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International Entrepreneurial Perspectives and Innovative Outcomes

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Foreword to the seventh issue of peer reviewed scientific Journal of Security and Sustainability Issues
The General Jonas Žemaitis Military Academy of Lithuania

Dear readers,

I am delighted to introduce to your attention the seventh issue of scientific peer-reviewed Journal of Security and Sustainability Issues. I encourage the efforts of pulling the classic and the newest ideas and practices, raising problems, suggesting alternative answers and analyzing plausible scenarios of countries’ development.

The journal was launched in the year 2011 by The General Jonas Žemaitis Military Academy of Lithuania – a university, which provides military and civil education for the Lithuanian Armed Forces. The initiative to integrate international intellectual potential of scientists and practitioners, representing civil and military parts of society, for discussion on problems related to secure and sustainable development of societies has been implemented. The idea has been supported by a wide range of international partners, e.g. University of Salford, A Greater Manchester University (UK), University of Essex, Essex Business School, Centre of Entrepreneurship Research (UK), Latvian and Estonian institutions of higher education and Lithuanian Energy Security Center, which became NATO Energy Security Centre of Excellence. This rich partnership, editorial board and scientific contribution witness the importance of problems under elaboration.

Looking from my personal perspective, I support discussions on the topics Journal of Security and Sustainability Issues embraces. I firmly believe that better future, towards which we move, cannot be achieved by mechanical application of theories or subjective beliefs. Sharing, arguing and fruitful discussion – those are the right tools enabling all of us to choose the most efficient answers to the most urgent questions and to trigger the fastest possible development of our own country.

Let us build our future together!

With best regards,

ALGIRDAS BUTKEVIČIUS
Prime Minister of the Republic of Lithuania
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ECONOMIC GROWTH, SUSTAINABLE DEVELOPMENT AND ENERGY SECURITY INTERRELATIONS

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Abstract. Presented paper aims to indicate what types of interrelationships between energy usage patterns prevailing in particular country, economic growth and finally, sustainable development could be distinguished. The topic of paper, or, rather research area, is neither new nor original. Nevertheless, an array of approaches towards character of considered interrelationships can be encountered. Complicity of chosen issue, we reckon, lies in differences of perception of the following questions. Our findings consequently would depend on, at first, how we measure economic growth in short and long terms, the second, how we measure energy security, and, the third, how we benchmark progress towards sustainable development. Methods, which we consider as being applicable for measuring of selected interrelationships, comprise a separate part of scientific elaboration. Therefore we formulate a task to overview the most contemporary measurable perceptions of economic growth, perceptions of energy security facets affecting economic growth and consequent reaction of sustainable development to various scenarios of energy consumption and economic growth. Resulting conclusions about measurement of indicated phenomena and argumentations of their plausible interrelation would lead us to choice of methodological approaches of described interrelations’ analysis.

Keywords: Economic growth, sustainable development, energy security, energy intensity, competitiveness.

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JEL Classifications: E21, E25, L1, N7

1. Variety of approaches towards energy security

Energy security in contemporary literature is being discussed from plethora of angles. After comparatively concise review of prevailing perceptions we will distinguish facets relevant for taking into account in the model, which would be devised for prediction of economic growth and sustainable development tendencies.

The most characteristic perception of energy security for early years of indicated decade can be represented by approach, according which energy security is seen as comprising constituent of sustainable development (Streimikiene et al. 2007). The article authors assume that policy makers need a simple tool for “current and future effects of energy use on human health, society, air, soil and water”. According to them, energy indicators for sustainable development (EISD) can be used. The further elaborations are based on 30 indicators used by United Nations Commission on sustainable development. Those indicators, as classic approach to sustainable development suggest, are attributed to a group of social, economic or en-
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Economic Growth, Sustainable Development and Energy Security Interrelations

Environmental ones. For further analysis authors select EISD, which they think are important specifically for Baltic States energy sector development. Hence the following indicators are being tackled: Energy use per capita, Energy intensity of GDP, Energy supply efficiency, Energy intensity in agriculture, Energy intensity in commerce, Energy intensity in household, Energy intensity in transport, Energy mix, Renewable energy share, Net energy import dependency, CO₂ emissions from energy sector per capita and unit of GDP (the scheme of core EISD indicators is presented in Figure 1).

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Fig.1. Set of core EISD

Source: Streimikiene et al. (2007)

A result of research lies in providing linkages between indicators and policy actions. Critically evaluating adopted by authors approach, it can be concluded that there is not much attention paid to a concept of energy security. Scientists perceive problem of energy use as constituent of sustainable development problematic. No contentious elaborations on currently urgent concept of “energy security” are provided. It complies with EUROSTAT approach, in principle.

Recall that interrelation of economic growth and energy use indicators as presented in EUROSTAT Sustainable Development Indicators system is not emphasized. According EUROSTAT Sustainable Development Indicators’ system, economic growth estimated by “growth rate of GDP per inhabitant” indicator is considered as a single and the most important indicator reflecting economic development of a country (it is found in Theme 1: Socio-economic development, in Level 1, what corresponds the highest level of abstraction). Role of energy in sustainable development processes is being reflected through the following multifaceted set of indicators. “Final energy consumption by sector” is found in Theme 2: Sustainable Consumption and Production, and reflects resource (in the case, specifically, electricity) productivity. Another reference to energy use is being made in the context of environmental sustainability. In Theme 6: Climate Change and Energy, Sub-theme “Energy” is being introduced. The following indicators are considered. Level 1, “Share of renewables in gross inland energy consumption”, Level 2, “Energy dependency”, Level 3 “Gross inland energy consumption by fuel”, “Electricity generated from renewable sources”, “Share of biofuels in fuel consumption of transport”, “Combined heat and power generation”, “Implicit tax rate on energy”. Impression is that energy security currently has obtained much broader treatment (e.g. Tvaronavičienė 2012) than is reflected in EUROSTAT Sustainable Development Indicators’ system. It means the discussion on multifaceted perceptions of energy security had not gained its momentum at year of the publication submission, i.e. year 2006.

Looking chronologically at evolution of energy security concept it is rather interesting to glance at introduction of some novel understandings of sustainable development. Classic and the mostly spread association with sustainable development research area triggers emerging of dimensions, mentioned in above cited paper, i.e. social, economic and environmental. Those aspects of development – more or less emphasized – inherently is embraced by the classic perception of sustainable development. Meanwhile, parallel to classic approach, obviously a lot of different understandings could be found. Not switching discussion towards research area of sustainable development but just for the sake of scientific interest, let us point out, that relating of energy, or energy security indicators to sustainable development indicators is relevant only in cases, when sustainable development perception coincides with classic one. Meanwhile, some perceptions of sustainable development do not directly
tackle energy issues at all (De Vries, Petersen 2009). These authors adopt different from classic conceptual framework of sustainable development evaluation, a hub of which is subjectively perceived quality of life. Paradoxically, those authors do not put especial emphasis on energy or energy security. That facet of reality is embedded in more general blokes of natural resources and technology (Figure 2).

Hence, to generalize, what seems to be classic approach towards energy and energy security (which meant that energy issues should be incorporated into sustainable development notion) appears to be not unanimously accepted. Here we enter into elaboration of energy security facets perceptions, which are analyzed as separate field and possibly, characterized by effects, which appears to be beyond boundaries set by research area of sustainable development.

An attempt of extending boundaries of renewable energy production impact estimation could be represented by e.g. research, in which concepts of substantive (classic) and procedural (extended) sustainability are being introduced; impact of renewable energy is being measured from prospect of local stakeholders (Del Río, Burguillo 2009) (Figure 3).

**Fig.2.** Conceptual framework for sustainability assessment

*Source: De Vries, Petersen (2009)*
Another research, published at the same year (2009), similarly as one considered above, incorporates renewable energy (biofuels, specifically) into extended (we can call it “procedural”) sustainable development framework. Authors adopt view of sustainable development elaborated by Sachs in his book “Caminhos para o desenvolvimento sustentável” (Garcez, de Souza Vianna 2009). Adopted approach suggests eight dimensions (instead of classic, or substantive, approach based on three conventional dimensions) of sustainable development: social, cultural, ecological, environmental, territorial, economic, and political on both national and international levels. Biofuels problematic addresses only social and environmental aspects of sustainability: 1) social sustainability—social inclusion of family farmers; regional development; food security; 2) environmental sustainability—influencing the carbon and energy balances of biodiesel; promoting sustainable agricultural practices; and a diversity of primary material (feedstock) (Garcez, de Souza Vianna 2009). Other attempts enrich the considered approaches (Gallego Carrera, Mack 2010; McNally et al. 2009, Bassi et al. 2009, Coccia 2010). E.g. in the later research energy security and sustainability are being observed through lenses of institutional capacity to react to changes caused by increase in production and population, therefore increase in demand of energy. If institutions are lacking that capacity to react, potential of conflict appears which threatens human security. “Power shed” may be needed, otherwise military forces might be employed (McNally et al. 2009). Nevertheless, stability rather than resilience solutions are of major importance. Peculiarly, the energy security is being related to institutional dimension of sustainable development. The context in which institutions are considered differs from rather conventional dimensions (Tvaronavičienė, Grybaitė 2012). In this case institutions are seen as factor able to mitigate effects of societal and economic pressures raised by increase in energy of demand, and, presumably conflicts by energy scarcity.

Hence, to generalize, above considered papers tackle renewable energy problematic and relate it with extended perception of sustainable development. It is
rather interesting to notice that both approaches put emphasis on non-economic dimension; while the first draws attention to stakeholders, the second points to social sustainability (through farmer employment; and farmers are stakeholders as well) and environmental sustainability (pollution). As it was already indicated, economic efficiently of renewable energy is not being estimated through cost-benefit lenses; even more – economic growth is not being considered by mentioned authors at all.

To elude impression that discussion on energy security after year 2007 lost its interest in interrelation of energy consumption and economic growth, let us glance at a paper, which “investigates the resource consumption of Japanese society since 1979 and its subsequent effects on the economic output of the nation and the environment” (Gasparatos, Gadda 2009). Main authors’ ideas related to energy security could be rephrased in the following way. Despite energy consumption in main sectors of economy, such as industry, transport, agriculture stabilized, or even decrease, the energy consumption by households and service sector continue to increase. Japanese has not managed to embed into its economy presence of foreign oil markets but nevertheless, rely on export on energy and other resources intensive commodities. There is no unanimous agreement about causal relationship between energy consumption and economic growth. One group of scientists claim than energy consumption results in economic growth, while opponents reckon reverse causality is more plausible (Gasparatos, Gadda 2009).

To conclude, authors consider energy consumption as driving force or consequence of economic growth. Energy security emerges as precondition of economic development and, consequently, sustainable development. This study investigates the resource consumption of Japanese society since 1979 and its subsequent effects on the economic output of the nation and the environment. In order to quantify resource appropriation and trends in production and consumption, the concept of emergy synthesis is employed. Our results show a significant increase in the total amount of emergy consumed by 66.9% between 1979 and 2003 which comes hand in hand with an increase in the level of environmental stress by 93.7% (quantified as the environmental loading ratio). On the other hand the emergy required to produce 1 USD of economic output has been gradually decreasing which denotes an increase in the efficiency of the conversion of natural capital into economic output. What is most interesting though is the growing dependence of the Japanese economy on imported emergy, increasingly from developing nations, that severely affects the potential for unhindered economic growth (Gasparatos, Gadda 2009).

2. Energy security and sustainable development interrelation

From the above presented considerations we can draw a conclusion that increase of total amount of consumed energy coincides with GDP growth and environmental damage, despite energy required to produce one conventional unit of GDP decreases (later we will introduce a concept of energy intensity).

Another concept related to reaction of so called “state welfare” to increased usage of energy is being introduced. As scientists Blum and Legey claim, “energy security is defined, in this context, as the ability of an economy to provide sufficient, affordable and environmentally sustainable energy services so as to maintain a maximum welfare state, even when issues would press it otherwise. We introduce the notion of energy security gap to represent the economy’s failure to show such ability (Blum, Legey 2012). The authors methodology is being reflected by a general approach which: (a) addresses the matter from the perspective of both demand and supply sides, with no spatial, temporal or sectorial constraints; (b) complies with any energy system (economic and physical) structure, regardless of either the energy security risk factors to which it is exposed or the mitigating measures it has available; (c) supports inter-economy and inter-temporal benchmarking (Blum, Legey 2012). To put those ideas into other way, we can say that economic growth, which coincides with increased consumption of energetic resources cannot be reached “sustainably”, i.e. without harm to environment.

Sensitivity of “welfare economy” or, if we rephrase authors, “susceptibility” to harm caused by increased energy consumption could be characterized by “resilience of economy”. Blum and Legey define resilience as the ability of an economy to handle energy related effects. The more resilient the economy is, the smaller its energy security gap. In other words, the larger the resilience, the lower (higher) the impacts of disadvantageous (advantageous) energy related effects in the economy; conversely, the smaller the resilience, the higher (lower) their effects (Blum, Legey 2012).
According Blum and Legey (2012), we are in a position to define an indicator for an economy's energy resilience. But firstly it is necessary to proceed through some auxiliary definitions. Let:

\[ A = \{a_i\} \]

vector of all economic activities that are potential sources of relevant energy related issues;

\( q_i, p_i, l_i \) - quantity, price and quality of energy or energy related materials flowing through activity \( a_i \);

\( W \) - energy sensitive measure of welfare;

\( \Delta q_i, \Delta p_i, \Delta l_i \) - deviations in \( q_i, p_i \) and \( l_i \); and \( \Delta W_i, \Delta W_i p, \Delta W_i l \) deviations in \( W \) as a consequence of \( \Delta q_i, \Delta p_i \) and \( \Delta l_i \), and actions taken through implemented energy security mechanisms.

Blum and Lege (2012) define three ratios of change, which are elasticity-like measures of welfare variations arising from deviations in energy quantity, price and quality in each critical economic activity.

1. (energy related) quantity–elasticity of welfare to deviations in activity \( a_i \):

\[ e_i^q = \frac{\Delta W_i}{W} \frac{\Delta q_i}{q_i} \]

2. (energy related) price–elasticity of welfare to deviations in activity \( a_i \), and

\[ e_i^p = \frac{\Delta W_i}{W} \frac{\Delta p_i}{p_i} \]

3. (energy related) quality–elasticity of welfare to deviations in activity \( a_i \):

\[ e_i^l = \frac{\Delta W_i}{W} \frac{\Delta l_i}{l_i} \]

Anyway, authors claim that despite their ability of those indicators to quantify to what extent an energy related issue impacts on the economy’s welfare, the above measures do not reflect thoroughly the economy’s energy resilience since it also depends on the nature of the welfare change. Two situations may occur (Blum, Legey 2012). (In one case, the energy related issue causes a decrease in the economy’s welfare (in this case, the more energy inelastic the economy, the less it is burdened by the issue). In another case, the energy related issue causes an increase in the economy’s welfare (in this case, the more energy elastic the economy, the more it will be able to take advantage of the issue).

Authors convince about two possible, diametrically opposite, directions of energy consumption impact on countries’ welfare. On the other hand, the more complicated question relating to benchmarking of consumption, i.e. estimating and setting a limit, which would separate beneficial and detrimental level of energy consumption (supply) would remain unanswered. Hence, in the report of European commission it has been noticed the same blind alley of research projects performed under Framework Program on sustainable development. It was mentioned that scientists tend to focus on modelling for the prediction of economies sectors development and its impacts rather than monitoring progress towards specific sustainability objectives (DG for R&I, EC 2010).

3. Economic growth and energy consumption (supply): if the same goals are being tackled by countries of different development

In order to answer to a question of methodological character, if energy consumption (in case of sufficient supply, of course) enhances economic wealth (or growth – to look through narrower lenses) let us depict countries’ economies functioning scheme. As Gasparados and Gadda indicate (Garparatos, Gadda 2009), the main assumption behind emergy synthesis is that real wealth depends on the amount of resources consumed within a system and as a result it makes use of a different valuation perspective to that of the traditional economic analysis that focuses on human wellbeing and utility. The authors (Garparatos, Gadda 2009) in Figure 4 present a simplified view of the input and output flows from a nation. The numerous emergy flows are aggregated into local renewable (R), local non-renewable (N, N1, N2, N0), imports (F, G, P2I) and export (N2, B, P1E) flows. These flows are then further combined into different indices that provide information on the metabolism of the system. Some of the most commonly used indices include the energy yield ratio (EYR), the energy investment ratio (EIR) and the environmental loading ratio (EYR).
Analysis of interrelation of economic welfare (or growth) and energy security requires to shortcut an extensive list of indicators. Some suggest narrowing down the concept of energy security to the concept of energy supply continuity. This reduces the overlap between the policy goals of energy security, sustainability and economic efficiency. The narrower concept of energy supply continuity can be measured more precisely and reduces the double counting of potentially less important aspects, simply because they lie on the border between different concepts (Winzer 2012). We will see later that other authors argue for narrowed but still broader treatment of energy security, i.e. they argue that not only supply but demand as well plays very important role (the greater demand, the greater supply and the greater consumption in economy, what results in detrimental effect of restricted supply to sustainable economic development).

The argumentation could spin supporting sides into vicious circle unless context of argument is introduced. Here we need to admit that level of countries development play a crucial role in stepping into one or another position of arguing parties. E.g. scientists from less developed and energetically dependent country, Lithuania, (Augutis et al. 2012) suggests energy security indicator, which is a special index which gives numerical values to important issues for security of energy sector. In his paper, each indicator is described by presenting the title, comments, factual and threshold, pre-critical and critical state values. The integral characteristics of these indicators show the level of energy security and in order to identify it, a point system assessment scale is used. The methodology developed in this paper is applied for the assessment of the Lithuanian energy security level in different scenarios. At first, indicator groups are constructed and group weights are determined. The weights of indicators within each group are established in two ways: when all weights are equal and one indicator is dominating. Taking into consideration the assessment of indicators by points, their weights in groups and group weights, the Lithuanian energy security level was determined according to separate indicator blocks. The security level of each indicator and each indicator block, and total security level are presented as the results. The indicators that have the highest impact on the security level increase or decrease are determined as well (Augutis et al. 2012).

Environmental threats are not the significant in that particular context. Lithuania has undertaken the obligation from the EU to increase the share of renewable energy sources in the final balance up to 23% until
2020. So far a level of 13% has been achieved, thus the obligation is most likely to be met. The main sources used are biofuel and wind energy. A greater problem is posed by the EU directive on Pollution Standards which will come into force in 2016. Following this directive, the Lithuanian thermal power plants will no longer meet the requirements indicated therein and will have to be replaced or equipped with new technologies, reducing the CO2 to the required level (Augutis et al. 2012). Economical threats are more worrying since Lithuania (as e.g. Latvia) is dependent on a single energy supplier, that is Russia (Augutis et al. 2012; Karnitis 2011). According this approach, energy contributes to a virtuous cycle of human, economic and social improvements that are essential to sustainable development in developing countries (Figure 5).

![Diagram showing the interrelations between energy and human, economic, and social development](image)

**Fig. 5. Links between energy and human, economic and social development**

*Source: Augutis et al. (2012)*

Kaygusuzl (2012) representing more developed country, switches emphasis from energy supply issues towards economic development sustainability. He claims “people of today and tomorrow demands much greater levels of energy services”. It also demands that these services be delivered in a manner that is more universally accessible, affordable, reliable, safe and environmental friendly. This will require fundamental changes in technologies, methods, infrastructure and people’s behavior everywhere. The change needs to be so profound that government, business and social leaders need to use every instrument at their disposal as effectively and efficiently as possible. Energy development and use should be placed in a sustainable
development context to ensure that no dimensions, resources or policy tools are overlooked (Kaygusuz 2012; Makštutis et al. 2012; Verbruggen 2006).

It has to be noticed that a numerous studies are devoted to energy consumption and environment pollution interrelation. In this article we do not tackle this particular relationship, but still it is worth to mention so called “Kuznec curve”, which indicates an inverted U form relationship between energy consumption and state welfare growth; i.e. the curve indicates that at low level of economic development energy consumption stimulates economic growth but the effect tends to transform into opposite after country achieves higher level of development because of deteriorating impact of GHG gas emissions on environment.

4. Alternatives of sustainable economic growth measurement

So far we discussion in the area of economic growth, sustainable growth and energy security interrelation area was concentrated in energy security perception, economic and sustainable development implications caused by increased energy consumption. While measurement of sustainable development has long been an almost conventional area of scientific discussion (e.g. Korsakienė et al. 2011; Borsekova et al. 2012), measurement of economic growth was implied to be conventionally adopted: i.e. economic growth is measured by GDP or GNI growth rates or GDP or GNI per capita growth. A relatively new approach to sustainable economic growth was expressed by You (2011). Authors employ the structural vector auto regressions framework and the generalized impulse response function to study the long-term dynamic relation between China’s energy consumption and sustainable economic growth. They claim that in addition to the conventional economic indicators (GDP growth rates), genuine savings rates are to be particularly examined to indicate sustainable economic development. They results show that the high elasticity of energy consumption dramatically undermines the capacity of China’s sustainability in terms of reducing genuine savings rates. Their analysis finds that clean and renewable energy increase the country’s genuine savings significantly. That is, renewable energy consumption promotes sustainable development for both natural and economic societies. However, increase in traditional solid energy consumption is more likely to benefit only the growth of GDP (You 2011; Feng et al. 2009; Zhang et al. 2012).

Besides introduction of savings rate into system of economic growth estimation, let us finish the current paper with additional observations related with energy intensive economies competitiveness in the long-run. To our minds, it is very important to take into account growing strand of scientific literature devoted to investigation of interrelationship between energy intensity and ability to export “dirty” or energy intensive products. “Clean” products are being seen as proxy for long-term competitiveness gained by international exports (Zuo 2011; Constantini, Mazzanti 2012).

Concluding remarks

In order to indicate interrelations between economic growth, sustainable development and energy security, we need to agree what presumptions lie under those categories’. By claiming what concept means what to us let to build rigid framework of scientific elaboration and formulate methodology of research.

Review of the most contemporary scientific literature on the topic has led us to the following insights.

The first, despite wide array of definitions of energy security concept, and numerous attempts to build complex indicators, nevertheless, a task of revealing interrelation between economic growth and energy consumption requires very concrete metrics. For less developed countries energy supply still remains a metric of the highest importance, which, consequently, stands for energy security.

The second, energy security (in our case supply or availability) can have rather controversial effect on sustainable development. The direction of impact can be positive either negative; positive impact can be tade-offed by negative, i.e. impact is context sensitive. We assume that for less developed countries increase in energy consumption stimulates economic growth and sustainable development. For more developed countries further increase in energy consumption can have detrimental effect because of increased environment deterioration. The final effect depends on economy income elasticity to energy price, which again can be related to country’s development level.

The third, we agree that short-term and long-term economic growth had to be distinguished. Long-term growth measure net had to incorporate savings rate,
as some authors suggest.

Benchmarking of rational and acceptable energy consumption had to be attempted with respect to countries development level. Economic growth and export competitiveness cannot be achieved by encouraging energy intensities increases, especially in exporting industries.

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References


NEW CHANGES IN THE LITHUANIAN ENERGY SECTOR

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Abstract. One of the most important strategic goals in Lithuania is implementation of sustainable development provisions. Taking into consideration closure of Ignalina Nuclear Power Plant implementation of this aim depends very much on development of the Lithuanian energy sector. This paper presents some findings from the analysis of the Lithuanian energy policy and the energy sector development, in particular taking into consideration the role of energy efficiency, renewable energy sources and nuclear energy. The paper focuses on changes in primary energy balance and in deployment of renewable energy sources over the period 2010–2020. The paper also presents analysis of changes in electricity generation taking focus on factors stimulating construction of new regional nuclear power plant in Lithuania and factors limiting its attractiveness.

Keywords: Energy sector, sustainable development, nuclear energy, energy intensity, renewable energy.


JEL Classifications: F16, F18, R10

1. Introduction

Environmental protection encompasses many aspects of rational and safe use of natural resources, including legal, biological, technological and economic measures. Environmental policy is one of the most dynamic of the European Union (EU) policies in particular taking into consideration concerns related with climate mitigation. It is influenced by many activities in various sectors of the economy since the role of environmental quality and human health is very important factor affecting the development of national, regional and global policies.

Activities in the energy sector, mining, manufacturing, transport sector and other industrial sectors are associated with environmental pollution, usage of limited natural resources, and therefore poses certain danger to the environment and human health. Policies leading to sustainable development create favourable conditions for achieving the welfare for future generations. Principles of sustainable development should be integrated into all activities based on the common understanding of environmental requirements, responsibilities and mechanisms of appropriate legislative determination in all the EU-27 countries.

The main principles for sustainable development were laid down at the United Nations conference on environment and development in Rio de Janeiro in 1992. It was agreed that “in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it” (The United Nations... 1992). Thus, sustainable development has been validated as a major ideology of long-term social development in many countries.
Lithuania being in transition from centrally planned to a free market economy since early 1990s has had an ambitious plan to become a member of the EU and to integrate into democratic international organisations, as well as to approach gradually to an average of leaving standards in developed European countries. At the same time Lithuania was ready for active cooperation with developed countries in the field of environmental protection. In 1992, the Lithuanian Environmental Protection Programme, covering the most important environmental problems including means and order of their solution, was prepared. In 1996, the National Environmental Protection Strategy was prepared and approved by the Lithuanian Parliament (National Environment Protection Strategy 1996). The Strategy included provisions related to the key environmental problems for that time and for the period of its implementation, the main priorities and objectives, principles of environmental policy, processes of the country’s integration into the EU structures, as well as means for implementation of the Strategy. Most of the Strategy provisions and planned measures were successfully implemented.

New activities in the area of the country’s sustainable development were stimulated by an aspiration to take part and to prepare the Lithuanian report for the Summit Meeting in Johannesburg in 1992. Taking into consideration the Plan for Implementation of this World Summit outcome, in 2003, the National Strategy for Sustainable Development was prepared and approved by the Lithuanian Government (National Strategy for Sustainable Development 2003). Sustainable development is treated in the Strategy as a compromise between environmental, economic and social goals of society, allowing reaching the commonweal for the society and for future generations, without exceeding limits of negative impact on environment. In 2009, taking considerable changes in the national economy and the energy sector the updated National Strategy for Sustainable Development was prepared and approved by the Lithuanian Government (Updated National Strategy for Sustainable Development 2009).

Efforts for sustainable development of the energy sector are clearly declared in the National Energy Strategy (Lithuanian Energy Institute 2003, 2008; The Government of Lithuania 2010). Provisions in these documents confirm that Lithuania will comply with the obligations in the energy sector assumed under international environmental conventions and will implement the requirements set in the EU environmental directives. One of the most important priorities of the Lithuanian energy policy is to contribute into initiatives and attempts of the EU directed to reduction of greenhouse gas emissions and mitigation of climate change in the world.

The aim of this paper is to set out some findings from analysis of the Lithuanian energy policy and the energy sector development, in particular taking into consideration the role of energy efficiency and deployment of renewable energy sources. The paper also presents analysis of changes in electricity generation especially taking focus on factors stimulating construction of new regional nuclear power plant in Lithuania and factors limiting its attractiveness.

2. Impact of the Lithuanian energy sector on environment

Total emissions of the main pollutants (CO, NO\textsubscript{x}, SO\textsubscript{2}, non-methane volatile organic compounds and particulate matter) from all stationary and mobile sources of pollution in Lithuania during the period 1990–2000 decreased more than 2.5 times, from 1.1 to 0.45 million tons. The emissions from stationary sources of pollution in Lithuania decreased more than 4 times. This reduction was stipulated by the decline of activities in manufacturing, more efficient use of energy resources by end users and the introduction of measures reducing pollution (Statistics Lithuania 2009 b).

Reduction of total air pollutants was caused by significant reduction of carbon monoxide. One can see also a tendency of reduction in the total volume of sulphur dioxide and particulate matter. Only volumes of nitrogen oxides and volatile organic compounds were increasing during this period. In 2010, the major contribution into air pollution was from the energy sector (67 % of SO\textsubscript{2}, 65 % of particulate matter and 52 % of CO), transport sector (68 % of NO\textsubscript{x} and 45 % of CO) and manufacturing (65 % of volatile organic compounds). Implementation of measures directed to reduction of SO\textsubscript{2} and NO\textsubscript{x} emitted into atmosphere by implementing the national emission reduction and ambient air quality improvement programmes is required (Baublys et al. 2011).

Currently more and more concerns are related with reduction of greenhouse gas emissions. In many
countries major sources of greenhouse gas emissions are: the sector of electricity and heat generation, fuel combustion in branches of economy, oil refining and emissions from other activities in the energy sector. Specific feature of the Lithuanian energy sector is that more than 70% of electricity in 1990–2009 was generated by Ignalina Nuclear Power Plant (NPP). Therefore contribution of energy transformation sector into balance of greenhouse emissions so far was rather low. As one can see from Figure 1, total amount of energy-related greenhouse gases emissions in 2000 was by 3 times lower than in 1990 (United Nations Framework…2012) owing to significant reductions of electricity and district heat generation using fossil fuels and during this period even larger (by 5.3 times) reduction of emissions was from fuel combustion in manufacturing, construction, agriculture, household and services sector. Reduction of greenhouse emissions in the transport sector which remains important source of air pollution (Ambrazevičius, Baublys 2001) during the period 1990–2000 was comparatively low (by 1.8 times).

![Figure 1](image_url)

**Fig. 1.** Emissions of greenhouse gases caused by fuel combustion:
1 – Energy transformation sector; 2 – Transport; 3 – Other sectors

*Source: United Nations Framework Convention on Climate Change (2012)*

In principle energy-related greenhouse gas emissions should reflect the trend of total primary energy consumption in the country. However, due to dominant position of Ignalina NPP in the electricity generation greenhouse gas emissions from the energy transformation sector during the period 2000–2008 did not increase. And vice versa significant increase (by 1.8 times) of emissions during this period from the transport sector was caused by fast growth of activities in this sector.

The changes of total greenhouse gas emissions over the period 1990–2010 are given in Table 1 (United Nations Framework... 2012). In 2000, total emissions decreased to 39% from the base year (1990) level, but during the period 2000–2008 greenhouse gas emissions increased by 25% due to growing activities in various sectors. In 2009, as a result of economic recession greenhouse gas emissions decreased to 41.4%, but in 2010 increased again to 43.1% from the 1990 level. In 2010, the share of energy-related activities in the balance of greenhouse gas emissions was 59.7%, share of agriculture – 24.0%, industrial processes – 10.5%, and share of solid waste disposal, waste incineration, etc. – 5.8%.
Vaclovas Miškinis, Juozas Baublys, Vidas Lekavičius, Alfonso Morkvėnas
New Changes in the Lithuanian Energy Sector

Table 1. Greenhouse gas emissions in Lithuania, million tons

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy-related emissions</td>
<td>33.70</td>
<td>11.04</td>
<td>13.04</td>
<td>13.21</td>
<td>13.36</td>
<td>13.15</td>
<td>11.95</td>
<td>12.85</td>
</tr>
<tr>
<td>Energy transformation sector</td>
<td>13.99</td>
<td>5.21</td>
<td>5.78</td>
<td>5.33</td>
<td>4.81</td>
<td>4.90</td>
<td>4.92</td>
<td>5.45</td>
</tr>
<tr>
<td>Transport sector</td>
<td>7.67</td>
<td>3.43</td>
<td>4.39</td>
<td>4.66</td>
<td>5.42</td>
<td>5.38</td>
<td>4.44</td>
<td>4.57</td>
</tr>
<tr>
<td>Other sectors</td>
<td>12.04</td>
<td>2.40</td>
<td>2.87</td>
<td>3.23</td>
<td>3.13</td>
<td>2.88</td>
<td>2.59</td>
<td>2.84</td>
</tr>
<tr>
<td>Industrial processes</td>
<td>4.30</td>
<td>3.03</td>
<td>4.10</td>
<td>4.36</td>
<td>6.16</td>
<td>5.50</td>
<td>2.30</td>
<td>2.25</td>
</tr>
<tr>
<td>Agriculture</td>
<td>10.57</td>
<td>4.68</td>
<td>5.26</td>
<td>5.25</td>
<td>5.41</td>
<td>5.16</td>
<td>5.15</td>
<td>5.16</td>
</tr>
<tr>
<td>Waste and solvents</td>
<td>1.36</td>
<td>1.40</td>
<td>1.38</td>
<td>1.32</td>
<td>1.30</td>
<td>1.27</td>
<td>1.27</td>
<td>1.25</td>
</tr>
<tr>
<td>Total</td>
<td>49.93</td>
<td>20.14</td>
<td>23.78</td>
<td>24.14</td>
<td>26.23</td>
<td>25.08</td>
<td>20.67</td>
<td>21.52</td>
</tr>
</tbody>
</table>


Lithuania has ratified the Kyoto Protocol with commitment to reduce greenhouse gas emissions from the 1990 level by 8% during the period 2008–2012. Currently Lithuania has no problems to comply with this obligation. But in a future amount of emissions will grow owing to closure of Ignalina NPP and increased consumption of fossil fuels for electricity generation as well due to increase of fuel combustion in other sectors of the economy caused by expected economic growth. Therefore provisions of sustainable development in the energy sector could be implemented by increasing energy efficiency, fast deployment of renewable energy sources and possibly construction of new nuclear power plant. Activities directed to reduction of greenhouse gases emissions in non energy-related activities could be based under implementation of modern technologies in manufacturing, improvement in waste management, etc.

3. Primary energy supply

The Lithuanian energy sector constructed through 1990 was oriented towards large, but inefficient energy consumption, as well as towards considerable exports of electricity from Ignalina Nuclear Power Plant (Ignalina NPP) and refined oil products from Mažeikiai Oil Refinery. Important features of the energy sector are very high dependence on primary energy supply from one country (Lithuania depends on Russia for 100% of its natural gas, for more than 90% of its crude oil and almost 100% of coal requirements), from one side, and still existing excess in electricity generating capacities as well as in the oil refining capacity exceeding by three times the country's internal demand, from another side.

Since 1990 due to significant reduction of economic activities, structural changes, reduced export of electricity and other factors primary energy demand was decreasing and in 2000 total primary energy supply was by 2.2 less than in 1990. But the period 2000–2008 could be characterized by stable and fast economic growth – GDP was increasing on average by 7.4% per year. In 2009, GDP decreased by 14.8%. Currently the country's economy is recovering – GDP increased by 1.5% in 2010 and by 5.9% in 2011. The development of the total primary energy consumption was stipulated by this economic growth but with certain fluctuations owing to changes in export of electricity to neighbouring countries during the period 2000-2008, and in particular due to closure of Ignalina NPP at the end of 2009. These changes in thousand tons of oil equivalents are shown in Table 2 and Figure 2.
## Table 2. Primary energy consumption in Lithuania

<table>
<thead>
<tr>
<th>Year</th>
<th>Electricity import/export</th>
<th>Indigenous resources</th>
<th>Coal</th>
<th>Nuclear</th>
<th>Oil and oil products</th>
<th>Natural gas</th>
<th>Total Thousand toe</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>-114.9</td>
<td>816.6</td>
<td>88.5</td>
<td>2193.9</td>
<td>2168.7</td>
<td>2064.3</td>
<td>7217.1</td>
</tr>
<tr>
<td>2001</td>
<td>-341.0</td>
<td>850.3</td>
<td>79.2</td>
<td>2961.0</td>
<td>2574.2</td>
<td>2146.7</td>
<td>8270.4</td>
</tr>
<tr>
<td>2002</td>
<td>-557.9</td>
<td>943.8</td>
<td>135.5</td>
<td>3685.5</td>
<td>2472.7</td>
<td>2170.4</td>
<td>8850.0</td>
</tr>
<tr>
<td>2003</td>
<td>-647.6</td>
<td>987.4</td>
<td>173.6</td>
<td>4035.0</td>
<td>2348.1</td>
<td>2354.3</td>
<td>9250.8</td>
</tr>
<tr>
<td>2004</td>
<td>-618.8</td>
<td>1013.1</td>
<td>169.3</td>
<td>3935.5</td>
<td>2540.9</td>
<td>2348.4</td>
<td>9388.4</td>
</tr>
<tr>
<td>2005</td>
<td>-255.1</td>
<td>1063.4</td>
<td>187.6</td>
<td>2694.0</td>
<td>2691.9</td>
<td>2476.9</td>
<td>8858.7</td>
</tr>
<tr>
<td>2006</td>
<td>-36.8</td>
<td>1118.3</td>
<td>260.7</td>
<td>2254.5</td>
<td>2690.2</td>
<td>2454.5</td>
<td>8741.4</td>
</tr>
<tr>
<td>2007</td>
<td>-118.0</td>
<td>1194.8</td>
<td>253.6</td>
<td>2562.4</td>
<td>2727.5</td>
<td>2892.1</td>
<td>9512.4</td>
</tr>
<tr>
<td>2008</td>
<td>-82.3</td>
<td>1231.2</td>
<td>219.4</td>
<td>2578.3</td>
<td>2955.7</td>
<td>2596.0</td>
<td>9498.3</td>
</tr>
<tr>
<td>2009</td>
<td>-252.1</td>
<td>1276.3</td>
<td>169.4</td>
<td>2828.2</td>
<td>2495.7</td>
<td>2181.6</td>
<td>8699.1</td>
</tr>
<tr>
<td>2010</td>
<td>515.1</td>
<td>1284.9</td>
<td>209.6</td>
<td>0</td>
<td>2552.4</td>
<td>2492.0</td>
<td>7054.0</td>
</tr>
<tr>
<td>2011</td>
<td>579.5</td>
<td>1314.1</td>
<td>232.2</td>
<td>0</td>
<td>2445.4</td>
<td>2718.8</td>
<td>7290.0</td>
</tr>
</tbody>
</table>


During the period 2000–2009 the share of the nuclear — the cheapest imported fuel — was very high and fluctuated about 31% with the lowest value of 25.4% in 2006, and the highest value of 36.6% in 2003. The role of nuclear fuel was very important because being comparatively cheap nuclear fuel helped to relieve certain burden of balance of payments and therefore soften social problems during transition period. Nuclear fuel helped also to increase the security of the primary energy supply, especially in the power sector. The share of nuclear energy in the primary energy balance in the year 2009 (year of the final closure of Ignalina NPP) was 29.6%.

Oil and oil products were the most important fuels in Lithuania over several decades. However, since 1990 their role was decreasing owing to significant reduced use of heavy oil products for production of electricity and district heat. During the period 2003-2008 contribution of oil products into the primary energy balance was increasing due to fast growth in consumption of motor fuel, and in 2008 it was equal to 31.1%. However, in 2009, due to significant reduction of motor fuel consumption, share of oil products decreased to 28.7% and increased again to 36.2% in 2010.
At present natural gas is one of the most important fuels in the Lithuanian primary energy balance. The share of natural gas, the most attractive fuel in a long-term perspective, was about 25% over the period 1990–2008. During the two years (2008 and 2009) period total consumption of natural gas was decreasing mostly owing to reduction of its non-energy use – in 2009, consumption of gas for production of mineral fertilizers was by 1.6 times less than in 2008 and by 1.9 times less than in 2007. Due to this reason the share of natural gas in the balance of total primary energy decreased from 30.4% in 2007 to 27.3% in 2008 and to 25.1% in 2009. Owing to closure of Ignalina NPP the share of natural gas increased to 35.3% in 2010 and to 37.3% in 2011. The role of coal was continuously decreasing – from 4.8% in 1990 to 1.0% in 2001. During the period 2002–2007 the share of coal in the primary energy balance was increasing and in 2007 reached 2.7%, but in 2009 its contribution decreased again to 1.9%. In 2011 the share of coal accounted to 3.2%.

### 4. Role of renewable energy sources

Primary energy resources in Lithuania are rather scarce. Currently the following indigenous resources are used for energy requirements: local oil, peat, wood, geothermal and hydro energy, as well as energy from chemical processes. In 2011, the share of all indigenous resources in the country's primary energy balance was 19.6%. Major share of extracted local oil is exported and its production since 2001 is decreasing. Peat-bogs are comparatively small and peat is used mostly in agriculture and in particular for horticultural needs. Certain contribution into balance of indigenous resources is originated from energy of chemical processes. This energy corresponds to the content of the thermal energy gained in the chemical processes (production of fertilizers), which is transferred into hot water and steam.

As it is shown in Figure 3, contribution of renewable energy sources (due to limited indigenous resources) is rather significant and since 2001 they are playing more and more important role. In 2011, the share of renewable sources in the balance of indigenous energy resources increased to 73.9%. Currently wood (including wood waste, boughs, wood chips, pellets, sawdust and waste from agriculture) is the main renewable energy source. The contribution of hydro energy in absolute value is fluctuating depending on climatic conditions with comparatively small changes, and since 2006 contribution of bio-fuels, used as a motor fuel for the road transport, as well as of wind energy is increasing.
Contribution of renewable energy sources could be illustrated by several indicators. The most aggregated are the following: 1) share of renewable energy in the country’s primary energy balance, 2) share of green electricity in the gross electricity consumption, 3) share of renewable energy resources from the gross final consumption. As one can see from Figure 4, the share of renewable energy in the primary energy balance is growing but with some fluctuations which are caused mostly by different volumes of electricity exported to neighbouring countries and by corresponding consumption of nuclear energy.
In 2010, owing to significant reduction of the total primary energy consumption this indicator was the highest during last twenty years – 15.1 %. Fluctuations of the share of green electricity are related to changes in the gross electricity consumption and also in volumes of its generation by hydro power plants. The largest contribution of green electricity into balance of electricity consumed for all country’s internal needs was in 2011 with 9.6 %. The share of electricity from renewable energy sources will increase faster in a near future as a result of planned construction of new wind power plants.

At present the main aggregated indicator, used in the EU-27 countries, is the share of renewable energy sources in the gross final consumption. In 2004, the value of this indicator was equal to 17.3 %, but it increased till 19.9 % in 2010 and to 20.4 % in 2011 owing to reduction of the gross final energy consumption.

Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources provides mandatory national targets for each the EU-27 country, which are consistent with a target of at least a 20 % share of energy from renewable sources in the Community’s gross final consumption of energy in 2020 (The European Parliament 2009) The national overall target for the share from renewable energy sources in the Lithuanian gross final consumption in 2020 is not less than 23 %. To achieve this target the Lithuanian Government adopted a National Strategy for Deployment of Renewable Energy Sources (2010), setting out the electricity and heat production from renewable energy sources as well as production and consumption of biofuels in the transport sector, covering the period 2010–2020. The objectives set out in this Strategy could be described by the indicators presented in Table 3.

**Table 3. Indicators of renewable energy consumption**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass for production of district heat, ktoe</td>
<td>418</td>
<td>539</td>
</tr>
<tr>
<td>Heat produced from geothermal energy, ktoe</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Heat from solar energy, ktoe</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Direct use of biomass in branches of the economy, ktoe</td>
<td>461</td>
<td>484</td>
</tr>
<tr>
<td>Renewable energy from heat pumps, ktoe</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Total renewable sources in heating and cooling, ktoe</td>
<td>894</td>
<td>1051</td>
</tr>
<tr>
<td>Biofuels in the transport sector, ktne</td>
<td>111</td>
<td>169</td>
</tr>
<tr>
<td>Electricity from hydro power plants, GWh</td>
<td>446</td>
<td>470</td>
</tr>
<tr>
<td>Electricity from wind power plants, GWh</td>
<td>924</td>
<td>1250</td>
</tr>
<tr>
<td>Electricity from solar power plants, GWh</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Electricity from power plants using biomass, GWh</td>
<td>761</td>
<td>1223</td>
</tr>
<tr>
<td>Gross electricity generation from renewable sources, GWh</td>
<td>2120</td>
<td>2945</td>
</tr>
</tbody>
</table>

*Source: National Strategy for Deployment of Renewable Energy Sources (2010)*

Based on comprehensive analysis, performed at Lithuanian Energy Institute applying the optimisation MESSAGE model, the reasonable share from renewable sources in the gross final consumption in 2020 should reach at least 21 % (Galinis et al. 2010; Miškinis et al. 2011). This target could be achievable for Lithuania without any support schemes in a case when the functioning of the energy sector is based on free market principles. A key factor promoting the wider use of energy from renewable sources is the external costs when using fossil fuels. These costs could be partly assessed for energy facilities as a charge for CO₂ emissions. Taking into consideration the impact of these charges, the volume of consumption of renewable energy sources over the next decade should increase by 1.8–2 times. In this case the share of energy from renewable sources in the gross final consumption in Lithuania would reach 26–29 % in 2020. The higher value is expected in a case of low prices for renewable energy sources, the lower – in the case of high prices for renewable energy sources. A significant contribution is expected in these scenarios from electricity generation using renewable energy sources – reasonable target for ratio
of the green electricity to gross electricity consumption is 27–31% in 2020. Very high potential for wider use of energy from renewable sources is related with modernization of the district heating systems and changes in their fuel balance. So far natural gas is dominating in the fuel balance of this sector with a 19% share of biomass. Based on the performed analysis, the rational share of biomass in this sector is expected to increase up to 53–62% over decade.

5. Alterations in energy efficiency

Inefficient use of energy is one of the legacies of central planning in all countries of Central and Eastern European countries. Therefore policy for increasing energy efficiency since 1990 was and remains as one of the most important strategic objectives in Lithuania. The most popular indicators of energy efficiency used in various publications are: primary energy intensity and final energy intensity. The first one, measured as the gross primary energy consumption per unit of GDP, is used for comparison of overall energy efficiency in various countries. Another one, measured as total final energy consumption per unit of GDP, is applied for comparison of how efficiently final energy is used by the end users.

Since 1995, primary energy consumed per unit of GDP at constant prices, has been decreasing in Lithuania by 5.4% per annum. In 2011, this indicator was by 2.4 times lower than in 1995 (Figure 5). Final energy intensity was decreasing on average by 4.2% per year and decreased during the period 1995–2011 by 2.0 times. In 2009, inelastic behaviour of energy consumers was confirmed – GDP decreased by 14.8%, but the primary energy consumption decreased by 8.4% and the final energy consumption – by 9.5%. Owing to larger reduction of GDP than energy consumption, in 2009, primary energy intensity in Lithuania was by 7.6%, and final energy intensity by 6.3% higher than in 2008.

![Fig.5. Changes of energy intensity indicators in Lithuania](image)


To compare overall energy efficiency in Lithuania and other countries, the ratio between the gross inland consumption (total primary energy supply) and the GDP could be applied. Currently in the Eurostat-database GDP figures are taken at chain linked volumes with reference year 2005 and applying exchange rates between national currencies and common currency (Euro). Based on these GDP indicators, primary energy intensity in 2010 in Finland was by 1.5 times, in Lithuania by 2.0 times, in Poland by 2.2 times, in Czech Republic by 2.5 times, in Romania by 2.6 times, in Bulgaria by 4.4 times higher than in the EU-27 (Eurostat 2012). One can see similar differences of the primary energy intensity indicators in developed European countries and countries with transition economies from Central and Eastern Europe based on data presented in publications of the International Energy Agency (2010 a, b; 2012 a, b) in a case when GDP from national currencies are transferred into US dollars (2005) applying exchange rates (Table 4). Based on analysis of these indicators, a conclusion about possibility of reducing
the primary energy intensity in the former Eastern Block by several times would be possible. However, such a conclusion is not correct because the real possibility for reduction of the relative primary energy consumption per unit of GDP is much lower (Miskinis et al. 2006). High energy intensity in the former centrally planned economies is determined first of all by the very low level of GDP in these countries. To have more correct comparison of differences in energy efficiency in developed Western countries and developing countries from the former Eastern Block, GDP should be adjusted by indicators of Purchasing Power Parities (PPP). This principle is used as the most reasonable for comparison of economic development level in the EU-27 countries.

Table 4. Energy intensity indicators in 2008, 2010

<table>
<thead>
<tr>
<th></th>
<th>Primary energy intensity, kgce/000 Euro [Eurostat]</th>
<th>Primary energy intensity, kgce/000 USD2005 [IEA]</th>
<th>Final energy intensity, kgce/000 USD2005 [IEA]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exchange rates</td>
<td>PPP</td>
<td>Exchange rates</td>
</tr>
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<td>EU-27</td>
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</tr>
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<td>Germany</td>
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<td>France</td>
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<td>152</td>
<td>120</td>
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<tr>
<td>Finland</td>
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<tr>
<td>Estonia</td>
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<td>546</td>
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</tr>
<tr>
<td>Latvia</td>
<td>301</td>
<td>363</td>
<td>236</td>
</tr>
<tr>
<td>Lithuania</td>
<td>366</td>
<td>311</td>
<td>300</td>
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<td>Czech Republic</td>
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<td>375</td>
<td>296</td>
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<tr>
<td>Slovak Republic</td>
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<td>371</td>
<td>302</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>717</td>
<td>671</td>
<td>569</td>
</tr>
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</table>

Source: International Energy Agency (2010 a, b; 2012 a, b)

Application of primary energy intensity indicators gives a possibility to compare overall energy efficiency in various countries. However, the primary energy consumption, necessary to meet requirement of energy consumers in each country, depends very much on the structure of electricity generating capacities, the role of the energy sector for the country’s economy, volumes of the primary energy consumption for non-energy purposes, etc. In addition it is important to note that changes in the energy transformation are going comparatively slowly. Energy efficiency in Lithuania (similarly as in other Central and Eastern European countries) has been increasing since beginning of the transition period first of all on the consumer side due to significant structural changes in the national economy and implementation of appropriate energy saving measures. Therefore indicators of the final energy intensity reflect better current status and changes in energy efficiency. Thus, these indicators are more suitable for comparison of energy efficiency in various countries and assessment of energy saving potential.

Based on preliminary expert assessment, the primary energy intensity in Lithuania in 2010 was lower by 20.1 % compare with 2009 owing to significant changes in the gross primary energy consumption. One can expect continued reduction of energy intensity during the period 2010–2020. Taking into consideration still existing energy saving potential, in 2020, the primary energy intensity in Lithuania could be reduced by 20 % and the final energy intensity by 25 %.

6. Changes in the Lithuanian power system

The most important changes in the Lithuanian energy sector in 2009 were related to the final closure of Ignalina NPP, especially taking into consideration its very high contribution into the country’s primary energy balance and in particular into electricity generation. Even after closure of Unit 1 at the end of 2004 this power plant was dominating in the electricity market – its share in the balance of gross electricity generation in 2009 was almost 71 %. Global economic recession and closure of this power plant...
were factors that have had painful influence not only on the energy sector, but also on the national economy, energy security in Lithuania and even in the Baltic region, competitiveness of the country’s manufacturing on the international markets, social needs of population and increase on greenhouse emissions. Reduction of electricity demand stipulated by significant decrease of activities in branches of the economy was only the factor mitigating the problem of decommissioned capacities.

According principles of the international statistics it is considered that nuclear fuel used for electricity generation is a domestic energy source independently where its supply is coming from. Although nuclear fuel was imported from Russia, dependence of Lithuania on energy import was decreasing from 70 % in 1990 to 41.9 % in 2003 due to growing contribution of all indigenous energy resources and nuclear fuel into the country’s energy balance. In 2009, dependence on energy import increased again until 50.7 %. Based on preliminary assessment, since 2010, this dependence owing to closure of Unit 2 at Ignalina NPP, increased up to 80 % because nuclear fuel used for electricity generation is substituted partly by imported fossil fuels and partly by electricity import from neighbouring countries. This dependence on energy import was very strong factor when justifying necessity to construct a new nuclear power plant in the updated National Energy Strategy (Ministry of Energy of the Republic of Lithuania 2012).

Ignaлина NPP was in operation for more than two decades without any accidents, supplying least cost electricity without any interruptions. This power plant was even as one of the main pillars of economic independence. These factors were important to form positive public opinion and attitude of the major political parties about nuclear option. In addition many factors stipulating construction of new regional nuclear power plant in Lithuanian are the following (Miskinis et al. 2009):

- Prevalence of import of primary energy resources from Russia, dependence of Lithuanian’s gas supply and power systems on Russia’s energy systems as well as absence of interconnections with Western European energy systems;
- The decommissioning of Ignaлина NPP has had a considerable effect on the structure of electricity generation sources, primary energy balance and electricity production price;
- The strict environmental requirements set forth to energy enterprises, including restrictions on CO₂ emissions;
- Rapid and significant increase of natural gas prices, which depend on a monopolistic supplier, and their instability at the international energy markets;
- Potential interruptions in supply of natural gas, crude oil and petroleum products or in their transit, etc.

Fast development of nuclear power in 1970 and 1980s in many countries was crucially influenced by accident on 26th April 1986 at Chernobyl Nuclear Power Plant when Unit 4 went out of control and exploded. This well-known nuclear accident of catastrophic proportions was also serious political and moral disaster. However, during last few years nuclear revival is again on the agenda in various regions.

On August 2010, 441 nuclear reactors totalling 374.6 GW were operating in 30 countries. In 2008, contribution from nuclear power plants in the total production of electricity in the world was 13.5 % and in the EU-27 – 27.8 %. At the end of 2010 new 65 nuclear reactors were under construction, including 26 units in China, 11 in Russia, 6 in India, 5 in South Korea, etc. However, many of the nuclear reactors listed by the IAEA as “under construction” have encountered construction delays due to political changes, shortage of finance, changes in designs, etc. Nevertheless this nuclear revival is factor supporting construction of nuclear power plant in Lithuania.

Nuclear option could be very attractive alternative for diversification of primary energy sources in the Baltic region and also because nuclear power plant requires importing not much uranium compare to amount of coal, heavy fuel oil or natural gas necessary for production of the same volume of electricity.

Due to global economic recession electricity consumption decreased in all sectors of the Lithuanian economy and total final consumption in 2009 was by 7.4 % less than in 2008. Similar reduction of electricity consumed by end-users in 2009 was in other Baltic States – in Estonia final electricity consumption decreased by 6.4 % and in Latvia by 7.9 % (Statistics Estonia 2012; Statistics Latvia 2012). Total final electricity consumption in the Baltic States decreased in 2009 by 1.73 TWh. In 2011, total final electricity consumption in the region increased again by 0.44 TWh compared with the 2009 level. Never-
theless slow growth of electricity demand in the Baltic States during the last two years can have impact on planned commissioning time of new power generation capacities.

To have consistent comparison with the forecast of electricity demand presented in (Deksnys et al. 2007), the same methodology and the same assumptions about economic development and factors stipulating electricity demand growth in Lithuanian were applied for the current forecast which is shown in Figure 6. Based on the comparison of previous and current forecast one can assess that net electricity generation in 2020 required to meet demand of final consumers in Lithuania will be by about 2 TWh less than expected in 2007. This lower demand is caused only by impact of the economic recession on electricity consumption in 2009–2010 in Lithuania. Taking into consideration similar reduction of electricity consumption in other Baltic States commissioning of new unit at nuclear power plant, earlier planned in 2020, could be postponed for some 5 years. Other reason for some delay could be expected growth of electricity generation using renewable energy sources and in particular construction of new CHP using biomass.

![Figure 6. Forecast of net electricity production in Lithuania](source: Deksnys et al. (2007))

No doubts that construction of new nuclear power plant is an important means increasing energy security in the Baltic region and contributing into programmes of climate change mitigation. However, there are many factors that can reduce attractiveness of nuclear option: slow pace of negotiations with strategic investor; high construction cost of a modern western-type nuclear power plant; absence of experience in private and public partnership for the case of so large project; lack of highly experienced human resources necessary for construction of such power plant; risk due to failure of project management; lack of experience necessary for preparation qualitative agreements with the strategic investor and project partners, uncertainty of competitiveness of the new nuclear power plant in the Nordic electricity market and market of Central and Eastern Europe as well other relevant markets. In-dept assessment of all these factors is required in particular taking into consideration current negative public opinion in Lithuania (based on results of consultative referendum).

Taking into consideration necessity to reduce dependence on energy import, economic and technical factors and in particular factor of energy security as well as environmental requirements, strategic goals in the energy sector such construction of new regional nuclear power plant, integration of the common Baltic electricity market into market of Scandinavian countries, construction of interconnections...
with Poland and Sweden, etc. should be based on comprehensive analysis of the energy sector development and consolidated decisions of Estonia, Latvia and Lithuania.

Conclusions

Important features of the Lithuanian energy sector are the following: high dependence on primary energy supply from Russian Federation caused by closure of Ignalina NPP; absence of interconnections with Western energy systems; growing contribution of renewable energy sources; largely developed district heating systems.

To ensure sustainable development of the national economy the most important measures are the following: fast deployment of renewable energy sources and in particular significant increase of the share of renewable energy sources in the district heat and electricity generation; continued reduction of energy intensity; construction of LNG terminal; construction of interconnections Lithuania-Poland and Lithuania-Sweden, and possibly construction of new regional nuclear power plant.

References


SOFT SECURITY FOR SUSTAINABLE DEVELOPMENT: EASTERN DIMENSION OF EUROPEAN NEIGHBOURHOOD POLICY

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Abstract. Presented paper suggests an instrumental approach to soft security and aims to reveal capacity of soft security instruments in terms of contribution to both security and sustainable development in the region which is addressed by Eastern Dimension of European Neighbourhood Policy and which includes Eastern Partnership (EaP) countries: Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine. Russian Federation (which is neither part of EaP nor among 16 EU partners addressed by the European Neighbourhood Policy) is also included in the overview as an important factor of influence in respect of regional security and relations between EaP states and EU. Referring to the main ideas of researchers and policy makers using different approaches to soft security as a phenomenon, the authors of the paper define soft security instruments as purposely organised social practices which rely mainly on sharing, congruence and development of values and competences of initiators and participants of security governance. Focus on the effectiveness of sharing, congruence and development of values and competences of initiators and participants of the EU policies and related joint projects as well as relevant combinations of soft instruments with economic and normative hard means is seen as a possibility to gradually increase level of regional security and transfer elements leading to sustainable development in this region.

Keywords: Security, soft security, sustainable development, Eastern Dimension of European Neighbourhood Policy.


JEL Classifications: F5, F6, O1

1. Introduction

States and international organizations have developed different approaches in order to mitigate insecurity problems. A long-standing debate related to those approaches usually raises the issues of effectiveness of particular approach, complementarities of those approaches or, on the contrary, risks of circumscribing one another. The process of formulating and implementing European Union (EU) policies related to managing international risks and enhancing influence schemes in the EU neighbourhood requires constant identification and re-examination of routes and instruments for meeting challenges to peace and security. A permanently expanding spectrum of security risks, threats and factual disruptions resulted by globalisation which creates environment of increasing complexity and interoperability outside EU borders, as well as a number of unresolved conflicts, which emerged during the dissolution of the Soviet Union, demand innovative solutions and increased attention to regional security issues. Prevailing EU approach to regional security challenges on European level focuses on so-called “soft security”.

Findings, insights and statements of a number of re-
searchers as well as policy makers are used for analysis of soft security in this paper, e.g. Stańczyk (2011), Lankauskiene and Tvaronavičienė (2012). The view that "the current policies and security measures cannot guarantee effective counteraction against potential challenges and threats. Now we know that their character is diversified and non-military to a high degree. Therefore, the relevant responses require corresponding non-military measures" (Stańczyk 2011:8) is supported in this paper. Building on the insights related to the significance of security to sustainability for today's globalized society as well as to common dimensions of security and sustainable development: "social, economic, environmental" (Lankauskiene and Tvaronavičienė 2012:28), this paper suggests a different angle of the approach to security: i.e. to differentiate security in terms of instruments used against risks and threats and to categorise them as "soft", "economic" and "hard".

Highlighting the role of soft security instruments which are defined as purposely organised social practices which focus and rely mainly on sharing, congruence and development of values and competences of those involved in the process of dealing with security issues, the paper briefly reviews existing EU policies and related project management related to EaP states and Russian Federation (which is neither part of EaP nor among 16 EU partners addressed by the European Neighbourhood Policy but is also included in the overview as an important factor of influence in respect of regional security and relations between EaP states and EU), suggesting to expand soft security component by further engaging selected participants from this region in the processes related to sharing, congruence and development of their competences which are necessary for effective dealing with insecurities on a larger scale, and thus to pave a way for extension of EU practices of sustainable development on regional level.

2. Scientific Perceptions of Soft Security

The concepts of security and power in international relations have a number of different aspects, since they reflect a number of closely interrelated phenomena and processes. For defining soft security as a component of external policy and joint project management, the following observations made by Buzan (1984) in respect of abstract concepts such as peace, power and security, are taken into account. "Conce...
sense, the soft-security agenda opens up a decentralised secondary avenue for international cooperation that in certain circumstances is easier, although not necessarily simple, to pursue”. Similar approach is used by Lomagin (2001:1) in relation to soft security issues with non-military origin of threats: “Soft security threats are those of non-military origin. Hard security concerns are considered more important in Russia, to the extent that some members of the political elite do not even know what soft security threats are. Because of the region’s proximity, soft security problems in northwest Russia receive more attention from the EU than other issues, although these problems are in no way limited to this region”.

However, such tendency to regard soft security organisations as secondary players in the system of international relations has been questioned by a number of analysts. As Pop (2000:1) mentions, “subregional frameworks of cooperation were perceived, due to their “soft” security issue approach, as “the Cinderellas of European security”. However, throughout the last couple of years, there has been a growing awareness, both politically and institutionally, of the value of these groupings. Consequently, subregional arrangements have begun to gain their rightful place within the new evolving, institutionally comprehensive and complementary European security architecture”. Vrey (2005:1) points out: “Proponents of soft security strive to ensure the goal of individual security without resorting to armed coercion. Given the extended scope of security sectors falling within the ambit of soft security regional co-operation is indispensable – a phenomenon most visible in European security architecture and that of Northern Europe in particular. Not only European decision-makers, however, pursue the soft security option”. According to Lindley – French (2004), dividing lines between hard and soft, military and civil security are dissolving and more flexibility as well as new sets of relationships are required to cope with new problems and manage new complexities associated with security issues. This is partly attributed to comprehensive approach to security underlying the European Security Strategy, which, according to Biscop (2005), aims to integrate different dimensions of the EU’s external policies: the military, economic, political and social.

In order to work out an instrumental approach in respect of management of security risks and to define factors of effectiveness of soft security instruments, it is important to take into account observations and conclusions of analysts in respect of the EU security governance and increasing scope of its reliance on soft instruments. Those aspects are explored by Hegemann (2012); Van Kersbergen and Van Waarden (2004); Dingwerth and Pattenberg (2006); Trubek, D.M. and Trubek, L.G. (2007), Rhinard et al. (2007), Bossong (2011), Hix (1998), Kohler-Koch and Eising (1999), Caparini (2006), Webber et al. (2004), Krahmann (2003) and Chayes, A. and Chayes, A.H. (1995). Hegemann (2012:2) provides useful insights on the EU security governance and increasing scope of its reliance on soft instruments. His analysis highlights a shift towards informal arrangements. According to Hegemann (2012:2) “an ambiguous and multifaceted system of security governance has emerged that aims to reconcile the need for more integration with national prerogatives and sensitivities. This system leaves most formal competences to member states but incorporates a growing number of actors, issues, modes of cooperation, and compliance mechanisms that vary in their degree of formality and informality.”

The development of the concept of security governance is related to transnationalization of security risks (Kahl 2010) and the widening of the concept of security (Buzan et al.1998). “Security governance thus highlights the rise of increasingly transnational security risks emanating from non-state actors, the mounting importance of various public and private actors for the provision of security under these circumstances, and the proliferation of networked forms of coordination to facilitate flexible solutions among a growing bulk of national and international actors” (Hegemann 2012:4). Evolving modes of governance encompass public and private actors, rely on horizontal networks and soft instruments such as exchanging best practices and others (Hix 1998; Kohler-Koch and Eising 1999). According to Hegemann (2012:5), “security governance can encompass informal and decentralized networks or formal integration and centralization”. In addition, “EU crisis management capacity is to a large extent ultimately relying on the willingness and ‘know-how’ of the multitude of European actors and levels to pool resources and assist each other” (Ekengren 2006: 91). Another important soft instrument which is being increasingly used in the framework of security gov-
Hegemann (2012) points out both potentially positive and negative outcomes of the increasing scope of the EU security governance’s reliance on soft instruments. According to him, member states and EU institutions created new and more informal mechanisms that produce some results and to some extent can rely on funding and coordinative platforms. However, it is not known “much about the long-term impact of incremental exercises such as peer reviews or security research on the development of actual national policies and the EU’s comparative advantage remains fragile with a view to the much larger national budgets and institutional infrastructures. Eventually, the plethora of informal networks and projects might be a problem itself and spread more confusion than coordination and coherence” (Hegemann 2012:18).

Taking into account that security issues are a top priority for the EU when dealing with states addressed by Eastern Dimension of European Neighbourhood Policy because of such security issues as a number of unresolved conflicts which lead to crime acceleration and complicate management of other security risks resulted by globalisation, it is considered within this paper that the process of the design and implementation of EU initiated policies and related projects is regarded by EU through the lenses of regional security. In this relation it is important to overview analysis of soft social instruments in a wider scope disregarding weather they are used as directly related to “soft security” or in association with to concepts of “soft power” or “soft law.”

3. Soft Social Instruments in Academic Discourse


Having overall understanding that security, defence and promotion of a desired order heavily depend in one way or another on the possession and use of power, scholars and politicians often differ in describing what is implied as “power”. Approach based on the understanding of power in international relations as military power operating on the basis of destruction/threats of destruction is frequently found in the literature on international relations. For example, Burton (1972:45) provides a statement that “Communications, and not power, are the main organising influence in world society.” However, descriptions of organizing, integrative or aggregative capability of social phenomenon to produce effects (desirable or as a side-effect) have led to indications of the existence of another kind of power of non-military (non-coercive) character, referred to as “civilian power” (Maull 1990; Smith 2000).

While some states often demonstrate preference of engagement in coercive (including military) power politics, others (like European Union) are keen to solve insecurity and international influence problems by paying more attention to construction of loose socio-economic networks and partnerships, operating on the basis of “positive conditionality”, using wide range of potential civilian instruments of conflict prevention, strengthening cooperation relations with other states and organisations, etc. Formation and implementation of different strategic policies and their combinations have gradually widened definition of power in international relations moving away from identification of power with military power. Boldvin (1979) has shown power’s dependence on the context in which the relationship exists and its interrelation with such characteristics as behaviour and motivation or possession of capabilities or resources that can influence desired outcomes. A number of studies (e.g. Mansbridge 1990, Vedrine and Moisi 2001) provide description of non-coercive motivation tools used by politicians. Through contrasting two models of power – domination and cooperation, Francis (2011) argues that the dominant concept of “power over” has led to a damaging militarism and suggests to focus on a “power with” using an “interdependence approach” (Francis 2011: 507) to life. Dichotomist approach to power and security is often detected in the broader context of “conflict transformation” concept introduced by Lederach in the 1980s when he began exploring “how do we transform those things that damage and tear apart human relationships to those that protect and build healthy communities” (Lederach 2010: 7). The conceptual framework of “conflict transformation” is oriented towards addressing the root causes of violent conflict and focuses on both structures and processes of interaction in protracted social conflicts. Conflict transformation is regarded as a complex process of changing a number of relationships, attitudes, interests, discourses and underlying structures.
that encourage and condition violent political conflict. Reimann (2004: 6) mentions such non-coercive measures used in the framework of conflict management (including conflict transformation) as “facilitation, negotiation, mediation, fact-finding missions, “good offices”, consultation in the form of problem-solving, workshops and round tables, capacity building, trauma work, grassroots training, development and human rights work”. In his thesis “Power plays in a de facto state: Russian hard and soft power in Abkhazia”, Jonston (2011: 1) claims: “The conceptual divide between “hard power” and “soft power,” and the resources that constitute the basis of each, remain hotly debated topics among International Relations theorists as well as foreign policy advisors and analysts. Two developments in the last decade that have greatly influenced the study of the hard-power/soft-power dichotomy are: (1) the pursuit by many single-state actors of foreign policy strategies identifying and actively incorporating soft-power instruments, and (2) the realization by political theorists that individual policy instruments often exhibit unexpected hard and soft-power characteristics and effects, sometimes resulting in hard power acting soft and soft power acting hard”.

Concept of soft law within dichotomy of “hard/soft” also has been explored in the different branches of social sciences. Almost two decades ago, in the article “Soft Law and Institutional Practice in the European Community”, Snyder (1999) noted that rules of conduct that may have no legally binding instruments/force can have practical effects for European integration. In relation to the debate over the relative value of hard and soft law, Buzan (2004) provides the argument “that soft and hard legalisations do not necessarily correlate with soft = bad/weak and hard = good/strong” (Buzan 2004:56, referring to Abbott and Snidal (2000). In the article “Hard and Soft Law in the Construction of Social Europe: The Role of the Open Method of Co-ordination”, Trubek, D.M. and Trubek, L.G. (2005) provide observations in respect of the relative value of hard and soft law in EU social policy “which should help us as we seek to move past dichotomous thinking and fully engage hybrid constellations. Once we understand the limits of approaches that stress one mode at the expense of the other, recognise that every judgement must be comparative and look at relative capacity for specific objectives in varied contexts, see that there are ways these approaches can be combined, and recognise that such combinations may be essential to accomplish specific goals, we should be able to transcend the terms of the hard/soft debate. And in doing that we will find ourselves with a new and richer understanding of what we mean both by “law” and “European integration.” (Trubek and Trubek, 2005: 346). Consequently, the conceptual divide between hard and soft instruments which is used by some theorists for stressing necessity to transform social interactions, is questioned by others, who urge to transcend such divide and find innovative combinations for accomplishing desired goals in specific contexts.

3.2. Soft Power as a Power of Attraction in the Framework of Threefold Taxonomy

The concept of “soft power” was defined in the context of international relations theory as a specific kind of power differing from “hard power” and “economic power” by Joseph Nye and further developed in a systemic manner in by him in his study “Soft Power: The Means to Success in World Politics” (Nye 2004). In his comprehensive analysis of the concept “soft power” as power of attraction which “often leads to acquiescence” (Nye 2004: 6), and its role in world politics, Nye describes in a detailed manner three types of power: (1) Military power which is associated with such kinds of behaviour as “coercion, deterrence, protection”, features such sources of motivation as “threats, force”, and is related with government policies using “coercive diplomacy, war, alliance”; (2) Economic power which is associated with “inducement, coercion”, features “payments, sanctions” as motivation sources and is related with government policies using “aid, bribes, sanctions”, and (3) Soft power which is associated with “attraction, agenda setting”, features “values, culture, policies, institutions” as sources of motivation and is related with government policies using “public diplomacy, bilateral and multilateral diplomacy” (Nye 2004: 18). Thus the term of “soft power” and its definition coined by Nye during several past decades has widely spread in political discourse. Focusing on one of the main characteristics of soft power: “getting others to want the outcomes you want” (Nye 2004: 4), Nye defines soft power as a power of attraction, which “co-opts people rather that coerces them” and “rests on the ability to shape the preferences of others” (Nye 2004: 4) and thus influences political outcomes. Soft power has high degree of independence and in some cases its direction of influence can
either coincide with governmental political goals and policy line or contradict/undermine them and even become a factor of deep changes in politics and social developments. According to Nye, if compared to two other kinds of power: military power and economic power, soft power works in different way – it engenders cooperation through “attraction to shared values and the justness and duty of contributing to the achievement of those values” (Nye 2004: 7) and therefore soft power should be taken into account while formulating policies. Nye notes that “The soft power that is becoming more important in the information age is in part a social and economic by-product rather than solely a result of official government action” (Nye 2004: 32). Soft power can “work” selectively: “Attraction does not always determine others’ preferences, but this gap between power measured as resources and power judged as the outcomes of behaviour is not unique to soft power. It occurs with all forms of power” (Nye 2004: 6). Resources of soft power have different sources: “In international politics, the resources that produce soft power arise in large part from the values an organization or country expresses in its culture, in the examples it sets by its internal practices and policies, and in the way it handles its relations with others” (Nye 2004: 8) and they depend significantly on governmental policies: “Government policies can reinforce or squander a country’s soft power” (Nye 2004: 14).

Similar approach based on threefold taxonomy in respect of power is used by Boulding (1989) who describes the nature of power as a social structure which can be described in three categories based on the consequences: destructive power, power of exchange and integrative power. According to Boulding (1989), one type of power may be predominant in some behaviours or organizations; however, generally the elements of each power are present. Threefold taxonomy approach is also used by Bonoma (1976) in description of interrelation between certain types of power-conflict dynamics. In this relation Bonoma (1976) outlines “three different prototypical power systems [...] the unilateral power system, in which a strong source imposes influence on a weak target; the mixed power system, in which partially equivalent interactants bargain to agreement or deadlock; and the bilateral power system, in which interactants are in unit relation and formulate joint policy programs” (Bonoma 1976: 499). Threefold taxonomy approach in used also by Wendt when he describes three kinds of macro-level systemic structures, “each based on the kind of roles that dominate the system” (Wendt 1999: 247); Hobbesian, Lockean, and Kantian. They are based, respectively, on such property as states viewing each other as enemies, rivals or friends as a fundamental determinant. According to Buzan (2004: 222), “The triumph of European power meant not only that a sharp and apparently permanent rise in the level of interaction (and thus density and interdependence) took place, but also that Western norms and values and institutions dominated the whole system,” using a mixture of coercion, copying and persuasion. Underlying forces influencing systemic changes and continuations on international level and related to both: the mode of influence and durability of effects are described by Buzan (2004: 103), who integrates insights of Wendt (1999: 247–50), Kratochwil’s (1989: 97), Hurd (1999) and March and Olsen (1998: 948–54) in his version of threefold taxonomy of those underlying forces: coercion, calculation and belief.

Overview of concepts of soft instruments suggests an approach which is useful for further research: (1) soft social instruments could be better suited for some circumstances, hard instruments could be more beneficial for others, (2) there is a possibility to engage in constructing hybrid constellations for accomplishment of specific goals (3) the process of EU security governance and sustaining stability on European level by non-coercive means which are associated with soft law and soft power, and which rely on shared values, can be also attributed to and captured by the concept of soft security, (4) soft instruments in the context of security governance are regarded by analysts as (a) being in opposition to coercive (hard) instruments in the framework of transformation and conflict management, (b) being in interplay/interrelation/interoperability with hard instruments, (c) being in interplay with coercive (hard) and economic instruments in the framework of influence enhancement.


The approach preferred by the European Union for security governance in its Neighbourhood is to proceed with European integration through legal harmonization, which translates into binding commitments by each EU Party to implement the acquis
One of the examples of joint projects based on such approach to regional security and stability is an initiative to create Energy Community as a response to the conflicts of the 1990s which, as it is stated in the website home page of Energy Community, “led to the disintegration of a unified energy system that stretched from the Adriatic to the Black and Aegean Seas” (Energy Community 2012 a: 1). Transforming EU power in this case into desirable external socio-economic and socio-cultural changes through intertwining security and economic goals with cultural aspects within the process of designing policies and implementing joint projects has been positively evaluated by the European Commission: “Energy Community is about investments, economic development, security of energy supply and social stability; but – more than this – the Energy Community is also about solidarity, mutual trust and peace. The very existence of the Energy Community, only ten years after the end of the Balkan conflict, is a success in itself, as it stands as the first common institutional project undertaken by the non-European Union countries of South East Europe” (European Commission 2011: 2).

EU policy targeted at creation and supporting of the Energy Community resulted in binding commitments by non-EU member Parties to incorporate relevant EU-originated *acquis communautaire*: “By extending the internal market for network energy beyond the boundaries of the European Union, the Energy Community carries forward the success story of European integration. Just as the European Union’s, the approach taken by the Energy Community is one of legal harmonization, which translates into binding commitments by each Party to implement the *acquis communautaire* as set out in the provisions of the Treaty and the measures adopted by the Ministerial Council of the Energy Community” (Energy Community 2012 b: 7). However in those fields where EU neighbours are not willing to accept this approach the EU is initiating cooperative projects acquainting with EU style of governance, spreading best practices, monitoring social and economic processes, encourages proactive reforms and shared problem-solving in the economic and social field, relying mainly on soft instruments and economic measures in order to prevent appearance and escalation of conflicts. Competence of finding solutions for “best fit” of “best practices” in the context of security governance becomes one of the major factors of achieving desired outcomes. Thus, EU combines transformational approach highlighted in dichotomist analysis framework and combinatory approach reflected in the analysis within threefold taxonomy based on interaction and congruence of soft, normative hard (relying on multilaterally acceptable legislation) and economic instruments.

Understanding by EU policy makers of the features associated with soft security and soft power has been revealed by analysis (Kavaliūnaitė 2011) of EU documentation containing notions of “soft security” and “soft power” which has shown the variety of terms in numerous EU cultural – linguistic contexts and their broad scope of descriptions. There is an overall shared understanding that the concepts of “soft security” and “soft power” are associated with sets of certain non-military social practices. One set of those practices is regarded as international policy issues and external instability management targets embedding certain risks and threats, which are supposed to be countervailed by “soft measures”. Another is viewed as particular set of instruments for countervailing, minimizing and elimination of those risks and threats. Function of “soft” (security or power) related instruments of international policies and management is attributed to certain non-military forms and patterns of social practices which also are described as an extensive list of examples.

As far as the scientific perceptions and findings related to soft security that have been highlighted in the previous sections are concerned, the overview of the concepts “soft security” and “soft power” in EU legislation in the framework of discourses of politicians who design EU external policy has to some extent confirmed some of the earlier described features of soft security in terms of attributing soft security with particular social practices, expanded a list of social practices attributed to soft security, and questioned ability of soft security to function as effective tool of security governance. The aggregated list of features associated with soft security instruments includes such social practices of non-military character as confidence-building measures, arms control development, reconstruction, long-term peace building, training in relation to conflict prevention/peace-keeping, reconciliation process, humanitarian assistance, good governance, human rights, joint exercises, best practices exchange, capacity-building, mutual learning, security research, peer reviews, cre-
Soft Security for Sustainable Development: Eastern Dimension of European Neighbourhood Policy

Angelė Čepėnaitė, Sigita Kavaliūnaitė

Soft security instruments are used in the framework of eastern dimension of European Neighbourhood Policy (ENP) and related projects for implementation of this EU initiative and function as a component of the process of joint management of those projects.

Either independent of under umbrella of NATO (presenting soft dimension of this organisation) could be mentioned: Cooperative Cyber Defence (CCD) COE, Estonia; Energy Security (ENSEC) COE, Lithuania; Nuclear Security COE, Lithuania; Explosive Ordnance Disposal (EOD) COE, Slovakia; Mountain Warfare (MW) COE, Slovenia; Human Intelligence (HUMINT) COE, Romania; BIPAI’s Romanian Clinical COE, Romania; Joint Chemical, Biological, Radiation and Nuclear Defence (JCBRN Defence) COE, Check Republic; Military Medical (MILMED) COE, Hungary; Crisis Management for Disaster Response (CMDR) COE, Bulgaria; Military Police (MP) COE, Poland. Lithuania and Romania stand out in this row as states having established two security issues oriented COEs each. Effective functioning of those centers would result in spill over of positive effects and elevating a level of professional response to regional security risks and threats.

Taking into account widening of the concept of sustainable development “from a near exclusive concern with the environmental predicament, to an integrated conception of environmental, economic and social determinants of the human future, in which the former is by no means dominant” (Vogler 2007: 430) and referring to sustainable development as “preventing of too much damage to the earth and to humans for contemporary and future generations” (De Tombe 2006: 69) it can be indicated that enhanced EU approach to regional security is closely related to the process captured by the concept “sustainable development”. Through establishment of a social interactive process based on shared values in the spirit of acquis communautaire for joint regional security gain, the EU is simultaneously transferring some elements of governance which have been developed by the EU institutions with focus on sustainable development determinants.


The need to share and develop, as well as to increase a level of security related competences of professionals within new members (after 2004 and further enlargements) in both EU and/or NATO contexts in order to achieve coherence with competences and values with other members’ professionals within transatlantic community, a number of security competence related institutions or specific structures within existing institutions have been established. As one of the examples of such emergence of new institutions, a number of security oriented centres of excellence (COE)
Taking into account theoretical insights provided by Buzan (2004) in respect of types of interstate society, as well as his interpretation of the concepts of “pluralism and “solidarism”, as assumptions for an overview of EU policies in respect of the region of concern, the following logics for separating two modes of EU approaches: (1) proactive: transformational or enhanced approach and (2) reactive: preventive or limited approach to regional security is suggested:

The EU has reached the development stage featured in higher or lower degree by cooperative, convergence and confederative types presenting thick layer of institutions, norms and shared liberal values that constitute comparatively high level of solidarism which ensures comparatively high level of stability and security. The regional security dimension of its external policies is focused on neighbouring states that feature coexistence and partly cooperative (mainly its pluralist side) types of interstate society presenting thinner layer institutions and norms with weak or without sufficient adherence to shared liberal values. From the point of view of the EU politicians, the latter is seen as more vulnerable to changes of circumstance and less stable than international society of the EU itself. As a long-term solution for enhancing regional security and stability within its neighbouring states a number of sets of various EU external policies and joint projects are used to encourage and assist those states to gradually transform their social and economic relationships in a variety of ways: innovative, imitative, continuative or restorative (Šaulauskas 2000) as well as (in the long run) their socio-cultural contexts and collective identities enabling movement towards convergence type based on shared liberal values in the spirit of acquis communautaire since this model is seen as an advanced option in stability, security and economic terms, as it has been proved by EU historic development since its interception. Trying to avoid unnecessary confrontation, the EU, according to this logics, should be keen to rely mainly on non-coercive means featuring attractiveness of the projects’ offer suggested to the EU partner state(s) leading to establishment of a social interactive process of the pursue of joint regional security gain. The coercive instruments (mainly in the form of conditionality and binding legislation) are seen as means playing complimentary role and introduced on the basis of mutual consent.

EU initiative illustrating above mentioned logics is Eastern Partnership within European Neighbourhood Policy which is described in the following way: “What happens in the countries in Eastern Europe and the Southern Caucasus affects the European Union. Successive EU enlargements have brought these countries closer to the EU and their security, stability and prosperity increasingly impact on the EU’s. The potential these countries offer for diversifying the EU’s energy supplies is one example. All these countries, to varying degrees, are carrying out political, social and economic reforms, and have stated their wish to come closer to the EU. The conflict in Georgia in August 2008 confirmed how vulnerable they can be, and how the EU’s security begins outside our borders. The European Commission put forward concrete ideas for enhancing our relationship with: Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine. This would imply new association agreements including deep and comprehensive free trade agreements with those countries willing and able to enter into a deeper engagement and gradual integration in the EU economy. It would also allow for easier travel to the EU through gradual visa liberalisation, accompanied by measures to tackle illegal immigration. The Partnership will also promote democracy and good governance, strengthen energy security, promote sector reform and environment protection, encourage people to people contacts, support economic and social development and offer additional funding for projects to reduce socio-economic imbalances and increase stability” (European External Action Service 2012).

The objective of the ENP which was developed in 2004 is “to share the benefits of the EU’s 2004 enlargement with neighbouring countries in strengthening stability, security and well-being for all concerned. It is designed to prevent the emergence of new dividing lines between the enlarged EU and its neighbours and to offer them the chance to participate in various EU activities, through greater political, security, economic and cultural co-operation. [...] The privileged relationship with neighbours will build on mutual commitment to common values principally within the fields of the rule of law, good governance, the respect for human rights, including minority rights, the promotion of good neighbourly relations, and the principles of market economy and sustainable development” (European Commission 2004: 3). Regarding the Common Foreign and Security Policy (CFSP) and European Security and Defence Policy (ESDP) as security governance instruments the “EU
and partner countries should also work together on effective multilateralism, so as to reinforce global governance. Strengthen coordination in combating security threats and address related development issues. Improved co-ordination within the established political dialogue formats should be explored, as well as the possible involvement of partner countries in aspects of CFSP and ESDP, conflict prevention, crisis management, the exchange of information, joint training and exercises and possible participation in EU-led crisis management operations. Another important priority will be the further development of a shared responsibility between the EU and partners for security and stability in the neighbourhood region (European Commission 2004: 13). The ENP’s initially bilateral format was further enriched with regional and multilateral co-operation initiatives, the EaP being one of them.

According to European Commission, the “EU and Russia have decided to develop their strategic partnership through the creation of four common spaces as agreed at the St Petersburg Summit in May 2003. Russia and the enlarged European Union form part of each other’s neighbourhood. It is in our common interest to draw on elements of the ENP to enrich work on the common spaces, notably in the areas of cross-border and sub-regional co-operation. The EU and Russia need to work together, as neighbours, on common concerns” (European Commission 2004: 6). The long term four “common spaces” were created in the framework of the Partnership and Cooperation Agreement and on the basis of common values and shared interests. These cover the following issues: (1) Common Economic Space, covering economic issues and the environment; (2) Common Space of Freedom, Security and Justice; (3) Common Space of External Security, including crisis management and non-proliferation; (4) Common Space of Research and Education, including cultural aspects.

In addition, the EaP states are engaged in a number of other EU initiatives. Though current European Security and Defence Policy aims to strengthen the EU’s external ability to act through the development of civilian and military capabilities, within Eastern Dimension military capabilities have not been applied directly. Two joint projects in the form of civilian missions in Moldova/ Ukraine (The EU Border Assistance Mission to the Republic of Moldova and Ukraine, started in 2005) and Georgia (The EU Monitoring Mission in Georgia, started in 2008) are being carried out in this policy context (European External Action Service 2011). The first mission focuses on prevention of smuggling, trafficking, and customs fraud by the job training and advice by professionals of border management services in EU Member States to Moldovan and Ukrainian officials providing EU support for capacity building for border management, including customs, on the Moldova-Ukraine border. The second is an unarmed and non-executive civilian ceasefire (after 2008 South Ossetia war) EU monitoring mission for stabilisation, normalisation and confidence building, as well as reporting to the EU in order to inform European policy-making and thus contribute to the future EU engagement in the region. In addition, Moldova and Ukraine are members of Energy Community, while Georgia has an observer status in this organisation.

Another important direction of using soft security instruments is a broadened and deepened scope of EU participation in political forums for regional intergovernmental cooperation such as the Council of the Baltic Sea States, Organisation of Security and Cooperation in Europe and others. However, existing socio-cultural barriers and national prerogatives result in higher or lower levels of motivation to engage in the cooperative projects suggested by the EU. As Sergunin (2010) points out, “Although Russia has embraced a growing number of cooperative projects with the EU, there have also been some limitations restricting both Russia’s engagement and the success of different projects. These include residual mistrust and prejudice, bureaucratic resistance in both Brussels and Moscow, authoritarian trends in Russia’s domestic policies, uneasy relations between “old” and “new” EU members, conflicting interests in the post-Soviet space and (as mentioned) the lack of an updated and revised Partnership & Cooperation Agreement”. Moscow reacted, according to Sergunin (2010) “to the EaP with both caution and scepticism, because the Russian leadership was not sure about its real goals: is the EU serious about making its new neighbourhood a stable and safe place or is it some kind of geopolitical drive to undermine Russia’s positions in the area? Moscow is particularly sensitive about the EaP programme because Russia has fundamental interests in the region that range from strategic and political (confederation with Belarus, military-technical cooperation with Belarus and Armenia, military conflict with Georgia, support
of the independence of Abkhazia and South Ossetia) to economic (investments, trade, energy supply, etc.) issues. It seems that the lack of a sound Russian strategy towards the EaP is one of the sources of misunderstanding in EU-Russia bilateral cooperation, a misunderstanding that sometimes contributes to derailing the Brussels-Moscow dialogue. As a result of this, both EU and Russian policies often give the impression of muddling on rather than a sound and forward-looking strategy”.

As a result of various overviewed above EU initiated policies and related projects which are each other complementing and reinforcing within EU and Eastern Dimension of European Neighbourhood Policy related states the two emerging subsystems can be differentiated: integration subsystem between the EU and those states which are more open to EU initiatives and its transformational approach, and sub-system with those states that are reserved (e.g. RF and Belarus) in respect of EU strategies. The sub-system which is developing on the basis of EU enhanced transformational approach has prospects of gradually turning into quasi organisation suitable for application of insights and methods developed by governance and organizational theories focussing on competence enhancement, such as Responsive/ Good Governance concept (OECD 2005; United Nations 2005), strategic approach to Human Resource Development developed and promoted by Garavan et al. (1999), Buyens et al. (2001), Hockey et al. (2005), Luoma (2000), Štuzgdiñiene (2008) and others, and Organizational Theory (Schout 2009) with focus on organizational learning processes and change through the establishment of a learning organization. This gradual formation of such quasi organisation includes most open and expressing interest in deeper European integration states: Moldova, Ukraine and Georgia. Additional privileges for participants from those countries in regional security governance, focused on competence development using different formats, could lead to higher level of regional security as precondition for sustainable development. They could include: privileged access of particular EU partner’s citizens to educational programmes and training schemes focusing on EU studies and regional security issues (e.g. energy security, social stability and others) combined with acquiring project management, team building skills as well as qualities of effective teamwork; privilege of participation in the joint projects for graduates from mentioned above educational programmes; privilege of participation in the joint policy making frameworks featuring possible extension of some of EU inherent modern forms of security governance, and others.

Conclusions

Suggested instrumental approach to soft security based on defining soft security instruments as sets of various purposefully organised social practices focusing and relying on sharing, congruence and development of values and competences of regional security governance initiators and participants revealed capacity of soft security instruments to contribute to both regional security and sustainable development as well as to foster the European integration in EU neighbourhood. Raising effectiveness of soft security instruments in the process of joint project management in the region of concern would imply considering special treatment of most open and expressing interest in deeper integration with the EU states addressed by Eastern Dimension of European Neighbourhood Policy and proposing them a number of privileges for their representatives in the form of opportunities to develop their security governance related competences through participation in specific educational programmes and training schemes, EU initiated joint cooperative project management and relevant joint security policy formation on gradually expanding scale.

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1. Introduction

The United States of America and the United Kingdom with the assistance of other NATO and non-NATO states initiated an international counter terrorism campaign the War on Terror (also known as the Global War on Terror (GWOT)). However, after more than ten years the War on Terror is still in the active stage. The pivotal issue regarding counter-terrorism actions in Afghanistan, considering how much money and energy spent on them, is whether such actions are effective or not. Dynamic system simulation approach was used to investigate interactions between counter-terrorism strategies used in Afghanistan (in the context of coalition strength) and the effectiveness of these strategies (in the context of terrorist strength). Data form different sources over a ten-year-period was used for analysis (2000-2010). It was found dynamic relation between recruitment rate of terrorist and coalition manpower that depends on time adjustments. However, further research is needed to get more precise results in finding causal loops in counter-terrorism system, thus this study should be evaluated only as a framework in further similar researches.

Abstract. The United States of America and the United Kingdom with the assistance of other NATO and non-NATO states initiated an international counter terrorism campaign the War on Terror (also known as the Global War on Terror (GWOT)). However, after more than ten years the War on Terror is still in the active stage. The pivotal issue regarding counter-terrorism actions in Afghanistan, considering how much money and energy spent on them, is whether such actions are effective or not. Dynamic system simulation approach was used to investigate interactions between counter-terrorism strategies used in Afghanistan (in the context of coalition strength) and the effectiveness of these strategies (in the context of terrorist strength). Data form different sources over a ten-year-period was used for analysis (2000-2010). It was found dynamic relation between recruitment rate of terrorist and coalition manpower that depends on time adjustments. However, further research is needed to get more precise results in finding causal loops in counter-terrorism system, thus this study should be evaluated only as a framework in further similar researches.

Keywords: Security, effectiveness, counter-terrorism, Afghanistan, dynamic system simulation.


JEL Classifications: N7, F5, F6

**Statement of the problem.** The main problem of counterterrorism activities in Afghanistan is whether such actions have been effective or not. Both huge amount of money and human resources have been spent in Global War on Terror, hence it is important to know whether we are in the right direction in this battle or not. Furthermore, we have a right to know actual course of actions of counter-terrorism because we are those who pay for this “war” and we are those whose family members and friends are dying in this fight.

**Rationale.** Growing expenditures of counter-terrorism actions and endless deaths among coalition forces have become a major issue. Vast amount of money have been spent developing counter-terrorism strategies. Are these expenses cost-effective, or maybe these billions of dollars should have been spent, for example, developing social integration programs for Muslims or for infrastructure programmes in developing countries such as Afghanistan and Iraq. Creating reliable effectiveness measurement system might help policy makers in solving such dilemmas. Furthermore, this study is significant because today governments are implementing contradictory anti-terrorism efforts not concerning about their utility and urgency. It is necessary to evaluate every anti-terrorism strategy and impact of that strategy before initiating it, in order to avoid mistakes. Regrettably, as Biddle (2004) notes, for all the significant research that judges military effectiveness, assessments of anti-terrorism strategies remain superficial. Differently from conventional army strategy, there are no robust figures which could be estimated. So how it is possible in reliable way to evaluate the effectiveness of counterterrorism efforts? Lum et al. (2006) admit:

“There is almost a complete absence of high quality scientific evaluation evidence on counter-terrorism strategies” and according to Morag (2005):

“A concrete methodology for studying a state’s ability to cope with wide-scale terrorism remains to be developed.”

Consequently, demonstrable, measurable, effective progress against terrorism is the desired goal of all countries involved in the Global War on Terror. The U.S.A. and the U.K. are particularly interested in cost-effectiveness of these enormous costs on fighting the terrorism.

This article will provide a method of measuring counter-terrorism effectiveness. However, further researches on the subject should be done to find out other applicable methods of assessing counterterrorism.

**Objectives of study.** The purpose of this article is to assess the effectiveness of counter-terrorism efforts in Afghanistan. The main question which needs to be answered is “how does counter-terrorism strategies effect terrorism?” Therefore, this study investigates the cause and effects using System Dynamics approach. The article focuses on causes of insurgent strength which are mainly associated with delays and disruptions in countering terrorism.

**Research question 1:** What are the root-causes of implementing the particular counter-terrorism strategy in Afghanistan?

**Research question 2:** How does coalition strength in one side affect the number of insurgents on another side?

**Research method.** Advanced dynamic simulation model was adopted in this study in order to better understand the interactions between particular counter-terrorism strategy and terrorism activities.

**Assumptions and limitations.** Evaluation of success or failure of counter terrorism can be indicated in terms of direct or indirect indicators. A main problem of researchers as well as governments seeking to examine effectiveness in counter-terrorism strategies is overconfidence on quantitative data such as terrorism acts, casualties, etc., especially on indicators which may relate with advancement but not explicitly assess the effectiveness, such as the quantity of money spent on counter-terror strategies. As terrorism consists of numerous elements and its activity depends on both internal (micro) and external (macro) factors, sometimes it is difficult to predict which particular casual made a significant effect on the increase or decrease of terrorism activities. Furthermore, because of terrorist organizations and government actions secrecy there is a limit available reliable data, consequently, this research cannot reflect precise results, just main trends and rough outcomes.

2. **Measurement of the effectiveness**

The governments, international governmental and
non-governmental organizations and, certainly, military are seized with understanding the effectiveness of counter-insurgency operations in areas like Afghanistan. International community is desperately looking for new methods to raise effectiveness. This is because there is a huge public pressure to curb the rising spending on these high-priced operations, besides, the noble intention to create everlasting peace and security in conflict zones such as Afghanistan and Iraq have been completed only partially, they failed to fulfill their promises made to the society of the world.

The ability of international and national institutions to promote the sustainable peace and security mostly relies on a capability to act constructively and collectively—to do the right things, at the right times, in the right ways, using the right means—and to measure in the objective way the effectiveness of complex operations (Meharg 2009).

It is understandable that an armed forces is effective to the extent that it uses its capabilities to destroy the hostile military while keeping save its own units—holding situational (role as attacker or defender) and environmental factors (natural barriers such as mountains, forests, or the weather), force size, and weapon technology constant (Biddle 2004; Dupuy 1992). Consequently, three outcomes could be presented: firstly, military effectiveness is an inherently dyadic concept, that is, it can only be measured in relationship to the adversary a military is fighting (Pollack 2002). Secondly, military effectiveness is associated to, but conceptually distinct from victory and defeat on the battleground. Armed forces might be acting very effectively but still may fail to accomplish missions, operations, or entire campaigns. Measurement of military effectiveness has to focus on the losses an army incurs and the losses it inflicts on its adversary in the course of action (Millet et al. 1988). And finally, an effective employment of military capabilities is the key factor of military effectiveness. While the size of armed forces, situational, environmental, and technological aspects may make a huge impact on operation results, an effective military utilizes these conditions for effectively employing its forces in order to destroy its enemy (Brooks 2006).

Effectiveness is the term mostly used to refer to the measurement of the goal attainment, therefore interconnecting the final result of an activity to its primary aims. Put another way, an operation would be effective if the end results are the same as the established goals. Thus, assessing the effectiveness of an operation, first of all, requires clear, explicit and quantified goals (Sherman 2009). Various subjects could be evaluated against effectiveness, such as time, materiel, people, resources, and money. It could be measured in terms of outputs, outcomes, effectivity, goal attainment, cost-effectiveness and macro impact (Mosselman and Prince 2004). Effectiveness encompasses not just the extent to which an operation goal has been accomplished, but also the non-intended and non-planned outcomes of such actions.

The concept effectiveness is omnipresent in humanitarian aid, international relations and politics, defense and security, and though it has various specific implications as defined above, it continuous to remain ambiguous, furthermore there is no a common perception of its effect related to international full-spectrum operations. Fundamental questions remain whether the multinational strategic counter-terrorism campaigns are promoting or exacerbate living conditions in places like Iraq, Somali, and Afghanistan. Some scientists suggest that interventions can actually do more harm than good and cause unintended negative consequences among conflict-affected populations (Aoi et al. 2007).

The description of effectiveness may differ between various disciplines of science. A conventional feature of these definitions is that effectiveness is perceived as an alteration resulting from some actions, hinted at looking for effective means to achieve the objects set. Metrics of effectiveness are defined as the output or end result of this process (Konu et al. 2009).

In public administration sector, effectiveness is regarded as an element of institutional productivity assessment. It relates to the competency of service actions or complete service systems to generate various desired outcomes that can be related to positive changes in client well-being. Effectiveness also includes adequacy, the ratio of service provision coverage to service needs, and targetability, which measures how the services reach those who need them. The substantial task of service providers is not only the quality of service and the satisfaction of a client, but also cost awareness of services. High quality service does not necessarily mean that costs will rise or decrease. It may also mean a better cost–quality relationship or, in other words, that the relative utility of the service from the perspective of service recipient improves (Si-omen et al. 2009). In management, effectiveness re-
Erikas Kaukas

Security Effectiveness and Counter Terrorism Efforts: Case of Afghanistan

There is a common consensus in economic science that cost-effectiveness analysis (CEA) and cost–benefit analysis (CBA) are two core methods which could be used to measure the effectiveness of an activity, program or strategy. A third method, cost-utility analysis, is often used as an extension of CEA. All approaches presuppose a well specified intervention, e.g. military operation, and a no-intervention condition, or control group, against which the intervention is compared. These three methods are broadly applied in health care industry; however they with some modifications could be successfully transferred in other industries such as defense and security. Generally, an intervention uses human, physical, or financial inputs to improve economic, social, political or military outcomes. The intervention may be a small scale program or a large scale policy shift (McEwan 2012).

The substantial distinction between CBA and CEA lies in the assessment of the incremental results of an intervention as incremental utility or as incremental effects. In CBA, the incremental benefits of an intervention are the monetary gains in social surplus created by the intervention (Boardman et al. 2010). Practically, CBA of investments in human capital commonly evaluate utilities as the supplementary incomes and tax revenues gained by participants and governments, respectively. In other conditions, utilities may be assessed as averted costs, i.e. monetary costs to society averted as an outcome of the intervention, such as decreased criminality.

In CEA, incremental outcomes are expressed in non-monetary measures. In military operations, the outcomes may comprise quantity units such as number of troops deployed, casualties, completion of missions, or overall insurgents killed; and quality measures such as civil-military cooperation, development of democracy in a conflict region, strategic achievements, or social programs, etc.

A cost-utility ratio \( C/U \) reflects the incremental cost per unit of incremental utility (McEwan 2012). Cost-utility analysis could be successfully applied in counter insurgency operations, where interventions would have the dual objectives of reducing terrorism acts and also improving the situation in a conflict zone year by year.

Measuring the effectiveness of counter-terrorism is challenged by political context. From a political perspective, it is a reasonably simple task to estimate short term progress (and regression) of tangible complex operations (Center on International Cooperation 2006). The doctrines of military and non-military operations (maintaining security that preserves lives, providing humanitarian aid, developing the stability and security in the conflict zones) are often distilled into absolute, binary terms by the media and politicians seeking the short term output headline (Meharg 2009). Lives are being saved, or they are not. Stability is either present, or it is not. Humanitarian aid is either being provided, or it is not. However, assessing intangible intervention effectiveness from a long term perspective is more complicated and has a tendency to be over-simplified in the similar manner that short term results are. Behavioral and attitudinal changes in recipient populations occur over the long term (Meharg 2009); nonetheless, these are complicated to determine and even more complicated to relate to specific operational results. Majority of governments and armed forces tend to claim early success in post conflict peace-keeping operations only to be accepted later by external actors, institutions, scientists, and international organizations. Lacking suitable assessment models, organizations like UN, NATO and EU have been placed in discreditable positions in which the member countries was induced to disavow earlier claims of successful progress and acknowledge many far-flung failures. This inaccurate communication of inaccurate information, especially concerning the reality of campaign failure, has had a significant negative effect on campaigns’ participants (soldiers, volunteers, etc.) moral and public opinion in places like Iraq and Afghanistan.

International joint operations are progressively multi-functional, inducing stakeholders to provide services across areas through a wide range of tasks and actions, embracing security, democratic governance and participation, humanitarian assistance and social well-being, economic stabilization and infrastructure, and justice and reconciliation (Meharg 2009). The desirability of accomplishing everlasting peace and security in post-conflict countries is compared against the feasibility of reaching such ambitious goals. Achieving “just enough” in an operation, or what is now referred to as “good enough” operations, is weighted against reaching the most desirable results: everlasting peace and security. Desirable results are extremely costly actions for an international community with increasing
economic pressures, and it is not yet certain why such expensive operations (in both lives and money) has not yet accomplished its established goals.

It is impossible to evaluate all factors of military operation actions as not all results, impacts, and effects can be established during the planning phases of an operation. There is common understanding that it is not likely to be able to assess the factual or real longer term effectiveness of actions in multi-functional operations because of the impotence to measure the entire campaign, resulting in a readjustment towards preparedness and capability, rather than effectiveness.

There are no universal metrics, benchmarks or indicators between stakeholders, and each actor uses a very incomparable set of techniques and models to evaluate what is important to them.

David Galula (1964) in his prominent study Counterinsurgency Warfare: Theory and Practice argues that “political organization at the grass roots” an important metric. His personal account of pacification in Algeria allowed him to propose more explicit indicators – how often his soldiers fired their weapons, how safely he could move from post to post, how accurate was his population census, and how often mayors shared information with him on rebel activities. Nonetheless, measuring the degree of public support, as well as the rebels’ dominance, remained doubtful. How, in instance, could the counter-terrorism agencies objectively assess political coercion? For armed forces personnel trained to rely upon indicators of terrain captured and enemy troops killed, Galula’s approach was not altogether satisfying.

South East Asia expert Bernard B. Fall (1994) in similar way emphasized the complication of assessing effectiveness in an unconventional environment. Fall (1994) described victory in insurgency warfare as “the people and the army … emerging on the same side of the fight”. He understood, though, that measuring success toward such victory needs appropriate metrics. Fall stated that trends in levels of security and population control could be plotted objectively on a map, given accurate reporting of assassinations, insurgent raids, and Vietcong taxation (in the case of Vietnam war). Evaluating “administrative control”, however difficult, if done correctly, provided armed forces high-rank commanders with the most explicit measurement of the effectiveness of their activities.

However, Valeriano and Bohannan (2006) suggested, that measurement of a local military’s strengths and weaknesses is more challenging, since it much more depends on the assessor’s perception of the specifications for successful counter-insurgency war. The authors’ questions for evaluating intelligence services, popular attitudes, and governmental agencies showed that measuring counter-terrorism effectiveness was difficult mission.

The Department of the Army’s Field Manual (FM) 31-16 (1967) Counterguerrilla Operations, though thorough, proposed limited framework on how to measure the effectiveness in an unconventional warfare. The manual recommended staffs to evaluate the success of the rebels, their connectivity to the local population, and the effectiveness of their communications and intelligence networks. Besides, the doctrine advised that commanders have to evaluate the “effectiveness of measures to deny the guerrilla access to resources required by him”.

Counter-terrorism manuals focused at the difficulty of measuring effectiveness and success in an unconventional environment. How was a commander to know if his troops had succeeded in forcing the terrorists to end their terrorism activities or just suspend them until the conventional danger had passed? If terrain has no tactical or operational value, how could commanders keep assess of their success against the terrorists? Lastly, how was a commander to measure the guerrillas’ influence on the local population? These are questions which manuals have to answer.

**Effectiveness versus efficiency.** Efficiency and effectiveness are essential concepts in evaluating and analyzing the success of complex operations such as Global War on Terror. Although it is evident that evaluating and analyzing the success is vital phase of any operation, military commanders rarely comprehend the real meaning of efficiency and effectiveness.

An operation can be efficiently conducted without being effective. Efficiency is not assessment of success in the battlefield; it is rather an assessment of operational excellence or military capability. Thus, basically, it is only concerned with reducing costs (in broad sense) and increasing operational capabilities (Mouzas 2006). Effectiveness, in turn, is mostly focused on military’s ability successfully perform the whole operation, i.e. to achieve their intended goals.

The difference of both variables (effectiveness and efficiency) could be shown on the simplistic framework
(Figure 1). Where, horizontal line denotes efficiency and the vertical line represent effectiveness. Here, the most efficient operation would be with the lowest cost, i.e. spent as little as possible money, human and technical resources, time and energy; subsequently, the most effective operation would be with the highest rate of performance, i.e. all goals are achieved. Additionally, framework is divided into four quadrants named with four letters. Each letter represents the status of operation: 
A – uncompleted with high cost; 
B – uncompleted with low cost; 
C – completed with high cost; 
D – completed with low cost. 

Here it is worthy to mention that in everyday language, media and even in scientific literature the term effectiveness is, usually, used in broad sense, i.e. efficiency is used as an already integral part of effectiveness; according to this statement the effectiveness and efficiency framework could be explained in slightly different way: the letters would then represent the following statuses of operation: 
A – very ineffective; 
B – ineffective; 
C – effective; 
D – very effective.

![Fig.1. The framework of effectiveness and efficiency](Source: Mouzas (2006))

3. The dynamic system of the effectiveness of counter terrorism

A victory over terrorism could be seen as having been achieved when the committing of terrorist acts has stopped sustainably. According to Quaker Council for European Affairs (2007) a victory over terrorism would replace a culture of fear with a culture of respect, engagement, vigilance and solidarity. Effective counter-terrorist policies would ultimately lead to the cessation of terrorist, state and inter-ethnic violence.

Effectiveness means the capability of producing an effect, and is most frequently used in connection with the degree to which something is capable of producing a specific, desired effect.

Measurement is the objective representation of objects, processes, and phenomenon (Finkelstein and Leaning 1984). Measurement captures information about these systems through their attributes (also known as characteristics, features, or properties). These attributes can be either directly or indirectly observable (Cropley 1998). Although objective, an important distinction is that measurement is also an abstraction. Measurement begins by identifying the system of interest and the attributes to be used in defining the system as depicted in Figure 2.
Once the attributes are identified, observations or data collection, on the system attributes can take place. Finally, measurement, indicator, or metric are need to be evaluated. Referring back to Figure 2, scales can be a source of error since a measure will always contain any error inherent in the construction of the scale (Potter 2000).

**Measurement of the effectiveness of the system.** As it is discussed above, effectiveness means the capability of producing an effect, and is most frequently used in connection with the degree to which something is capable of producing a specific, desired effect.

Measurement is applied to a system within a specific context (Morse and Kimball 2003). Before measurement planning can begin, however, a framework for conceptualizing measures is needed.

A measure of effectiveness (MOE) concerns how well a system tracks against its purpose or normative behaviour (Sproles 1997). In other words, a MOE determines if the right things are being done.

Useful construct for conceptualizing a system is an input-output model (Figure 3). Inputs can consist of either controllable or uncontrollable factor. These inputs enter the system and are ‘transformed’ into outputs. The input-output model is quantifying the impact of an input, which is fundamental to understanding and control of any system (Kaydos 1999; Neely et al. 1997).

A core component of the input–output frame is defining system boundaries. The boundaries of a system are where attributes of the system interact with attributes outside the system. Visualising a network of linked input-output systems, where outputs of one system are the inputs of others, could be very helpful in defining boundaries of system.

The main issue in understanding which inputs link to which outcomes is establishing and connecting the cause-effect linkages between the strategic, operational, and tactical levels as well as the impact of inputs and environmental factors on each of these levels (Ka-
plan and Norton 1996; Sink 1985).

The cause-effect interactions can be problematic to identify because the output of one system may be the input of another system and some of the systems may be hidden or inaccessible (Leonard 2004). Additionally, there may be a dynamic delay between a system input and when the impact of that input is seen. Further, for systems in dynamic environments, the cause-effect relationships can change over time (Kaplan and Norton 1996).

Obviously, counter-terrorism is very sophisticated system with huge amount of inputs and with different outputs. Therefore, first of all, it is necessary to define the boundaries of this particular system, after that to define attributes of this system and to measure them, and, finally, to evaluate the effectiveness of counter-terrorism efforts in fighting terrorism by using results of measurement. Properly constructed model based on this representation can then be used not only for assessment but also for forecasting the behaviour of the system.

4. Methodology

Purpose of study. The objective of this research is to assess the effectiveness of counter-terrorism efforts in Afghanistan using theoretically-based, but empirically usable approach. To achieve this goal required the following new contributions.

1. Define the system and its purpose.
2. Define elements (subsystems) of the system.
3. Define the model.
4. Define attributes of the system.
5. Define measures of the attributes.
6. Measure the system.
7. Define the state of the system.
8. Create the model using dynamic simulation program.
9. Analyse the model.

Choice of the research method. The selection of the research method gives possibility scientifically to answer the research questions in the most suitable approach – within the given limits of time, budget and skills (Ghauri and Gronhaug 2002). The availability of few suitable research methods was assessed, and it was decided to choose System Dynamics as the modelling and simulation paradigm in this study. The contributors that mainly had impact on the choice of simulation are the following:

1. Possibility to access to statistical data.
2. Insights from the literature review.
3. Almost complete absent of empirical studies in measuring effectiveness of counter-terrorism.

System Dynamics proposes to explicitly investigate how feedback loops affect the system behaviour. Specifically, a System Dynamics analysis can be described as a process that involves the following steps: (1) Development of an understanding of the system based on a closed-loop system approach; (2) capturing and modeling the feedback structures in the system by using causal diagrams; and (3) development of a simulation model based on stock and flow diagrams, and mathematical equations.

Data collection. To analyse the counter-terrorism system and its effectiveness only secondary data were used. Data were collected using different sources. The suitability of different sources were assessed, and it was chosen the source which provided the most reliable and comprehensive data. The reliability of source was maximized by gathering data from governmental databases. However, not all data was possible to find using governmental data bases, therefore over sources were used. Data over a ten-year-period was used for analysis (2000-2010).

Analysing civilian casualties in Afghanistan it was used even five different sources: The UN Assistance Mission in Afghanistan (UNAMA); The Afghan Independent Human Rights Commission (AIHRC); The Afghanistan Rights Monitor (ARM); Human Rights Watch; and Professor Marc W. Herold’s insights. All of them provided different numbers; e.g. civilian casualties’ interval was between 11,443 and 14,240 civilian deaths.

It was used main three sources to collect statistical data of terrorism acts and number of terrorists: Global Terrorism Database (GTD), Worldwide Incidents Tracking System (WITS is the U.S. National Counterterrorism Center’s database of terrorist incidents) and The Violent Extremism Knowledge Base (ISVG). Finally, U.S. Homeland Department, NATO, ISAF sites were used to gather data of coalition troop number on the ground in Afghanistan.

5. Analysis of results

It was used Powersim Studio software package to build advanced dynamic simulation model of counter-terrorism system.
Simulation was used to better understand the interactions between the number of insurgents or terrorism acts and the strength of coalition troops. Counter-terrorism strategies often experience international pressure in using overestimated strength of military to counter much smaller units of insurgency (i.e. using military power non-effectively). The first step in solving this problem is to build a model that would explain the relevant interactions. Roughly speaking, counter-terrorism effectiveness consists of two main components increasing or decreasing the military strength to match an effective or desired level of military and keeping number of troops high enough to cover what decision-makers expect military demand will be in future. To have strategic advantage and to be safe, decision-makers keep several times as many soldiers in Afghanistan as they believe will be needed to counter terrorism.

Most often the assumptions about future military demand are based on the current rate of terrorism that includes number of terrorists and number of terrorism acts committed by them. The current terrorism rate constitutes the real demand the coalition forces faces. The strategy formulating the expected military demand is simple. When the beliefs about future counter-insurgency need change, this affects the desired strength of military and the rate at which policy-makers recruit troops. The process described above suitable for measuring the recruitment rate of insurgents as well.

**Causal loop diagram.** The causal loop diagram shows the feedback processes that control the insurgents manpower (strength) and coalition manpower (strength). The diagram contains two reinforcing and two balancing feedback loops (Figure 4).

**B1** is balancing (or negative) feedback loop depicting the causal relationship between insurgent manpower and insurgent recruitment rate. An increase in insurgent manpower will reduce insurgent recruitment rate.

**B2** is another balancing loop that shows the relationship between coalition manpower and coalition recruitment rate. An increase in the coalition manpower leads to decrease of coalition recruitment rate.

**R1** is a reinforcement (positive) feedback loop depicting the causal relationships among insurgent casualties, insurgent recruitment, insurgent manpower, coalition recruitment, coalition manpower and coalition security operations. An increase in the insurgent casualties leads to an increase in insurgent recruit-

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**Fig. 4. Causal loop diagram**

*Source: prepared by author*
ment to make up for the shortfall. The higher insurgent strength, the greater the coalition recruitment rate which, in turn, increase coalition manpower. The growth in coalition manpower, increase the number of counter-terrorism operations which leads to higher rate of insurgent casualties rate.

R2 is another reinforcing loop that shows the direct causal relationships among insurgent manpower, terrorism acts and coalition recruitment rate. An increase in insurgent manpower leads to an increase in the rate of terror acts; more terror acts require more coalition troops be recruited to handle an increased number of terror acts.

Model. As it could be seen from the model (Figure 5), the number of insurgents and the strength of coalition represent an accumulation of fighters, in our case insurgents and troops. The number of insurgents and the number of military strength must be increased and decreased in some way. The recruitment is a flow of fighters that adds to the number of insurgents and coalition strength, while casualties drain both.

The number of insurgents and the strength of coalition represent an accumulation of fighters, in our case insurgents and troops. The number of insurgents and the number of military strength must be increased and decreased in some way. The recruitment is a flow of fighters that adds to the number of insurgents and coalition strength, while casualties drain both.
The recruitment depends on several factors, including the difference between the actual strength of insurgency (looking from insurgency perspectives) or coalition (looking from counter-insurgency perspectives) and the desired strength. Since the recruitment flow rate dependent on the number of fighters, information link is created that shows this relationship.

To represent the difference between actual strength and desired strength in the recruitment equation (both insurgents and coalition), new variable is needed. Desired strength is not an accumulation of insurgency or coalition strength, but rather a value that is determined by decision-makers based on the current strength.

The third element of recruitment is the time it takes to make political decision in counter-terrorism case, or to prepare new insurgents in insurgency case. The time factor represents a delay in the system because in real situation, recruitment cannot instantly increase the strength of fighters. It takes time to make a decision, to train fighters and even physically transport them into the war theatre. In insurgency case, one-third of the discrepancy between actual and desired insurgency strength is corrected each month. Therefore, when the desired level of insurgency changes, it actually takes three months for the actual strength to change accordingly. In coalition case, one-sixth of the discrepancy between actual and desired insurgency strength is corrected each month. Therefore, when the desired level of coalition changes, it actually takes six months for the actual strength to change accordingly. However, the time could be changed manually in simulation, in order to find the optimal scenario.

To be able to correctly define number of casualties and desired strength, more variables need to be added to the model. Casualties decrease the strength of both insurgency and coalition. Casualties' rate variable represents injuries, deaths and arrests experienced during military operations in the period of ten years from 2001 to 2010. It represents an outside influence on the model.

Expected strength is an important part of this model because it translates changes in demand into changes in recruitment. Consequently, it takes statistical data (casualties' rate or recruitment of insurgents' rate) and converts it into action that controls how much terrorist organisations or coalition recruits fighters. Demand is not a physical accumulation like insurgency or coalition strength. It can seem like an abstract idea, with expectations about demand being even more abstract. However, the accumulations represented by levels (i.e. strength) do not have to be physical accumulations. Since delay needs to be introduced in the changes of expected demand, it is best to model it as a level. Flows are the only elements that change levels; therefore a flow is needed to represent the change in expected demand. Time factor is also needed to indicate how long it takes to assess situation and to issue reports or orders about real demand. It takes one month to assess new situation and issue new orders for insurgents, and it takes three months to evaluate terrorism situation and to issue orders for coalition. However, time could be changed manually in simulation.

Insurgents' leaders and U.S. military commanders and/or policy-makers use recruitment to cover desired strength; it should always reflect the expected demand. The insurgency strength the terrorism organisations wants to keep on hand should cover two months of expected casualties as it is time to find potential recruiters.

The desired coalition strength, together with recruitment, determines how many troops on the ground the decision-makers want to have. Coalition capability shows how many insurgents (or terror acts) each soldier can counter in one year.

This model was built to analyse a certain problem, i.e. measurement of the effectiveness of counter-terrorism. The model therefore involves some of the adjustment possibilities that are added to the simulator (Figure 6).

In order to illustrate how different conditions influence a simulation, it was made for user to choose scenario for the coalition desire strength simulator. It is possible to choose between two scenarios: countering insurgency and countering terror acts. Different scenarios requires different strength of coalition because coalition has different capabilities countering terror acts and countering insurgents. Also it is possible to correct time to make political decision, time to make military assessment, time to recruit and prepare new insurgents. Consequently, it is possible to monitor how different time adjustments influence different variables.
Model behaviour. With statistical data on Global War on Terror in Afghanistan and the SINWAVE function added to the model, the behaviour of model started to oscillate. The SINWAVE function produces a time-dependent sine wave, with Amplitude as its amplitude, and Period as its period. The wave is shifted by the time Offset. Without any external inputs of data all the variables of the model would be constant, indicating that the model is in equilibrium. However, the model is knocked out of equilibrium by real statistical data, which vary every year during all simulation period (2001-2010). Statistical data brings the model out of equilibrium and reveals its dynamic behaviour. As it could be seen from the graph bellow (Figure 7), rate of insurgent casualties fluctuates reflecting statistical data. Expected casualties follows slowly, and after a number of months it adjusts to the new level of casualties. Recruitment, however, increases suddenly as the casualties rate increases. To get a good understanding of why recruitment behaves as it does, behaviour of the two variables ‘insurgent strength’ and ‘desired insurgent strength’ must also be inspected.

Source: prepared by author
The graphs below (Figure 8) show actual and desired recruitment of terrorists, and actual and desired coalition strength. The desired recruitment of terrorist increases immediately when the casualties rate increases, but due to the delay in recruitment, number of terrorists increases only after some time and cross the desired recruitment line only at the end of the year; when desired recruitment rate decreases suddenly because of lower casualties, actual number of insurgents decreases only after some time. The behaviour of actual and desired coalition strength could be explained in the same way.

The results of the external data input such as insurgents’ casualties, coalition rate of countering insurgency, coa-
lition rate of countering terror acts and rate of coalition casualties can be seen in behaviour of the other variables. Expected demand of coalition strength can be seen as increase, until it reaches the new level of insurgent recruitment. The rate at which it increases is slowing because the flow changes expected demand according to the discrepancy between recruitment of insurgents and expected strength of coalition.

When the number of insurgents or the number of terror acts rises, the desired strength of coalition rises as well because implementers of counter-terrorism strategy need more troops to handle the increase with its current capability to counter terrorism. Through the recruitment process, workers are added to the level of coalition strength, causing it to follow the desired strength after a delay (representing the time it takes to make political decision). The increase in the coalition strength cause more insurgent casualties (more terrorists are killed or captured), increasing the desired recruitment of insurgents. The behaviour of insurgent casualties’ rate is quite similar to the behaviour of the coalition strength. The values are different, of course, but the shape of the curves is the same.

Until the recruitment rate of insurgents crosses above the casualties’ rate, the desired recruitment rate is rising and the actual number of insurgents is still falling. After recruitment of insurgents rises above the casualties’ rate, however, the desired recruitment of insurgents’ rate starts to fall and the actual number of insurgents starts to rise. The desired strength of coalition also begins to fall, following the recruitment rate of insurgents. The desired strength of coalition is still falling, but is still positive, so actual strength of coalition continues to rise. Once desired strength reaches the value of actual strength, however, it falls below and starts to bring actual coalition strength down with it.

With each iteration, it becomes clearer how the variables affect one another. The entire model is struggling to reach the equilibrium following the inputs of statistical data and sinwave function into ‘casualties’ rate’ variable. The actual strength of insurgents is trying to reach desired strength, similarly, the actual strength of coalition is trying to reach desired strength, and desired recruitment of insurgents is trying to reach casualties rate. For the entire model to be in equilibrium, each of these parts must themselves be in equilibrium simultaneously.

**Conclusions and recommendations**

The main purpose of this article was to explain the causal chain between causes (a counterterrorism strategy) and effect (scores of indicators/effectiveness). That would help to justify the choice of particular counterterrorism strategy. Therefore dynamic system simulation approach was used to investigate causal loops.

First of all, in order to measure the effectiveness of counter-terrorism strategies, it needs to be analysed as a system that is made up of many different elements interacting with each other, all with their own indicators of success. Consequently, elements (or attributes) were defined. Once the attributes were identified, data collection on the system attributes took place. After that, data were analysed and measured.

Secondly, advanced dynamic simulation model was used to better understand the interactions among the elements of the system. Two balancing (negative) feedback loops and two reinforcement (positive) loops were identified in the system.

Finally, the behaviour of the system was analysed using various graphs. Model was simplified and tailored to any user. Therefore, it has been possible for user to change intervals in time variables such as time to make military or political decision, time to find and prepare new recruiters or time to assess the situation. So user of the model can find the most effective scenario by changing time values. In addition, user can choose the scenario of model as well (countering insurgents or countering terror acts). Results of model have indicated direct relationship between the number of terrorist or terror acts and coalition strength. The amplitude of difference between these variables depends on time assumptions.

Taking everything into consideration it is obvious that measurement of the effectiveness needs further researches, particularly in dynamic simulation context. This study should be evaluated only as a framework in further similar researches. Furthermore, the models of counter-terrorism effectiveness should incorporate soft variables (e.g., fear of civilians, perceived security etc.) and more process-related variables (e.g. funding, infrastructure damages) so as to explore the causes and effects more precisely.
References


THEORETICAL ISSUES OF RELATIONSHIP BETWEEN UNEMPLOYMENT, POVERTY AND CRIME IN SUSTAINABLE DEVELOPMENT

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Abstract. This paper analyzes theoretical issues of relationship between unemployment, poverty and crime in sustainable development. The concepts of these socio-economical categories were analyzed and theoretical aspects of relationship between unemployment, poverty and crime were disclosed. It was found that unemployment, poverty and crime, as distinct socio-economical process is not widely considered in the literature. More often the specific relationships between two of the variables are studied. The evaluation of unemployment and poverty, unemployment and crime, crime and poverty showed that all three components are linked together through a negative connotation with socio-economical consequences, which further reinforces the ignoring of principles of sustainable development in the socio-economical policy of the country.

Keywords: Unemployment, poverty, crime, coherence, sustainable development.

Reference to this paper should be made as follows: Šileika, A.; Bekerytė, J. 2013. The theoretical issues of unemployment, poverty and crime coherence in the terms of sustainable development, Journal of Security and Sustainability Issues 2013 2(3): 59–70. http://dx.doi.org/10.9770/jssi.2013.2.3(5)

JEL Classifications: J2, E2

1. Introduction

In recent years the spread of unemployment, poverty and crime has been affected by economic crisis. These three processes are by far the most influential in both economical and social, as well as in psychological sense. Scientific research work often examines the definitions, forms or measurement techniques of unemployment, poverty and crime and examines the reasons for their emergence. However, the relationship between unemployment, poverty and crime has received little attention. The unemployment effect is significant - it slows down the wage increases, reduces government revenues. In addition, it is linked to people's mental and physical health and also provokes poverty and the growth of law violations. These problems are relevant both in Lithuania and European Union, but their solution (particularly in regions where there is an evident differentiation between the indicators characterizing these problems) has not yet become the strategies for sustainable development.

The scientific literature on poverty-related causes (Akoum 2008; Lenagala and Ram 2010; Dao 2008; Smith 2010) identifies the primary factors that can cause poverty are unemployment, which are overpopulation, unequal distribution of resources in the global economy, the inability to reconcile the personal income to the cost of living, lack of education, and at the same time - employment opportunities, that are largely shaping the country's sustainable development. It is clear that unemployment and poverty have a direct impact on the growth of crimes.

Most research works explore the relationships between two variables (unemployment and poverty, unemployment and crime, poverty and crime). The
relationship of all three factors (unemployment, poverty, and crime) is examined by just a few foreign authors (Spuy and Röntsch 2008). Meanwhile, the Lithuanian scientific research is lacking in this area. The lack is especially seen while studying sustainable development and the triad of our question in terms, and that is the main reason for further research. Research object and purpose is to analyze the theoretical aspects of relationship between unemployment, poverty, and crime in the view of sustainable development. Research methods: systematic socio-economical literature review, generalization methods, comparative, structural and logical analysis.

2. The concept of unemployment, poverty and crime

Modern literature of unemployment, poverty and crime issues includes a lot of closely related research areas. But firstly we need to look at the views and opinions to unemployment, poverty and crime, as a distinct socio-economical processes and issues that are presented in scientific literature by discussing their concepts, forms, methods of measurement, their causes and consequences. Only then one can switch to the examination of relationship between the categories in question.

For the analysis of theoretical aspects of unemployment, firstly it is necessary to define the concept of unemployment (Table 1).

<table>
<thead>
<tr>
<th>Authors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berglind (1991); Potts (1999); Green (2000); De Koning (2001); Pavildou et al. (2011); Vetlov (2003); Bernument et al. (2006)</td>
<td>Unemployment is an economic condition in which the working-age individual is looking for a job, but cannot find it. The unemployment statistics include people, who in the last four weeks were unemployed or people who have been made redundant, but are still willing and able to work.</td>
</tr>
<tr>
<td>Collins (1991); Gennard (2009)</td>
<td>Unemployment is the measure of “economic health”. This means that the lower unemployment rate in the country indicates that the country’s economical situation is good. In economics, unemployment refers to economic situation, which shows the extent of unemployment.</td>
</tr>
</tbody>
</table>

Source: created by the authors, based on scientific literature presented in the table.

It can be generalized that the cause of unemployment is seen as economic condition in which individuals, who actively seek employment remain not hired. The definition of unemployment is also closely linked to the term of “economic health”. In addition, the crucial aspect is that unemployment is inevitable, because full employment, even with economy in equilibrium at a potential national product (PNP) point is impossible.

The unemployment scale can be defined by using its measurement term, i.e., unemployment rate. The unemployment rate is an economical indicator, which is expressed as a percentage of unemployed and working people (Berglind 1991; Bernument et al. 2006). It reflects the loss of human recourses and moral implications. Unemployment leads to the formation of a number of factors and reasons, most important of which are economical crisis and structural reorganization of economy in technical revolution conditions, also wage rigidity and so on. However, not all causes of unemployment are constant. The analysis of Bernument et al. (2006), Theodossiou and Zarotiadis (2010), Duman (2010), Gennard (2009), Pavildou et al. (2011) works show that it is possible to provide an overall classification to the causes of unemployment:

- **Low staff qualification.** Higher qualification reflects in higher employment opportunities;
- **The political environment an national policies;**
- **Economical crisis.** It significantly increases the number of unemployed;
- **Staff replacement with technology.** Technology increases productivity, but has a negative effect on unemployment;
- **Population growth.** Population is an important socio-economical factor. If as the population is growing no new jobs are available, the unemployment increases, when the labor supply exceeds the demand.

Unemployment has affects the whole economical
sphere. Negative economical consequences of unemployment are given in Table 2.

Table 2. Unemployment effects of the economic sectors

<table>
<thead>
<tr>
<th>Economical indicators</th>
<th>Authors</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation</td>
<td>Phelps (2007)</td>
<td>The aim to reduce inflation influences the level of unemployment.</td>
</tr>
<tr>
<td>Emigration</td>
<td>Blanchflower and Oswald (1995)</td>
<td>Emigration is affected by the rising of unemployment.</td>
</tr>
<tr>
<td>Wage</td>
<td>Blanchard and Diamond (1990); Blanchflower and Oswald (1995); Phelps (2007)</td>
<td>Rising of unemployment has a negative impact on wages.</td>
</tr>
</tbody>
</table>

Source: created by the authors, based on scientific literature presented in the table

Gross domestic product and unemployment rate are interrelated. Vetlov (2003) research on economical growth factors over the period of 1995-2002 showed that Lithuania’s GDP grew by about 40 percent, but the reduction of employees reduces the GDP growth rate by 5 percentage points. It should be noted that when unemployment exceeds the natural unemployment level, the country is not likely to produce so-called expected national product. The application of unemployment measures to reduce it often encourages inflation. At the same time the fear of unemployment encourages people to emigrate. It is influenced by age, gender, education and work experience.

Wage rate is also one of the consequences of unemployment. Blanchflower and Oswald (1995) have statistically researched 12 countries and have confirmed that the areas that the lower wages are paid in areas where the unemployment rate is high. The researchers noted that the wage elasticity coefficient in regard to unemployment rate was approximately equal to 0.1. Blanchard and Diamond (1990) argue that wages depend not so much on the existing national unemployment rate than on its change.

Unemployment affects not only economic, but also social areas. The consequences of unemployment to social areas are distinguished in Table 3.

Table 3. Unemployment effects of the social sectors

<table>
<thead>
<tr>
<th>Social indicators</th>
<th>Authors</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Mortality</td>
<td>Ahn et al. (2004); Voss et al. (2004)</td>
<td>The rising of unemployment rate affects not only physical, but also mental health.</td>
</tr>
<tr>
<td>Poverty</td>
<td>Saunders (2002); Ukpere and Slabbert (2009); Apergis et al. (2011)</td>
<td>Poverty levels increase with increasing unemployment rate.</td>
</tr>
</tbody>
</table>

Source: created by the authors, based on scientific literature presented in the table

As a rule, unemployment is higher in rural areas. According to the report on Lithuania’s integration into EU’s influence of restructuring, high levels of unemployment in rural areas form the unfavorable social background, leads to a low standard of living, increases the gap between rural and urban family income and welfare. These circumstances reduce rural people’s access to proper education, medical, cultural, communication and other services. Therefore, it is necessary to pursue a sustainable development in the country.

As in most post-communistic counties, Lithuania’s public discussion and solutions to poverty issues by government policies has no tradition. Although the phenomenon cannot be ignored and social policy pro-
vides some kind of degree of support, but in official documents the category of poverty was avoided for a long time (Poverty Reduction Strategy for Lithuania 2000). Poverty is one of the most relevant problems, which is face not only by Lithuania, but also in developed countries. In 2000 sustainable Millennium Development goals were set by The United Nations Millennium Summit, which was attended by 189 counties. The most important goal was to reduce people poverty and social exclusion. As follows by 2015 halving the population whose income is less than 1.25 U.S. dollar a day and halving those who suffer from hunger (Kersiūnė 2011). The concept of poverty, based on the views of researchers, is given in Table 4.

Table 4. The concept of poverty

<table>
<thead>
<tr>
<th>Authors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akoum (2008); Lenagala and Ram (2010); Smith (2010); O’Boyle, E. and O’Boyle, M. (2012)</td>
<td>Poverty is defined as dissatisfaction of individual’s basic needs. These needs include clean water, nutrition, health care, education and shelter. Poverty is a multidimensional social phenomenon whose cause is dependent on sex, age, culture, social and economic factors. Poverty is associated only with insufficient income as the poverty level is determined in accordance with the income. People who live below poverty level is slightly above are considered poor.</td>
</tr>
<tr>
<td>Whright (1996); Smith (2010)</td>
<td></td>
</tr>
</tbody>
</table>

Source: created by the authors, based on scientific literature presented in the table.

So poverty in the most general sense is the shortage of the first necessity goods. It is a condition, when individual lacks some quantity of money or material gods. The concept of poverty is analyzed by foreign authors, such as Akoum (2008), Lenagala and Ram (2010), Smith (2010), O’Boyle, E. and O’Boyle, M. (2012). These authors point out that poverty leads to dissatisfaction of individual’s basic personal needs. Personal needs usually include clean water nutrition, housing, clothing and health care. Research results show that poverty is a multidimensional socio-economic phenomenon. Causes of poverty depend on sex, age, culture, social and economic factors. Poverty factors are inter-related. The concept of poverty is also associated with poorer human health, increased mortality, “corruption” of society, i.e. in increased crime or other factors that are not useful for economic growth and social welfare. However, what is a need for one individual, must not be necessary relevant to another. Individuals’ personal needs are conditional, based on the socio-economic environment and past experiences.

Objective quantitative definition of poverty is measured statistically and determined as monthly or annual family income amount required for normal functioning. Therefore there is much debate on measurement tools of poverty. In Lithuania, poverty concepts and measurement methodology problems are widely considered in A. Šileika (1967–2011) works, where the concept of poverty was expanded and normative method application expediency and examination practice was based. He was the first in Soviet Lithuania, who estimated the population of different social groups in poverty. While examining views of various scientists (Whright 1996; Smith 2010; Šileika and Zabarauskaitė 2006) poverty measurement concepts can be divided into two approaches to poverty. The first represents the absolute poverty concept, and the second - the concept of relative poverty. The concept of absolute poverty is methodologically based on the view that the calculations must be based on a normative minimum consumption budget, which determines the minimum necessary physical, mental (intellectual) and social need at individual level, ensuring the reproduction of society in terms of minimum qualification for a single low-level employee who performs his work in simple conditions. Calculations show that 24.5 percent of Lithuanian population in 2010 was below absolute poverty line (Šileika 2011). Since 2005 a common European Union (EU) poverty measurement methodology was adopted in Lithuania for calculation of relative poverty. According to it the main indicator for measuring poverty is poverty risk level after social payments. Relative poverty, which is equivalent to 60 percent of disposable median income, is used to calculate poverty risk levels. For comparing the different poverty risk levels in different countries the poverty measuring methodology in EU is unified. However, it should be noted that the relative poverty line should be used in developed EU countries, where the standard of living is high and the income and consumption indicators are high too.
Meanwhile, in Lithuania, as in many other Central and Eastern Europe countries that joined EU after 2004, even minimal personal needs satisfaction remains a problem. Therefore, a calculation made by relative poverty line does not reflect the poverty situation in those countries (Šileika and Zabarauskaitė 2006).

The concept of absolute poverty is associated with minimal personal satisfaction level, which, as the production grows and the whole society progresses, also has a tendency to increase. It is the absolute poverty line that is the objective poverty measurement indicator, which is not provided in databases of Lithuania’s Department of Statistics (Šileika and Zabarauskaitė 2006). So if there is an opportunity and access to data for poverty measurement, it is appropriate to use both absolute and relative poverty line and according to them calculate the indicators of poverty. But in order to monitor and evaluate the effectiveness of poverty reduction policies and designing poverty reduction measures in the country it is more appropriate to use absolute poverty line (Šileika and Zabarauskaitė 2006). There are also two main indicators for measuring poverty that can be found in scientific literature (Akoum 2008) poverty level, which is defined as minimal income level, below which an individual is officially considered to be living in poverty and the depth of poverty, which is defined as an average deviation of expenditure by poor people from the poverty line.

In common economic sense (Dao 2008; Smith 2010; Akoum 2008) the forms of poverty are divided into: 1) income-related poverty and 2) not related to income poverty. The first (related to income) poverty is influenced by the fact that household income are not enough for food or other necessary physical needs. The poverty that is not related to income is influenced by the fact that households do not have access to affordable intellectual and social services (education, health care, culture).

The population poverty are affected by both political decisions and historically formed family’s socio-economic differences, as well as cyclical fluctuations of the country, which impede sustainable development of economics. Poverty Reduction Strategy for Lithuania (2000) states that “the main cause of poverty in Lithuania is low GDP and high income inequality combination, undeveloped social protection because of low recourses allocation and the lack of the social protection a accuracy” (Poverty Reduction Strategy for Lithuania 2000).

One of the main goals of criminal law in the context of sustainable development in the country is to ensure the legality and order, prevent and restrain criminal elements of individual members, perform preventative function in all regions of the country. In other words, the purpose of criminal law is the protection of human rights and freedoms, all kinds of property, public security and public order, environment and the protection of constitutional order from criminal intent, which must reduce crime and ensure public safety. The approaches to the concept of crime are shown in Table 5.

Table 5. The Concept of crime

<table>
<thead>
<tr>
<th>Authors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sakalauskas (1999)</td>
<td>Crime is the breach of rules or laws for which the law governing institutions give convictions.</td>
</tr>
<tr>
<td>Fadaei-Tehrani and Green (2002); Scerra (2011); D’Amico and Block (2007)</td>
<td>Crime is a rational act, since the individual chooses whether or not to carry out the crime.</td>
</tr>
</tbody>
</table>

Source: created by the authors, based on scientific literature presented in the table.

The crime can be defined as illegality and is classified differently in each country. National law defines what is prohibited and how the violators have to be punished. Crime is a serious problem, which affects the whole society. It affects victims and perpetrators, as well as their families. Theoretical aspects of crime are analyzed through economic, sociological and psychological perspectives. Looking at the economic aspects, the crime firstly is a rational action. In deciding how to use their time, individuals can choose between legal work, illegal work or not to work in general (Fadaei-Tehrani and Green 2002). Crime poses a threat not only to an individual, but also harms an overall social development of the country, destroy the main
Algis Šileika, Jurgita Bekerytė

Theoretical Issues of Relationship between Unemployment, Poverty and Crime in Sustainable Development

Unemployment and poverty. Scientists approach to unemployment and poverty relationship is two-fold. Some scholars argue that unemployment is directly influenced by poverty (Saunders 2002; Ukpere and Slabert 2009; Apergis et al. 2011), others (Clifton and Marlar 2011) indicate that poorer countries do not always have higher unemployment rates. One can accept the scientific view that unemployment and poverty are two closely related problems facing the present world economy.

Unemployment is exacerbating the economic crisis and reduces the overall purchasing power of the nation. This leads to poverty, which in turn, increases the debt burden and unemployment. Unemployment and poverty are more common in less developed countries. However, due to the global economical downturn, the recently-developed counties face their challenges.

One of the indicators of well-being is a low poverty rate. Selected welfare model and the implementation of social policy determine the lining standards and the expression levels of poverty, unemployment and social exclusion. Saunders (2002) states direct and indirect impact of unemployment on poverty and inequality. Finally, unemployment is destroying the funding base of welfare programs and increases poverty and social inequality. Namely unemployment worsens poverty. High poverty, as a rule, coexists with unemployment, thus the direct relationship between these two problems can be seen. However it is often discussed that relationship between unemployment abd poverty depends on controversy. The analysis units to determine labor force status are individual, and poverty research focus on income units, thus, a person may have low income and still not be bankrupt until other family members have revenue that is shared - this is sufficient to say that the family is living above poverty line. Being unemployed does not necessary mean living below or above poverty line.

Ukpere and Slabert (2009) in a conducted qualitative study found that there is a positive correlation between unemployment, currently wide spread globalization, income inequity and poverty. This view is shared by Tsaliki (2009). He states that efforts to increase labor flexibility by liberalizing labor market contributes to the polarization of income and increase poverty levels. The survey data of other authors (Apergis et al. 2011) showed that there is a two-way relationship between poverty and income inequity in both short and long terms. In the short term both income inequality and unemployment have a posi-
tive and statistically significant impact on poverty. It is worth noting that there is a correlation between export and poverty reduction. Since export and poverty ratio are asymmetrical, the export reduction may increase poverty and unemployment. Thus, each national export development strategy should include poverty reduction (Skea and Barclay 2007).

Clifton and Marlar (2011) Gallup media research should be distinguished from abundance of other research on unemployment and poverty. It was found that there is no significant relationship between unemployment rate and GDP per capita. Employment growth does not necessary reduce poverty. There is a tendency that in “productive” sectors even a small elevation in employment reduces poverty, but in “less productive” sectors a slightly bigger employment growth is needed (Hull 2009).

Altogether, according to the works analyzed, it can be argued that a higher unemployment rate means that there are more unemployed people who may find themselves below the poverty line. However, unemployment and poverty is complex phenomenon and should be examined only by individual exiting conditions of a country (in particular - the structure of the family), but also by individual regions of the country. This issue is very relevant in Lithuania, where the region’s socio-economic development inequality is clearly noticeable. In 2011 unemployment in Vilnius region was 14,3 percent, while in Utena region - 23,2 percent (thus, there were 8,9 percent difference in interregional unemployment rate). A significant differentiation prevails in regional poverty indicators. A tendency is seen that in economic slowdown has reduced jobs and working hours in value adding areas. And only after economy recovered, people of these regions had a greater opportunity to return to the job market, get out of poverty, while the socio-economic difference between regions declined. It should be noted that this is positive for sustainable national development.

Unemployment and crime. Since ancient times, correlations between unemployment and crime can be seen, although unemployment is just one of the factors that influence crime. It is believed that unemployment causes crime. Unemployment and crime relationship is analyzed quite widely in the scientific literature. The most studies show (Elliott and Ellingworth 1996; Fadaei-Tehrani 1989; Fougere et al. 2009; Tang 2011) a positive link between these events, but in the long period the results are not very consistent. Tang (2011) found that in the long-term crime correlates with unemployment and the number of tourists. This was done according to Johansen-Juselius integration test.

Unemployment has a direct impact on recidivism (Fadaei-Tehrani 1989). If the unemployment rate is reduced, a reduction in crime can be seen (Fadaei-Tehrani and Green 2002). Fougere et al. (2009) analyzed youth unemployment and crime causation in France. Tackling youth unemployment can actually help to reduce property and drug-related crimes. Meanwhile, other economic or violent crimes tend to correlate less than youth unemployment. Elliott and Ellingworth (1996) studied 11 713 households in England and Wales in order to determine whether there is a causal relationship between male unemployment and crime. It was found that on the regional level male unemployment affect crime, in particular ones that are real estate or property related.

Unemployment and crime relationship is studied by Lithuanian scholars. In 2001 Ministry of Social Security and labor ordered a research “Sociological research of social and occupational needs of the convicted” (research leader prof. habil. dr. A. Šileika). It was found that unemployment is one of the main factors influencing criminal activity. Before getting into prison 52 percent of respondents had not worked. Of these, 58 percent have been long-term unemployed (had been out of job for more than 12 months). Among them 43 percent had not been working for two years. People on there last year of penalty would like that the government would provide material support, would help to find a job and handle their documents, after their freedom date. The study also showed that former prisoners have more trouble trying to employ than other unemployed groups. In most cases it is non-professional, low-educated people, whose conviction reduces the chances of employment even more. A similar view is shared by other authors. For example, S. Raphael and R. Winter-Ember (2000) argue that a person, who has committed crime, has lower chance of employment. Logical assumption that unemployment is a key factor in making crime is supported in table 5, which include unemployment rate (percent) and a number of recorded offenses per 100 000 people dynamics of all Lithuania, Vilnius and Utena regions in the period of 2005-2011.
Table 5. Unemployment rate (percent) and the number of registered criminal offenses (number) per population of 100 000 in 2005-2011

<table>
<thead>
<tr>
<th>Indicator, year</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment rate (percent)</td>
<td>Lithuania</td>
<td>8.3</td>
<td>5.6</td>
<td>4.3</td>
<td>5.8</td>
<td>13.7</td>
<td>17.8</td>
</tr>
<tr>
<td>Vilnius region</td>
<td>8.6</td>
<td>5.0</td>
<td>4.5</td>
<td>6.3</td>
<td>14.3</td>
<td>16.2</td>
<td>14.3</td>
</tr>
<tr>
<td>Utena region</td>
<td>6.0</td>
<td>5.9</td>
<td>4.4</td>
<td>5.4</td>
<td>10.0</td>
<td>21.3</td>
<td>23.2</td>
</tr>
<tr>
<td>The number of registered criminal offenses (number) per population of 100 000</td>
<td>Lithuania</td>
<td>2631</td>
<td>2421</td>
<td>2185</td>
<td>2325</td>
<td>2492</td>
<td>2363</td>
</tr>
<tr>
<td>Vilnius region</td>
<td>3653</td>
<td>3470</td>
<td>3170</td>
<td>3533</td>
<td>3657</td>
<td>3231</td>
<td>3315</td>
</tr>
<tr>
<td>Utena region</td>
<td>1993</td>
<td>1759</td>
<td>1569</td>
<td>1692</td>
<td>1692</td>
<td>1804</td>
<td>1816</td>
</tr>
</tbody>
</table>

Source: created by the authors, based on Department of Statistics under Lithuanian Republic Government

As it can be seen both in the whole country and in individual regions (Vilnius and Utėna) the number of offenses per 100 000 population in 2005-2011 period basically correlates with unemployment trend rate indicators (except for the year 2010-2011, when administrative sanctions had a greater impact on the decline in crime). It should be also noted that unemployment can cause psychological problems such as reduction in self-esteem and stress, which undoubtedly encourages criminal offense. So it can be concluded that measures for unemployment reduction are effective in the fight against crime and in turn, is a strengthening factor in sustainable development of the country.

Poverty and crime. Impact of poverty on crime can be explained by various reasons. Poverty can lead to a greater or lesser stress, which, in turn, may encourage an individual to make a theft, robbery or other violent crime. Criminal action is the way for poorer people to acquire economic goods, which could not be attained legally. The can acquire more material goods by threatening or force, thus leading to brutal and violent crimes. For many people, especially for impoverished ones, goods acquired from crime can outweigh the risks, so it can be suggested that poverty should increase crime rate.

Much attention on the problems of poverty and crime was paid by Fadaei-Tehrani (1989). His studies have shown that the official crime rate is almost always higher among the poor. Poor people are often arrested and convicted for committing crimes. In other words, the decision to commit crime is based on the self-centered cost-benefit analysis assessment and psychological elements. People often have to make decisions on which activities (legal or illegal) to do. This issue was analyzed by other authors, but their studies were more specialized - in order to prove that the poorest children living in families are more prone to crime than growing in affluent families (Griggs and Walker 2008). Griggs and Walker (2008) examined the impact of poverty on children’s growth and their further development. Relationship between children living in poverty and their subsequent behavior is obvious. Such children are more prone to engage in riskier activities, initiate early smoking, become more aggressive and commit crimes. Thus, as Wong (2007) study results show, crime is influenced by poverty, also - through family dysfunction. According to this, in his opinion, it is possible to distinguish two main groups of models:

1) Working models - they are characterized by the fact that the decision to engage in illegal activities lead to a decision on how much of property an individual is willing to risk. Therefore, the result of illegal activity should be expresses in monetary equivalent.

2) Time distribution models - they are characterized by the fact that illegal activity consumes a lot of time, and its consequences cannot be determined. According to this perspective, in opinion of this author, participation in illegal activities is considered “labor supply with uncertain consequences”.

So in general connection between poverty and crime is undeniable, because those who suffer from poverty, deprivation, can often reject the legal and social norms. However, there should be noted that the poorest countries and poorest people are not prone to crime. Costa Rica, which is the richest country in Central America, and Nicaragua, which is the poorest country in Central America, both lead as the safest countries in the region (United Nations Office on Drugs and Crime 2007). Zhao et al. (2002) presented a mathematic model, which studies the dynamics of poverty and crime? It was found that government intervention and control of criminal activity in poor countries can often reduce crime, and also to mitigate the problem of poverty.
Some studies reveal how poverty affects property-unrelated crime rate, specifically terrorism. This area was studied by Kreuger and Malečkova (2003). These researchers while examining interrelations between poverty and terrorism found that a possible link is indirect and very weak. It was found that Palestinian suicide bombers often come from affluent families. On the other hand, poverty at the national level may indirectly affect terrorism through economic conditions and political instability.

To summarize the research on relationship between poverty and crime, it should be stated that the strength of this relationship depends on the nature of crime. Poverty correlates the strongest with property-related crimes. In addition, children who grow up in poverty are more likely to commit crimes than those that had not experienced poverty. Also it should be noted that the link between poverty and terrorism are not strong or directly related. Alongside, it should be stated that poverty and crime interrelations also depend on the particular characteristics of the country in which these relations are analyzed.

Unemployment, poverty and crime. The triad that this paper examines (unemployment - poverty - crime) as a causal - consequential socio-economical process and explores in terms of sustainable development has the lack of attention in scientific literature. There are two works (Gillani et al. 2009; Spuy, Röntsch 2008), which analyze the relationship between all three elements. Gillani et al. (2009) studied to determine whether poverty or unemployment leads to an in crime in Pakistan. Their analysis of data showed that both unemployment and poverty lead to crime. Increasing unemployment reduces income - and that’s what makes people to commit crimes. However, not only low income, but rising inflation encourages individuals to transcend their own moral boundaries. In the research in Africa, Spuy and Röntsch (2008) found out that majority of respondents think that crimes are influenced by poverty and unemployment, while emphasizing “civil paralysis” and “inaction of civic problems”. Separately it should be noted that social exclusion processes also often associate with unemployment, poverty and crime at the appropriate level in the country. On the other hand, the exclusion of clusters is determined by the views of people in that country and their place of residence (Institute of Social Research 2004).

The examination of the relationship between unemployment, poverty and crime national wide and in cross-selection of “city-rural areas” (Table 6).

<table>
<thead>
<tr>
<th>Indicators, years</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment rate (percent)</td>
<td>Lithuania 8.3</td>
<td>5.6</td>
<td>4.3</td>
<td>5.8</td>
<td>13.7</td>
<td>17.8</td>
<td>15.3</td>
</tr>
<tr>
<td></td>
<td>City 8.6</td>
<td>5.5</td>
<td>4.2</td>
<td>5.7</td>
<td>12.6</td>
<td>16.0</td>
<td>12.8</td>
</tr>
<tr>
<td></td>
<td>Rural areas 7.6</td>
<td>6.0</td>
<td>4.4</td>
<td>6.1</td>
<td>16.5</td>
<td>22.4</td>
<td>21.0</td>
</tr>
<tr>
<td>Poverty risk level (percent)</td>
<td>Lithuania 20.5</td>
<td>20.0</td>
<td>19.1</td>
<td>20.0</td>
<td>20.6</td>
<td>20.2</td>
<td>20.0</td>
</tr>
<tr>
<td></td>
<td>City 13.5</td>
<td>13.1</td>
<td>12.7</td>
<td>13.6</td>
<td>14.7</td>
<td>16.2</td>
<td>14.7</td>
</tr>
<tr>
<td></td>
<td>Rural areas 34.6</td>
<td>34.0</td>
<td>32.2</td>
<td>32.9</td>
<td>32.7</td>
<td>28.4</td>
<td>30.7</td>
</tr>
<tr>
<td>The number of registered criminal offenses (number) per population of 100 000</td>
<td>Lithuania 2631</td>
<td>2421</td>
<td>2185</td>
<td>2324</td>
<td>2492</td>
<td>2363</td>
<td>2468</td>
</tr>
<tr>
<td></td>
<td>City 3036</td>
<td>2814</td>
<td>2508</td>
<td>2678</td>
<td>2836</td>
<td>2595</td>
<td>2705</td>
</tr>
<tr>
<td></td>
<td>Rural areas 1820</td>
<td>1630</td>
<td>1505</td>
<td>1583</td>
<td>1750</td>
<td>1846</td>
<td>1968</td>
</tr>
</tbody>
</table>

Source: created by the authors, based on Department of Statistics under Lithuanian Republic Government (2012)

As we can see, the table essentially confirms the socio-economic causal-consequential sequence. The trend indicates a strong and logical dependence between unemployment, poverty and crime, although in rural areas the relationships between processes are more inert, because of rural lifestyles. At the same time it shoes that the processes in question and relationships between them need to be analyzed in the respect of sustainable development in the whole country.

Conclusions

This paper analyzes theoretical issues of relationship between unemployment, poverty and crime in sus-
Algis Šileika, Jurgita Bekerytė

Theoretical Issues of Relationship between Unemployment, Poverty and Crime in Sustainable Development

Theoretical Issues of Relationship between Unemployment, Poverty and Crime in Sustainable Development

The strength of relationship depends on the nature of crime in the scientific literature it can be stated that the positive effects among this phenomenon. Logical assumption that unemployment is a key factor in definition for a single low-level employee who performs his work in simple conditions. It can be summarized that in the evaluation of the concepts encountered in the relationship between unemployment and poverty problems, the higher unemployment rate means that there are more unemployed people who may find themselves below the poverty line. However, unemployment ad poverty are complex phenomenon and should be examined not only by individual existing conditions of the country (especially - structure of the family), but also by individual regions of the country. This issue is very relevant in Lithuania, where the region's socio-economic development inequality is clearly noticeable.

There are a lot of discussions on the relationship between unemployment and crime issues in scientific literature. Studies, as a rule, have a conclusion about the positive effects among this phenomenon. Logical assumption that unemployment is a key factor in delinquency is evident in the research that was conducted in Lithuania over the past decade. An analogous conclusion can be drawn today, while this article provides statistical material for that. It shows that both in Lithuania, and in its regions offenses per population of 100 000 mainly correlated with unemployment trends.

To summarize the relationship between poverty and crime in the scientific literature it can be stated that the strength of relationship depends on the nature of crime. Poverty correlates the strongest with property crimes. The same is true of children grown in poverty - they are more likely to commit crimes than those who had not experienced poverty. Also it should be notes that poverty and terrorism are not directly or strongly related.

The triad that this paper examines (unemployment - poverty - crime) as a causal - consequential socio-economic process and explores in terms of sustainable development has the lack of attention in scientific literature. However there are few works from which a definite conclusion can be made about the relationships of these processes. The same trend can be seen in this article and allaying material presented on unemployment, poverty and crime indicators and their dynamics in Lithuania. Although in rural areas the relationships between processes are more inert, because of rural lifestyles. At the same time it shows that the considered processes and relationships between them need to be analyzed in the context of sustainable development country wide.

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1. Introduction

A rather paradoxical situation is developing in the mobile communications sector that gives us a previously unprecedented opportunity to communicate anywhere and at any time.

On the one hand, it is a booming sector nowadays. Four sequential generations of technology has evolved from circuit switched low quality analogue voice network to digital packet switched broadband technology that ensure secure voice, messaging and data communication services. More and more people use mobile services, the global compound annual growth rate (CAGR) of mobile subscriptions in the last decade was near 20%, to near 6.5 billion by end-2012. Annual growth of total mobile traffic is even more rapid – around 60% in the last years. Development of broadband technologies and increasing shift to data-intensive Internet applications (TV, audio-video, gaming, social networking, etc.) in mobile environment generated an avalanche growth of mobile data traffic; its CAGR is more than 100% over the last 5 years. Mobile penetration (MP) in Europe exceeds the global indicator by more than 50%, Europe’s mobile broadband (MB) penetration is threefold the global figure (EC 2012, ITU 2012). The traffic per device is higher than the global one; it is even twofold for middle and high range smartphones (uMTS 2011).

On the other hand, average revenue per user (ARPU), which is one of the basic indicators for mobile operators that show their financial welfare, globally has decreased by 19% between 2007 and 2011. Although total revenues of mobile market are increasing (glob-
al CAGR was more than 6% over the last years) due to strongly increasing number of subscriptions and rise in data revenue, this indicator also can not be evaluated as sustainable one. Developing markets grew 12% annually, while developed markets (where penetration is quite near to saturation) – 2,8% only. Voice ARPU is near to flat or even decreasing, data revenue can not compensate these losses yet. European ARPU has fallen even by 20% at the same time due to additional strong regulatory measures initialized by the European Commission (gradual decrease of roaming and interconnection tariffs). This tendency will continue in the coming years, global mobile subscriptions would grow at a CAGR of 7,3% till 2016, while mobile revenues at a 6,3% only; low income customers have become an overwhelming majority of new subscribers.

Market development in the Baltic States is analogous to global trends; table 1 shows the basic indicators of Baltics mobile markets. Mobile data traffic in Lithuania grew at CAGR of 107% in the last 5 years. At the same time revenues and ARPU of mobile operators have declined sharply, e.g., more than by 30% between 2007 and 2012 for Lithuanian operators, although share of revenues from data transmission (GPRS, EDGE, UMTS) has increased from 2,6% till 6,7%. Mobile ARPU of Latvia and Lithuania were among the lowest three in EU in 2010.

Table 1. Basic indicators of Baltics’ mobile markets

<table>
<thead>
<tr>
<th></th>
<th>Penetration rates, % of population</th>
<th>ARPU in mobile communications, 2010 (EUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mobile, October 2011</td>
<td>Mobile broadband, January 2012</td>
</tr>
<tr>
<td>Estonia</td>
<td>134%</td>
<td>42,0%</td>
</tr>
<tr>
<td>Latvia</td>
<td>158%</td>
<td>29,7%</td>
</tr>
<tr>
<td>Lithuania</td>
<td>152%</td>
<td>29,6%</td>
</tr>
<tr>
<td>EU27</td>
<td>127%</td>
<td>43,1%</td>
</tr>
</tbody>
</table>

Source: Digital Agenda Scoreboard (2012)

Such tendencies could create a serious risk factor for development and sustainability of mobile services in Baltics – scant investments in network infrastructure and possible decrease of quality of communications and services.

The aim of the current study is to analyze development of mobile services, to evaluate future customers’ demand for them and on this base to identify operators’ challenges and to forecast sustainability of supply of the mobile services in the Baltic States.

It has to be mentioned that there are incomplete, fragmented, incompatible and even contradictory statistical data on Baltic mobile markets in various sources – national statistics and regulators’ data, surveys made by operators and specialized companies, etc. Data of official sources are much more conservative in comparison with self-esteem of operators, while specialised consulting companies are in between of them. Our analysis and forecasts are mainly based on official EU and Baltic State statistics, on information from national regulatory authorities (Konkurrentsi- met 2012; SPRK 2012; RRT 2012) as well on conclusions and forecasts of independent experts (e.g., UMTS, Analysis Mason, Maravedis-Rethink, Wireless Intelligence). Data from Baltics’ mobile operators, other companies connected with mobile business (e.g., Akamai, Panda Networks) as well from polls organized by PR companies (e.g., GFK, C&R, SKDS), are used as illustrative information.

2. Demand

Generally accepted key factors, which influence development of mobile communications (e.g., increasing connection speeds, supply of advanced mobile devices, more and richer offer of media content and applications), of course are valid in the Baltics too. Nevertheless number of regional individualities makes some specific aspects as contributors of growth (drivers), while some aspects are insignificant, but some of them even braking ones; hereto both current situation and dynamics of development have to be evaluated to assess sustainability of the mobile market.
2.1. Consumers’ assessment

Consumers’ evaluation of the mobile market, their satisfaction with provided services is a principal factor for assessment of change and development of demand for services. Exactly low (even alarmingly low) satisfaction of consumers with the mobile and Internet services in many EU countries is a substantial indirect evidence of existing problems: 45% of ranking assessments are in the third ten among 30 various services of general interest, financial, transport and entertainment services; consumers of 4 countries evaluated mobile services as the worst services in their country (DG Health 2012). It becomes clear that satisfaction with current level of services really will discourage the new consumers in some countries.

Direct consumers’ evaluation of MB services is not provided, but it can be created using the both assessments of mobile and Internet services:

development of mobile market characterises level of general preparedness of society for mobile services; people, who already use mobile services and who would benefit of further functional development, is the base for potential MB consumers; the real numbers are slightly misrepresented due to M2M connections (Internet of things);

situation in fixed Internet services market shows the real necessity of society, its motivation for and accept

of Internet services; since the MB is considered first of all as tool for access to Internet, it actually shows share of population who potentially could become the MB consumers.

Therefore to assess MB services the normalized MB market performance indicator is created using an integrated variable, which combine mobile market and Internet market indicators:

$$\text{MPI}_\text{MB} = 0.01 \times \text{MPI}_\text{mob} \times \text{MPI}_\text{int}$$

where:

- $\text{MPI}_\text{MB}$ – normalized MB market performance indicator;
- $\text{MPI}_\text{mob}$ – mobile market performance indicator;
- $\text{MPI}_\text{int}$ – Internet market performance indicator;
- 0.01 – the coefficient of proportionality.

There is a distinctive relationship – reduction of MB market performance indicator when MB penetration increases (Figure 1). This correlation is not very strong, nevertheless it exists. Really it shows lower assessment of systems, which capacity become inadequate to their load (e.g., due to insufficient investments in the infrastructure and therefore low quality of services provided); such situation poses some risk factor for sustainability of mobile services in future.

![Combined normalized MB market performance indicator, 2012](source: authors' own study)
Baltic countries stand out against the EU27 average level quite well due to assessments of mobile telephone services that are 9-14 ranks above the EU27 average. Nevertheless evaluating services, which are provided by mobile operators, only 11% of Latvian users (10% of Estonians, 17% of Lithuanians) fully agreed that the Internet speed corresponds to what was promised by operators.

2.2. Drivers and problems

The most critical driver from demand side is a sharp evolution and usage of mobile equipment – smartphones, media tablets, dongles (PCs, laptops, notebooks), M2M devices. 4G consumer devices are becoming available for affordable prices. Sales of smartphones more than tripled in Lithuania and grew two thirds in Estonia in 2011; Latvian mobile operators have announced rise in smartphone usage in 2012 S1 compared to 2011 S1: LMT by 78% and Bite Latvia by 50%. Number of mobile-connected laptops and tablets in LMT network grew by 51% in 2011. M2M were 2% of all active Lithuanian mobile subscriptions in 2012 Q2, during the half-year their number increased by 9%. LMT also has noticed more than 50% growth of M2M applications for business customers in 2011.

A real fixed/mobile convergence has been started. Data on numbers and types of mobile terminal equipment, which was sold to consumers, show a large number of consumers, who use them for access to Internet in fixed location; e.g., 24.8% of WiFi connections in Latvia are made by means of mobile phones, 15.3% – by smartphones.

All basic e-services are well developed in Baltics, including mobile access – e-governance, e-banking, e-healthcare, e-education, etc. Specialized m-services (e.g., m-parking, m-positioning, m-tickets) also are widespread, Estonians are indisputable leaders in usage of them.

When looking on impact of MB applications/services, which are associated with advanced devices, it is critical to evaluate actual use of these services. Mobile Internet traffic grew 2.3-fold in Lithuania and tripled in Estonia in 2011. Number of mobile Internet users grew by 23% in 2011 (LMT), but the amount of mobile data doubled in each 8 to 12 months in last years (TELE2 Latvia). 77% of smartphones in Estonia, 72% in Latvia and 76% in Lithuania were connected to mobile Internet at least once a week in 2012.

Nevertheless a lot of subscribers do not use capacity of devices in full. Younger generation is the most active user of new opportunities in the Baltics as elsewhere; e.g., around 50% of 15-24 years old people are using mobile Internet in Lithuania, while only few percent of people over 50. Advanced applications are used by no less than 40% in the age up to 39 years of polled smartphone users in Latvia; the number falls more than twice in older age groups.

At the same time around 30% of smartphone users exploit only basic functions like voice calls, SMSs, address book and camera. Lithuanians are the most active users of voice and message services in Baltics, they are the most active messengers in the whole EU too; nevertheless figures have decreased for 13% voice and for 9% SMSs per subscription in the last 4 years. At the same time Estonia has shown the growth of mobile minutes by 17% in 2012 Q1 in comparison with 2011 Q1.

Mobile usage is strongly affected by availability of local content that is based on use of national languages. Lack of the national content and advanced applications, which are highly requested by majority of mobile users, is a serious development breaking factor. As Latvian phenomena should be mentioned the fact that the most used social networking application in mobile phones in Latvia is the locally developed site draugiem.lv (57% of polled users) with Facebook in the second (51%) and Twitter in the third (25%) position.

In the context of heavy network usage it is worth to mention several socioeconomic factors that reduce the potential demand for advanced mobile applications in Baltics. Global and European economic prognoses are not optimistic still, which is an alarming signal for very small (total Baltic GDP was only 0.53% of EU27 GDP in 2011) and extremely open (total export and import of goods and services was 152% of GDP of Baltic States in 2011) economies. Purchasing capacity of users is a factor, which, of course, influence the customers willingness to use charged services.

Estonia was the most successful among the Baltic States during current economic crisis, naturally level of income and savings of Estonians is the highest, while, e.g., in Latvia around two thirds of users of
mobile applications are exploring only free applications and have never purchased them. Use of charged applications by one third of mobile users highly depends on their income level: 15% of users of income group up to 200 EUR/month in comparison with 47% of income group of 600-850 EUR/month.

Demographic processes also have a strong impact. An active emigration during the last years due to economic crisis in Baltics’ economies is a noteworthy individuality in these countries in addition to low birth rate and ageing of population in all Europe. According to official statistics Latvia has lost near 12% of population since 2005. Even more significant reduction relates to persons of active and under active labour force – the most active users of advanced services. Analogous situation is in Lithuania (more than 10% reduction) while losses in Estonia are much less pronounced (2%).

Mentality of population is one more affecting factor. It is not a secret that Scandinavian countries are the global mobile communications leaders. Estonian mentality is very near to Finnish one and composition of Estonia’s indicators currently are the most similar to Finland’s ones – high ratio of MB vs mobile users, rapidly growing comparatively high mobile traffic.

3. Supply
3.1. Drivers

A new demand in practice is created when an access to network is given (see, e.g., EC 2011). Therefore from the supply-push side network development policy of operators, their investment policy has a critical importance. On the other hand frequency assignment depends on telecommunications policy in the country and its compliance with national development strategy (BEREC 2012).

The 2,6 GHz spectrum has been auctioned in all 3 Baltic countries (Karnitis et al. 2012); it is already applicable for LTE deployment in Estonia and Lithuania, in Latvia spectrum will be available from 2014. An auction was held in Latvia, while strategy of the Estonian and Lithuanian NRAs was beauty contest that is not a typical process for this band. Payments for spectrum were quite adequate to current mobile market situations (number of MB subscriptions, ARPU), nevertheless Latvia’s operators invested more in spectrum licences (Figure 2). In all three countries major mobile operators have symmetric portions of GSM, UMTS and LTE spectrum that are sufficient to deliver qualitative MB services.

![Figure 2](image_url)

*Source: authors’ own study*
3G and 4G technologies will maintain the leading positions in Baltics mobile markets. Expressive market consolidation and/or arrival of new competitive local players is not observed and not expected. Impact of alternative wireless technologies (e.g., CDMA, WiMax, satellite-based) is low. There is only one remarkable WiMax provider in both Estonia and Lithuania; only one operator is developing countrywide mobile Internet access in Latvia by exploring CDMA2000 technology. Migration of these operators to LTE is unlikely in the near future. At the same time the social networking and incoming of global over-the-top content providers (OTTs) is changing the whole value chain and will have remarkable impact on broadband markets.

National and local governments are keen to support 4G roll-out (Gruber and Koutroumpis 2011; Ooterghem et al. 2009). There is a positive impact of MB on economic activities – e.g., business mobility, remote monitoring of processes, not speaking on increasing productivity due to time savings when information is searched or any Internet application is used.

### 3.2. Challenges

Quality of mobile services is one of the main reasons for dissatisfaction of customers and the key challenge for operators. Therefore the Baltic NRAs are conducting regular quality control nevertheless methodologies are different so a direct comparison is impossible.

E.g., NRA of Latvia takes measurement of real download and upload speeds, latency and jitter. 45.1% of tests, which were performed throughout territory of Latvia in 2011 4Q, showed download speed over 2 Mbps (Figure 3), nevertheless indicators of three mobile operators were very different – 79%, 38% and 18% correspondingly; at the same time only 16.7% of tests showed speed over 4 Mbps. Operators, of course, pay more attention to the major cities, consumers’ density and traffic here is much more profitable and motivating; measurements show 65.2% over 2 Mbps and 21.7% over 4 Mbps. Supply of medium-size regional centres actually is on the country’s average level, that would not be adequate for cities, which concentrate business entities as well educational and public institutions and which the Latvian National Development Plan for 2014-2020 defines as development centres. All abovementioned relate in full to the upload speed too.

<table>
<thead>
<tr>
<th></th>
<th>Latvia</th>
<th>Major cities</th>
<th>Medium size cities</th>
<th>Settlements &amp; rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 Mbps</td>
<td>16.7</td>
<td>21.7</td>
<td>16.7</td>
<td>14.6</td>
</tr>
<tr>
<td>1-2 Mbps</td>
<td>40.2</td>
<td>43.5</td>
<td>33.3</td>
<td>24.7</td>
</tr>
<tr>
<td>2-4 Mbps</td>
<td>14.7</td>
<td>19.3</td>
<td>33.3</td>
<td>24.7</td>
</tr>
<tr>
<td>&gt; 4 Mbps</td>
<td>28.4</td>
<td>43.5</td>
<td>33.3</td>
<td>14.6</td>
</tr>
</tbody>
</table>

**Fig. 3.** Download and upload speeds in Latvia, 2011; percentage of measurements

*Source: authors’ own study*
Improvement of communications capacity is a key challenge for operators nowadays. Upgrade of infrastructure, deployment of 4G networks throughout the territory is the basic tool; 2.6 GHz band as well 800 MHz band will be exploited for this task; 800 MHz would become available in Baltics in 2015 after migration of Radio Navigation Services from this spectrum in Russia and Byelorussia. Measurements of Estonian NRA confirm efficiency of 4G technology – tested download speed is increasing till 20-30 Mbps.

Current high prices for 4G services in Baltics is another challenge; e.g., TeliaSonera partly owned operators charge flat rate 27-29 EUR/month while TeliaSonera tariff in Sweden is only 5.80 EUR/month. Such prices would be unaffordable for majority of customers and would become a strong breaking factor: total average spending for mobile communications and Internet (including fixed Internet) in Latvia in 2011 was 13,20 EUR/month, even consumers of 5th quintile (having the highest personal income) spent only 18 EUR/month in average.

An ongoing parallel fixed fibre expansion has to be mentioned as serious potential source of impact on roll-out of mobile networks (Schejter et al. 2010; Thompson, Garbacz 2011). EU broadband policy pushes investments in optical access networks (FTTH and FTTB) and in addition requires supporting also availability of unbundled metallic access lines. This takes place in parallel to the EU radio spectrum policy that supports high-speed MB (LTE) roll-out.

Very high fixed Internet speeds have been already achieved in Baltics due to intensive deployment of fibre networks. Especially it relates to Latvia, Internet test surveys regularly rank it among global leaders since 2008. Continuing successful implementation of national-wide core and/or middle mail optical network projects in all three countries may cause different scenarios and business models affecting mobile demand and future investments in the MB networks. At the same time impact of fixed network should not be evaluated as real threat to sustainability of Baltics’ mobile markets.

3.3. Risks

There are significant technological peculiarities and differences between metallic or fibre solutions on the one hand and wireless solutions for broadband access to Internet on the other hand. It has to be understood that mobile access never will be able to compete with quality of fixed broadband networks. Currently service providers do not explain advantages and disadvantages of wire and wireless technologies to consumers, it would be one of reasons for low satisfaction of consumers with mobile services provided (DG Health 2012). It has to be done to escape confusions and decrease dissatisfaction; critical mass of incompetent and unhappy customers would become a significant risk factor for mobile market development.

Regular multi-annual measurements allow recognition of several serious risks of quality of service degradation in the near future; the control will be continued and even expanded for early detection of quality risks, for promotion of sustainability of mobile services.

Mobile networks that are upgraded from 2G to 3G and somewhere from 3G to 4G still have some bottlenecks due to existing gap between increasing usage of the network on the one hand and its extension on the other hand; particularly it takes place in metropolitan areas with high penetration of users in one cell. The real density of customers increases, especially it relates to users of high speed terminal equipment (dongles and smartphones), who are downloading large files (e.g., movies); at the same time the number of customers, who could be served by the base station in any particular cell, remains the same as before. It means that the base station and channel between the base station and switching/controlling equipment will be deployed for the relatively long time; connection of other users of this cell may be worsened and their download speed decreased. Advanced network configuration, small cells and fibre connections have to become the standard solutions.

Typical proportion of download and upload speeds for the MB access is around 2-3 (see Figure 3) with the tendency to increase slightly when the download speed is increasing. A characteristic problem is operators’ desire to use the scarce frequency resource to connect customers as much as possible; providers emphasise the high download speed without the adequate increase of upload speed; e.g., a lot of Estonian NRA measurements show 4G upload speeds, which are lower than 1 Mbps (abovementioned proportion in this case is more than 20). The result is high level of asymmetry between download and upload speeds; such situation becomes critical first of all for content-
creative applications (e.g., educational and health care services, social networking, on-line gaming).

One more risky issue for the MB supply is actual high level of latency (up to 500 ms) and especially jitter, which sometimes is up to 200-300 ms depending on traffic in comparison with 1-5 ms for fibre and xDSL solutions. This feature really does not influence quality of downloaded content from different sources or surfing on Web sites. Problems would be emerged by the jitter over 50 ms for applications, which ask for correct sequence of packages (ITU 2008), e.g., frozen picture or not synchronised picture and sound using different types of IP TV (LMT has reported that video applications generate 30% of total traffic nowadays), distorted sound using Skype, etc.

4. Demand growth projections – sustainability

Forecasting mobile markets is done on a regular basis (e.g., Krizanovic et al. 2011; Zarmpou et al. 2011), it asks for reliable market data. Although a variety of institutions are publishing various statistical data on the mobile communications development, official statistics has not stabilized yet. The NRA of Lithuania is the only institution in Baltic States that regularly provides reports on the sector containing a lot of statistical data since 2002, but, unfortunately, reports do not contain analysis of trends. Some kind of mobile statistics for Latvia and Estonia is available since 2009 in the best case, but statistics for mobile broadband even later.

There are several possibilities for modelling development of mobile markets (see, e.g., Arvidsson et al. 2007). We are using a sigmoid model because cumulative number of mobile subscriptions in general grows over time according to a sigmoid (S-shaped) curve. The sigmoid model, which is based on the Gompertz function (that can be appropriately parameterized), provides sufficient flexibility for predicting MP (e.g., Rouvinen 2006; Zheng 2009). Therefore, based on the study of past trend and the market development scenario, we are applying Gompertz distributions to forecast the mobile and the MB subscription growth.

The problem is in the small number of input values and large number of output values (middle-term prediction is necessary to evaluate sustainability) that could cause the over-learning of models. In addition processes and trends are distorted by the economic crisis. Therefore to raise potential forecasts benchmarking also is applied, especially for the forecast of the MB development.

4.1. Penetration

The current MP in all Baltic States is above EU27 average level (Table 1); even more, that of Latvia and Lithuania ranks in the first five among EU Member States. At the same time only Estonian MB penetration is near the EU27 average number, while both Latvia and Lithuania are lagging behind. Naturally Estonian mobile traffic is the most intensive one in Baltics.

Analysis of development of Lithuanian mobile market shows that the MP trend surprisingly well corresponds to the ideal S-curve, especially in the pre-crisis period (Figure 4). There is slowdown since 2007 (before crisis!) instead of earlier rapid growth, which is a characteristic feature of gradual entering in the saturation phase. Approximation of the real development trend with the ideal sigmoid function demonstrates the MP level about 170% that would be achieved around 2016. The crisis has resulted in loss of 2,5-3 years of development, the further development would slow down too. So we can predict achievement of 170% level till 2020.
Pre-crisis approximation curve

LT

EU27 Post crisis correction

UMTS forecast for Representative WE country

Latvian figure is slightly over Lithuanian one, but differences between the two countries really do not exceed the level of statistical dispersion. There is no reason to predict another future for Latvian mobile market.

Prognosis of UMTS for so-called Representative Western European (WE) country coincides with our forecast – 170% level for the MP in 2020. But there is much lower initial position of WE country (125% in 2010), which actually is average EU27 indicator. The forecast would be evaluated as very optimistic one; currently increase of the MP is slowed down on the level 150-160% only in leading EU countries. Although WE country is and some time will be in the growth phase, implementation of this forecast asks for an increase in the rate of growth, which is highly unlikely; 150-155% would be more realistic figure for 2020.

Situation of Estonia is only slightly above the EU average, the country also is in the growth phase still; there is no doubt that Estonia will achieve the saturation phase, but later than its Southern neighbours. 160% for 2020 would be a credible and acceptable figure.

Reliable MB penetration statistics is available for the last several years only, therefore indirect approach will be used. Continuing described combined methodology and comparing the MB penetration with the MP and fixed broadband penetration in the EU countries we are obtaining a line of general relevance (Figure 5). In this case the saturation is far still, it could be at the MB penetration level 90-100%. All Baltic States are in the S-curve growth phase still.
Estonia’s trump card is take-up of fixed broadband in households, as well experience of wider usage of e-government and e-commerce services by society, while acceptance of mobile services is higher in Latvia and Lithuania. Taking into consideration ongoing fixed Internet development projects, demographic (aging society) and economic (quite low GDP and personal income level) reality, the fixed broadband penetration S-curve shows its increase by 6-8% in each Baltic State. It means that MB penetration gap with the line of relevance will be reduced. Our prognosis is 65% MB penetration for Estonia and 60% for Latvia and Lithuania in 2020.

4.2. Devices and traffic

Mobile traffic trends show that the growth continues in Baltics as well as in Europe and around the world, e.g., the mobile traffic in Lithuania has doubled in two years. Future projections differ by growth rates (CAGR 60-90%); some slowdown factors appear, but there are no signs on approaching saturation phase.

There is no reason to forecast huge traffic differences among three Baltic States, nevertheless projected slightly various penetrations and some individualities in the structure of equipment exploited are affecting traffic. Most traffic as elsewhere will be generated by the genuine broadband devices – dongles and smartphones.

The global tendency will take place in Baltics too – upgrade of handsets, usage of smartphones instead of middle- and low-range phones, increasing proportion of smartphones in the total range of equipment. On the one hand predicted larger increase of the MP in Lithuania and especially Estonia is a process-stimulating factor in comparison with Latvia; on the other hand a comprehensive mobile take-up in Estonia will involve in the mobile market mainly lower-income customers who will use phones; the growth rate of smartphones as a whole will be lower in Estonia (Figure 6).
Use of dongles is underdeveloped in Latvia due to very strong impact of economic crisis on purchasing capacity of the population (reduction by 20-40%). Recovery of economy has been started now; it means that we can believe in rapid growth of dongles’ usage. Latvia could be the only Baltic State where the ratio dongles vs smartphones will increase; a convergence of these ratios will take place very near to projected representative WE country level (1:3,2).

The dongles will be used by professionals and active users therefore we can forecast the medium generated traffic in 2020 – around 15 GB/month/subscriber. There would be a difference in smartphone usage; the current situation shows that many owners do not use their smartphones actively because of pure motivation, lack of skills or low purchasing capacity for charged services. Our prognosis – less than medium level of usage, around 5-6 GB/month/subscriber.

Internet of things will be represented by two categories of equipment; currently we have lack of data on their use practices in Baltics, therefore our prognosis will be more conservative in comparison with the forecast for WE country (UMTS 2011):

- high traffic devices (e.g., online video monitoring and control systems) could generate continuous data flow up to 3 GB/month/subscription;
- traffic of M2M devices that are connected peri-

dically (e.g., radio frequency indication systems, data acquisition equipment) would be much lower – around 100 MB/month/subscription.

The current dynamic development of applications and growth of M2M subscriptions show the high probability of density of both categories of devices in 2020 that are near to the global prognosis (UMTS 2011) – around 7-8% for each category.

Middle-range handsets and small number of low-range ones will continue to represent the largest group of equipment – near 45% of devices in Estonia as well 50% in Latvia and Lithuania. We can forecast quite active their usage by comparatively skilled owners; the generated traffic would achieve 2-2,5 GB/month/subscription.

The voice traffic will not increase significantly. Current communication habits (around 150 min/month/subscription) generate around 75 MB/month, the similar number would be real in 2020 too.
Fig. 7. Distribution of Lithuanian mobile traffic by device, 2020

Source: authors’ own study

Overall mobile traffic structures in Baltic States could be projected as quite similar, the forecast for Lithuania is shown on Figure 7. The traffic forecasts are summarized in the Table 2.

Table 2. 2020 mobile traffic forecasts

<table>
<thead>
<tr>
<th>Country</th>
<th>Monthly traffic per subscription</th>
<th>Total monthly traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estonia</td>
<td>4.4-4.6 GB</td>
<td>9-10 PB</td>
</tr>
<tr>
<td>Latvia</td>
<td>4.0-4.2 GB</td>
<td>14.5-16 PB</td>
</tr>
<tr>
<td>Lithuania</td>
<td>4.1-4.3 GB</td>
<td>20.5-22 PB</td>
</tr>
</tbody>
</table>

Source: authors’ own study

In total analyzing trend in 2012 we have slightly reduced previous forecast for Baltics (Karnitis et al. 2012) to CAGR around 45-50%. Our assumptions may prove to be more or less accurate, some minor differences may appear in scenarios related to the level of demand, its structure, the growth rate and other secondary indicators. However it is clear that in general there are no doubts on demand sustainability.

5. Sustainability of supply

Mobile communications are available in Baltics during last 20 years. Mobile operators have proven their ability to provide services that meet the growing demand, including two transitions to new technologies. Currently technological development has emerged giant new features that are enticing to customers.

The sector consequently is entering in the next transition, qualitative changes in the service delivery (IP services and data transmission becomes a major issue instead of voice) will be its major hallmark. But it is a common knowledge that any transition asks for much greater attention to challenges and risk factors, it relates in full to mobile sector to secure supply sustainability (Figure 8).

A strong incentive for customers to use mobile services is caused by availability of the local content in the national language; it amounts up to 80% of the total traffic. Mobile operators really can only stimulate creation of the content, while other companies and public institutions are the main actors in the creative work. Another substantial content issue is availability of all advanced applications (e.g., mobile cloud computing, M2M applications, etc.).

Qualitative ubiquitous delivery of the content primarily depends on the infrastructure. An optimal planning of the network (e.g., small cells in populated areas, reasonable frequency distribution for download and upload traffic, sufficient capacity of channel to switch, etc.) is the first step to ensure the smart usage of available scarce frequency resource and return of investments. Transition to advanced technologies (LTE as well LTE-advanced in future) will be necessary very soon to provide transmission of forecasted gigabytes. It should be mentioned that only upgrade of base stations to 4G without network optimization will be a risky approach, the desired effect will not be achieved.
Traffic forecasts indicate necessity for new frequency bands (especially for 4G), projected traffic growth cannot be served by means of existing bands. Baltic NRAs with frequency allocation for wireless communications have created a favourable climate for development of services; all three NRAs are among the most successful five in this activity in the EU, only use of 800 MHz band has delayed because of abovementioned reason.

The introduction of affordable business models will be a big challenge for operators, transition to 4G requires for their review in difference with transition to 3G, which was carried out without significant changes in business practice. The deployment of 4G network will ask for huge investments (it is evaluated necessity of around 200M EUR in Estonia and 300M in both Latvia and Lithuania for 100% LTE deployment) while the purchasing capacity of population does not rise so fast. As already indicated, prices for current 4G offers are much higher than real household spending for communications services. Low desire to spend larger share of income would become a serious risk factor, especially if quality of services is not enough high.

Conclusions

The market of mobile services in the Baltic States is developing dynamically. Each new technological generation offers new possibilities, while the current strong competition is forcing operators to use any of these options. As a result increasing solvent demand is met, consumers’ assessments of services’ availability, quality and price is above EU27 average level. There are no radical differences among Baltic States now, mid-term forecasts do not identify such in future too.

Analysis shows that demand and usage (mobile and mobile broadband penetration as well traffic) growth will continue in mid-term (projections till 2020), appreciably risks for demand sustainability are not identified. Global and local socioeconomic factors could have a minor impact on development pace and on purchases of advanced applications, but the general trend will remain.

Supply-side sustainability risk is slightly more serious. Currently the mobile ARPU is low that would create problems for huge investments, which are necessary for transition to 4G technology. Especially it relates to Latvia and Lithuania, it is difficult to assess the ARPU, which is significantly less than 100 EUR, as reliable base for sustainable development. Design and implementation of the appropriate business model becomes a priority for operators. We are sure that this fully feasible task for operators will be performed and risk factor avoided.

Reliable statistical data on mobile communications are needed for more accurate analysis of tendencies including early identification of sustainability risks. The common interest and task of government, regulators and operators is to activate the data collection and gathering.

References


1. Introduction

In recent years, arguments that social capital has a positive impact on organizations have been widely diffused (Camps, Marquès 2011; Cantner, Stuetzer 2010; Chang et al. 2006; Coleman 1988; Dakhli, Clercq 2004; Fu 2004; Inkpen, Tsang 2005; Jamal et al. 2011; Kaasa 2007; Kaasa, Vadi 2008; Kaasa et al. 2008; Kaasa, Parts 2008; Kang, Kim 2009; Rooks et al. 2009; Nielsen 2005; Özdemir, Demirci 2012). Meanwhile, Juknevičius (2003) states, that social capital can vanish. In his point of view, social capital is important for the society, but its loss poses a threat to the unity of the population and this result encourages a social isolation of individuals. It is stated that mutual trust among people is one of the characteristics of social capital, which appears crucial for entrepreneurs. It affects entrepreneurship via social norms, networks, human capital and trust perceiving it through cognitive, structural and relational dimensions. Fu (2004) observes the significance of trust, where a lower employees’ turnover and more reciprocal labour-management relations could cut transaction costs and bring higher-performance work practices.

Scientists agree that networks are essential for a sustainable business performance. Based on researches conducted by Johnson et al. (2002), a quarter of all existing customers were friends or acquaintances in the beginning. Cantner and Stuetzer (2010) reveal that in the process of developing sustainable innovations companies do not often possess enough information about prices, production process, costs and competition. According to Fu (2004), the share of informa-
tion among various market players should definitely help in this matter, partly via a better use of resources and increasing sustainable innovation capabilities. Indeed, social capital acts as the driving factor for sustainable innovation capabilities in the modern business world. Based on Global Entrepreneurship Monitor (GEM 2012) and scientific literature, the research question is raised: how social capital affects entrepreneurship via sustainable innovations. The methodology of Global Entrepreneurship Monitor (GEM 2012) encompasses two research methods: the quantitative adult survey (APS: Adult Population Survey) and qualitative interviews with experts (NES: National Experts Survey). The results indicate problems in Lithuanian enterprises that are examined via social capital dimensions.

2. Social capital and its relation to innovation capabilities

Within the scientific literature researchers often analyse different elements of social capital mitigating the role of ideologies among these elements. Coleman (1988) distinguishes communication channels, social norms, expectations and obligations as the essential elements that constitute to the creation of human capital. In a similar way Rooks et al. (2009) observe the importance of social capital while highlighting the dependence between networks and sustainable innovative performance. Social capital refers to trust (interpersonal and institutional), impacts of networks and social norms that facilitate the creation and maintenance of an adequate social structure together with other forms of capital. This should facilitate a long-term growth and sustainable development (Portela et al. 2012). Adler and Kwon (2002) point out that “…social capital facilitates access to broader sources of information and improves information’s quality, relevance, and timeliness.”

While tackling the importance of social capital from the organizational perspective Fukuyama (2002) relates social capital to human capital, which should be enhanced through education (thus, it requires investments in training and an institutional infrastructure). According to the author, apart from the transmission of certain specific skills and knowledge, social capital requires the inculcation of shared norms and values (habits, shared experience, and leadership). Stam and Elfring (2008) point out that ‘high network centrality, then, facilitates an entrepreneurial orientation by increasing a firm’s capacity to quickly identify, access, and mobilize external resources. Indeed, recent research supports this view and shows that ventures with high centrality pursue more sustainable innovative strategies and have better odds of acquiring venture capital’. Nahapiet and Ghoshal (1998) agree that elements of social capital can act as the basis for improving a sustainable business performance. Rahmani & Mousavi (2011) associate internal social capital as various organizational activities. Boulila et al. (2006) note that “…lower trust can discourage innovation. In this context, entrepreneurs must devote more time to monitoring possible malfeasance by partners, employees and suppliers and spend less time to devote to innovation of new products or processes”. Covey and Merrill (2009) analyse the benefit of trust by using the formula of “economic trust” (Figure 1).

![Fig.1. The formula of “economic trust”](source: Covey and Merrill (2009))

“The greater the level of trust within a community is, the greater is the likelihood of cooperation” (Christofooru 2003). In companies where there is a high level of trust, it is easier to obtain the loyalty of employees, customers, suppliers and investors (Covey, Merrill 2009). The formula reflects the dependence among trust, speed and cost. It means that a low level of trust makes a negative impact on labour productivity (speed) and cost of products or services. “Trust can influence innovation through many mechanisms. First, the higher the general trust, the lower the monitoring costs of possible malfeasance or non-compliance by partners and the smaller the need for written contracts” (Kaasa et al. 2008). Hence, social capital acts as the fateful factor for a career success (Seibert et al. 2001).
Kaasa (2007) elucidates that innovation is, in general, the introduction of something new or significantly improved (products, services or processes). Though the introduction of innovations is costly, it always brings a smaller or larger effect. Thus, enterprises have to evaluate factors that may affect a sustainable performance of organizations (Figure 2).

**Fig.2.** Expanded formula of ‘economic trust’ within organizations  
*Source: Adapted by authors, based on Covey and Merrill (2009)*

The adapted formula indicates the elements that act as the driving factors in organizations. A high level of motivation, a sustainable development of human capital, trust, social norms and networks make influence on the companies’ productivity (speed) and costs. Kaasa (2007), Allani *et al.* (2003), Landry *et al.* (2000), Rahmani and Mousavi (2011), Nielsen (2005), Kang and Kim (2009), Camps and Marques (2011) confirm that social capital is related to innovations. Kaasa (2007) observes “social capital as a relevant factor of innovation…”, meanwhile, Rooks *et al.* (2009) state that social capital may not only make a positive impact on the economy and innovative activities, but also can act as a constraint. Human capital is considered as one of the key elements of social capital for sustainable innovative activities in organizations. Kaasa (2007) reveals that “…social capital has a positive impact on education and human capital.”

Allani *et al.* (2003) note that human capital plays a crucial role for companies willing to seek for major competitiveness, increasing sustainable innovative capabilities of business. Kaasa and Vadi (2008) associate innovations with some kind of change and uncertainty, as cultures with a strong uncertainty avoidance are more resistant to innovations. On the other hand, cultures with a stronger uncertainty avoidance tend to protect the intellectual property by patenting. However, developing and patenting innovations are sequential phenomena: if there are no innovations there is nothing to patent as well.

Kaasa and Vadi (2008) point out that employees of individualistic societies have more possibilities to try something new in contrast to collectivistic societies, i.e., individuals of individualistic societies have more driving motives or opportunities to receive recognition for innovative ideas. Nevertheless, Everdingen and Waarts (2003) reveal that within organizations with a high power distance, the centralized decision structures, authority and formal rules dominate, whereas sharing of information is limited. The author confirms that the level of centralization and formalization is related to the one of innovations. On the other hand, the teams’ ability to adapt to the changing environment is closely related to sustainable innovative capabilities, i.e., there must always be enough attention paid to employees, focused on gaining knowledge, ideas and integration. Indeed, “the innovation process cannot be successfully completed without acceptance and implementation of new ideas and practices by majority of team members. However, a novel and innovative idea may be imported by an opinion leader, it can only be successfully implemented at a team level when team members agree on and accept it through diffusion processes, based on team members’ social network” (Kang, Kim 2009).

Özdemir and Demirci (2012) approve the importance of leadership in sustainable innovative processes. “In order to support the innovation processes, leaders should also be able to develop competencies and culture for innovation. Last, but surely not least, leaders are respon-
sible for ensuring healthy flow of information within the organization. Both internal and external, and formal and informal information is crucial to creativity and learning that in return sparks the innovation initiatives.”

In a similar way as Özdemir and Demirci (2012), Kang and Kim (2009) point out that “team members’ social capital alone cannot guarantee successful team innovation without an opinion leader’s role.”

In addition, the level of innovations may depend on historical events. Tonoyan (2004) indirectly indicates that the level of social capital is lower in countries that belonged to the Soviet Union. The author emphasizes that the level of corruption is increasing gradually and it is the highest in Soviet Union countries. On the one hand, the corruption does not depend on social capital concepts, but from a different perspective, the level of corruption may depend on individuals’ values, norms, traditions and the environment. The history of countries determines the level of innovativeness in organizations and it partly explains the differences of corruption levels between the Eastern and Western countries. Svedsen (2003) confirms that a high level of corruption may lead to a negative trust which endangers a sustainable economic growth.

Anis and Mohamed (2011) while interpreting Birley’s (1985), Hulsink’s and Elfring’s (2003) research results, denote that a high level of social capital helps entrepreneurs to get more funding, and, according to Jenssen and Greve (2002), interpersonal relationships among entrepreneurs and bankers facilitate the access to financial capital. The regression analysis indicates the dependence between social capital and the receipt of funding. These findings can be backed by Heikkilä et al. (2009) who discovered that there was a correlation between social capital and borrowing from financial institutions. The analysis confirmed the existing relation between social capital and innovations via the receipt of financing.

Nevertheless, social capital associates with the access to information which is beneficial for entrepreneurs. Entrepreneurs with a great diversity of human capital are able to get more relevant information of high-quality. The variety of human capital indicates the experience of entrepreneurs or teams in organizations. Entrepreneurs can better evaluate the breadth of experience, quality and new information, its usefulness, and integrate it in the existing knowledge base. It is emphasized that these entrepreneurs have broader social networks, in line with more opportunities to choose the right partners (Cantner, Stuetzer 2010).

Within a well-developed scientific literature on innovation capabilities the level of innovations depends on social capital in organizations. Camps and Marques (2011) submit that there are four factors that make influence on a sustainable development of social capital (stability, closure, interdependence, interaction) (Figure 3).

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**Fig.3.** The effect of drivers on social capital dimensions

*Source: Camps, Marquès (2011)*
While scrutinizing the importance of social capital in business Johnson et al. (2002) point out that the structural dimension is the concept of social capital which describes relationship among people in networks. Social networks provide the access to resources that bring to enterprises a wide range of opportunities and some constraints. Cantner and Stuetzer (2010) suggest that the access to resources has an intrinsic importance for small and newly established businesses that usually suffer from the deficiency of financial resources, insufficiently skilled labour force, suitable equipment for researches and development and manufacturing.

The relational dimension involves the motives of behaviour (Chang et al. 2006). Nahapiet and Ghoshal (1989), analysing the structural dimension, indicate trust, norms, expectations as the relevant elements. Relying on the Nahapiet’s and Ghoshal’s (1989) argumentation, Rahmani and Mousavi (2011) reflect that this dimension describes individuals’ relationships. Inkpen and Tsang (2005) note that the cognitive dimension expresses the common understanding and objectives among the network members. According to Nahapiet and Ghoshal (1989), individuals’ beliefs are one of the elements of cognitive dimension in the organizational environment which can influence the organizational culture formation, as a result stopping a sustainable innovative performance. However, there could be interpreted Nahapiet’s and Ghoshal’s (1989) thoughts, where elements of the cognitive dimension are not just belief, but also ideals, values, mental models, schemata. Also, the tacit knowledge can be attributed to the cognitive dimension (Monaka, Konno 1998). “Tacit knowledge is what we know as human beings. Sometimes we are not aware that we have tacit knowledge. In an organization, the amount of tacit knowledge is much more than other types of knowledge (explicit and embedded). For this reason, we ought to know the value of tacit knowledge in an organizations and we have to find out how can it be managed by CEO” (Sagsan 2003). Thus, the dependence between social capital and innovations exists (Figure 4).

Rahmani, Mousavi (2011) determined innovations as “…(1) the ability to develop products to meet the needs of market, (2) the ability to use existing technology to develop products, (3) the ability to develop new products or update existing products to meet the needs of markets, and (4) the ability to acquire new technology to create new opportunities.” Innovations cover formal and informal relations among companies and various actors in their own environment, and learning is diversified, which includes learning-
by-using, learning-by-doing and learning-by-interacting. Nielsen (2005) indicates four possible types of knowledge, i.e., know-what, this type of knowledge is described as knowledge about facts and know-why includes scientific knowledge, whereas know-how emphasizes the ability to do something, know-who is knowledge about who knows what and how to do it. It can be stated that the importance of knowledge acts as the essential element for sustainable innovative activities; however, social capital is a driving key creating a competitive advantage.

Mačerinskienė and Aleknavičiūtė (2011) point out that "social capital is a component of intellectual capital. It is based on a set of values and the subsequent indicators such as confidence, loyalty, sincerity, compromise, transparency, solidarity, responsibility, honesty, and ethics." Also, Nahapi et al. Ghoshal (1989) reveal that social capital makes influence on the development of new intellectual capital creating benefits for sustainable innovative activities (Figure 5).

Thus, benefits of social capital increase the innovative performance. According to Mačerinskienė, Aleknavičiūtė (2011), social capital makes the influence on the access to new markets, reduces the employee turnover and business risk, and fosters a better diffusion of information. It is obvious that social capital stimulates sustainable innovations and creation of intellectual capital in enterprises. Indeed, incremental and radical innovations depend on intellectual capital. Amiri et al. (2011) reveal that structural capital
includes buildings, equipment, software, processes, patents and trademarks. Structural capital encompasses image of organizations, information systems and proprietary databases. The essential elements of structural capital can be analysed as organizational process and innovative capital. Organizational capital is realized as an organizational philosophy and framework. Another dimension is process capital including methods, procedures and programs, which help to strengthen the delivery of goods and quality of service. Innovation capital encompasses the intellectual property and intangible assets.

Amiri et al. (2011) claim that relational capital examines trademarks, licenses, franchises, focusing less on communication and relationships with customers. Human capital can be understood as a part of intellectual or social capital. Thus, intellectual capital makes the impact on incremental and radical innovations. On the other hand, social capital affects organizations via incremental and radical innovations.

Camps and Marquès (2011) announce that “the greater the stability, the greater the potential to build stocks of social capital in the three dimensions: stability promotes the creation of networks and relationships, allows people to share experiences which drive same vision and language, and finally it facilitates the creation of trust, norms and obligations.” The authors note that “closure refers to the existence of dense social network boundaries that distinguish members of a group from non-members, and within which all actors have relationships with each other” (Camps, Marquès 2011). To continue, Camps and Marquès (2011) indicate that the interdependence reflects common goals and business success. Camps and Marques (2011) note that communication reflects relationships among individuals by indicating quantity, quality and strength. Jamali et al. (2011) underscore “the importance of both structural and relational elements as in ensuring partner diversity (structural) but also relational elements as in fostering incentives for sharing knowledge and effective coordination mechanisms to ease concerns about opportunism and ensuring the sharing of critical and timely knowledge between partners.”

Hill (2003) reveals that the creativity and innovations are important factors for entrepreneurship; however they are not synonyms. Creativity is often a solitary, individual process and refers to the generation of novel ideas. These ideas may have very little value to anyone else except to the creator. In other words, creativity can be defined as “a process of being sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies etc”.

Also Hill (2003) notes that “innovation refers to the process which follows the conception of a novel idea and often involves several people who each offer different suggestions and contributions.” Indeed, a high level of social capital may contribute to a sustainable growth of innovations in organizations. Notwithstanding all the benefits of social capital, Camps and Marquès (2011) reminds that building social capital requires considerable investments of time and resources, mainly because of maintaining ongoing relationships and norms and slack resources.

Nielsen (2005) states that social capital affects the product and service innovations in several ways “it helps to reduce malfeasance, induces reliable information to be volunteered, causes agreements to be honoured, enables employees to share tacit information, and places negotiators at the same wavelength.” Figure 6 reflects the importance of a high level social capital within the product life cycles, covering the product and process innovations.
In the stage of product introduction the level of innovations grows gradually, while process innovations are extremely limited, compared to innovative products. A producible product is focused on a suitable size and shape with the aim of manufacturing well-made products beneficial for final customers. Sometimes manufacturers allow consumers to test items so that they could check properties of product exploitation. When manufacture innovations are dominating, processes and products enter the final stage of the product maturity. The driving force in this stage focuses on automation of manufacturing and volume enhancement (McDaniel 2002).

“Innovation processes thrive on trust, networks and norms that decrease transaction costs, increase the quantity and quality of information, facilitate coordination and diminish collective action problems. Innovation can be seen as an intermediate variable. Social capital enhances innovation, and innovation generates a sustainable economic growth and development” (Nielsen 2005). It is obvious that social capital makes influence on product and process integration through product life cycles.

3. Methodology

The research is based on the methodology and data of Global Entrepreneurship Monitor (GEM) for the year of 2011. GEM is considered the largest dataset on entrepreneurship in global markets, where nearly 70 economies are investigated, and Lithuania takes the part of this consortium. Two research methods are combined: the quantitative adult survey (APS: Adult Population Survey) and qualitative interviews with experts (NES: National Experts Survey). While APS examines the influence of an individual, his or her characteristics, motives, attitudes or actions in the life-cycle of entrepreneurial processes, NES is to collect the data on the role of institutions and framework conditions for developing entrepreneurial activities in the economy. To elucidate the specificity of Lithuanian entrepreneurs, there was a list of additional questions related to social image of entrepreneurs in Lithuania prepared.

The APS survey in Lithuania covered the sample of 2003 adults from 18 to 64 years. The regional proportions of respondents within this survey are in line with the regional spread of population at the country’s level. The Lithuanian survey of experts took place in September 2011. It was conducted by the team of the In-
ternational Business School at Vilnius University (Dr. Mindaugas Laužikas, Dr. Erika Vaiginienė, Dr. Vikinta Rosinaitė, Aistė Miliūtė, Skaistė Batulevičiūtė, Simona Dailydaitė). The responses came from two groups of respondents: starting or helping to start a business having no revenue generated yet (N=255) and business owners (N=307).

The expert interviews enclosed 36 experts from 9 different fields: finances, governmental policies and programs, education and trainings, R&D, business and physical infrastructure, the market openness or cultural and social norms. The NES is more qualitative than quantitative in its original conceptualization. In qualitative research, i.e. focus groups and similar, it is considered that with at least 4 qualified opinions one can calculate a representative average opinion about a thematic item. In the NES, all experts make opinions about all proposed items using Likert scales of 5 points: 1 = completely false and 5 = completely true. In the worst scenario, including non-responses to some items among the experts, there are always more than 20 opinions in each item. Experts must not know that each one of them was selected by its expertise in one of the 9 areas: this remains secret for them and only the GEM team has this information (GEM 2012).

4. Trust, norms and networks in Lithuanian firms

Driven by the insights presented within the scientific literature review, the first focus of the present research is on trust and networks. The research results show that nearly 50% of respondents absolutely agree and one fourth (26.1%) of respondents agree that dealing with people provides with a lot of business opportunities. To continue, only one third of respondents had difficulties to decide, whether they would understand better business activities under the management or consulting of other people, while 40% of respondents were fond of initiating changes in business processes themselves.

In spite of researches and publications tackling the issue of trust in business, the analysis is always challenging, because of the difficulty to measure it. One of the possible ways to measure trust in business is to examine the social image of entrepreneurs and who are the principle contributors to social image. The research results indicate that notwithstanding a positively evaluated social image of entrepreneurs by both experts and respondents, some key-strategic groups should be more dynamic in promoting entrepreneurial initiatives. Only 8.6% of respondents suppose that universities and lecturers contribute to the social image of entrepreneurs, while groups and group mates were mentioned by 6.2%. In addition, there is a huge potential to strengthen the social image of entrepreneurs at the level of secondary schools: nearly 95% of respondents did not receive necessary knowledge on entrepreneurship from school professors. The modest contributors were the family members (7%). It is of significant importance that 50.4% of respondents emphasize the power of media in building the social image of entrepreneurs. Friends and relatives were mentioned by 38.6% and other entrepreneurs by 39.8% of respondents.

Another interesting finding is related to the characteristics of the respondents living place: more than two thirds (70.5%) of respondents' stated that over the last two years they did not know people who had started business in their environment, while 28% admitted, that they knew businessmen in their environment. Such answers are supported by the perception of business opportunities in a living environment in the upcoming 6 years: only 19% of respondents consider their living place as having good possibilities to start the business. Analogically, the two thirds consider their living place being not in favour to start business. The negative perception of a living place was accompanied by a negative evaluation of skills, knowledge and expertise necessary to start a business (only one third of respondents had evaluated their skills, knowledge and experience as suitable).

It is not enough to generate innovative ideas and evaluate business opportunities; often those ideas are unrealized because of the lack of initiatives to execute those ideas. Only 10% of respondents helped to execute ideas during the period of the past 12 months. The half of respondents needed one year or more for helping to establish a business, other needed up to one year for helping to establish a business. 80.2% of respondents were the principle or co-owners of a business; 61.3% established and developed their business in a two-people team, and 26.3% were three people in a team while starting their business.

The previous experience in a company helped 46.5% of respondents to form the business or innovation idea, and only 13.4% of employers provide or intend to provide the support for the business development or serve a necessary physical infrastructure (86.6% of
employers do not provide such support). The previous experience is also useful because 46.7% respondents who have established their business intend to employ their ex or present colleagues. Apart from human and financial resources, each business needs technological resources. This is confirmed by 44.4% respondents already having their business established, where the technologies in use are related to technologies of their previous or current employer. Though more than 63.9% of respondents involved in business (starting or helping to start businesses) use technologies and apply procedures necessary for the creation of products and services for longer than 5 years, a rapidly changing business environment, progress of information technologies and a severe competition in global markets demand from 25.9% entrepreneurs to renew technologies and procedures more often, as technologies and procedures last from 1 to 5 years, and 10.1% of respondents need to do this every year. Among respondents who already have their business established and own it, 19.4% need to renew them in the period from 1 to 5 years, while 8.6% of respondents need to make necessary changes annually.

For 51.5% respondents who started their business the previous job experience helped to build the business idea. However, 90.4% of respondents indicated that their current or previous employers avoid of providing their business with the financial support of physical infrastructure. 31.1% of respondents accentuated the importance of working in other companies and particularly intentions to employ their current or ex colleagues. 44.6% respondents-business owners use technologies that completely or partially related to the previous or current employer.

Trust and networks could be also translated to such factors as entrepreneurs’ investments in initiatives of other people. 58.8 per cent of respondents who invested in other businesses allocates those investments to their relatives, and 31.6% to neighbours and friends. Other 2.6% dedicated their investments to colleagues, and 6.1% to unknown people with a good idea.

The role of trust and networks could be illustrated by the fact that many entrepreneurs are working for other employers while executing their initiatives. Thus, it is important to have a look at the employment status of respondents. It appears that 54.9% of respondents were employed full time, 7.3% of respondents were part-time employees, 17.4% were self-employed, 10.6% were looking for a job, 9.4% of respondents were on their retirement leave or with disabilities, and 7.6% were students. 61% were employed in profit seeking companies, 26.2% in governmental organizations, 10.1% were employed in non-profit organizations. The majority of respondents (63.1%) were working in organizations with the headcount of more than 2 employees.

Within the variety of organizations 19.1% of respondents were involved in the creation or realization of new activities. 57.6% were involved in such processes with no respect whether these activities take place in their current organization or not. 71.9% of respondents were involved in the generation process of new entrepreneurial and innovation ideas over the last three years. 33.9% of respondents managed such processes, 53.6% helped to generate such ideas, and 12.5% executed, managed and supported entrepreneurial processes. 57.4% of respondents were continually preparing and executing ideas not stopping themselves at the generation stage: 37.8% managed the preparation activities and execution processes, 48.9% helped to prepare and execute activities, and 13.3% were responsible for both functions.

Notwithstanding quite high numbers on respondents involved in entrepreneurial activities, the indicators of sustainable innovation performance among Lithuanian entrepreneurs were quite disappointing, as 71% of respondents-owners could not characterize their products and services as innovative for their customers/clients, and 66.7% of respondents felt a strong competition in the market. Therefore, the innovativeness and competitive advantages of Lithuanian companies trigger many doubts.

Deriving from the scientific literature analysis the role of social capital on Lithuanian companies should be examined via cultural and social norms in Lithuania. According to the interrogated experts; cultural and social norms do not encourage the risk-taking and entrepreneurial activities. 72% experts do not agree that cultural and social norms encourage the entrepreneurial spirit, and 56% of experts believe that the national culture does not sufficiently enhance the creativeness and innovativeness of the Lithuanian nation.

Summarizing the research results there could be a conceptual model designed to illustrate the role of social capital on a sustainable innovation performance of Lithuanian companies. It gets clearer how trust, networks and cultural and social norms affect the innovativeness of Lithuanian companies (Figure 7).
As it is illustrated in the above presented model innovation capabilities are translated to such factors as the perception of innovativeness and creativeness, risk-taking, generation of innovative ideas along with execution, management and support of entrepreneurial processes and activities. All of these factors contribute to competitive advantages of Lithuanian companies that are difficult to achieve without trust, because trust influences the social image of entrepreneurs, relationships among people, perception of business opportunities in the environment as well as respondents’ opinions on entrepreneurs’ skills and knowledge to start business. It should be added that competitive advantages are achievable only via the key strategic partnerships and cooperation; thus, networks contribute through entrepreneurs’ investments, the employers’ support for a sustainable business development or physical infrastructure, the previous experience in a company and numbers of initiatives of executing ideas. In a broader perspective, all these elements act within a set of cultural and social norms that support or prohibit a sustainable innovation performance. Therefore, the role of education organizations and education itself on business should be the object of the further researches in order to use the existing potential of Lithuanian companies.

Conclusions

Social capital is an important factor in disseminating knowledge across the society and business, while entrepreneurship affects a sustainable economic development (Portela et al. 2012). Relying on Mačerinskienė and Aleknavičiūtė (2011) “confidence, civic behaviour and associativity strengthens the social networks, contributing to the sustainable economic development.”

The interaction of various elements of social capital acts as the catalyst creating and strengthening competitive advantages. Based on Musai et al. (2011), social capital can facilitate the accumulation of human capital, financial investments, sustainable innovation processes, creativity and the management efficiency. The analysed social capital elements (trust, relations and norms) significantly contribute to the performance of Lithuanian companies. More than three fourths of respondents agree that relationships among
people bring many business opportunities. Trust and networks cover such important aspects as co-operation with employers, employing ex or current colleagues, the social image of entrepreneurs, perception of the innovativeness and creativeness, entrepreneurs’ investments in activities of other people as well as the accumulated experience in a company.

Though 57.4% of respondents are continually preparing and executing ideas not stopping themselves at the stage of generating ideas (37.8% manage the preparation activities and execution processes, 48.9% help to prepare and execute activities, and 13.3% of respondents are responsible for both functions), 71% of respondents-owners do not characterize their products and services as innovative while 66.7% of respondents feel a strong competition in the market.

It is closely related to the fear of risk and social and cultural norms that, according to experts, do not encourage the creativeness and innovativeness of the Lithuanian nation. It draws the implication that the educational and governmental policies and/or programs should concentrate more on entrepreneurship and sustainable innovations in Lithuania. Only when the creativity and sound strategic management are employed in business the sustainable innovation capabilities can be acknowledged and fully used.

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