simply a taxpayer, provided for by relevant laws or other legal acts regulating the tax payment. According to the classification of taxes, as Grown and Valodia (2010) state, the tax system can be analyzed and evaluated precisely by the type of taxpayers, i.e., a natural or legal person. After all, respective tax laws often provide for a variety of benefits, tax rates, tax differentiation, respectively, to natural and legal persons. It should be emphasised that this tax system evaluation profile is fully consistent with the assessment of entrepreneurship too, since, as Katz and Green (2013), Kuratko (2013) highlight, entrepreneurship is also usually measured according to what kind of person – a natural or legal – is interested in its enforcement. However, in the context of a country’s level of entrepreneurship, natural and legal persons mostly take a slightly different name – self-employed persons and companies. It should be stressed that such a division is more logical seeking to assess a country’s tax system in terms of entrepreneurship promotion, as not every individual can become a self-employed, i.e., businesses entity, and not every legal entity is a company. It is also necessary to assess the role of the public sector, which can significantly distort the results of the tax system assessment, especially given the fact that legal entities operating in the public sector are characterized by completely different principles and purposes of taxation. So, taking into account that both self-employed persons and companies can be treated as entrepreneurial entities, identification of the role of the tax system also reflects the differences between the entrepreneurial entities. It is worthy of note that the government, which is entrusted to dispose of with the disposal of public funds allocated to the development of science and technology, must act as a smart businessperson and to find as many ways for funding the priority area of the country’s economy as possible. One of the most ways is direct or indirect promotion of entrepreneurship, precisely, through the country’s tax system, which is resorted to only for redistribution of received state tax revenues among certain economic units, but also, through tax incentives, for promotion of one or the other areas of business, entrepreneurship of self-employed persons or companies (see Figure 1).
It should be emphasised that the tax system plays a very important role in the creation of entrepreneurial economy – namely, by virtue of it, state tax revenues are redistributed among all participants in the economic cycle – households, businesses, and the government. However, we should keep in mind that none country’s economic cycle can be closed, therefore, an important role is also attributed to foreign markets – foreign investment, international companies, etc. Thus, upon redistribution by the state of revenue among participants of the economic cycle through the tax system, the number of entrepreneurial entities and an increase in their business volume are highly important for the development of entrepreneurial economy. As stated by Mariotti and Glackin (2011), there consulting and education on the development of entrepreneurial entities, financial tools, tax incentives, etc. are indispensible. So, the tax system’s role in creating entrepreneurial economy continues – namely, its elements – tax incentives, tax holidays, tax credits, or similar means help in promoting entrepreneurship in the country. An entrepreneurial entity that intends to become a new business entity – a company or a self-employed person – always opts for a more favourable business environment – a country, business pattern, and so on. Parker (2004) argues that a new business entity, before a venture creation, evaluates all opportunities for the development of the business, however, as evidenced by studies of some researchers, an emphasis is, nevertheless, paid to the national tax system. Though, it should also be stated that the tax system in the context of development of entrepreneurial economy should not be understood only as a collection, but also as an administration of taxes. As stated by Valdez and Richardson (2013), that only the entrepreneurial unit that is mastering sufficient information can generate business ideas and seek to implement them using state support for business.
It should be emphasised that the state’s support of business may have a myriad of forms and expressions, from the very tax incentives, tax holidays to the establishment and funding of business parks, valleys. The European Union’s “Entrepreneurship 2020 Action Plan” is currently considered to be a priority and provides for measures to remove barriers to entrepreneurship: to create ambitious measures to promote start-up’s and new businesses, to make business transfers more successful, to improve business access to finance, and to give second chances for honest bankrupts. It also seeks to make tax policies more favourable to businesses, therefore, evaluation of national tax system in terms of entrepreneurship promotion is particularly important currently. This just proves the importance of the tax system’s role in the development of entrepreneurial economy. The basis of the entrepreneurial economy, according to Reid (2010), is considered entrepreneurial entities – companies and self-employed persons. It should be noted that self-employed persons’ entrepreneurship is highly influenced by internal entrepreneurship-determining factors. As stated by Hsieh et al. (2011), internal factors are extremely important to be divided into two sub-groups – innate and acquired personal characteristics of an individual, since it has an effect on evaluation of efficacy of measures to promote entrepreneurship. Innate characteristics are attributable to such personal qualities as intuition, recklessness, careerism, adventurism, and self-confidence, and they cannot be acquired by learning, training or otherwise. It must be emphasised that this is precisely the reason that possession or lack of innate, entrepreneurship-influencing characteristics explains why only a certain part of society are business people, capable of successfully creating and nurturing their own business. Acquired characteristics are no less important; they can be acquired during studies or work and include, first of all, knowledge and practical experience, business features and motivation. It should be noted that solely innate, entrepreneurship-influencing characteristics are not enough – entrepreneurial entities, having a sufficient degree, amount of knowledge, skills and abilities acquired during practical experience, must obtain sufficient support from third parties. According to Porter (1994), Takeru and Siohong (2011), such support is described and defined in the scientific literature as consulting and education in business development opportunities. However, as noted by Gaspar (2009), Tanas and Audretsch (2011), it is much more important to create right conditions in a country for existence and development of entrepreneurship, and they are most commonly associated with the entrepreneurship development-friendly tax policy making.

Conclusions

An analysis of scientific literature allows to state that although authors suggest different concepts of the tax system, the vast majority of scientists, however, reach consensus and agree that the tax system is a whole of interdependent, mutually complementary, restricting, and influencing taxes, collectable in a country in accordance with the general principles of taxation including administration of taxes as constituent elements of it. Thus, the tax system in the context of development of entrepreneurial economy should not be understood only as a collection, but also as an administration of taxes. It should be emphasised that the tax system plays a very important role in the creation of entrepreneurial economy – namely, by virtue of it, state tax revenues are redistributed among all participants in the economic cycle – households, businesses, and the government. Besides, the tax system elements – tax incentives, tax holidays, tax credits, or similar means – help in promoting entrepreneurship in the country and, thus, the development of entrepreneurial economy.

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SUSTAINABLE VALUE IN MEASURING OF CORPORATE SUSTAINABILITY: APPROACHES AND THEIR EVALUATION

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Abstract. The ultimate goal of an enterprise is value creation (Rappaport, 1986; Mills and Weinstein, 2000; Jensen, 2001) and it has a great importance for its owners (i.e. shareholders). The concept that is currently coming to the forefront, however, is that of sustainable value. The present paper deals with the definition and evaluation of basic points of departure, approaches and selected tools that lead to measuring corporate sustainability. The last section presents a theoretical basis of measuring corporate sustainability based on sustainable value, which will be the basis and starting point for primary research in selected industries.

Keywords: sustainable development, corporate performance measurement systems, sustainable value, integrated sustainability reporting, SVA


JEL Classification: M14, M21, O44

1. Introduction


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As found by a recent study, 93 per cent of company directors believe that the issue of sustainability will be crucial for the success of their companies. The ultimate goal of each enterprise is value creation (Rapport 1986; Mills and Weinstein 2000; Jensen 2001) and it has a great importance for its owners (i.e. shareholders) but a contemporary enterprise can essentially be looked at as being a network consisting of a large number of mutual relationships between individuals and groups (stakeholders) that affect the way the enterprise is managed and how its behaviour is affected as well and, in turn, are influenced by the company’s behaviour (Freeman 1984; Donaldson and Preston 1995; Post et al. 2002). In more depth, Post et al. (2002) emphasize that the capacity of the enterprise to generate sustainable wealth over time is determined by its relationships with other interested parties (stakeholders) that become critically important for the enterprise at a particular time or on certain fundamental issues or problems for the enterprise. From this perspective, all these mutual relationships between the enterprise and its stakeholders become strategic for the enterprise long-term success and survival, and the measuring of corporate success cannot be limited to value creation for only one group of its stakeholders, i.e. the shareholders (Šimberová 2010; Perrini and Tencati 2006; Clarkson 1995). It also supports the idea that companies should operate in a socially responsible manner, and that the impact of the company for each of the stakeholders is taken into account, including the ways in which the engagement of the stakeholders can support the creation of sustainable value from the long-term point of view. The main purpose of this paper is to perform a critical analysis of expert resources and to define and evaluate basic assumptions, approaches and selected tools that are the basis of the corporate sustainability measurement systems in connection with the concept of sustainable value. The scientific aim is to establish, on the basis of this analysis, a suitable theoretical framework for measuring corporate sustainability based on sustainable value, which will be the starting point for the creation of the theoretical premise for primary research in selected industries. Material and methods: Content analysis is based on an extensive literature search with a special emphasis on the areas of development and of theoretical starting points of corporate performance measurement systems that subsequently lead to an integrated approach in reporting and measuring of the so-called sustainable value and then, purposefully, on certain selected models for measuring sustainable value (e.g. EVA, MVA, SVA, SVAPPAS) that are currently used in the context of an integrated approach in reporting, but also criticized by many authors. We set out from the already established assumption that current models suffer from certain limitations especially in the selection and the number of factors, in not respecting the complex dependencies between individual factors and in the explanatory power, which does not reflect the current reality. In the first part, we assess the development and framework bases of contemporary corporate performance measurement systems including key authors and initiating institutions in terms of their development, methods, with an emphasis on the contribution to sustainable value measurement. In the next part, we clarify the concepts of sustainable development, efficiency, effectiveness, performance, sustainable value, and we describe in some detail the corporate sustainability measurement system based on sustainable value. In the ensuing discussion, we analyze the strengths and weaknesses of individual approaches and of selected instruments for sustainable value measurement, and in the last part of the paper we present, based on the conducted analysis and a discussion, relevant conclusions, which will serve as a basis for the conceptual starting points of our further research. General conclusions ensuing from our content analysis of expert sources are as follows: first – from the point of view of a successful construction and use of a system of corporate sustainability measurement and evaluation, the key issue is the linking of the financial and non-financial indicators to the ultimate goal, which currently seems to be sustainable value and sustainable success; second – the key issue in the creation of all corporate measurement and evaluation systems is the choice of appropriate key indicators and corresponding metrics, which are influenced by the theoretical basis of the systems selected for corporate sustainability measurement, as well as by the region, the industry and, e.g., the size of the enterprise; third – only a small number of initiatives in the field of corporate sustainability measurement has an integrating character and includes all three dimensions, i.e. environmental, economic and social, in the measurement system. The key activity in this area seems to be integrated sustainability reporting which opens the door for enterprises to competitive advantage based on the principle of sustainable value and sustainability.

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2. Development and Evaluation of Corporate Performance Measurement Systems (CPMS) from the sustainable value perspective

In the last few years, we have witnessed various attempts to streamline corporate operations that fall within long-term common priority targets of enterprises, and to increase their performance. The incompleteness of financial indicators’ information value has long been telling us that systems based on exact financial indicators are insufficient, although we cannot deny their fundamental analytical information value in the form of, e.g., an easy comparison, which is partly due to the availability of resources (such as annual reports, published financial results, balance sheets, profit and loss statements, cash flow statements, etc.) and partly to the fact that their construction is based on accounting standards and allows comparisons with identical indicators from the past (and also between companies and countries). An analysis of current practice and theory shows that some phenomena cannot be expressed solely by financial indicators, although they do ultimately participate in, and have influence on, the final financial results (e.g. in the terms of their connection with corporate governance, decision making and management of the company). Contemporary performance measurement systems promote division of performance evaluation approaches by means of both financial and non-financial indicators (Ittner et al. 2003; Synek et al. 2009; Marinič 2008). Recent years have seen a major growth in the development of corporate performance measurement systems which has been caused by turbulences and changes in the environment. Over the last 25 years, we have thus been able to trace changes in the basic theoretical premises of these measurement systems (CPMS), from the shareholder theory to the sustainability theories, which are mainly based on theoretical premises of the stakeholder theory. Table 1 below reflects that development and gives a general evaluation of individual theoretical approaches and tools including key authors, with regard to sustainable value. The original approach based on the shareholder theory whose principal centre of interest was value for that particular key group was gradually extended to also include other interest groups in the late 1990s that, according to some authors (Freeman 1984; Post et al. 2002; Brown and Faser 2006; Steurer 2006; Hubbard 2009), also participate in the creation of value for shareholders, and the stakeholder approach, which assesses corporate success based on the benefits for all stakeholders of the enterprise. Balanced Scorecard (BSC) is another performance measurement system (Kaplan and Norton 1992) based on the stakeholder theory, but some authors (e.g. Mooraj et al. 1999) have noted that it does not include the employee, supplier and social perspectives in performance measurements, although generally speaking it is in fact a tool for the measurement of external and internal economic values. For instance Figge et al. (2002) argues against the recommendations of Kaplan and Norton (1992) to establish only a total of 14 -16 metrics for BSC, according to them the system should respond more flexibly to individual cases and effects. This approach did not find practical application, no causal connectedness between factors was developed, and no consistent way was found how to incorporate other new corporate performance measurement metrics that would be linked to environmental responsibility or social relationships. Another stream of thought was associated with social responsibility, the foundation of which is mainly the control over the impact the enterprise has on the environment and the society, also called corporate social sustainability (Bowen 1953; Elkington 1997). This approach is associated with the concept of “sustainable development”, which represents the idea of equal influence in corporate goals on three areas, i.e. on the environmental, social and economic issues (the triple bottom line or TBL). In practice then, as a reflection of new currents, we can identify changes related to reporting “Global Fortune 250”, where the percentage of enterprises adding the so-called voluntary environmental, social and sustainability reports to their financial reports increased from 35% in 1999 to 52% in 2005 (Holler 2009: 26–27). In the early stages, enterprises viewed this development more as a necessity (something that must be done because it is mandatory) but later there was a growing awareness and understanding that it might be useful as a part of competitive advantage. In this context, a large number of studies were conducted and subsequently papers published on the search for, and construction of, suitable indicators to measure corporate sustainability (Buritt et al. 2002; Kocmanová et al. 2010, 2011, 2012a, b; Hřebíček et al. 2011a, b) or combinations of sustainability measurement indices (WEF 2002-2014; Elias 2003; Böhringer and Jochem 2006; Whitford and Wong 2009; Babecicky 2013; Bardy and Massaro 2012). As early as in 2001, the European Commission published recommendations for integrating sustainability premises into corporate annual reports (European Commission 2001). The result of this initiative and the general response to sustainable performance reporting was that enterprises published their “sustainability” reports either as separate
documents or as part of their annual reports (Jones et al. 2005; O’Dwyer and Owen 2005; Amran and Haniffa 2011), but this ostensibly encouraging trend was limited mostly to a few large concerns. These reports become public documents of the enterprises and subsequently provide a picture about their position on, and activities in, the economic, environmental and social issues to their internal as well as external stakeholders (WBCSD 2002). In the academic understanding, “sustainability” reporting is synonymous with social reporting, corporate social and environmental reporting (CSER) or environmental reporting, which carries the same meaning in that it is in fact a report on social responsibility of the enterprise towards its stakeholders (Stiller and Daub 2007).

Table 1. Development of Corporate Performance Measurement Systems, Tools, Changes and Sources: towards to the sustainability value perspective

<table>
<thead>
<tr>
<th>Theory</th>
<th>Tool</th>
<th>Changes of approach</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shareholder Theory</strong></td>
<td>The perspective uses shareholder return to measure overall firm performance.</td>
<td>Porter 1980</td>
<td></td>
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<tr>
<td><strong>Stakeholder Theory</strong></td>
<td>Its perspective of corporate performance incorporates shareholders value, but recognizes that shareholders are just one group of stakeholders.</td>
<td>Freeman 1984; Reich 1968; Post et al. 2002; Brown and Faser 2006; Steurer 2006</td>
<td></td>
</tr>
<tr>
<td>Balanced Scorecard</td>
<td>The internal process is becoming dominant for measuring performance.</td>
<td>Kaplan and Norton 1992;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The original model does not incorporate employee, supplier or community perspectives on firm performance.</td>
<td>Mooraj et al. 1999; Bieker and Gminder 2001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Measures should be integrated and linked via cause and effect (not just the 14-16 performance measures of original BSC).</td>
<td>Figge et al. 2002</td>
<td></td>
</tr>
<tr>
<td><strong>Corporate sustainability</strong></td>
<td>The Triple Bottom Line (TBL) Groundswell of public opinion that firms were responsible for more than just creating economic value. TBS adds social and environmental measures of performance to the economic measures.</td>
<td>WCED 1987, Bowen 1953; Elkington 1997</td>
<td></td>
</tr>
<tr>
<td><strong>Sustainability Reporting</strong></td>
<td>Sustainable development embodies three inextricably connected principles: environmental integrity, social equity and economic prosperity. Performance in one area has effects on the other two areas.</td>
<td>Hockerts 1999; Bansal 2002</td>
<td></td>
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<td></td>
<td>At the organizational level, a sustainable business has been defined as one that ‘meets the needs of its stakeholders without compromising its ability also to meet their needs in the future’. (Sustainability- something that has to be done because it is law).</td>
<td>Hart 1995; Florida 1996 IFC Sustainability Framework 2012</td>
<td></td>
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<tr>
<td></td>
<td>The organizations follow an evolutionary path in their attitudes and behaviours- from compliance to competitive advantage.</td>
<td>EEMT 2002; IFC Sustainability Framework 2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sustainable framework, developed by an international consult- ing firm.</td>
<td>GRI 2002; GRI 2004; GRI 2006; GRI 2013; Bardy and Massaro 2012;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environmental Sustainability Index (ESI), developed by the World Economic Forum (WEF), which includes socio-economic, environmental and institutional dimensions- evaluation and measurement of sustainability on a country scale- cross-national analysis</td>
<td>Elias 2003</td>
<td></td>
</tr>
</tbody>
</table>
Environmental Management Systems (EMSs), based on ISO.

Corporate Social Responsibility (CSR).

The Sustainable Balanced Scorecard (SBSC).

Corporate Social and Environmental reporting (CSER), based on the three theoretical perspectives: legitimacy, stakeholder and political economy.

Organizational Sustainable Performance Index (OSPI) - (four-quadrant BSC and add social and environmental indicators to create a six-component SBSC).

Environmental, Social and Corporate Governance Indicators (ESG), KPIs, SERS

Integrated Sustainability Reporting (initiative of many worlds’ bodies, which should integrated financial and nonfinancial results of the company into one Integrated Reporting, which should include SVA and EVA).

Source: adapted and processed from Perrini and Tencatı 2006; Hubbard 2009; Holler 2009; Amran and Haniffa 2011; Kocmanová et al. 2012 a; Dočekalová et al. 2011; Babcicky 2013

3. Sustainable development and selected models (methods) of sustainable value measurement

In connection with the term of enterprise sustainability measurement, it is worth noting that phenomena such as efficiency, effectiveness and corporate performance are nowadays among the basic characteristics of enterprises related mainly to sustainable development as an important megatrend of our time. This ensures the incorporation of both financial and non-financial aspects into their measurements. From the enterprise point of view at present, a commitment to sustainability means higher value, i.e. competitive advantage.

The relationship between the efficiency and effectiveness is shown in Fig 1.

Fig.1. Effectiveness vs. efficiency

Source: CBSolution.net: Connective business solutions. Effectiveness vs. efficiency (2011)
“Effectiveness indicators measure how much your targets were reached. They relate actual to expected values. ... Efficiency indicators include traditional financial ratios (profitability, turnover ...), but non-monetary efficiency measures are today recognized as a key factor to track cause-effect of business decisions.” (CBSolution.net: Connective business solutions. Effectiveness vs. efficiency 2011).

As mentioned above, the term sustainability is associated with every activity of human society on the planet Earth. The basis of its significance can be traced to the definition of the phrase sustainable development presented in 1987 by Gro Harlem Brundtland in the Report of the World Commission on Environment and Development (WCED) of the United Nations (UN) entitled Our Common Future: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Sustainability means to promote the present-day economic growth while protecting the environment and natural resources with respect to the future. Sustainability must be global in character but it is at the same time necessary to reflect local and regional conditions. It is important to harmonize not only the environmental, social and economic issues and corporate governance (CG) principles but also the levels of different countries. It is apparent that sustainability concerns all activities on the planet Earth. It is necessary to monitor the values of a large number of indicators that are relevant for the principles of achieving sustainability (more detail in e.g. Moldan 2012). Different metrics have been developed and different data have been used to evaluate (sustainable) corporate performance. Compared with the past, when they were purely financial in character, there is now a growing need to also include data of non-financial character, specifically for the need of development towards sustainability. In this context, current economic theory and practice pay considerable attention to the concept of value, which can be approached from various angles and related to other phenomena. Models of value measurement, value estimates, etc. are constructed.

There is a European standard NF EN 12973 of 2000 which defines the value management and presents concepts associated with value, such as value analysis, value comparison, etc. Value increases with the decreasing number of resources or increasing satisfaction of needs. Value management of enterprises strives to maximize progress in achieving goals while minimizing the resources (more detail in Czech Standards Institute, Czech Technical Standard 2000). Value management is associated with concepts such as customer value, value planning, value analysis, product value strategy, etc. (more detail in Šimeček 2009: 10–12).

4. Market Added Value, Economic Added Value

Let us briefly mention at least two important and widely used values of financial nature, whose construction (introduction) in an enterprise and the monitoring of its performance play an important role: The financial indicator Economic Value Added (EVA) (Bartulec 2011: 24) is used to determine the company value, design compensation purposes, for interconnecting the strategic and the operations management of companies. Its construction at the end of the last century was an important moment in corporate theory and practice.

The calculation of EVA on the basis of economic profit is as follows (Chvátalová et al. 2010: 31):

\[
EVA = NOPAT - C \cdot WACC
\]

\[
NOPAT = EBIT \cdot (1 - t)
\]

where: \( NOPAT \) = Net Operating Profit After Taxes, \( C \) = Invested Capital; \( WACC \) = Weighted Average Costs of Capital, \( EBIT \) = Earnings before Interest, \( t \) = Tax Rate.

Market Value Added (MVA) is specifically aimed at measuring market value. According to the Management Mania (2011-2013), MVA “measures the difference between enterprise market value and value of the capital invested. It expresses the wealth of the owners (shareholders). The calculation is possible in two versions: ex

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ante: MVA = Present value of future results according to EVA; ex post: MVA = Market value of the enterprise – Total paid-in capital.

Although the numerical calculations of these values (EVA and MVA) are not trivial, they can be easily calculated at the time of widespread utilization of information and communication technologies and even some advanced mathematical methods, e.g. the neural network model, can be used for the purpose. There are many computer systems that contain built-in procedures (e.g. MATLAB, Maple etc.). Since approximately the turn of the millennium, the scientists have adopted a new approach to measuring value - in particular with regard to sustainability. Highly acclaimed European specialists Frank Figge and Tobias Hahn work on the development of models to measure an important characteristic, the so-called Sustainable Value Added (SVA). In their paper, Figge and Hahn (2004b: 173) present their new ideas: “…a new approach to measure corporate contributions to sustainability…” and say that: “…it is more promising to develop sustainable measures based on opportunity costs…” and also that: “…Sustainable Value Added considers simultaneously economic, environmental and social aspects… Because substitutability of different forms of capital is disputed, for the assessment of corporate contributions to sustainability we need additional information about eco- and social effectiveness, i.e. on the absolute degree of the use of environmental and social resources by companies.” In a later paper, Figge and Hahn (2005: 47) say:

“We develop and apply a valuation methodology to calculate the cost of sustainability capital, and, eventually, sustainable value creation of companies.” They went on to specify their basic idea of taking into account the economic capital, but also other forms of capital: “Our methodology borrows the idea from financial economics that the return on capital has to cover the cost of capital. Capital costs are determined as opportunity costs, that is, the forgone returns that would have been created by alternative investments…” They applied this methodology in the British Petroleum. The Sustainable Value Added calculation they performed in five steps (see formula 3) using economic output of company, economic output of benchmark, resources of company, resources of benchmark (more detail in Figge and Hahn 2005: 47).

Van Passel (2008: 26) discussed: “…an outline of the possibilities and limitations of value-oriented methods to assess farm sustainability…” Van Passel states (in Figge and Hahn 2004 a, b; 2005) that: “This approach has been developed outside the agricultural sector and already applied to major companies (e.g. BMW, Shell). Recently the approach has also been tested and used for the agricultural sector.” Care of course must be taken to choose relevant resources that influence sustainable development in agriculture. Choosing the appropriate, suitable and available indicators specific for agriculture takes a long time, and large number of resources needs to be tapped that discuss ambiguity of assumptions, development dynamics in developing methods for measuring sustainable value. Furthermore, Van Passel (2008: 28) points out that: “…an interesting way is to use good performing farms as examples for the sector as a whole. Sustainable farms may be used as a mirror for future farms. Therefore, it is essential to develop and use methods to identify sustainable farms. The approach could help decision makers to identify farms that best suit policy objectives. It also provides information to what extent resource use can be improved conditional on the current technology.”

In their paper, Mondelaers et al. (2011) summarize the outputs of the three-year EU SVAPPAS Project (FP6 STREP EU-project SVAPPAS (Sustainable Value Analysis of Policy and Performance in the Agricultural Sector)). They point out that sustainability in agriculture is a constant problem, and also that various methods have been developed, but few of them are used in practice for policy evaluation because the most of them are only burden oriented. The Sustainable Value (SV) method by Figge and Hahn (2004a) was critically analysed and extended by four modifications for the agricultural sector. Mondelaers et al. (2011: 9) define the objective of this project as follows: “The objective of the 2007... was to test, elaborate and apply this new method in the agricultural context. Another goal of the project was to evaluate the suitability of EU Farm Accountancy Data Network (FADN) data for SV analysis. This project brought Figge and Hahn, the original developers of the SV method, together with a multidisciplinary group of agricultural and ecological economists.”
Four modifications for the agricultural sector:

- First of them is based on the idea: *The original SV method does not take the underlying production functions into account when calculating the benchmark productivities. This criticism is formulated and described by Kuosmanen, T. and Kuosmanen, N. (2009). Incorporating production functions is one of the modifications to the original method. This modification ensures that the value creating potential of one resource is dependent on the other resources. The formulae originate from Mondelaers et al. (2010: 12–13).*

- Second of them is based on idea: “*The modified method now allows for alternative benchmarks. …One of the suggested alternative weighting schemes is based upon the firm’s marginal productivities, or shadow prices.*” This suggestion draws on the work of Kuosmanen, T. and Kuosmanen, N. (2009) and Mondelaers et al. (2010).

- Third of them is based on the idea: “*…therefore proposes incorporating sustainability thresholds on capital use.*” This proposal is supported by (Mondelaers 2010; Merante et al. 2010).

- Fourth of them is coming with the assume: “…that all companies involved are exposed to the same degree of risk” (Figge and Hahn 2007). This assumption can be relaxed by calculating risk-adjusted opportunity costs, i.e. opportunity costs that have the same level of risk as the company that is being evaluated.

Figge and Hahn (2007) have developed a methodological framework that has (in adapted form) been tested and applied by Van der Vennet et al. (2010) in an assessment of the sustainability of Flemish pig production.

In their paper, Mondelaers et al. (2011: 13–14) also noted that “*The SV method can be used both for policy assessment and policy design.*” And “*By changing the weighting of the different firms in the benchmark, it is easy to switch between the private investor’s view, the manager’s view and the policymaker’s view.*”

Timo and Natalia Kuosmanen (2009) analyzed the procedure in the Figge-Hahn’s (FH) construction of the Sustainable Value in their paper “*How not to measure sustainable value (and how one might)*”. These authors criticize in the Figge-Hahn’s methodology (Figge and Hahn 2004a,b; 2005) that the estimator for opportunity costs which is based on poorly realizable assumptions. Kuosmanen, T. and Kuosmanen, N. (2009: 235–236) say: “…we do not criticize the theoretical concept of SV…”, they appreciate: “…the idea of valuing resources based on their opportunity cost. However, one must sharply distinguish the theoretical object of interest (the estimand) and the computational rule (the estimator).” They think that: “Unfortunately, FH do not draw this distinction, but present their SV estimator as a definition that leaves no room for error.”

Let us consider the formula below, which is a mathematical expression for the calculation of the estimator of sustainable value by Figge and Hahn (including the possible formal modification) as shown on pages 236–237 in (Kuosmanen, T. and Kuosmanen, N. 2009):

\[
S_{i}^{FH} = \frac{1}{R} \sum_{r=1}^{R} \left( \frac{y_{i}^{*}}{x_{i}^{*}} - \frac{y_{r}^{*}}{x_{r}^{*}} \right) x_{r} = y_{i} - \frac{1}{R} \sum_{r=1}^{R} \left( \frac{y_{r}^{*}}{x_{r}^{*}} \right) x_{r}^{*} \tag{3}
\]

where \(x_{r}^{*}\) can be understood as eco-efficiency of the benchmark (benchmark: the added value \(y_{r}^{*}\) and the resource \(x_{j}^{*}, \ldots, x_{r}^{*}\), analogously \(x_{i}^{*}\) for \(i^{th}\) firm’s eco-efficiency.

Kuosmanen, T. and Kuosmanen, N. (2009: 236–242) point out that:

- “*The benchmark*” could represent the aggregate economic output (i.e., GDP) and the resource use of the economy as a whole (as Figge and Hahn 2004b suggest), or it could represent the average output and resource use of the sector (e.g., Van Passel et al. 2007).”

- “…drawing a sharp distinction between the conceptual idea and the operational estimator. … In particular, the production function is assumed to be linear, with specific coefficients determined by the “benchmark”. Linearity is a very strong assumption, implying perfect substitutability of all resources, which directly violates the principle of strong sustainability.”

Kuosmanen, T. and Kuosmanen, N. (2009) introduce the possibility of some econometric approaches to the estimation with evidence of statistical foundation. Using the Monte Carlo method they are compared the true
and the estimated values for sustainable value in the case of the Figge and Hahn’s (FH) estimator and in the case of using ordinary least squares (OLS) estimator and they point out better results for the estimator in the second case (their approach). They tested FH vs. OLS approach (using empirical data sample of 65 European manufacturing firms in 2001–2003 of ADVANCE Project - ADVANCE-project4 2008, Hahn et al. 2007) and in their opinion the FH estimator has not sufficiently explanatory power.

Figge and Hahn (2009) expressed the criticism against Kuosmanen, T. and Kuosmanen, N. (2009) by identifying: “…three conceptual misfits: a mismatch in the perspective of the analysis, a misspecification of opportunity costs and the irrelevance of production functions. Ultimately, Kuosmanen and Kuosmanen’s train of thought rests entirely within the realm of productive efficiency analysis, where as Sustainable Value builds on the foundations of financial economics and consequently adopts a macro rather than a firm perspective.” Sustainable Value and its measurement by a benchmark approach is often discussed topic mainly on professional field. For example, Ang and Van Passel (2010: 2303) responded to the debate Kuosmanen and Kuosmanen (2009) Figge and Hahn (2009) as follows: “…the debate is very confusing because the original Sustainable Value approach presents two largely incompatible objectives. ... If one intends to present the overall resource efficiency of the firm from the investor’s viewpoint, we recommend the original benchmarking methodology. If one on the other hand aspires to create a prescriptive tool setting up some sort of reallocation scheme, we advocate implementation of the productive efficiency theory.” They call on more consideration of the system for the selection of resources, the inclusion of the value chain political analysis.

Ang and Van Passel (2012) in their paper discuss problems: “…on weak sustainability versus strong sustainability (the substitutability of human-made capital for natural capital)”. Sustainable value and its measurement are under development. For example, Liesen et al. (2013: 175) present a new strategic tool for the company top management - Net Present Sustainable Value: “The concept of ‘net present sustainable value’ is introduced as a new strategic tool for sustainable investment appraisal, which extends the traditional net present value approach to include resources other than capital.”

5. Discussion

As we have already mentioned, the ultimate goal of the enterprise is value creation and it is of great importance not only for its owners (shareholders) because many other interested parties are also involved in value creation. They form a network consisting of a large number of inter-relations between individuals and groups (stakeholders) that affect the way the enterprise is managed and also how its behaviour is influenced, which ultimately may also affect its sustainability. It is generally known that many other more or less successful attempts to implement various new management approaches aiming to increase corporate performance failed to meet the expectations placed on them, especially because the goals that they defined were not conceived comprehensively, were unclear etc., but most importantly they failed because they did not to connect the factors determining value creation - value creation accelerators (i.e. value drivers) with the ultimate goal of the enterprise. Measurement based on the construction of financial indicators is hampered by several serious shortcomings related to the information value of those indicators (Marinič 2008; Wöhe 1998 in Marinič 2008; Higgins 1997 in Marinič 2008):

• despite high information value of financial indicators and their possible widespread application through the apparatus of mathematical and statistical methods, a simple algorithm cannot describe the complex reality of business practice;
• the very construction of indicators based on the mathematical and statistical apparatus struggles with the problem of the informative value of the source data (exact figures are directed towards past events that have already ended) - named as deficiencies of the database;
• interpretation of indicator and outcomes is prone to problems with respect to factual explanations, these are called methodological shortcomings, a major role is also played by subjectivity in interpretation;

4 From ADVANCE Project (full version at http://www.advance-project.org/): “The ADVANCE survey assesses the value created by 65 European companies from the manufacturing sector through their environmental performance. ADVANCE uses the Sustainable Value approach which enables sustainable performance to be measured in monetary terms.” More in (ADVANCE-project 2008).
According to Marinič (2008: 28) these shortcomings undermine efforts to construct key performance indicators, the so-called Value Driver Tree, which is created by breaking down those indicators into lower level sub-indicators, and which, by means of factor analysis, should help identify key drivers of corporate performance.

Financial indicators, on the other hand, have also some advantages:
- the speed and low cost at which they can be acquired and processed owing to the availability of the data;
- another advantage is that their construction is based on financial standards allowing easy comparison with identical indicators from the past, both within the company, among companies and internationally.

The concept that is currently coming to the foreground in the context of corporate sustainability measurement systems is that of sustainable value because company sustainability depends on its measurement (Holler 2009). Although economic indicators are necessary, they are not sufficient to generate sustainable value. Shortcomings in their application can be eliminated by the application of non-financial indicators, which can be used to both define and measure also non-financial goals.

Disadvantages of non-financial (non-economic) indicators include (Marinič 2008):
- they are not based on accounting standards;
- the main disadvantage is the cost issue and the time factor;
- they are acquired by various methods and with disparate denominators (time, quantity….), which renders inter-company comparisons problematic

The advantages of non-financial indicators, on the other hand, include (Marinič 2008):
- the ability to express the proportion of intellectual property, the so-called intangible assets, in the overall result of the company’s activities and in creation of added value;
- connection with the long-term strategy and long-term business objectives;
- the ability to define and predict factors influencing the overall success of the enterprise;
- the ability to characterize the basic aspects of the company’s value chain;
- they are future oriented;
- the ability to define the main factors influencing the development of targeted financial indicators;
- greater sensitivity to changes in the external environment, which means that they can improve management control processes if applied correctly and rapidly;
- the ability to anticipate the consequences and implications that are usually measured by exact financial indicators;

Figge and Hahn (2004b) are considered pioneers of the method of measuring sustainable value published in their paper in Ecol.Econ. Figge (2005) deals with problems related to the issue of value posed by the environmental management, one of key questions being how environmental management can participate in creating a sustainable corporate value. They look for management approaches that are focused at creating values, also called value-based management. The aim is to identify factors called value drivers. Freeman et al. (1973) and McIntyre and Thornton (1974, 1978) refer to the relationship between environmental performance and economic performance as environment efficiency, Schaltegger and Sturm (1990) as ecological efficiency, and, more recently, Schmidhein and World Business Council for Sustainable Development (2002) and WBCSD (2000) call it eco-efficiency. According to Figge (2001) and Figge and Hahn (2004a), only companies that provide for an adequate return on economic, environmental and social resources are able to generate sustainable value. Figge and Hahn (2004a) and Figge (2005) set out from Rapport’s stakeholder value theory (1986), which was dominant at that time, and extended it to include an approach whereby value-based management can be based on option value. By comparing value drivers of the two approaches, they produced a matrix based on two dimensions, i.e. risk and opportunity costs. In their paper “Creating sustainable value”, Hart and Milstein (2003) sought to clarify the relationship between sustainable development and the creation of sustainable value at a company level. According to them a company is sustainable if it contributes to sustainable development by simultaneously producing economic, social and environmental benefits, the so-called triple bottom line. To
achieve company sustainability, most companies try to reconcile that with the aim of increasing shareholder value. Only few of them practice the integrating orientation measuring the environmental, economic and social dimensions (Singh et al. 2009, Veleva and Ellenbecker 2001; Labuschagne et al. 2005). An analysis of several sustainability initiatives undertaken by Singh et al. (2009) showed that although different frameworks exist, their main objective in a majority of cases is the environmental dimension. Cruz and Boehe (2008) proposed an approach in their research called “sustainable global value chain”, in which they argue that sustainability is a part of the “global value chains”. Three main themes emerged that can be considered as problems associated with the proposed concept, which the authors called the “sustainable global value chain”. They are the bargaining power between the players in the chains, the differentiation strategy of the global value chain, and cooperation in building global value chain awareness. According to Van Passel et al. (2007) the sustainable value approach refers particularly to the efficiency in using the capital of the company (at a micro level) and the efficiency of the benchmark (at a macro level).

Measuring sustainability from the sustainable value perspective seems to be an important trend that promises the so-called sustainable success to companies. The analysis of this topic contributed several interesting ideas to ongoing discussion relating to the following areas: first, although there exist many different sustainability measurement initiatives, only a few of them are based on integrative approach of all three sustainability dimensions, i.e. environmental, economic and social (Singh et al. 2009; Veleva and Ellenbecker 2001; Labuschagne et al. 2005).

Conclusions

From the point of view of a successful construction and utilization of the system for measuring and evaluating corporate performance, the key issue is the interconnection between financial and non-financial indicators and the ultimate goal, based on its understanding of the principles of their mutual causality (the key question is how close that interconnection is and how it works). When creating systems for corporate measurement and evaluation, it is most important to select appropriate key performance indicators and corresponding metrics. The aim has recently been to construct key performance factors, the so-called Values Driver Tree, which is created by breaking down exact financial and non-financial indicators into lower level sub-indicators and, by means of factor analysis, to define individual influences that affect value creation and in this way to identify key elements of corporate performance. These indicators, as shown for example by Marinič (2008: 31) must meet the following requirements:

- meaningfulness, non-ambiguity, explanatory power;
- a high degree of information and data integrity;
- applicability to feedback and subsequent corrections; and
- effective interconnection between strategic goals and value creation accelerators.

Fulfilling these requirements also appears to be one of the crucial issues for their selection, which is one of key questions of contemporary research. In accordance with our findings, sustainable value that leads to sustainable success of the enterprise will in future be the ultimate goal. Our theoretical analysis and partly also the results of our already conducted research point to the most convenient way, a model, for measuring that value. They indicate that sustainable value needs to be measured comprehensively using sustainability indicators, the so-called sustainable strategy, that is directed at a unified “sustainable reporting.” During our project Construction of Methods for Multifactor Assessment of Company Complex Performance in Selected Sectors, we met with many phenomena and relationships concerning sustainable value measurement. We believe that methods for sustainable value measurement should be developed in a very careful and sensitive manner not only for different industries but also with regard to geographical and historical conditions. The methods should be open to allow for a flexible and timely response to changes and technological advances in the industry, or to new uses of information and communication technologies. In order to mainly achieve better compatibility of developments monitoring in the industry and, in fact, in the whole economic system of the country, etc., corporate governance factors should be integrated to the set of environmental, social and economic indicators.
In our previous research, we came across many facts which are closely linked with sustainability and the value chain. We consider the original concept of sustainable value measurement model according to Figge and Hahn (2004 a,b) as very successful and inspiring because it is based on a sophisticated yet clear and simple idea, although we are aware that particular models for sustainable value measurement can be modified – according to, e.g., the industry, measurement conditions, time horizon, geographical conditions, etc. This has a significant influence on the choice of the model’s input factors. Corporate governance factors play an increasingly important role because we believe that they should participate in determining sustainable value. Similarly, we also wonder whether the final summing up and averaging of the ascertained partial values is ideal for our purposes. E.g., we pursue the idea of whether the numerical differences in partial resources have the same primary weight relative to the determination of the final sustainable value. In this step, we see room for modifications and other uses of the original idea for the construction of a model for sustainable value measurement. Realistically achievable sources should also be set for benchmarking.

Another critical area for measurement seems to be interconnection between economic and non-economic indicators (social, environmental and corporate governance) and the ultimate goal. This interconnection requires that causal relationships be defined as well as frameworks and ways of functioning derived from them. Still another problem is how close those interconnections and bonds are, and the question of understanding their operation. In our previous research and through the analysis of other expert sources, we verified that the dependency and closeness of individual indicators can be determined not only by classical statistical methods (such as regression and correlation analysis, statistical tests of outlying data, multivariate statistics, etc.) but also by non-statistical methods (such as methods based on the fuzzy set theory, methods of formal mathematical logic, expert systems, neural networks, etc.). When creating systems for measurement and evaluation of sustainable corporate value, the selection of indicators and metrics corresponding to them is of key importance.

From the preceding analyses, a number of other conclusions relating to sustainable corporate value measurement systems and the key models used can be drawn:

With regards to reporting:
- At present, there are several ways of thinking about the theory of the firm, each of which has different implications for corporate performance reporting (Hubbard 2009; Hahn and Kühnen 2013)
- Practical cases most frequently concern “high-performing” companies, whose business strategies are being scrutinized and others try to emulate them; but to be able to determine the value of such a strategy, we would have to be able to measure the “height” of that performance
- Orientation towards integrated sustainable reporting is supported by the activity of important institutions that deal with sustainable development (Hahn and Kühnen 2013)
- Voluntariness of reporting is related to the size of companies, voluntary reports are mostly submitted by large companies.
- Although there has been an increase in the number of companies that submit social and environmental reports, the quality of those published reports has not improved and “there is little evidence of progress in the integration of social and environmental impacts into management decisions” (Ipstein 2004: 1).
- If sustainability is to become a reality, it is necessary that that concept is taken into account in decision-making at every level of the society (Agenda 21 1992).
- In the corporate setting, this means an integration of sustainability aspects (economic, social and environmental) into the current system of corporate performance measurement (Searcy et al. 2005).
- In most cases, sustainability reports have little relevance to everyday reality of a company (Dowse 2005). This difference when sustainability indicators are administered separately from business management systems (Bieker and Gminder 2001; Figge et al. 2002) is one of the biggest challenges. If companies want to simultaneously achieve an improvement in their economic, social and environmental performance, a lack of integration will prove to be a major obstacle ... without such integration, there will be no sustainability management (Figge et al. 2002: 2).
Regarding measurement and indicators

- Although there are several initiatives for sustainability measurement, only a few of them are inclusively orientated to the measurement of environmental, economic and social dimensions (Singh et al. 2009; Veleva and Ellenbecker 2001; Labuschagne et al. 2005). An analysis of several sustainability initiatives undertaken (Singh et al. 2009) showed that although different frameworks exist, their main objective in most cases is the environmental dimension.

- There is no consensus regarding sustainable development indicators for sustainability measurement (Sikdar 2003; Searcy et al. 2005; Wang 2005), which represents a major obstacle to implementing sustainable development strategies (Veleva and Ellenbecker 2001) and increasingly initiates the need to “define a common methodological standards and a set of indicators” (Warhurst 2002: 40). Even though it might, on the other hand, lead to distortions in the measuring system (e.g. problems in comparing regions, industries, companies, etc.), as pointed out by, inter alia, Adams and Frost (2008).

- One option that has been developed by some academics and practitioners in an effort to solve this reporting problem is to incorporate sustainable development measures into the organization’s performance measurement system (PMS), as suggested by Figge et al. (2002); Hubbard (2006); Bieker and Gminder (2001). It is a suitable approach as sustainability will be managed together with traditional measures and will be reinforced by the benefits of an already effective PMS in that it helps, e.g., clarify the corporate strategy; it communicates strategy of the entire organization; defines the objectives and sets targets for business units, project teams and employees; motivates and monitors employees, and managers guide their activities; it informs employees, managers and shareholders about the efficiency and effectiveness of activities, and about strategy and probability of success of future operations.

- Although there are many different approaches to sustainable corporate performance measurement offering a number of sustainability indicators, Veleva and Ellenbecker (2001) argue that there exist no frameworks for the assessment of manufacturing process sustainability. Callens and Tyteca (1999) developed indicators based on the concept of cost-benefit analysis and a concept based on principles of production efficiency.

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Abstract. Considering lack of benchmarking and observation data, the article analyses issues of technology transfer in Lithuania. Comparison of Lithuanian innovation performance with EU country members is given as well as foreign direct investments in last period. While analysing main technology transfer networks, article explains what problems Lithuanian clusters meet in each model. The main conclusion is that Lithuanian clusters lack experience and investments, also Lithuanian enterprises are mainly small and may not be interested to invest in the development and adoption of technology.

Keywords: sustainable development, technology transfer, cluster, foreign direct investments

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1. Introduction

Over the past years social scientists and policy makers have been playing more and more attention to regions’ growth and sustainable development. Competitiveness and innovativeness are considered to be the key aspects to assuring economic success (NGP Cluster Excellence Conference – Inge Maerkedahl 2011; Balkienė 2013; Laužikas, Mokšeckienė 2013; Mačiulis, Tvaronavičienė 2013; Vosylius et al. 2013; Ala-Juusela et al. 2014; Guruz, Scherer 2014; Cuneo et al. 2014; Barberis et al. 2014; Lankauskiene 2014; Figurska 2014; Tvaronavičienė 2014; Vasiliūnaitė 2014; Išoraitė 2014; Morkvėnas 2006).

In this regard it is important to share information and learn from each other. Clusters enables companies to do exactly that. Clusters are complex and dynamic structures that are subject to continuous change. Strong clusters can promote economic growth through leveraging the innovation and business potential of a region (Lämmer-Gamp 2012). The faster the knowledge is absorbed the greater the dependence on the sources of knowledge becomes (Nonaka, Reinmoller 1998). In a dynamic and rapidly changing contemporary globalizing economy it is, thus, necessary to pay attention to knowledge creation as a process that is of equal importance to the processes of learning and competence building (Asheim and Coenen 2005).
In our economy knowledge is the most strategic resource and learning is the most fundamental activity for competitiveness (Lundvall 1992). Europe’s past was shaped by science: the Greco-Roman Antiquity, the Renaissance and the Enlightenment all emerged from advanced European scholarship, arts, research and ingenuity. Yet we cannot afford to simply gaze upon this legacy with nostalgia and pride. We must look forward, and recognise that not only is science a part of our future, it must be central (A report of the President’s Science and Technology Advisory Council (STAC) 2014).

Technology transfer is one of main methods to share information and it is aimed to strengthen cluster management excellence as well as to provide more professional business services to European SMEs through clusters and contributes to development of more world-class clusters in the EU. Moreover technology transfer can be used as a tool for benchmarking clusters which helps identifying cluster strengths and weaknesses, know where it stands in international comparison. In the last decades, Science and Technology politicians have given wide concern to technology transfer themes. In the European Union a bundle of measures at regional, national and communitarian level has supported the creation of many satellite agencies and organisations variously dealing with technology transfer. However, their model and structure is not always clear: missions are sometimes blurred, overlaps and missing competencies are frequent, and some degree of competition and mismatch of objectives is perceivable.

2. Study Area

Like other former Soviet republics, Lithuania has been virtually closed to foreign investment until 1990, when it regained its independence and began the process of transition to a market economy. The first stage of the privatization process, which began in 1991, offered limited opportunities for foreign investors. It was not until 1997 that foreign direct investments (FDI) inflows into Lithuania increased significantly, as a result of the second stage of the privatization program. FDI inflows peaked in 1998, when 60 percent of the shares of Lietuvos Telekomas (Lithuanian Telecom), the fixed-line monopoly operator, were sold to Amber Teleholdings, a consortium of Swedish Telia and Finish Sonera (EBRD 2001) (Hoekman and Smarzynska Javorcik 2006) (Figure 1).

![Fig.1. Foreign direct investments, net inflows to Lithuania](source: The World Bank)
Due to its late start, Lithuania has attracted less FDI than other Central and Eastern Europe countries, but after economic crisis in 2006–2008 is rising fast. Unfortunately FDI and technological innovations within closely cooperating business, science and governmental institutions not guarantee their successful integration into multiform systems (business, society) or its continual use. Lithuania has a lot of problems with the transfer and diffusion of new technologies. It is proved by the statistics of European innovation (Sajeva et al. 2005). The study of innovation and technology transfer models is rapidly becoming a popular line of study in the research of technological systems. Academicians, business managers, IT managers and other commercial organizations have benefited significantly from this line because the result is value-added. Lithuanian Universities are not normally known for their entrepreneurial attitude and flair. They are recognized, however, as major knowledge and research centers. It might be argued that for many start-ups it is becoming vital to come into a university as soon as possible (Jaržemskis et al. 2005). The ever changing perception of the role of technology in our society as well as in Lithuania provides educators with a myriad of challenges and problems for the curriculum. Lithuania’s future begins from the knowledge and that determines the level of Lithuanian technological society.

3. Main objectives

It is vital for companies to separate what to learn and where to compete. In this situation it is necessary to have working benchmarking system that would serve companies as a tool to know where they have to do better, what they can learn from other, what are their strengths and their weaknesses (Büscher 2011).

Benchmarking, as a tool, would serve for three main goals:

- To benchmark cluster performances across the regions;
- To identify international, national and regional clusters;
- To identify successful cluster policies and to enable systematic peer reviews of cluster specific framework conditions (Andersen et al. 2006).

Identifying these aspects rises cluster excellence both to the benefit of firms and public authorities that are supporting clusters (Meier zu Köcker 2011). Importance of cluster benchmarking. It helps to move from financing cluster organizations to using cluster organizations for the implementation of cluster excellence policies, for example to commercialize European products and services worldwide and find partners outside the member states. It is, of course, important to underline “the tremendous importance of incremental innovation, learning by doing, by using and by interacting in the process of technical change and diffusion of innovations” (Freeman 1993).

The main specific objectives of this project can, therefore, be presented as follows:

- Verify an assumption, that cluster excellence impact could be measured by activities excellence achieved after joined cluster activities.
- Identify technology transfers impact to sustainable cluster development.

4. The problems of innovation and technology transfer

To begin with it has been noted by experts, that though the development of technology proceeds Lithuania as well has achievements in such fields as laser or biotechnology, however, these cases are rare. Moreover although Lithuania has enough resources for innovations, the interaction between universities and businesses is a casual and uncontrolled process. It should be noted that Lithuania’s economy is based on small and medium businesses. Small and medium businesses do not have such favorable possibilities to use knowledge as large international companies do. Finally the changes in business environment particularly influence a small business. Government should create better opportunities for interaction between academic institutions and businesses. (United Nations 2003). As a result, based on this year’s Summary Innovation Index, the Member States fall into the following four performance groups:

- The first group of Innovation leaders includes Member States, in which the innovation performance is well
above that of the EU, i.e. more than 20% above the EU average. These are Denmark, Finland, Germany and Sweden, which remains in the top position of these countries if to compare with last year’s edition of the Innovation Union Scoreboard.

- The second group of Innovation followers includes Member States with a performance close to that of the EU average i.e. less than 20% above, or more than 90% of the EU average. Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK are the Innovation followers.
- The third group of Moderate innovators includes Member States where the innovation performance is below that of the EU average at relative performance rates between 50% and 90% of the EU average. Croatia, Czech Republic, Greece, Hungary, Italy, Lithuania, Malta, Poland, Portugal, Slovakia and Spain belong to the group of Moderate innovators.
- The fourth group of Modest innovators includes Member States that show an innovation performance level well below that of the EU average, i.e. less than 50% of the EU average. This group includes Bulgaria, Latvia, and Romania (Figure 2).

![Fig.2. EU Member States innovation performance Source: Innovation union scoreboard (2014)](image)

The performance of EU national innovation systems is measured by the Summary Innovation Index, which is a composite indicator obtained by an appropriate aggregation of the 25 indicators. The components of the Summary Innovation Index are the key to solving technology transfer problems in Lithuania. The most important subjects which can determine the SII are University and Enterprises. However, it works when the government creates an environment for researcher (science) and businesses to come together.

5. Main innovation and technology transfer models

The scientific literature notes three main models of technology transfer and adoption but full existence of them in Lithuania is questionable. First model, also known as Direct model (University – Industry). As mentioned before, Lithuanian enterprises are mainly small and are not concerned with investment in the development and adoption of technology. In other words, model of technology transfer (University – Industry) in Lithuania does not exist because of low performance in industrial arias. Second model, known as Intermediaries model: (University - Science Park – Industry). The role of Science Park is undoubtedly positive. The main problem with these institutions is that the enterprises established are not entrepreneurial. Technology Parks are supposed to develop business and science interconnection, the enterprises specialization in science research and development sphere are engaged there. Technology transfer and innovation support services in Lithuania (Innovation’s centers, science and technology parks.):
1. Lithuanian Innovation Centre, with 5 representatives across Lithuania;

2. 9 Science and Technology Parks:
   1. North Town Technology Park
   2. Science and Technology Park
   3. Visioriai IT Park
   4. Kaunas High and Information Technology Park
   5. Klaipeda Science and Technology Park
   6. Šiauliai University ST Park
   7. Sunrise Valley Initiative
   8. Technopolis Initiative
   9. Kaunas Regional Innovation Centre

The main problem with science parks is that there is no one benchmarking system adopted, which could show us how well or poorly they perform. Due to this industry is not willing to invest. Last model, known as Intermediaries with Business Approach (Establishment of new firms) University – Incubator/Open Lab – Science Park – Industry. The basic aim of a business incubator is stimulation of founding new companies and creation of a consultancy support environment with maximum opportunities of development of new companies (Medium and Small business developmental agency of Lithuania). However Lithuanian incubators, science parks, and open laboratories are only in the developmental stage (Braukmann and Pedras 1990; European Commission 2009; Kotilainen 2002; White 2005; Medium and Small business developmental agency of Lithuania 2001).

Conclusions

Sustainable development of regions is affected by industries and companies’ innovativeness, which is partially determined by technology transfer mode. The problems of technology transfer are difficult and as varied as the organizations involved in the process. The problem is reflected by the European Union statistics in the technology and innovation sectors, where Lithuania in all categories does not reach the average of the European Union. Today a manager cannot solve engineer’s problems, likewise an engineer’s cannot solve manager’s problems. This is the answer why incubators are needed and why we need technology planners and managers of broad specialization. There is no overall managerial system of innovation activity, the mechanism of promotion of innovation development is not effective enough. Lithuania has created a lot of various learning programs devoted to technology, but they often lack effectiveness and brain drain problem is becoming really serious.

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SOCIAL ENTREPRENEURSHIP AND SUSTAINABILITY – UNDERSTANDING THE CONTEXT AND KEY CHARACTERISTICS

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Abstract. This research article presents sustainable model system based framework derived from the scholarly investigation into the existent research literature on social entrepreneurship. The social entrepreneurship is emerging as a viable alternative to the traditional institutional setups for making a sustainable impact and reach towards the underserved needs of the low-income population living in the developing economies. The existing research on social entrepreneurship lacks focus on creating an integrated framework thereby posing a limitation to the entry, growth and penetration of the social entrepreneurship based market setup. The sustainable model system comprises a combination of the constraining conditions and key choices. The constraining conditions include the environmental and firm-specific constraints like need addressed, mission type and socio-economic objectives. The relative impact and significance of the key choices vary for different social enterprises depending upon the applicable constraining conditions.

Keywords: social entrepreneurship, base of the pyramid, sustainability, literature review

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JEL Classifications: M140, M10

1. Introduction

Prahalad and Hammond (2002) argue that the base of the pyramid (BoP) segment living in the developing economies poses an unmet opportunity for the global organizations (Esposito et al. 2012) to design and implement inclusive business models for solving the real problems (energy, healthcare, education, water, sanitation, information, finance, housing and transportation etc.) of the 4 billion people (Hammond et al. 2007). The individuals in this socio-economic segment earn less than $8 (Year 2002 PPP levels) per day. The persistence of the poverty challenge impacting the BoP segment highlights the complexity of the BoP market despite the extensive presence and philanthropic efforts of the traditional institutions like non government organizations (NGOs), government and corporate social responsibility (CSR) initiatives of the commercial enterprises (CEs). The limitations of these different market based institutions have led to the evolution of a new category of entrepreneurship known as ‘Social Entrepreneurship’. The social entrepreneurship involves
the focus on setting up the self-sustainable social enterprises that target the real needs of the BoP segment by implementing the market-based self-sustainable business models, which are unique and differentiated from the traditional approach in terms of value offerings, value creation, value delivery and socio-economic outcomes. The objective of this research article is to review the social entrepreneurship related literature across the multiple dimensions including the understanding of the research trends, methodological orientation and research paradigms.

2. Social Entrepreneurship – Literature Review

There are increasing numbers of research articles highlighting the different ways and means to target the underserved population in these developing economies. The developing economies comprise the majority of the population living across the world (Figure 1). The predominant market segment in these developing economies is characterized as an uncertain, informal, rural and heterogeneous ecosystem having people lying at the bottom of the socio-economic category (Esposito et al. 2012). This low income segment is referred to as the Bottom of the Pyramid (also known as Base of the Pyramid or BoP). The BoP segment differs from the non-BoP segment in terms of the lack of paying capacity, lack of market awareness, and increasingly prevalent market imperfections like information asymmetries, market fragmentation, weak legal institution, weak infrastructure, resource scarcity and poverty penalty (Viswanathan et al. 2007; Goyal et al. 2012). This implies that the traditional forms of entrepreneurship (CEs, NGOs and government institutions) and their associated business models from the developed economies do not provide a sustainable fit into the BoP context of the developing economies. There is a need to redefine these business models suited to the context of the BoP (Prahalad and Hammond 2002; Dahan et al. 2010; Thompson and MacMillan 2010). These differences have led to the emergence of social enterprises, which are adopting the market-based logic to design the sustainable business models (Nidumolu et al. 2009) targeting the primary needs of the BoP segment across the developing economies. Sustainable development involves, “meeting the needs and aspirations of the present without compromising the ability of future generations to meet their own needs” (WCED 1987). The concept of sustainable development embodies three inextricably connected principles: environmental integrity, social equity and economic prosperity (Goyal et al. 2012). The level of performance in one area affects the other two areas. Sustainable business models explore the synergy between the social, economic and environmental benefits (Ashley 2009).

The review of the research literature highlights the multiple dimensions contributing the sustainability of the social enterprises aiming for an effective socio-economic impact at the BoP.

2.1. Understanding the Context

The social need is defined as the gap between the socially desirable condition and the existing reality (Guclu et al. 2002). The term ‘social’ implies the different interpretation for different people depending upon their personal and cultural backgrounds (Seelos and Mair 2005). One of the alternatives to resolve this ambiguity involves studying social enterprise through the lens of a widely recognized and global goal of achieving sustainable development, that integrates the social needs to which many institutions and businesses have committed themselves (Seelos and Mair 2005). Sullivan et al. (2002) argue that the context of social entrepreneurship is influenced by the dynamics of the macro-environment, globalization trends, and role of the respective governments. Weerawardena and Mort (2006) argue that the social mission, need for sustainability and the prevailing environmental dynamics shape the behaviour of the social enterprise.

The literature review highlights the role of three main dimensions in determining the overall context of a social enterprise (Figure 1). These dimensions are also referred to as the constraining conditions, which shape the contextual business model and strategic actions of the social enterprises. These dimensions include (1) identifying the social need to be addressed; (2) defining the social mission; (3) and understanding the environmental dynamics.
The first two dimensions of identifying the social need and defining the social mission refer to the static constraints. These constraints define the scope and boundaries of the social enterprises (Kapoor and Goyal 2013). The behavioral characteristics of the social enterprises are determined on the basis of the congruence to the social mission context. The performance evaluation on the mission requires setting up the socio-economic metrics. This poses a big challenge for the social enterprises due to the lack of quantification, multiple causal attributes and varying perceptions regarding the creation of the social impact (Austin et al. 2006; Moskvina 2013).

The third dimension involves understanding the environmental dynamics faced by the social enterprises while targeting the low income segment at the BoP (Shukla and Bairiganjan 2011). The environmental dynamics is determined on the basis of the understanding of the challenges pertaining to the environmental context, customer and competition at the BoP (Goyal et al. 2014b). The key challenges pertaining to the BoP environment include (1) ineffective government policies; (2) lack of market infrastructure (electricity, water, roads, transportation etc.); (3) scarcity of reliable data sets; (4) low population density; (5) geographical limitations; (6) market heterogeneity; (7) and limited availability of skilled resources. The customer related challenges include (1) income volatility; (2) lack of savings pattern; (3) low level of literacy; (4) diversity of languages; (5) mobility barriers; (5) and need for social acceptance. The competition related challenges include (1) lack of market awareness; (2) dominance of informal market players; (3) presence of government institutions; (4) and lack of complementary offerings.

2.2. Understanding the Key Characteristics

Dees (2001) argues that the key characteristics of social enterprises involve (1) focus on the social mission; (2) identifying the new opportunities to serve the mission; (3) focus on the continuous innovation, adaptation and learning; (4) managing resource constraints; (5) and holding accountability for the social outcomes and
impact on the target segment. Guclu et al. (2002) emphasize the significance of an effective resource strategy in enabling the sustainability of a social enterprise. The access to skilled resources is critical for the success of the social goal and objectives. This is especially important, when access to skilled resources is a big challenge for the social enterprises in the context of the operating environment. Peredo and McLean (2006) argue the need for an added support in the form of legislation and other forms of social policy to sustain at the BoP. Mair and Marti (2006) put emphasis on the embedded organization culture and leadership in ensuring the success of social enterprise. The BoP context poses challenges in terms of the operating environment, socio-economic profile of the customer and informal market based competition. This makes it necessary for the social enterprises to design the customized business model, which ensures financial sustainability while remaining socially relevant.

The research literature reflects divergent views regarding the key characteristics of a social enterprise targeting the BoP segment. The key characteristics involve (1) focus on segmentation; (2) offering end to end solutions; (3) undertaking experimentation and innovation; (4) focus on local embeddedness; (5) developing non-traditional partnerships; (6) type of leadership and organizational culture; (7) and focus on scalability. Regarding segmentation, Pitta et al. (2008) argues that the success at the BoP requires the clear understanding of the target segment. BoP is terra incognita in terms of segments and their needs. The basis for segmentation involves segmenting by income level (low income, subsistence, and extreme poverty), role / engagement type (consumers, producers, employees, and clients), and other socio-economic factors like gender and occupation (Rangan et al. 2011). The value offering and delivery approach differs across the different sub-segments within a BoP.

Regarding design of end to end value offerings, there is a need to adopt a solution based approach at the BoP (Viswanathan et al. 2008). The end to end solution should target the real need of BoP segment (Letelier et al. 2003; Eyring et al. 2011) argue that the value offerings by the social enterprises must solve the real need of the BoP customers more effectively, simply, accessibly, and affordably than the alternatives available in the informal market ecosystem. This includes looking at the other complementary aspects of the social needs like fulfillment of the aspirational value, customization as per the paying capacity, financial accessibility, usability, durability, and access to after-sales support (Letelier et al. 2003; Grootaert et al. 2004; Prahalad 2004; Jose 2008b; Pitta et al. 2008).

Regarding experimentation and innovation, the non-availability of the reliable data sets, lack of market infrastructure, limited cash flow and the prevalence of socio-economic complexity at the BoP mandates the need for prototyping and ‘trial-and-error’ approach in the BoP market. This is needed to learn the radical and unconventional ways of doing business (Yunus et al. 2010) in the uncertain markets. The ability to undertake the low cost probes minimizes the risks of failure while maximizing the rate of learning, thereby pushing the ability to design solutions suited to the local context (Simanis and Hart 2006; Yunus et al. 2010). The common understanding is that innovation is a dynamic but critical attribute required for a sustainable business model at the BoP. The enterprises targeting the BoP segment need to undertake continuous product, process and business model innovations (Andersen and Markides 2007; Jose 2008a,b). These innovations at the BoP has less to do with finding new customers than addressing issues of product acceptability, affordability, availability and awareness (Andersen and Markides 2007). The process of innovation requires systemic mode of idea generation, evaluation and value co-creation (Hart and Sharma 2004; London 2009; McGrath 2010). The disruptive innovation at the BoP requires focus on leveraging technology to bridge the accessibility, affordability and availability barriers (Hart and Christensen 2002; Chesbrough 2010; Teece 2010).

Regarding local embeddedness, Miller (1996) defines embeddedness as “the extent to which a company’s strategy reflects or is influenced by its social and institutional connections”. The emphasis lies on designing the indigenous business model that builds upon the grassroot learning, local customs and conditions. The embedded business model lifts psychological and cultural barriers and develops a local presence within people’s everyday life. The actions involve (1) training and hiring the representatives from the local community as employees and micro-entrepreneurs, who could also be made co-owners of the local business (Gibb and
Adhikary 2000; Goyal et al. 2014 a); (2) developing the non-traditional partnerships with government institutions, local market players and local communities (Hart 2005; Hart and London 2005; Goyal et al. 2014 a); (3) and setting up a process for grassroots learning and feedback (Goyal et al. 2014 a). This requires focus on systematically identifying, exploring and integrating the views of the stakeholders on the fringe, and co-creating new business opportunities and business models with marginalized groups and communities (Hart and Sharma 2004).

Regarding non-traditional partnerships, there is a need to address the environmental challenges by creating a market-based ecosystem (Prahalad 2004). This requires focus on developing the non-traditional partnerships with NGOs, CBOs, local institutions, informal market competitors, and government bodies (Prahalad and Hart 2002; London and Hart 2004). Prahalad (2004) argues, “Such an ecosystem consists of a variety of institutions coexisting and complementing each other. ... [It] allows private sector and social actors, often with different traditions and motivations, and of different sizes and areas of influence, to act together and create wealth in a symbiotic relationship.” The partnerships with the local institutions and individuals enable the social enterprises to gain local trust, build market acceptance, and enable last mile reach and connectivity. This leads to the setting up of the physical infrastructure, social infrastructure and social legitimacy at the BoP (London and Hart 2004; Brugmann and Prahalad 2007; Dahlan et al. 2010; London et al. 2010). However, the non-traditional partnerships are primarily driven by the social contracts rather than the legal contracts (Soto 2000; London and Hart 2004; Hart 2005).

Regarding leadership and organizational culture, there is a limited focus and attention in the literature regarding the same for the social enterprises. The leadership qualities involve a mix of unique behavioral and strategic capabilities. The behavioral capabilities involve equality for all, patience, passion and optimism towards the goal. The strategic capabilities involve ability to take up an orbit shifting challenge, focus on experimentation and innovation, building collaborations and partnerships, build a learning organization driven by the social mission. The leader should be able to balance the speed, cost, and impact of execution (Seelos and Mair 2005; Munshi 2009; Chesbrough 2010). Yunus et al. (2010) argue that the key leadership attributes required for targeting the BoP segment include focus on process efficiencies and innovations. Yunus et al. (2010) say “questioning the current rules of the game was at the very heart of Grameen Bank’s foundation. One of the key leadership qualities at BoP involves ability to understand the inefficiencies in the current process and ability to challenge the conventional wisdom and mindset.” Rangan and Thulasiraj (2007) argue that the key leadership qualities, which are being needed for a sustainable and scalable business model at the BoP include focus on alignment with mission, developing the management systems, building a learning organization, leadership capacity, and designing an integrated value-chain driven by continuous innovations, experimentation (learning by doing) and strategic choices.

Regarding scalability, social enterprises need to make a provision for expanding quickly, effectively, and efficiently to ensure sustainable socio-economic impact for all the stakeholders. The decision to scale or not requires the identification and articulation of the preconditions for success (Prahalad 2004). The economies of scale at the BoP are driven by higher volumes resulting from geographic expansion of particular product/service offering. The economies of scope are driven by using the same distribution network for offering multiple product/service offerings effectively (capacity to expand without loss in performance and quality) and efficiently (capacity to expand with decreasing cost and efforts) across the target segment. The economies of learning are driven by setting up a learning and feedback process which involves inputs from the ground involving local partners and target segment. One of the key drivers for scalability at the BoP is to manage the cash flow efficiently. The availability of capital is scarce and expensive at the BoP, and tends to be concentrated in the hands of a few large enterprises (Khanna and Palepu 1997; Arnold and Quelch 1998). It is the efficiency of capital use rather than the profit margins that determines the profitability at the BoP (Prahalad 2004). There is a need for augmentation of managerial capacity, firm capabilities and standardization of operating procedures (SOPs) to drive the scalability (Prahalad 2004; Rangan and Thulasiraj 2007). Rangan et al. (2011) argue, “Indeed, decent profits can be made at the base of the pyramid if companies link their own financial success with that of their constituencies. In other words, as companies make money, the communities in which they operate...
must benefit by, for example, acquiring basic services or growing more affluent. This leads to more income and consumption—and triggers more demand within the communities, which in turn allows the companies’ businesses to keep growing. A corollary of that principle is that from the very beginning, scale is critical: Tentative forays into the base of the pyramid do not yield success.” The scalability at the BoP require a s-curve orientation, which involves significant investment of time, capital and resources in creating market awareness, trust and acceptance before aiming for growth in volumes.

3. Discussion and Results

The analysis of the social entrepreneurship related literature brings forth the conceptual framework that highlights the constraining conditions and key characteristics. The constraining conditions include the static and dynamic factors, which determine the scope, boundary and behavioral characteristics of the different types of enterprises. The static factors include the need type, mission orientation and performance metrics setup of the enterprise. The dynamic factors include the macro-environmental challenges pertaining to the limitations and complexities related to the operating environment, socio-economic profile of the customer and type of competition. In the case of social enterprises, the need type is related to the availability of a formal market ecosystem for basic requirements of the day-to-day life like access to food, energy, healthcare, education, technology etc. The mission is social, which is driven by the ability to make a social impact in the lives of the underserved segment while remaining self-sustainable. The socio-economic outcome is measured by the social metrics comprising different attributes like numbers impacted, extent of outreach, and type of social impact. The operating environment comprises the attributes like infrastructure, market information, socio-economic profile of the dominant customer segment, level and type of competition etc.

Regarding the key characteristics, the relative importance and focus vary for the different social enterprises targeting different social needs, particularly in terms of the criteria for segmentation, design of value offerings, undertaking experimentation and innovation, creating local embeddedness, leadership and cultural orientation, and scalability approach (Figure 2). The segmentation is based upon the sub-income levels and role type. The sub-income levels classify the BoP segment as a low-income or subsistence poor or extreme poor. The value creation and delivery models differ based upon the income levels and buying capacity. The role type involves engagement of the BoP segment as a customer or supplier or employee or micro-entrepreneur. The value offerings require the design of end to end solutions in terms of solving the real need of the target segment more effectively, simply, accessibly, and affordably than the alternatives available in the informal market ecosystem. This also involves integrating the access to financing and after-sales support considering the lack of availability of complementary offerings at the BoP. The focus on undertaking experimentation and innovation at the BoP is needed to learn the radical and unconventional ways of doing business at the BoP. The capacity to perform low cost probes minimizes the risks of failure while maximizing the ability to design solutions suited to the local context. There is a need for creating an embedded organization culture and social mission focused leadership. The focus on local embeddedness enables the social enterprises to remain congruent with the local customs, real needs and context while designing the offerings. This lifts the psychological and cultural barriers. The actions required for creating local embeddedness involve localization of resources by training and hiring the locals, and developing local partnerships. The focus on developing local partnerships involve collaborating with the local stakeholders like non-government organizations, community based organizations, government institutions, local communities and social institutions. This enables the social enterprises to gain local market knowledge, build local acceptance and develop delivery channels for last mile connectivity and reach. Finally, the focus on scalability involves adopting the ‘S-curve’ growth model rather than the vertical growth model. The ‘S-curve’ model requires significant investment of time, capital and resources in creating market awareness, trust and acceptance before aiming for growth in terms of social impact volumes.
### Constrained Conditions (Drivers)

**Static**
- Mission Orientation
- Needs Type
- Metrics

**Dynamic**
- Macro Environment – context, competition, customer, company

### Key Characteristics

<table>
<thead>
<tr>
<th>Segmentation</th>
<th>Value Offerings</th>
<th>Experimentation &amp; Innovation</th>
<th>Local Embeddedness</th>
<th>Partnerships</th>
<th>Leadership &amp; Culture</th>
<th>Scalability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income level</td>
<td>Role (value creation)</td>
<td>Conducting Field Pilots (Trial &amp; Error)</td>
<td>Local Capacity Building, Grassroot Learning</td>
<td>Non-traditional (Government, NGOs, CBOs)</td>
<td>Social Orientation &amp; Embedded Culture</td>
<td>S-curve Orientation, Social Impact driven</td>
</tr>
</tbody>
</table>

![Fig.2. Model – Constraining Conditions and Key Characteristics](source: authors)

### 4. Research Implications

This research holds implications both for the research community and the practitioner community. The contribution to the practice involves highlighting the emergent patterns including the constraining factors and the key characteristics necessary for the design and implementation of the business models at the BoP. This research is an attempt to provide support to the practitioners, who wish to enter the BoP market but face challenges in conceptualizing the market information and learning. The contribution to the theory involves identifying the existing patterns from the research literature and developing an integrated logic among those patterns. This holds significance from the two perspectives. The first perspective involves shaping the recommended course of action for the future research. The second perspective involves recommending a shift in the future course of the research from unique case based experiences to broad qualitative and quantitative studies. This shift is needed to make an orientation towards developing the social entrepreneurship theory.

### Conclusions

The research article conducts a review of the existent scholarly literature. This article is an original attempt to stimulate a reflective introspection in the research community and formulate a model for the practitioners willing to take up the for-profit social entrepreneurship route towards the BoP market. The dominant logic of the market economy focuses on the economic returns as a basis for the success or failure of the organization. However, the review of the scholarly literature highlights the significance of social entrepreneurship as a means for targeting the BoP markets. This perspective recommends the shift in orientation from the economic growth towards the socio-economic outcomes as the basis for designing and evaluating the business models of the social enterprises entering the BoP markets.
References


TOWARDS SUSTAINABLE SECURITY: COMPLEX DYNAMIC SYSTEMS AND LEADERSHIP

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Abstract. There is neither one obvious power acting on the world, nor obvious balance of power and long-term peace and stability. The paradigm of complex dynamic systems would allow understanding more clearly the real order of the world that cannot explain the dominating old mechanical paradigm. Complex dynamic systems have characteristic features and act in many fields where leadership becomes inefficient when following mechanical paradigm.

Keywords: sustainable security, complex dynamic systems, leadership, chaos, order, management, organization, members

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JEL Classifications: F60

I. Introduction

Security, sustainability facets, security and sustainability interrelations are widely discussed in scientific literature (Matyasik 2014; Norkevičius 2014; Mačiulis, Tvaronavičienė 2013; Vosylius et al. 2013). Complex systems and leadership are seen as factors directly affecting sustainable security proxied by military.

The terms “warfare” and “leadership” became inherent. Both a serviceman and a leader act in response to arising challenges and problems and solve them in the most efficient way. The General Jonas Žemaitis Military Academy of Lithuania trains future commanders-leaders. “The graduates of the Military Academy of Lithuania are expected to be competent and responsible leaders. How are they prepared for that? How will they hold values, use their skills and overcome challenges?” (Kanauka 2013).

A leader’s actions are influenced by a present situation. The future commanders-leaders of the armed forces are trained to act in unfavourable conditions and crisis situations by overcoming the impact of stress. In such circumstances future commanders have to be able to make rational decisions, mobilize their troops and command them in order to perform a mission anytime and anywhere. As difficult and stressful circumstances cannot be accurately forecasted and it is difficult to get prepared for them, it is aimed to train commanders-leaders who are capable of adapting to potential circumstances and undertaking efficiently their tasks.

The world is changing; therefore, this change is continuous and unpredictable. Reviewing earlier forecasts of analysts and experts of different fields after some changes, inaccuracy of forecasts appears. Heads of states
emphasize permanent global change that is not always beneficial. In his speech to the graduates of the United States Military Academy in West Point, the President of the United States Barack H. Obama said: “Four and a half years later, as you graduate, the landscape has changed. But the world is changing with accelerating speed. This presents opportunity, but also new dangers” (Obama 2014). Rapidly changing world brings new threats and dangers. Twenty years ago, U.S. President George H. W. Bush gave a speech to the graduates of the United States Military Academy in West Point. He said: “A half century has passed since that day when Stimson spoke of the challenge of creating a new world. You will also be entering a new world, one far better than the one I came to know, a world with the potential to be far better yet. This is the challenge. This is the opportunity of your lifetimes” (Bush 1993). In his speech to the graduates of the United States Naval Academy ten years ago the U.S. President said: “And in the decades ahead, the changes will be even more dramatic. In the years ahead, you will see dramatic changes taking place all around you” (Bush 2005). The U.S. Secretary of Defence Caspar W. Weinberger talked about the challenges 30 years ago too: “[...] when we must remain ready to consider the means to meet such serious indirect challenges [...] we face difficult challenges [...] we can meet the challenge posed by the unfolding complexity of the 1980’s” (Weinberger 1984).

Challenges and dramatic changes arise continuously in the development of the world. These changes are dangerous but providing new opportunities. The world is as it is. Leaders have to step into the world that reveals complexity and becomes a challenge to leaders. It cannot be ignored or avoided as it will be one of the most serious leadership problems in the U.S. One cannot turn a blind eye to reality. It is necessary to monitor carefully changes and understand, evaluate and react appropriately to them. Global leadership requires us to see the world as it is, with all present threats and uncertainty. Facing arising challenges have to be an important part of American leadership. “We can’t ignore [...] to meet the demands of today must be a critical part of American leadership” (Obama 2014). Uncertainty, as a new factor, furthers challenges and dramatic and dangerous changes. There is a lack of clarity and it is not long-term. Obscurity and uncertainty are inevitable as a situation cannot be clear for a longer period of time. “In this era of surprise, we cannot know for certain [...]” (Bush 2005). Future leaders might confront new challenges. Although the times are changing, tendencies remain. Unprecedented challenges are expected. “We have faced trials that were not foreseen [...]” (Obama 2014). “[...] we face a threat with no precedent” (Bush 2002).

There will be lots of challenges and threats and their reasons or origin will be unknown. They are almost inevitable. Having avoided some challenges, a crisis will arise nevertheless. “Because we face a spectrum of threats [...] yet, while the source and nature of today’s challenges are uncertain [...]” (Weinberger 1984). Leaders confront challenges and crises that are unavoidable in dramatic situations. Addressing them might require fighting and taking risk that lead to losses. “The bicentennial class of West Point now enters this drama [...] you will face times of calm and times of crisis” (Bush 2002).

It is a modern world and people have been talking a lot about it. The presidents of the superpowers talk to the graduates of military academies or servicemen. New challenges, dramatic crises. It is a chaotic world. Threats arise where they are not expected and the origin of danger is not always obvious. The limits between open conflicts or hidden unfriendly actions are eliminated and it is impossible to forecast an initiator or time and place it might appear. Complex relations or interaction balance at the edge of an open conflict but may not necessarily lead to it. Leaders have to be able to deal with threats, counter them and get prepared for a crisis if it hits unexpectedly. It needs preparation. Future leaders have to be trained to be ready to fight in any circumstances, with any means, in any way and for any reason. “Yet, so blurred have the lines become between open conflict and half-hidden hostile acts that we cannot confidently predict where, or when, or how, or from what direction aggression may arrive” (Weinberger 1984). “In the complex new world we are entering [...] we must engage ourselves if a new world order” (Bush 1993). “In this time of unprecedented dangers [...] in our time, terrible dangers can arise on a short moment anywhere in the world, and we must be prepared to oppose these dangers everywhere in the world” (Bush 2005). “You graduate from this academy in a time of war [...] this war will take turns we cannot predict. [...] From this day forward it is your challenge as well. And we will meet this challenge together” (Bush 2002). “Our war on terror is only begun” (Bush 2002). “And already, we see disturbing signs of what this new world could become if we are passive and aloof. [...] Two hundred
years ago, another departing President warned of the dangers [...]” (Bush 1993). “Difficult and dangerous work remains […] in this new era of warfare [...]” (Bush 2005) “...and continuing challenges here at home [...]” (Obama 2014).

It is necessary to understand what needs to be changed and how. We have to restructure, reorganize and reconstuct as well as to keep in step with the changing world, change mechanism or structure, ascertain and determine what we need, aim for, want and lack to achieve or have. Reorganizations and changes await us. “This success has brought our nation, once more, to a moment of transition. […] Even as our forces prevail in today’s missions, we have the opportunity – and the responsibility – to look ahead to the force that we are going to need in the future. […] to clarify our strategic interests in a fast-changing world” (Obama 2012). “Now, just as the world has changed, this architecture must change as well” (Obama 2014).

There were mistakes that we have learnt from, we cannot repeat them, but will it help to avoid other mistakes in the future? We will have to overcome the resistance of people and colleagues from close environment who will be against the reorganization necessary for the future or will support different changes. “We can’t afford to repeat the mistakes [...] when our military was left ill prepared for the future” (Obama 2012). “The opponents of change are many, and its champions are few, but the champions of change are the ones who make history” (Bush 2005). Future leaders will not be able to ignore the reality – fast-changing world, challenges, crises, unexpected threats with no clear limits. It’s a chaotic world where leaders will perform endless transformations and mistakes will threaten their actions. Their comrades and people from close environment will resist changes. The length of such a chaos is not clear. We don’t know whether or not we will ever achieve stability and peace and leaders will be able to relax and people could enjoy peace and clear future. Such a chaotic world is not explored and has no laws or powers that influence it and cause chaos.

An “ordered and reliable” system of organizations interacts with the real chaotic world. “Here is the real world as described in the new sciences of living systems and complexity theory. It is a world of interconnected networks, where slight disturbances in one part of the system create major impacts far from where they originate” (Wheatley 2007). “Reliable, ordered and predictable management systems and mechanisms created by people can exist efficiently in laboratory conditions, but in the real world that is characterized by chaos, these mechanisms and systems become not as efficient and meet many difficulties and disorder. Chaos is not a disorder, it is a complex order. The behaviour of living systems is shaped not by order, but by disorder – a complex order” (Skurvydas 2008). By trying to comprehend the behaviour of the complex dynamic systems (CDS), the focus is on the system adaptation process and conditions/circumstances that have an impact on the creation of the new order. The focus is also turned to the prolonged adaptation process of a system that is on the edge of a chaos. If a new order spontaneously emerges from a chaos status, it is called self-organization (Kaufmann 1993, 1995; Coveney, Highfield 1995; McIntosh, MacLean 1999; Stirling 2013). If a CDS is a subject to impulse or input, the system’s response is not clear or forecasted as the output may be evident in all possible ways. Such a great number of possible system responses and variants relate to high-level uncertainty and instability (MacIntosh, MacLean 1999).

Order and laws incomprehensible to a man are called chaos and an order created by people is applied. This order does not work well for people as they act in accordance with a chaotic order of the world instead of coherent system designed by people. Organizations established by people are overwhelmed with a chaotic order instead of efficient coherent system developed by people; therefore, it is necessary to improve an organization according to a desired order. The interaction of such organizations increases the level of chaos and thus even bigger disorder of the world – laws of the world – prevail. People keep developing, management tools become more and more powerful; however, chaos still rules. When do we notice the reality of organizations? Organizations typically become evident to us when a problem or crisis occurs. Organization’s ability to survive is revealed when a crisis hits.
II. Complex Dynamic Systems (CDS)

2.1. What are CDS? When were they first researched and by whom? CDS Scientific Paradigm

Complex systems are a contrast to the classic conception of the linear mechanical order of the world. Researchers who thoroughly researched and described CDS are as follows: Thomas C. Shelling, U.S. economist and Nobel Prize winner who was one of the first researchers to describe complex dynamic systems that are able to change themselves, and Ilya Prigogine, Nobel Prize Winner who researched substance and energy flow through complex systems and described them as a dissipative structure – an open system that maintains itself in a state far from equilibrium. Dissipative structures produce new forms of order that arise spontaneously in a complex system when it is far from equilibrium, at “the edge of the chaos.” When the flow of energy increases, the increased activity produces instability and “bifurcation” results. At this point, reorganizing occurs – self-organizing that results in the emergence of a new structure for coherence and efficiency. Without dissipative structures and exchange with the environment, entropy would result.

Complexity theories are increasingly being seen by academics and practitioners as a way of understanding and changing organizations. The popularity of the CDS theory increases and researchers consider it as a way to understand and change organizations (Shelling 1978; Prigogine 1997; Burnes 2005; Fouda, Koepf 2014). The theory is put to the test in practice. Complex systems are called chaotic systems, systems of systems, complex adaptive systems and non-linear systems. In this article they are called complex dynamic systems (CDS) (Skurvydas, Mamkus 2000; Skurvydas 2008, 2010, 2011; Wilson 2013).

The new CDS paradigm encourages facing the reality. The behaviour of the CDS is dynamic, spontaneous, chaotic, unpredictable and non-linear, while the order of the CDS is a chaotic order as today the chaos is perceived not as a disorder but rather as an order that is recondite and difficult to manage. Following the laws of the CDS, an original, unique, unpredictable and fragile order is formed. There is no sole world-creating power, there are many of them and they are constantly changing (Gell-Mann 1994; Bak 1996; Bar-Yam 1997; Prigogine 1997; Holland 1998; Kauffman 2000; Hilborn 2000; Skytner 2001; Laszlo 2002; Burggren et al. 2005, Skurvydas 2008, 2010, 2011; Taleb 2010; Anzo, Barajas-Ramirez 2015).

Researchers have doubts about determinism and the order created by people with the help of which the world should be efficiently ruled. Efforts are undertaken to establish and comprehend the laws of the CDS. It is considered that better results and more efficient activities will be achieved by applying the laws in practice than following presently dominating mechanical deterministic conception.

2.2. Features and Characteristics of the CDS

The laws of the CDS are used to explain some obscure and unexplained chaotic phenomena of the present and past. The researchers define the following CDS features:

1. Dynamics. The law of dynamics is undoubtedly one of the key CDS laws as it describes the most common CDS behaviour patterns: behaviour of self-adjusting systems is formed over time, i.e. every time a new feature is formed according to the same rules. If the same feature is formed, most probably it happened in accordance with other rules. We may assume that a precise meaning of the CDS feature always manifests only with some probability (Bak 1996; Skurvydas 2008, 2010, 2011).

2. Multistability. Dynamic system aims to be stable. As there is no absolutely stable status and there are lots of statuses, dynamic system moves from one status to another by looking for a more stable one; however, unsuccessfully as a live system does not stay long in one place. In order to understand the concept of equilibration, one must think of it as a dynamic process in an organism functioning at far from equilibrium states, not as a static equilibrium. It is not a sequential process of assimilation, then conflict, then accommodation; it is not linear. Equilibration is instead a non-linear, dynamic “dance” of progressive equilibria, adaptation and organization,
growth and change. It results from “coupling” with our surround. The self-organization effect is observed \textit{globally} when the system transits from a chaotic disordered state to a stable one (Fosnot 2005; Serugendo \textit{et al.} 2011; Skurvydas 2008, 2010, 2011; Stirling 2013).

Non-linear systems have in general several stable states, and this number tends to increase (bifurcate) as an increasing input of energy pushes the system farther from its thermodynamic equilibrium. To adapt to a changing environment, the system needs a variety of stable states that is large enough to react to all perturbations but not so large as to make its evolution uncontrollably chaotic. In some cases, a relative equilibrium settles for a certain period of time. It satisfies all the parts of the CDS; however, it cannot be violated. “The failure of communism has shown that the market is much more effective at organizing the economy than a centrally controlled system. What Adam Smith, the father of economics, called “the invisible hand” can nowadays simply be called self-organization” (Heylighen 2001).

3. \textbf{Irreversibility (characteristic of behavior).} The CDS is always in a different status. Its behaviour direction is “complex” as it moves to the so-called “complex attractor”. Thus, it “conquers” new spaces. It is a CDS globalization process – new links and interaction with environment. The CDS “live” at “the edge of chaos” or is in the process of constant search, instability, possible mistakes and doubts (Skurvydas 2008, 2010, 2011). An “attractor” is a form of a system behaviour that regulates (attracts) the behaviour of the whole system that looks chaotic at first sight.

4. \textbf{Self-regulation.} As the CDS has a self-regulating power, it “dislikes” being controlled from outside (Adami 2002; Higgins 2002; Strogatz 2003; Skurvydas 2008, 2010, 2011). We can say that the CDS “self-regulates from inside”. Self-regulation often takes place spontaneously under a different scenario; however, it does not mean that the CDS does not react to environmental changes. Several strategies of the interaction between the CDS and environment are possible: a) CDS adapt to environment; b) CDS create environment; c) CDS look for the most suitable environment (Skurvydas 2008, 2010, 2011).

This spontaneous emergence of order at critical points of instability is one of the most important concepts of the new understanding of life. It is technically known as self-organization and is often referred to simply as “emergence.” It has been recognized as the dynamic origin of development, learning and evolution. The CDS ability to learn and creativity is a base for adaptivity as well as the ability to adapt to present environment and act efficiently. In other words, creativity – the generation of new forms – is a key property of all living systems. And since emergence is an integral part of dynamics of open systems, we reach an important conclusion that open systems develop and evolve. Life constantly reaches out into novelty (Capra 2002, p. 14). Intuitively, self-organization refers to the fact that a system’s structure or organization appears without any explicit control or constraints imposed from outside the system. In other words, the organization is intrinsic to the self-organizing system, and it results from internal constraints and mechanisms, which are based on local interactions between its components. These interactions are often indirect and are carried out through the environment. Self-organization and emergence are not perfect; units in a self-organizing system are prone to opposing actions, their behaviour may induce needless redundancies, and decentralized control limits the ability of the system to find a globally optimal solution. However, for systems that are complex and operate in a dynamic environment, the use of self-organization offers significant advantages, such as increased scalability, robustness, reduced communication and unit processing costs. Social behaviour of humans is typically self-organizing, and it normally gives rise to emergent complex global behaviour. In many cases, individual human behaviour is based on small-range local information, and communication is carried out on local direct or indirect interactions, which produce complex societal behaviour. As complex systems, organizations exist far from equilibrium where the ongoing interaction of system components leads to emergent and self-organizing behaviour. A central principal of complexity theory is \textit{emergent self-organization}, whereby systems achieve order because multiple local agents interact and those interactions produce unintended outcomes without the intervention of a central controller (Plowman \textit{et al.} 2007; Chiles, Meyer & Hench 2004; Skurvydas 2008, 2010, 2011; Serugendo \textit{et al.} 2011).
5. Transformation. It is a capacity to create a fundamentally new system when ecological, economic, or social (including political) conditions make the existing system untenable. It may prove necessity to configure an entirely new stability landscape – one defined by new state variables or the old state variables supplemented by new ones. The changes cascade through and may transform the whole panarchy with all its constituent adaptive cycles. Transformation explains the relations between the parts, how one part becomes another. It describes the process involved in the changing nature of the parts. Each structure is also self-regulating, meaning that structures inherently seek self-maintenance, organization and closure (Walker et al. 2004).

6. Open to changes. Life is the opposite of stasis. Isolation and stasis over time would result in a system running down – entropy and death. Natural selection increases the diversity while at the same time deselecting some of the possibilities. It also thrifty conserves the activity and self-organization accomplished at each stage so that it does not have to be done over again. Organizations are complex evolving systems. Just about all the things going on in organizations are complex interactions of people, changing technology and environment. Changes happen all the time (Dennett 1995; Fosnot 2005; Knowles 2014).

7. A system cannot be accurately defined or forecasted. It is impossible to forecast accurately the behaviour of the CDS and the beginning and end of catastrophes. Coincidence and chaos play a significant role in explaining the behaviour of the CDS. Every behavioural “mistake” (that is impossible to avoid and that can be internal or external) of the CDS may spontaneously and unexpectedly change the direction and tempo of the CDS that is a deterministic system and operates only in certain stages and usually in artificial conditions. The CDS behaviour can be forecasted only in short periods and by knowing that any detail can destroy any forecast. Often “a detail” is not a detail because it can multiply and cause unpredictable behavioural changes of the whole system. As a result, in the original disordered state of the system, distant parts of the system are basically independent; they do not influence each other. Knowing the configuration of the components in one region would give no information about the configuration in another, non-contiguous region.

8. The whole is more than a total of the elements. If we know the elements of the whole, it is still unknown. Biologically, the brain is a complex system composed of a set of neurons and interactions between them. Although conscience is a result of neuron operations done at a lower level, it is currently not possible to understand or explain human conscience by observing the brain neurons and their interactions. For example, an important reason that has historically triggered collective behaviour in natural societies is the ultimate goal of species survival. This goal is not explicitly expressed at the individual level, but it is reflected in the collective behaviour of society members towards the emergence of social functions and group dynamics allowing the maintenance of the system’s organization (Serugendo et al. 2011; Lindberg, Schneider 2012).

9. A process makes a structure. Structures are human constructions – cognitive mental systems with transformational laws that apply to the system as a whole, not only to its elements. Those organizational designs that are based on the holographic principles of connectivity, redundancy and self-organization facilitate innovation and rapid change adaptation. An advantage that today’s organizations have is that through information technologies they can very easily transform themselves into holographic entities and thus eliminate the bounded rationality that may characterize them.

Formally, the basic mechanism underlying self-organization is the (often noise-driven) variation, which explores different regions in the system’s state space until it enters an attractor. This precludes further variation outside the attractor, and thus restricts the freedom of the system’s components to behave independently. This is an equivalent to the increase of coherence or decrease of statistical entropy that defines self-organization. The idea is very simple: the more widely a system is made to move through its state space, the more quickly it will end up in an
attractor. If it would just stay in place, no attractor would be reached and no self-organization could take place. Even when a community’s actions conform to an external mandate, it is a community – not a mandate – that produces the practice. In this sense, communities of practice are fundamentally self-organizing systems (Wenger 1998; Heylighen 2001; Walker et al. 2004; Kontoghiorghes et al. 2005).

10. Synergy. Dissipative structures that are characteristic of synergy. Generally, the emergent phenomena are an externally identifiable outcome, for example, particular pattern or structure, property, behaviour or system state, which, although not explicitly represented at a lower level, appears at a higher level. That complex collective behaviour usually occurs without any central control, and it is derived from the simple local individual behaviours and interactions, who analyzed lasers and similar collective phenomena, was struck by the apparent cooperation or synergy between the components (Heylighen 2001; Serugendo et al. 2011). Cooperation and synergy (interaction) are characteristic of the CDS elements.

11. Spontaneity. Spontaneous collective behaviour when a leader is not clear or he/she is not present. During spontaneous movement the CDS elements maintain minimal distance from each other (Skurvydas 2008, 2010, 2011). Having input and output (the input-throughput-output component and their interactions both within themselves and with the external environment).

12. Adaptation. It is an ability to adapt that is related to continuous learning from goal-directed experiments (learning from mistakes). A change adaptation is defined in terms of the extent to which an organization can adapt to changes rapidly. Relationship between learning organization characteristics and organizational outcomes of change adaptation, innovation and bottom-line performance demonstrates how democratic and open systems, which allow employees to think, challenge the operating norms of the organization be creative and take risks, ultimately transform themselves into innovative and rapidly adapting entities capable of coping with highly complex and rapidly changing environments; conceptual framework with regard to the association between learning organization practices and change adaptation, innovation as well as bottom-line organizational performance.

The CDS adapt when a crisis hits external factors or during reorganization of a system. Adaptability is the capacity of actors in a system to influence resilience. A characteristic feature of complex adaptive systems is self-organization without intent. There are two types of system modes: fast and slow adaptation modes. System modes are liable, i.e. they may change rapidly. Rapid changes of behaviour are observed during critical periods; therefore, we can say that a catastrophe strikes. Other features, such as continual adaptation to changing environment will only be exhibited by the more complex systems, distinguishing, for example, an ecosystem from a mere process of crystallization (Levin 1998; Heylighen 2001; Walker et al. 2004; Kontoghiorghes et al. 2005; Skurvydas 2009; Wilson 2013).

13. Self-organizing crises or catastrophes that are characteristic of behaviour. It is believed that it is impossible to predict accurately the beginning or end of a catastrophe because any CDS behaviour “mistake” (that is impossible to avoid and that can occur in the inside and outside) can spontaneously change not only the direction of the behaviour but tempo as well. Crises allow CDS cleaning excess and, if necessary, updating missing elements. Consequently, a CDS crisis is an inevitable feature of such systems behaviour. The more dynamic the system, the more self-organizing the crisis. It is encouraged to know better the interaction of the CDS elements instead of the elements alone as the behavioral feature of the CDS as the whole is more than the total of their elements. As a result, we cannot make a decision about an element by the whole of the DS as well as to understand the whole by the behaviour of an element. A common characteristic of physical self-organizing systems is the existence of some critical threshold, which causes an immediate change to system state when reached. That critical threshold can be a combination of values of certain system variables (Prigogine 1997; Rose 1998; Higgins 2002; Adami 2002; Strogatz 2003; Perkiomaki et al. 2005; Laughlin 2005; Skurvydas 2008, 2010, 2011; Serugendo et al. 2011).

14. Resilience. Resilience is the capacity of a system to absorb disturbance and reorganize while undergoing a change so as to still retain essentially the same function, structure, identity, and feedbacks – in other words, stay
in the same basin of attraction. Because of the possibility of multiple stable states, when considering the extent to which a system can be changed, return time does not measure all of the ways in which a system may fail – permanently or temporarily – to retain essential functions. Adaptability is the capacity of actors in a system to influence resilience (Walker et al. 2004).

15. Attractor. In all systems, an important issue is their capacity to deploy the effective global behaviour that permits the realization of their intentional or non-intentional goals. Non-linear systems have in general several attractors. When a system resides in between attractors, it will be in general a chance variation called “fluctuation” in thermodynamics that will push it either into some attractors. The CDS has several attractors and moves to them but its priorities can change (Heylighen 2001; Serugendo, Gleizes, Karageorgos 2011).

16. The absence of centralized control. Some of these features, such as the absence of centralized control, are shared by all self-organizing systems, and can therefore be viewed as part of what defines them. Communities of practice exist in any organization. Because membership is based on participation rather than on official status, these communities are not bound by organizational affiliations; they can span institutional structures and hierarchies. This living process results in a much richer definition than a mere institutional charter. As a consequence, the boundaries of a community of practice are more flexible than those of an organizational unit. The membership involves whoever participates in and contributes to the practice. A community of practice’s life cycle is determined by the value it provides to its members, not by an institutional schedule. It does not appear the minute a project is started and does not disappear with the end of a task. It takes a while to come into being and may live long after a project is completed or an official team has disbanded. To be effective, therefore, managers and others must work with communities of practice from the inside rather than merely attempt to design them or manipulate them from the outside.

We are making a transition from hierarchical forms of organization to this web-like creation. They self-organize like crazy into different groups. It changes them. It changes their work. Ultimately, they are ignoring the existing structures (Wheatley 1997; Wenger 1998; Heylighen 2001).

17. Summary. As the systems or their elements form (usually spontaneously) original features of a system or a system as the whole by interacting and it is impossible to comprehend all the interaction cases, a more possible way to know systems or their elements is not only the search of mechanisms but dynamic features as well. A dynamic phase space of system functions is suitable for that. It is necessary to recognize not only the dynamics of the system functions but also the dynamics of the interaction of the systems functions as the whole as it is more than a total of elements. If we know elements, it does not mean that we know the whole (Hilborn 2000; Skurvydas 2008).

2.3. The Fields of the CDS

The CDS have a characteristic behaviour and peculiarities that are different from mechanical concept organizations. The features are usually very different when compared to mechanical deterministic theory.

Issues. Evolution has played a key role in the formation of complex systems or systems of systems (SoS) in the areas such as society, biology and the military. One of the interesting aspects in comparing these systems is in the trade between interdependence and the ability for the systems within the larger system to act independently. In the evolutionary process individuality was more dangerous than living in groups. People could easier defend themselves in groups and hunting was more successful (Bar-Yam et al. 2004).

Cellular biology. Plants and animals are extremely adaptable, living in the majority of environments presented on the Earth. The level of adaptability achieved by plants and animals has come at the cost of independence, at least in the case of Mitochondria, which was once a bacterium. The evolution of cellular biology has led to the high levels of interdependency, at the loss of component independence (Bar-Yam et al., 2004).

Society. Humans are mammals, the majority of which are social. Some of our ascendancy in the animal world
comes from improvements to the individual, e.g. larger brains and opposable thumbs, but perhaps a larger portion came from our collaboration and cooperation in groups and the evolution of these group skills, e.g. hunter-gatherers. The individual was at greater risk of starvation or predation. More effective groups ate and bred better. The availability of rich sources of nutrition, meat and grain added energy to the human system and allowed the development of more complex behaviours. The cycle of human interaction and cooperation has led to increased efficiency in the fulfillment of basic human needs, as well as the production and usage of more energy, hence greater complexity, ad infinitum, at least to date. With respect to the question of tradeoffs between interdependence and independence, humans can operate at the independent level and some choose to do so. However, independence usually comes at the cost of efficiency of filling basic human needs, e.g. the hermit (Bar-Yam et al. 2004).

The SoS characteristics. The following characteristics were common across the three fields of biology, sociology and military: evolutionary development, emergent behaviour, self-organization, adaptation, complex systems, individual specialization, and synergy (Bar-Yam et al. 2004).

<table>
<thead>
<tr>
<th>Different elements</th>
<th>Biological</th>
<th>Social</th>
<th>Military</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational independence</td>
<td>Maybe</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Managerial independence</td>
<td>Maybe</td>
<td>Are not applied in some cases; maybe</td>
<td>Yes</td>
</tr>
<tr>
<td>Geographic distribution</td>
<td>Yes</td>
<td>Changing</td>
<td></td>
</tr>
<tr>
<td>Interdependence*</td>
<td>Yes</td>
<td>Sometimes</td>
<td>Qualified goal</td>
</tr>
<tr>
<td>Multiple taxonomies*</td>
<td>Yes</td>
<td>Maybe</td>
<td>Yes</td>
</tr>
<tr>
<td>Goal/need seeking*</td>
<td>Maybe</td>
<td>Need; goal seeking may evolve</td>
<td>Goal</td>
</tr>
</tbody>
</table>

Table 1. The SoS (or CDS) characteristics are not common across the fields of biology, sociology and military (Bar-Yam et al. 2004).

Concluding Observations

Unpredictable phenomena and crises continuously occur all around the world. The speeches of the former and present leaders of the superpowers dedicated to the armed forces and society emphasize the necessity to prepare for the emerging new threats and challenges and address them. As the dominating mechanistic deterministic paradigm is not appropriate for the chaotic evolution of the world, researchers direct their attention to complex dynamic systems paradigm that corresponds to the real chaotic world. The laws of the CDS conflict with the laws of the mechanical paradigm. Social behaviour of humans is typically self-organizing, and it normally gives a rise to emergent complex global behaviours. The behaviour of separate people as well as organizations or public behaviour globally has the features of the CDS. People, building up a society, follow the laws of the CDS.

III. The Real Situation. Present /Coming CDS Era vs the Old Mechanical Era

3.1. The Change of Leadership Concept under the Influence of the CDS. The Essence of Leadership according to the CDS

While researchers discuss the significance of leadership, a question arises what leadership is when evaluating organizations as complex adaptive systems (Plowman et al. 2007). If an organization is treated as a CDS, the role of a leader and leadership becomes vague in an organization.

The articles about leadership present leaders having knowledge about future events and being able to eliminate ambiguities or problems in all organizations. Traditional attitude to leadership has been shaped of a long-lasting
understanding about organizations as systems aiming for balance with clear future, while leaders control behaviour and plan intervention (Stacey 1992; Wheatley 1999; Plowman et al. 2007). Leaders in mechanical linear system could follow the rules and principles with regard to a stage an organization was in at that time. An organization transformed to fit the next stage according to forecasted evolution, a leader took forecasted actions and activities. However, crises hit an organization at an unexpected time. Not everything happened following the rules and established procedure.

Russell Ackoff states that currently we are in the process of leaving mechanism-machine age that originated in the Renaissance and entrenched when the society was industrialized. Then mechanism-machine metaphor became an attitude about evaluation and talking about organizations (Reed 2006). Now humans look for other energy resources or efficient use of present ones. When significant changes will take place in the energy area, the prevailing economic-political situation will change in the world as well. Future changes deny some economic-political forecasts that reflect present economic-political world stability and encourages making new forecasts having very little to do with stability and clarity.

Some mathematical catastrophe theories played a leading role in the objective real world theory disciplines and still do and their role is becoming increasingly important. However, in mathematicians’ circles and society, these theories assumed a wrong role of being capable of solving problems in social and natural sciences (Homburg 2014).

### 3.2. Differences between Mechanical and Complex Dynamic Systems Leadership

Mechanical systems are rather simple and forecasted; however, complex dynamic systems are different. Leaders have the symptoms of this phenomenon and unreasonably require simplicity and certainty in complex systems that are in unclear and variable environment. System thinking is essential in an unstable and rapidly changing environment. According to Ackoff, cause and effect relationship was sufficient to explain all the phenomena. We still have the mechanism-machine age thinking. Current problems and questions that organizations have are more complex and challenging than earlier. Leaders act in complex, complicated and puzzling environment.

Success in an unstable environment requires different thinking about problems and organizations (Bar-Yam et al. 2004; Reed 2006; Lynch, Dagostino 2013). Former separate economic, industrial and political areas are closely related. Changes in one field influence other fields. Processes differ in type and length. Results are unpredictable, inconclusive and continuous. Leadership in such circumstances becomes similar to surfing to the goal that is not invariable as well.

Leadership requires interaction of the opposites in complex organizations and unstable environment that would lead to transformational thinking, origin of a new paradigm with a new power of thoughts (Paparone 2004; Bradberry 2012).

Traditional attitude to organizations is based on the idea that the world is already known and explored as it is a mechanical system with a different operating force and rules of procedure (Capra 1996; Stacey 1995; Plowman et al. 2007). Therefore, organizations have rules of procedure, formalized control and hierarchical structure of government that simplify ongoing processes and allow a simple, clearly defined and predictable response to global changes. Traditionally, organizations look for order and leaders are expected to reach for stability by reducing complexity with the help of codification (Boisot & Child 1999; Plowman et al. 2007); therefore, leaders strive to control future by diminishing complexity and uncertainty directing to clearly defined future (Plowman et al. 2007).

An organization receives information that causes fluctuation but identity helps to maintain balance at the threshold of a chaos. If a system maintains order too strictly, it might alter as it will not be able to transform and consequently will fail. If it lives in a chaos, it will not have memory and will not be able to learn and adapt while transforming. When information is accessible to everyone in an organization, a response is fast and effective and it is easy to transform and it does not mean that anyone can make a decision. It means that everyone evaluates information himself/herself, thus leading to the most objective evaluation of information according to which decisions will be made (Wheatley, Kellner-Rogers 1996).
There is no defined state or model for the CDS. Their leaders take action due to a firm intention, not because of a clear action plan. Local plans are developed when necessary or in unexpected cases. Leaders have to trust in organization’s intellect. The future is unknown but they believe that an organization is capable of handling all challenges (Wheatley, Kellner-Rogers 1996). Imposing strict order in an organization is useless and harmful. Loose order, ability to balance at “the edge of chaos” and fast response to changing circumstances determine activities. A leader resembles an acrobat balancing on high ropes at an appropriate pace (too fast or too slow pace may cause a fall) and having sensitive receptors that analyze environment and allow making most appropriate decision at the moment.

When we think of organizations as mechanisms, we do not evaluate the power of internal communication in the self-organizing organizations. The order of mechanical systems relies upon standard procedures foreseen for all the cases. However, when a chaos erupts, all the actions lose control (Wheatley 2007). In the CDS world, leaders focus not only on clear, planned actions, steps and stages, they address the potential of organization members, ability to involve them into processes, mechanical detachment to processes and ability to inspire. Plans cannot be trusted and followed blindly as determination and organization’s daily routine is more important. Strict hierarchy and order of actions decrease organization members’ efficiency.

The CDS laws contradict hierarchy and order created following the example of mechanical organizations. The majority of people disagree with the CDS theory, though everyday events prove the theory globally. According to it, the real world, not the mechanical one that we made up, requires us to learn to deal with the chaos and adapt strategy and change our behaviour so that it could lead us to order instead of increasing chaos. We got stuck between two paradigms/theories one of which is not effective and the other one is too odd to be accepted. A new real world chaos creates new order. The world that is able to create order without command, control and charisma. When individualities find common interest and desire that are uniting them, they self-organize and decide how to proceed. Self-organization evokes creativity and creation of adaptive system. Power and possibilities develop from new relations (Wheatley 2007; Lindberg, Schneider 2012). Common aim and desire arouse creativity leading to excellent results. It is important for organization members to communicate with each other and that free and non-hierarchical communication and common aim would reveal creative potential.

We want a system to be dynamic and able to adapt to changing environment. The limits of such system are inflexible and fragile, however, live and having creative potential able to work efficiently and reduce chaos. Stability, reliability, predictability and control are great for mechanisms, yet people and organizations are not mechanisms (Knowles 2001; Moen 2013).

During the last several decades, researchers collected data on dynamic systems. It was established that the CDS are able to self-organize for interrelated learning, adaptation and development. It is a contrast to our normal behaviour towards how we follow hierarchy and laws. The ability to communicate, have great vision, motivate people to work hard, achieve results and innovations and implement changes. Leaders are expected to create resistant and adaptive organizations able to deal with growing crises without losing track and progressing with leaders’ luck. We must understand how to motivate people and develop an ability to self-organize and transform. We also have to be aware how we lose these abilities and thus cause even greater chaos and require hierarchy, role, purpose, command and controlled leadership (Wheatley 2007).

According to some researchers, the mechanical paradigm still dominating nowadays does not reflect the real world. The CDS paradigm is more realistic as it demonstrates the presence of order and disorder (chaos) and denies the idea that the world can be organized according to personal wishes and this order will be stable. The CDS paradigm contradicts the mechanical one by indicating that a long-time stability, balance and clear order in particular cannot be brought to the world. Thus, the world has to balance disorder (chaos) and order. The CDS is criticized for its universality – an ability to solve problems in different fields. However, the advantage of the CDS is presented as a possibility to classify and concentrate all possible and suitable analogues of a situation.
Conclusions

1) Crises, chaos and challenges are characteristic of mankind. The world change is a continuous and unpredictable process. Uncertainty is inevitable.

2) There are many forces acting on the world with no clear balance, long-term peace and stability. Global processes are characterized by a chaotic state.

3) Humans and organizations are not mechanisms. A human, society and the world are complex dynamic systems.

4) The paradigm of complex dynamic systems according to which the world balances on the edge of chaos contradicts mechanical systems paradigm that proves that the world is known and explored.

5) The paradigm of complex dynamic systems allows understanding global chaotic phenomena.

6) A possible way to explore systems or their elements is to research dynamics of the systems as the whole function interaction.

7) The essence of leadership and the role of a leader in the conditions of complex dynamic systems are different than in the mechanical paradigm.

8) Traditional approach to leadership has developed from a long-lasting understanding about organizations and the world as mechanical systems, the future of which is already known, that has clear separate acting power, rules of procedure and leaders control behaviour and plan interventions.

9) Leaders unreasonably require simplicity and certainty in complex systems that are in unclear and unstable environment. The order of mechanical systems relies on standard action procedures provided in all cases, in creators’ opinion.

10) Organizations that operate in accordance with the principles of complex dynamic systems adapt more successfully to a rapidly changing environment. When information is available to everyone in an organization, everyone evaluates it for himself/herself and thus allow most objective evaluation of information according to which decisions will be made leading to quick and efficient reorganization.

11) We got stuck between two paradigms one of which is not effective enough and the other one is too odd to be accepted.

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