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KNOWLEDGE-BASED ECONOMY IN THE EUROPEAN UNION: CREATION PROCESS, THE MAIN TYPICALITIES AND PROBLEMS OF CLUSTERIZATION

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Abstract

Possibilities for the development of new forms of economic, social and technological headway designed to create and further improve economies based on knowledge & innovation are analyzed here.

The main emphasis is put on *national and regional economic specialization and creation of new networks of clusters in the situation of the development of the European Union.* We have found that clusterization oriented towards the increase of efficiency of various national and regional economies is a critical precondition for successful creation of modern economy based on knowledge & innovation, both in the whole space of the European Union and particular countries.

Another idea - a concept of creation of regional and cross-regional clusters and their networks also known as „economic oasis" - is suggested here. It is explained in the paper that in the economies based on knowledge development of clusters and their networks will soon become one of the core forms of economic and technological advancement. The authors of *scientific research present* the object of which has been *creation of the knowledge based economy in the situation of the enlargement of the European Union. The objective of the completed research has been* the proof of the fact that *key priorities for creation of the knowledge based economy is the urge of technological advancement and enhancement of compatibility and productivity* using such opportunities as *specialization of national and regional economies, creation of clusters and their networks,* as well as *the development of so called economic "oases" and hyper-clusters in the entire economic space of the European Union.* The main *result* of the completed research is the concept of *strategies oriented towards integration and synthesis,* the basis for which is the *universal principle of „creation of a new quality":* we should utilize this principle in elaborating and implementing the strategies for creation of knowledge based economy in the European Union. Key *tasks* of our completed research have been the following: demonstrate the fact that knowledge based society and knowledge based economy in the European Union should be created according to the *universal principle of „creation of a new quality;* prove the necessity to create and apply *the strategies oriented towards innovation, integration and synthesis;* reveal the essence of the *rational specialization of national and regional economies*; show the necessity of creation and expansion of *regional, cross-regional and international innovation networks of clusters and economic "oases"* in the European Union; demonstrate the fact that *networking of science and technology parks and business centers* is *the first stage of the knowledge based economy creation process;* show the necessity of the networking of science and technology parks and business centers in the context of knowledge based economy creation processes in Lithuania.

Keywords:

Knowledge - based society and economy, innovation, integration - and synthesis – oriented strategies, high technology, networks of clusters and economic „oases", European Union, Lithuania.

Introduction

The future of the innovation in the European Union is very close linked to the creation of the knowledge based society and knowledge based economy.

This means that key issues that require *strategic decisions* of innovation are to be considered as issues of creation of the knowledge based society and knowledge based economy.

The essence of these issues could be revealed in the following:

– *what* should the knowledge based society and knowledge based economy be in the future in the European Union?

– *how* should the knowledge based society and economy be created in the European Union?

Striving to find answers to these questions determines

the necessity of elaboration and implementation of appropriate *strategies for creation of knowledge based society and knowledge based economy*. In its turn, in order to ensure elaboration and implementation *appropriate* concepts and methodologies of preparation and justification of strategic decisions should be used.

The article analyzes a new approach towards the way how *long term strategies* designed to create knowledge based economy in the European Union and in the countries of the European Union (for example – in Lithuania) should be prepared.

These tasks have been of a *priority* when attempting to create a modern knowledge based society and knowledge based economy in the European Union.

Creation of knowledge based economies in the European Union as a sphere of complex scientific research

Knowledge based economy is a new stage of social and economic development indicating that *a society of a new type* is being formed which is characterized by *new quality of life and new possibilities for further modernization*.

Creation of knowledge based economy should be considered as a very important *object of scientific research*. As we might know, there are numerous publications in the contemporary scientific research practice dedicated to the creation of knowledge based economy. (Cohendet, P., Stojak, L., 2005; Currie, W., 2000; David, P.A., Foray, D., 2002; Ein-Dor, P., Myers, M., Raman, K.S., 2004; Farnsworth, K., 2005; Goeransson, B., Soederberg, J., 2005; Grace, A., Butler, T., 2005; Hunt, S.D., 2000; Huseman, R.C., Godman, J.P., 1999; Merrill, R.E., Sedgwick, H.D., 1997; Leydesdorff, L., 2004; Steinmueller, W.E., 2002).

Summarizing the completed research allows us to conclude that in addition to the already developed research directions some *new and greatly prospective* directions might *additionally* be elaborated: one could expect that the research in the directions mentioned above could allow to define *new approaches* towards the *concept* of the knowledge based economies, and the assessment of the conditions necessary for successful implementation of such economy. It is especially important for the *new approaches* to thoroughly prepare and implement the *strategies* designed to create knowledge based economy.

Scientific research dedicated to the creation of knowledge based economy can be completed in two important new directions including:

1. *To create knowledge based economy it is necessary to evaluate the political, social, cultural, economic, information and technological environment.* When completing the research in chosen directions there should be assessed whether *political, social, economic, information and technological environment is adequately or inadequately favorable* for creation of knowledge based economy: if the findings show that such environment is *inadequately favorable,* adequate ways to influence this environment should be sought in the course of the research. Main priorities for the research in this direction are connected to definition of *common* to the entire world phenomena of the economic, social, technological or other progress, along with assessment of *features* of the development typical to either *large regions of the world and various groups of countries* (for instance, analyzing possibilities for creation of knowledge based economy it is necessary to thoroughly examine regularities of the development of the European Union and prospects for the quantitative transformations in the economic, social and cultural space of the European Union)

2. *Creation of visions and patterns of knowledge based economy.* Completing the research in this direction it should be defined what kind of knowledge based economy should be in the *future* and *how* it should function. Key priorities of this direction could be:

- structure of the future knowledge based economy,
- principles and mechanisms of the functioning of this economy
- factors of growth, along with orientations of economic, social and political development;

3. Elaboration, justification and implementation of the necessary strategies for the creation and further modernization of the knowledge based economy. Completing research in this direction there should be a decision made about *how* there will be the transition from current economy to the visionary economy based on knowledge executed; *what* should the *strategies* of the *transition* be; and *what* should the policies of the society and the state be dedicated to the creation to the knowledge based economy. Main *priorities* of the research in this direction are:

- completion of political, economic, legal and other prerequisites for creation and further development of the knowledge based economy,
- transformation of the current economic system, in order to create future knowledge based economy based on the current one,
- international co-operation in the spheres of innovations and technologies,
- training of human resources in preparation of solid intellectual foundation for the knowledge based economy.

The new directions of the scientific research mentioned earlier reflect on a wide *panorama* of the issues that should be examined before creating the knowledge based economy. It is obvious that analysis of these issues is directly oriented towards the fact that

adequate methods of management are used that would allow to prepare and implement strategies appropriate to the changes happening in the society.

Strategies designed to create knowledge based economy in the European Union

Contemporary economic principles and practices confirm that in *efficiently operating economic systems their surplus value* is *created at greater extent*. This statement works in all cases where ways to increase efficiency and compatibility on the scale of both particular economic subjects and large national and regional economic systems (Boldrin, M., Canova, F., 2001; Bond, E., Syropoulos, C., Winters, L.A., 2001; Chortares, G.E., Pelagidis, T., 2001; Dutta, M., 1999; Guy, M., 2001; Redding, S.,Venables, A.J., 2004; Sangmon, K., 2002)

The main precondition to ensure high efficiency and compatibility of any economic system is to achieve that any economic system should be *properly specialised*. Hummels, D., Ishii, J., Kei – Mu Yi, 2001; Huseman, R.C., Godman, J.P., 1999; Melnikas, B., 1997; Olsen, T.E., Osmundsen, P., 2003).

Under the *proper specialisation* we understand the situation where the range of products produced within the *economic system* guarantees *magnification of the surplus value within this system*: the economic system should be exceptionally oriented towards the series of products, services and activities, whose structure allows to achieve potentially greater surplus value or higher velocity of the increase of this value.

For the sake of the rationalisation of the national or regional economic system various means may be implemented. These means should create a *solid complex*, and have to be *long-term* and *consecutive.* The idea of the means should ensure that the entire economic system of particular region or country is developed as a *large macro-cluster or hyper-cluste*r. These large macro-or-hyper-clusters may be *multi-profiled* and oriented towards *creation* of different and diverse *final products*, and it is very important to create final products that are compatible in *global markets*.

It is obvious that large macro – or- hyper- clusters in particular countries or regions should meet the following requirements:

- large clusters of this kind function as *open systems*, maintaining both internal and external economic and technological relations in international and global markets,
- *inside* of the large clusters of this kind various specialised clusters can be created within incorporated diverse institutions of science, research and education, enterprises of production and services, business incubators, parks of science and technology, centers for innovation, and industrial, trade, transportation and communication companies.

Development of large economic systems in a way of *clusterisation* may be of great variety. A very prospective method to implement this way is creation of *regional (territorial) or sectorial "oases"*.

In general "oasis" can be explained as an *economic system*, *possessing extremely advantageous political, legal, economic and other conditions for activities and development*. These conditions are as a rule exclusive and in their presence the "oasis" as economic system receives various privileges or extremely beneficial environment is created for it. "Oases" can be established on behalf of political will of a *state* or even a *group of states*: by the way, the idea of regional "oases" is very viable in the improvement and implementation of regional policy of the European Union, with the intentions of creation of "oases" "not only in particular countries, but also regions, comprised of regions of different countries.

Regional "oasis" is one where exceptionally advantageous conditions for economic development are created in a territorially outlined area (region). This area may coincide with systems of administrative territorial division of particular countries or may not.

Sectorial "oasis" is one where exceptionally advantageous conditions are created for particular branch of economy, and particular segments of business or public sector.

Creating and developing "oases" it is very important to consider demographic situation, possibilities to attract, concentrate and efficiently utilise human and financial and other resources, as well as possibilities rapidly expand various innovations.

The idea of the "oasis" and opportunities to promote this idea in the situation of the development of the European Union has been described quite comprehensively (Melnikas, B., 2002, 2003, 2004).

Summarizing the statements given above, we may confirm that the concepts of *proper rationalization of national and regional economic systems*, as well as concepts of creation of *macro-or-hyper-clusters and "oasis"* are of great importance, ensuring progress in the entire space of the European Union.

The idea of clusters, their networks and "oases", oriented towards rationalism of specialization of regional economies is very promising, when creating *the knowledge based economy* in the European Union. The implementation of this concept should be based on the *universal principle of „creation of a new quality"* when planning to prepare and implement appropriate *strategies oriented towards integration and synthesis.*

Networking of science and technology parks and business centers as the first stage of the knowledge based economy creation process: the case of Lithuania

The 21st century knowledge revolution created new opportunities and possibilities for the access and use

of knowledge and information. The transition towards a knowledge economy requires from policy makers to understand the comparative strengths and weaknesses not only their countries but economic systems also and then act upon them to develop appropriate short and long term policies and investments. Edmund Phelps Nobel prize winner in economics maintain that there are two economic systems in the West. Several nations including the US, Canada and the UK-have a private-ownership system marked by great openness to the implementation of new commercial ideas coming from the entrepreneurs.

The other system-in Western Continental Europe-though also based on private-ownership, has been modified by the introduction of institutions aimed at protecting interests of "stakeholders" and "social partners". The both systems include employer confederations, big Unions and Monopolistic Banks. According some authors both of them (Europe, North America) represent corporate downsizing, or the dark side of global economy. All economies and especially new born post communist market countries are looking for the personal way of development. In today's global economy, knowledge has become an even more decisive factor of competitiveness, productivity and growth. The global digital/knowledge economy offers unprecedented opportunities to produce and sell on a mass scale, reduce costs, and customize to the needs of consumers – all at the same time. Whether you live in a large country such as the USA or China, mid-sized country such as India or Canada or a smaller country such as Lithuania, your potential market is of the same global size. And you can source (net source) inexpensively wherever you wish.

Various management writers have for several years highlighted the role of knowledge or intellectual capital in business. The economic integration and globalization are the two trends of current development of the world economy. In the global digital village every individual or small business can go global and directly compete with any company. Competition in the goods and services market has been brought to new, higher levels, and permanently so.

Developed countries can no longer hide behind politically motivated barriers, physical or other walls to protect themselves from competition from developing countries or emerging markets. Rather than clinging to old models, individuals and corporations in developed and (increasingly) in developing or transition nations need to upgrade their competitive advantages through more education and training.

New information and communication technologies (ICT), especially the Internet (increasingly wireless), bring new opportunities, to concentrate on core competencies, specialize and increase trade and investment flows. For these gains to occur, however, what needs essential transformation is the corporation itself.

Corporations need to change the ways they do business, they must become more flexible, amorphous networks of international entrepreneurs and knowledge managers working on particular projects. How such corporations should be governed is a new challenge before the managers working under the conditions of the global knowledge economy.

In the global economy any country, if it is serious about rising its standards of living must open its economy so as to avoid itself of opportunities of trade, interact with and learn from it. Modern growth strategy was developed at Harvard by M.Porter (Porter, M., 1990), where the different stages of competitive development of the nations are presented. A.Lahti (Lahti, A., 2007) resumed Porter's economic growth stages presenting them in the form of chart and named them like Global Challenge and the new economics:

Stage A : Factor-driven. Practically, any of the internalized or globalized industries have drawn their competitiveness from the basic factor conditions, such as low-cost labor and access to national resources. Firms typically produce commodities more than specialities. The rate of technology and R&D investments is low. The local economies are highly sensitive to fluctuations in commodity prices and exchange rates. There are only a few truly international firms. Domestic demand for exported goods is modest. The role of foreign firms is considerable, as they act as a channel for foreign markets and they bring foreign technology, knowledge and management with them to the host country. Technology is assimilated through imports, imitation, or foreign direct investment (Lahti , A., 2007).

Stage B: Investment-driven. In the investment-driven stage, countries develop their competitive advantages by improving their efficiency in producing standard products and services which become increasingly sophisticated.

While the advanced technology still comes mainly from abroad, with licensing and joint ventures, local firms' invest in process technology and modernization of production facilities etc. Firms often produce under contract to foreign manufacturers that control marketing channels. Home demand is still rather undeveloped, and related and supporting industries are not functioning optimally. It is typical to this stage that wages and input prices are higher than before and employment is increasing. Public policy concentrates on long-term matters. One of the major areas are infrastructure projects. Harmonization of customs, taxation, and corporate law may allow the economy to integrate more fully with global markets (Lahti, A., 2007).

Stage C: Innovation-driven. In the innovation-driven stage, the number of industries operating successfully at international level increases and broadens. Firms create new technologies and methods and compete with low costs due to high productivity rather than low production

factor costs. Home demand increases and becomes more sophisticated. Clusters are well developed, fostering innovation and technological change. A country's competitive advantage lies in its ability to produce innovative products and services at the global technology frontier using the most advanced methods. Institutions and incentives supporting innovation are crucial for further development. The economy becomes stronger against outer shocks, like cost shocks, because of its ability to compete with technology and product differentiation. Improvements related to externalities, market imperfections and incentives are important to develop the well-functioning factors, product and financial markets (Lahti, A., 2007).

Stage D: Wealth-driven. Unlike other stages the wealth-driven phase is driven by past accumulation of wealth and becomes unable to generate new wealth. Firms become more vulnerable to uncompetitiveness. They innovate less and the investment rate decreases. Employees begin to lose motivation and so on. The result is that firms lose competitive advantage compared with foreign firms and may even start to move their headquarters from their original home country to other countries. The standard of living and welfare is still rather high. The policy attempts in this stage try to increase the dynamism of the economy, innovations and profitability (Lahti, A., 2007).

First three stages involve successive upgrading of a nations competitive advantages and will be associated with progressively rising economic prosperity. The transition through the four stages is not automatic since countries may get stuck in a stage. Most investment-intensive economies are finding that their relatively high-cost labor make them vulnerable from really lower-wage countries, such as China, India. The transition towards knowledge economy requires to understand the comparative strengths and weaknesses of their countries, make evaluation of its opportunities and threats.

Every country possesses its own strengths and weaknesses, opportunities and threats. In spite of the heavy burden of the Soviet occupation legacies, after regaining its independence in 1990 Lithuania embarked on a path of determined, radical, and sustained reforms aimed at re-establishing democracy and functioning market economy. It succeeded remarkably and is now regarded Europe's transformation success story. At the same time Lithuania was in position how to answer the question: what could and should a low – income country with an educated population do to exploit new opportunities associated with the knowledge revolution?

When the WTO&ITC team compared Lithuania's ICT industry with similar industries of countries in the region. The conclusion was made that the industry is developing and expanding its activities across the region. In the EU market, activities related to sub-contracting or onshore software application were taking place. Although conclusion was made, that Lithuanian ICT industry is relatively small compared to the ICT market of Poland for example, it has good growth potential driven by niche areas and niche products.

In today's world separate market participants are unable to achieve good results which knowledge economy requires.

The key for solving problems are networks, clusters and other common activities. In the network of such knowledge institutions there are very popular objects of knowledge economy such as knowledge camps, houses, towers, islands, technological parks, valleys, etc.

At the present time in Lithuania five programmes of integrated research, higher education and business centers (valleys) are under preparation. The integrated research, higher education and business center (valley) is a research, higher education and knowledge-intensive business potential concentrated in a single territory, which has a common or related infrastructure and purposefully contributes to the creation of knowledge-based society and knowledge-based economy.

By developing valleys in Lithuania it is sought to create clusters of research, higher education and knowledge-based economy of an international level, to speed up the creation of knowledge-based society and to strengthen Lithuania's competitiveness.

Valleys in Lithuania are created seeking to concentrate, renew and optimize the infrastructure, which would enable state-of-the-art technologies and other most promising sectors of science, technologies and business to be developed, relations between scientific research and higher education to be strengthened, close interaction between scientific research, science, higher education and knowledge-intensive business to be ensured, as well as to engage in training researchers and other specialists.

Also, it is sought to develop scientific co-operation of the highest level on the national and international scale, to attract necessary foreign investments of great intellectual potential, and on the basis of research and higher education, as well as knowledge-intensive business to create clusters of knowledge-based economy.

At the present time the following centers are working on programmes and have already presented the improved visions: Vilnius *Saulėtekio technologijų slėnis* (Vilnius Sauletekis Technology Valley), *Vilniaus Santaros slėnis* (Vilnius Santara Valley), the Kaunas integrated research, higher education and business centers Nemunas & Santaka, the integrated research, higher education and business center (valley) for the development of the maritime sector of Lithuania(Klaipeda).

In our paper we are going more widely present the knowledge based project –"Sunrise Valley".

"Sunrise valley" in Vilnius is one of innovative centers, which was deliberately modeled after the Silicon Valley,

California, where "Eastman Kodak", "General electric", "Intel Fairchild", "Lockheed", "Hewlett Packard" and other companies started and developed their activities.

Knowledge economy clusters are successfully created near Universities in different countries. Very successfully towards this direction are developing our neighbors-Nordic countries. In recent years Finland and Sweden twinkled their resources for RD especially in the last decade that influenced growth of high tech level of production in exports of those countries. Technological parks "Kista" and "Technopolis" are well known knowledge economy clusters in all over the world. The neighboring country Poland also has great achievements in this field of activities. Poland is successfully developing 45 ha square Technological Park "Technoport" near the capital Warshaw. Good conditions for successfully activities started in Vilnius "Sunrise valley" where special social enterprise "Sunrise valley" in May of 2003 was established.

Vilnius University and Vilnius Gediminas Technical University, well known Lithuania's corporate leaders: ALNA, SONEX, OMNITEL, BITE GSM, EKSPLA, Laser Research Institute, the members of the Knowledge Economy Forum of Lithuania were foundators of this public unit. In February of 2004 this project was joined by municipality of Vilnius, which became shareholder of this establishment. In reality "Sunrise valley" accumulated theoretical and practical potential of the best Lithuanian research Institutes, Universities, think tanks, consultants, firms and organizations and is ready to tap into the growing stock of global knowledge and adapt it to local needs.

In the long run (till 2015) "Sunrise valley" the largest unit of Lithuania's knowledge cluster must be developed into the largest innovation centre in the Baltic states, where high added-value products and services will be created. Such a vision for "Sunrise valley" in the year 2005 was predicted by International Consortium "Centre for Strategy and Evaluation Services", famous Technological parks from Great Britain, Sweden and experienced local business partners. According to the evaluations by the year 2015 in territory of 2,5 ha about 150 new high tech enterprises with more than 3000 employees will be created, among them: Innovation Center for the development of laser and IT as well as the formation of business incubator and a scientific–technological park. It will be companies established by Universities and Research Centers, where students, professors and researchers from those institutions will work.

Conclusions and recommendations

Creation of the knowledge based society and knowledge based economy in the European Union is a very complex, long-term and ambiguous process.

Key *challenges and priorities* that require main attention when creating the knowledge based society and knowledge based economy are the following:

1. Creation of knowledge based society and knowledge based economy in the European Union should be oriented towards the solution of the following *problems:*
   - problems *of insufficiency and increase in the cost* of energy and raw-material, as well as problems of *secure and reliable* import of these resources, along with problems of creation of *alternative energy* and *economies oriented towards alternative raw materials*,
   - problems of *new prospective markets* necessary *for implementation* of production in the European Union, and problems of its development and introduction,
   - problems of the required potential development for *state-of-the-art* products, as well as problems of *compatibility of the products oriented towards high technologies in the* global markets,
   - problems of *social security, economic well-being,* as well as *social, legal and ecological environment* improvement;
2. In the *strategies* designed to create the knowledge based economy in the European Union main emphasis should be put on the following *priorities*:
   - *rational specialization* of national and regional economies*,* ensuring *high compatibility* both in the European Union and in global markets,
   - transformation of national, regional and sector economies into the *macro –or hyper –clusters* and *systems of such clusters,*
   - development of *clusters and networks of economic "oases" in the entire space of* the European Union,
   - further development of *clusters and networks of economic "oases" as key organizational structures* characteristic to the system of the European Union;
3. In the situation of the further development of the European Union the following provisions should be implemented:
   - issues of modernization and compatibility increase for the national, regional and sector systems should be tackled *in the strategies oriented towards integration*,
   - issues related to creation of the *integral and undivided* knowledge based society and knowledge based economy should be tackled *in the systems oriented towards synthesis in the entire space of the European Union.*

The research on knowledge based economy creation in Lithuania as well as in other countries of the European Union concludes that:

- the transition towards a knowledge economy requires that policy makers understand the

comparative strengths and weaknesses of their countries and then act upon them to develop appropriate short and long term policies and investments,

- Lithuania will need to develop higher added-value market niches that will precisely call upon the Lithuanian capabilities to create an entrepreneurial economy that is integrated continentally and globally : knowledge economy provides such opportunities especially in the context of knowledge and innovation in the European and global business,
- bridging science and business together provides a compelling platform to research the issues of upgrading competitive advantage in developed countries and contract out non–core competencies to emerging markets,
- bridging science and business together via creating a network of knowledge institutions and projects based on innovative scheme such as Sunrise Valley in Vilnius, deliberately modeled after the Silicon Valley, California and others, create the starting position. Post communist and other emerging market countries such as Armenia, Czech Republic, Ukraine, Hungary, Poland and others are well advised to jump to these new opportunities as they represent the best chance yet to realize the "latecomer's advantage" by leapfrogging to technologies and models of doing business which are new for Western countries as well.

Further scientific research and practice dedicated to creation of strategies for the knowledge based society and knowledge based economy in the European Union are greatly promising and important.

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