FUNCTIONING OF THE LOCAL PRODUCTION SYSTEMS IN BULGARIA, POLAND AND RUSSIA

THEORETICAL AND ECONOMIC POLICY ISSUES

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FOREWORD

Dynamic and developing local production systems (LPS) are considered the success factor in building a knowledge-based economy. The structures are perceived not only as a way to improve the competitiveness and innovation of individual economic operators but also as a mechanism stimulating the growth of entire regions. Networks within LPS help generate and disseminate new economic ideas and information, innovation and experience. The structures are considered the basic form of improving the efficiency of the science and research sector and the innovation of less developed regional and national economies.

Huge interest in local production systems has boosted activities for their development. Creation of clusters and the support for their development have become one of the pillars of industrial, scientific and research, innovation and SME-oriented policies implemented in many countries. Accumulation and concentration of activities and instruments to stimulate the growth of the LPS observed in the last decade resulted in the emergence of a new, separate branch of sectoral policy called *cluster-based policy*.

"Explosion of research" into the idea of LPS in recent years has focused around the circumstances and operating mechanisms of these economic structures. No doubt we may conclude that the number of definitions of the structures equals the number of authors and publications and differences, to which they point are often minor and vague. The idea of local production systems originates from the research and analyses of the French school of regionalists, economists and sociologists. It is almost identical with the idea of a cluster proposed by M. Porter in Anglo-Saxon literature.

On top of that, the idea of LPS is deeply rooted in many theoretical schools and takes from many interdisciplinary research movements. It draws on, inter alia, the Italian concept of industrial districts, French school of research on entrepreneurial environment and innovation or Californian new industrial spaces school of thought. References to the latter can also be traced in considerations over a learning city or a regional system of innovation.

The publication we hereby present belongs to a wide range of such considerations. It derives from research works, discussions and network relations developed within the research community as a result of the Project *Functioning of the Local Production System in the Conditions of Economic Crisis* (FOLPSEC), implemented within the 7th EU Framework Program (FP7-PEOPLE 2011 IRSES). The monograph discusses various aspects and points of view on the LPS based on the experiences from Central and East European countries and from the Russian Federation.

The publication is divided into two parts. The first one entitled *Methodology and operationalization of LPS theory* pays attention to theoretical and methodological aspects of the analysis and evaluation of local production systems. It includes four papers.

The first one by S. Tonkova, M. Kuzmanova, *Indicators for LPS effective functioning measurement* focuses on the efficiency of the LPS. The authors conduct an interesting analysis of various approaches to how the efficiency of economic structures is assessed to finally propose their own idea, which takes account of the plenitude of assessment perspectives (Balanced Scorecard for LPS).

I. Ivanov in the paper *One of possible methodological set of scientific research approaches to LPS* proposes an interesting analysis of clusters. His considerations are presented against the background of the conflict theory, which he uses as a point of reference for the analysis of the essence of clusters. The author suggests the shift in the analysis of LPS operating mechanisms and reorientation of research over the cluster phenomenon.

G. Zabunov, N. V. Gilina in the paper *Institutional conditions for the functioning of clusters* suggest an institutional perspective on how the clusters operate. The authors broadly interpret the importance of institutions for economic growth to further propose the methodology of the analysis of institutional conditions of the functioning of clusters.

The first block of considerations closes with the paper by O. Burmatova, entitled *Environmental and economic diagnostics of the local production systems on the local and regional level*. The author examines environmental and economic surrounding of clusters. She focuses on methodological issues and proposes an array of indicators, which make it possible to analyse the internal operating environment of LPS.

The second part of the publication, *Policy and regional conditions of LPS' functioning*, analyses regional and systemic circumstances of the functioning of clusters in the countries of Central and Eastern Europe. The authors refer directly to operating conditions of LPS and to experiences from Poland, Bulgaria and Ukraine.

The first analysis conducted by M. Ulbrych *Reindustrialization as a mean of improvement of competitiveness of the European Union* highlights reorientations in the EU industrial policy. The author explains the phenomenon of the third industrial revolution and against this background she shows structural changes in the EU economy. Further she analyses the idea of reindustrialisation in strategic EU documents.

Considerations proposed by Y. Savelyev, V. Kurylyak, Y. Kurylyak, *Benchmarking of cluster-type local production systems in the world economy and Ukraine* illustrate the degree and conditions of clusters development in Ukrainian regions. The authors identify operating mechanisms and the importance of clusters for economic growth stressing the diversity of formats jointly referred to as local production systems. They demonstrate the level of development of clusters, activities aimed at their development and highlight the importance of university – business collaboration within the framework of science parks.

Next three papers discuss the issues of innovation and technology transfer. In the paper *Transfer of Knowledge and Technology in the Region of Łódź*, E. Stawasz explores science and business collaboration arrangements. He analyses the essence of knowledge transfer and forms of collaboration between economic entities and R&D sector. The author also describes institutional environment and barriers to technology commercialisation in the Lodz Region.

Aspects of intellectual property rights are examined in the text by V. Borissova *Intellectual property role for the local production systems efficient functioning in times of crisis*. The author starts with the analysis

of creativity and its importance for social and economic development and analyses innovation and intellectual property as key factors of economic growth. He points out to economic benefits of an intellectual property-based business model and identifies growth trajectories in the times of crisis.

The monograph closes with the paper by M. Lyzun *Technology parks as an element of local production systems formation*. The author starts her considerations with the analysis of the substance of the operations of technology parks to further proceed to experiences and effects produced by the technology parks in various countries. She identifies the role and importance of technology parks for the development of the LPS.

Nowadays, knowledge is generated by scientific circles, in international research teams. To an ever-increasing extent, knowledge is a collective enterprise, the outcome of a set of network relations and partnership and less and less the effect of a researcher's individual effort. Possibilities of scientific collaboration developed by the Project Coordinator of FOLPSEC Professor Stanka Tonkova created a unique climate for the research team and, together with the support and motivation of Dr. Mariusz Sokołowicz, have importantly influenced the final shape of the publication, for which I wish to extend sincere gratitude on behalf of myself and my co-authors.

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PART I.
METHODOLOGY AND OPERATIONALIZATION OF LPS THEORY

Stanka Tonkova[*], **Mariana Kuzmanova**[**]

INDICATORS FOR LPS EFFECTIVE FUNCTIONING MEASUREMENT[1]

1. Introduction

LPS successful functioning depends not only on objective factors, but also on a number of subjective ones, among which one can mention: the strategic decisions taken by the LPS individual actors and their inscription into the overall strategy for regional development; the degree of development of the scientific and production potential of the organizations operating in the region; stimulating of ideas and good business practices exchange; the cooperation between LPS participants in order to guarantee

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[1] This article was prepared as part of the 7th Framework Programme FP7-PEOPLE-2011-IRSES Project No. 295050 FOLPSEC – Functioning of the local production systems in the conditions of economic crisis (comparative analysis and benchmarking for the EU and beyond).

a complex satisfaction of consumer tastes and preferences depending on their specialization in production; taking advantage of the LPS geographical location, thus enhancing the competitiveness and more.

In order to increase the efficiency of the use of objective and subjective factors, as well as to achieve LPS successful functioning, authors set out the purpose to reveal the effectiveness complex nature in terms of goals, resources, information flows, communication, adaptability, sustainability, life cycle and changes, and to develop a balanced system of indicators to measure it.

To achieve the goal of the present study, the focus of the research quests was oriented towards the following research tasks:

– justification of the limitations of traditional indices and decisions taken, related to the measurement of the efficiency of the LPS members, as well as of the system as a whole and to the means of its improvement; revealing the advantages of implementing the complex approach towards effectiveness;

– development of a balanced system of indices for LPS effective functioning measurement.

2. Traditional approach for the effectiveness and efficiency measurement

In management theory and practice, there is proven scientific research and contributions in the field of effectiveness measurement and the means of its improvement. However, the indices applied and decisions taken are limited in their character – they solve a strict set of problems only (financial, manufacturing, human resources, organizational, regional, environmental, etc.). Attempts have been made for one or several indicators to be brought to the forefront and to attribute a synergistic interpretation to them. These are considered as the focus of the variety of problems the respective economic system is facing in relation to effectiveness management. However, experience has shown that a particular effectiveness indices carry some limitations. These originate from the restriction of the particular indices in covering a complex manner the relationships and interactions that determine the effectiveness in the process of its measurement.

Within the context of the effectiveness and sustainable development management of the economic systems and of LPS in particular, a number of issues has to be solved, including:

– planning issues, arising, on one hand, from the need for a complex linking of the system of targets, resources, framework conditions and limitations, and on the other, from the inability to predict with sufficient accuracy the changes in global factors (financial and economic crisis, changes in international economic conditions, political situation, scientific progress, etc.),

– organizational consolidation of subsidiaries and associated companies to serve their operation from the parent company, which in many cases is inefficient in terms of cost, territorial proximity, identified priority markets service, etc.,

– country's accession to the European Union, which is a major challenge for the Bulgarian companies in terms of effectiveness, since the privilege for the Bulgarian exporting companies to recover VAT from the budget has dropped out. Furthermore, additional difficulties arise in connection with the intensification of the competition and the strong dependence of local businesses within the LPS on imported raw materials,

– Bulgarian organizations have difficulty in answering the question of where to set the weight of each activity in their portfolio. Accordingly, the role of advisory bodies in studying trends in supply, demand, individual market segments etc., is greatly increasing,

– indices used in the management practice cannot cover the efficiency in all its aspects and in the economic theory and practice there is no uniformity in the scope of the criteria for effectiveness assessment,

– limited character of the possibilities of the traditional approach for evaluating the effectiveness assessment does not allow the comparative analyzes by industry sectors and periods,

– insufficient experience regarding the effectiveness linking to the possibilities for LPS sustainable development.

Final evaluation of the effectiveness of the strategic changes in the organization and of LPS functioning could be done by using the "increasing productivity" index, "increasing competitiveness"

respectively, where the realization of the production has a leading role and its manufacturing is the result. To this end a suitable iterative procedure could be used.[2]

3. A new approach towards effectiveness measurement

Economic efficiency is the relationship between the results and the costs of achieving them. In the anti-crisis management terminology, production efficiency is defined as the ratio between the market value of the goods produced and the summary consumption of resources.

According to some authors, the effectiveness "presents the degree of achievement of goals and objectives set", while the efficiency characterizes "the optimization of the amount of resources used to achieve the objectives in terms of the actual result of the operation".[3] In other words, effectiveness implies "to do the right things" while efficiency, in turn, means "doing things correctly".[4]

In practice, in the analysis of the organizational effectiveness, the following indices based on the data from the profit and loss accounts (income statements) and in the balance sheets, are often used:

1. Profitability of sales (in %), defined as the ratio between net profit and net revenues from sales

2. Coefficient of cash flow, calculated as the ratio of cash flow from the core (operational) activity and sales net revenues. The coefficient characterizes the relative effectiveness of the company in terms of opportunities to generate positive cash flow from core activities. It shows what cash flow is able to generate 1 level sales revenues. Favorable values of the coefficient are greater than 1.

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[2] A. Kovatchev, *Restructuring – Productivity – Sustainable development of Economy*, "Economic Alternatives" 2006, No. 3, UNWE, Sofia, p. 3–12.

[3] M. Alexandrova et al., *Management. Theory and Practice*, Vezni-4 Publishing House, Sofia 2013, p. 16–17.

[4] J. Becker, *Marketing − Konzeption. Grundlagen des strategischen und operativen Marketing – Managements*, 6. Aufl., Verlag Franz Vahlen GmbH, München 1998, p. 836.

3. Turnover of inventories in days, of receivables and payables. The lower the values of these indices are, the more efficiently the company operates. Moreover, the values are affected by the organizations dependence on suppliers, operation seasonal specificity and other factors.

The most commonly used indices for the effectiveness of the investment projects are:

1. Net present value (NPV). It characterizes the ratio between income (received) and expenditure (outflows) cash flows. Projects with negative NPV are generating loses and should be rejected. While NPV equals 0 the investment is redeemed by its size. The project is selected when NPV>0 and has a maximum value.

2. Index of profitability of the investment project. It is the ratio between the present value of net cash flows and revenue cash flows. Acceptable values of the index are those which are greater than 1.

3. Internal rate of return, IRR. Required condition is that IRR is greater than the discount rate.

4. Period of return on investment. This is the number of years for the recovery of the investment or the year in which NPV becomes greater than 0.

The indices described above reflect primarily important financial ratios in the organizations, including local production systems, without offering options to compare with other organizations and LPS. In times of crisis, keen competition, largely saturated markets, scarce and expensive possibility for test reference comparison of the own achievements with the best in this field, or the best way to play (best practice), which has built in or outside the industry is of particular importance for an organization inside or outside given branch. The top result is referred to as a benchmark – expert standard, predetermined pattern, used as a reference point.

Compared to the traditional management methods, the benchmarking promotes efficiency and innovation in particular in terms of formulation of ideas and their practical realization: decision-making process improvement, organization weaknesses overcoming and competitive advantages creating, its strategic vulnerability reduction, attraction of new customer groups etc. The study of positive experiences is based on the European Benchmarking Code of Conduct, developed by the European Fund for Quality Management – EFQM.

Very often, the effectiveness is seen in its interaction with the target system of the enterprises and LPS. Thus, several questions are raised:

– target system is diverse in terms of their hierarchy, relative importance, the time factor. This significantly hampers the assessment of the effectiveness due to the need for interpretation of mixed indices. Furthermore, the different phases of the life cycle of the organization and relevant LPS are typical specific target priorities,

– objectives of the organization and LPS are characterized by relations harmony, competitiveness and indifference to each other,

– moreover, the effectiveness criteria are also diverse, and some of them are even contradictory: profit, quality, productivity, flexibility, agreement on goals, interpersonal communication, human resource management etc.,

– in the enterprises LPS there are difficulties with the use of appropriate activity measures and hence in measuring the degree of target achievement. On the other hand, many of the targets are not openly displayed or are not quantitative. This hampers the process of determining the resulting deviation between targets and achievements, and making sound decisions to address deviations.

A key objective of LPS management is to ensure their sustainable development. It is therefore appropriate that the effectiveness and sustainability are considered in their connection and interdependence. According to experts of the World Bank, sustainable development in global aspect implies an oriented towards the preservation and multiplication of the human capabilities management of the society aggregate capital with a focus on economic, social and environmental sustainability.[5] Valuable conclusions concerning the nature and guidelines of sustainable development are laid down in both the concept and policy for sustainable development (Agenda 21, Rio de Janeiro 1992 and Johannesburg 2002); in the deployment of modern strategic alliances (established on a contractual basis) between firms; in the implementation of the new overall marketing conception. "Sustainable development realization proposes a change from process-oriented to the re-

[5] Jose I. dos R. Furtado, T. Belt, R. Jammi, *Economic Development and Environmental Sustainability: Policies and Principles for a Durable Equilibrium*, World Bank Publications, 2000.

sult-oriented production approach, its »dematerialization«, successively moving to the most economic use of the limited earth resources, maintaining the ecological balance of the planet, abandonment of the consumer lifestyle, humanization of the relationship between living now and future generations".[6] The purpose of that development includes not only the growth revival and changes in its quality, but also meeting the needs of jobs, energy, water and health, maintaining a stable population size, preservation and expansion of the resource base; redirecting technology and risk management and integrating environmental and economic decision-making.

Sustainable development should be considered at different levels of management: at the level of the organization, sector, region, and national economy. It requires achieving the target system, harmonizing the interests of all public entities, skillful use of the environmental factors. LPS sustainable development involves sustainable development in its economic, social, environmental and institutional subsystems in compliance with the development priorities defined.

Against that background, several conclusions could be made. The most important are as follows:

– effectiveness is a complex concept, that reflects the complex relationships within the economic systems and in particular in the LPS, in terms of objectives, means, information flow, communication, adaptability, growth, life cycle changes,

– effectiveness should be defined within the concept of LPS' long-term success and sustainable development,

– effectiveness should reflect LPS' readiness for flexibility and change,

– it is necessary to point out that the effectiveness characterizes LPS interaction with its external environment, as well as the particularities of its internal variables management,

– effectiveness should reflect the expectations of the LPS different groups of influence in terms of the analysis of the relationships interests – specific objectives – effectiveness criteria from the given group point of view. Within that context, it is necessary to find a reasonable compromise and balance between different interest groups.

[6] A. Kovatchev, *Management of the Economy*, Siela Publishing House, Sofia 2001, p. 214.

4. Possible solutions

Based on the conclusions drawn above, we would like to recommend into consideration the use of the balanced scorecard for performance assessment (Balanced Scorecard) in its capacity of an appropriate tool for solving the diverse and sometimes contradictory tasks related to management effectiveness. The Balanced Scorecard is the result from research on management effectiveness and ways of its improvement through the implementation of alternative methods based on non-financial indices.[7] Moreover, the methodology allows not only the development of a short-term comprehensive concept for LPS management. Through its implementation, it becomes possible to stimulate the strategic initiatives oriented towards key processes and activities improvement, as well as to encourage the changes and effectiveness increase in long-term perspective. By specifying the target system within the model, individual perspectives and the motivation of the employed persons could be increased through the system of effectiveness measures used, and the rapid feedback. Thus, according to the authors, LPS sustainable development could be defined as: harmonious movement of LPS within the individual perspectives of Balanced Scorecard aimed at ensuring long-term success.

Within the Balanced Scorecard for LPS performance assessment, the following perspectives could be defined:

– human resourses perspective – indicators: number of organizations involved in LPS (business organizations, research and development organizations, NGOs and other institutions providing support to LPS); total number of employees in the LPS-forming organizations; average age of the employees; share of the employees with secondary and higher education; staff turnover., administrative capacity at municipal and regional level; managerial staff number in LPS-forming organizations; number of internal seminars and programs for qualification up-grading; number

[7] D. Norton, R. Kaplan, *The Balanced Scorecard − Measures that drive performance*, "Harvard Business Review", January−February 1992, p. 71−79; D. Norton, R. Kaplan, *Putting Balanced Scorecard to work*, "Harvard Business Review", September−October 1993, p. 134−147.

of employees in research and development within the LPS; education and training costs per associate; number of innovative and innovation proposals; average wage growth;

– financial perspective – indicators: ross value added dynamics; profitability, profitability of the investments, growth in net sales, working capital., funds for joint projects implementation incl. co-funding of initiatives of organizations belonging to LPS, NGOs, local authorities; external funding of initiatives of LPS-forming organizations, funding the construction of office premises of laboratories to be used by LPS- forming organizations;

– processes perspective – indicators: average execution time of a standard contract, number of standard contracts, quality of production, level of technology compared to the most advanced solutions, labor productivity, average time for decision-making, quality of products and services; interaction between the LPS organizations; technology transfer between the LPS organizations; number of integration events; joint training activities; number of implemented joint procurement and contracts; number of established joint distribution channels; market information exchange between the LPS organizations; number of joint participation in exhibitions and fairs; system used for visual identification and a joint website etc.);

– results perspective – indicators: measures taken to increase employment in the LPS organizations; number of training programs for LPS staff delivered; relative share of LPS staff with increased professional qualification; share of products for the domestic market; share of products for foreign markets; number of attracted new businesses in LPS; number of innovations in LPS; share of R & D expenditure in total expenditure on innovation; number of implemented, resp. declared joint projects co-financed by the EU; number of implemented, resp. declared international projects with other external funding; number of agreements for cooperation with foreign companies etc.;

– potential perspective – indicators: communication strategy; business capacity of and traditions in the LPS; joint initiatives implemented for the development of the organizations functioning in LPS; attractiveness of the region for the investors; new initiatives and projects; crisis

impact on the development of the LPS-forming organizations as well on the LPS as a whole; financial support for LPS development; degree of novelty of the techniques and technologies used; investments in IT; partners' number: high-tech and research organizations; employment dynamics in the region; number and size of organizations in the LPS; changes in LPS structure; partners' joint actions effects; investments in the conquest of new markets; investments in human resources development; education system relevance to LPS needs; partnership with central and local authorities; market structure availability; LPS leading role in regional economic environment etc.;

– ecological perspective – indicators: composition and characteristics of the production resources, discharges of polluting substances from the activities implemented, administrative activities related to environmental and technical control and trials, cost-efficient use of natural resources (energy, soil, water), costs for reducing the harmful effects of production processes on the environment, costs for industrial waste water treatment, soil remediation, and waste recycling etc.).

5. Conclusions

In the Balanced Scorecard for LPS performance assessment, the perspectives defined allow the problems of LPS strategic development to be reduced to an analysis of a number of dichotomies of the evolution, such as: predictability – unpredictability, appropriateness – inappropriateness, success – failure, unsteadiness – steadiness, balance – imbalance, stability – instability.

Results of the analysis allow the comparative analysis of the results of LPS establishment and functioning, as well as the evaluation of their impact on local economic and social development, and beyond. These could be used while seeking institutional support to facilitate and intensify cooperation within the LPS. Europe of the Regions supports the efforts in this direction through a number of initiatives, including: Europe 2020 strategy, Monitoring Platform, the European Entrepreneurship Region Scheme, The Industrial Policy for the Globalization Era Forum etc.

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of socio-economic disparities among countries in the global context of EU expansion, "Acta Oeconomica", No 23, Univerzita Mateja Bela v Banskej Bystrici, Ekonomicka faculta, in co-authorship, p. 72).

Abstract

In the present work, the authors, using the complex approach, consider the efficiency of the local production systems (LPS) functioning in the context of the statement, that the traditional approach in evaluating the effectiveness is not only a carrier of unduly restricted interpretation of the factors that affect it, but also affects the relationships between them. This significantly distorts the reality and reduces the quality of the managerial decisions taken. In order to overcome the limited capacity of the traditional approach for LPS effective functioning assessment, a system of criteria for evaluating their effective functioning is proposed, combined with indicators for effectiveness measurement.

Key words: local production systems, measurement, balance scorecard, quality management.

Ivaylo Ivanov*

ONE POSSIBLE METHODOLOGICAL SET OF SCIENTIFIC RESEARCH APPROACHES TO LPS[1]

1. Introduction

The deep transformation of the economic, political, social and spiritual spheres after the end of the Cold War have led to rearrangements in the list of threats to the modern society. The global problems related to terrorism, local conflicts and natural disasters, the protection of the critical infrastructure and energy security came to the forefront. Problems, whose genesis is the furious struggle for shortage resources of any kind. This increasing scarcity of the vital resources in the modern world forces all economic entities, including the state institutions, to adhere in the highest possible degree to the principles of market effectiveness. The economic policy in countries with market economy should be conducted according

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to its rules. All of this makes the creation of new mechanisms for implementation of relations in the sphere of the economy inevitable. In consequence, limitations of the state in the market environment and in the field of direct impact on economic entities must be taken into account. Studies on the competitiveness of nations and states were focused on the economy as a whole with the assumption that major influence on the above processes national economic policy has. Both in the development processes and the processes of competition and enhancing the competitiveness, locality as the driving force of development is barely recorded. The globalization gives the companies the opportunity to receive capital, goods and technology from anywhere and they can move the production to where it is most effective in terms of the costs. The governments are perceived as decliners of their impact on the competition, in comparison with the forces acting globally. All the processes described so far set their mark also on the local production systems (LPS). In this context, different problems with scientific and practical nature arise. Some of them cannot be resolved with the familiar scientific instruments. The researchers and practitioners are constantly confronted with the problem of finding and implementing methods and approaches for management and organization of the systems and subsystems in the various spheres of the public life, which are adequate to the state of the society. In following lines, we intend to offer a possible methodological complex by scientific approaches and methods suitable for use when studying LPS.

2. The conflict, the conflictology and the synergetics

The modern society is becoming more clearly aware that the old ideas and concepts lose their power, and increasingly looking for new solutions to the problems corresponding more complete with the new challenges in the rapidly changing environment.

Every day, we can see more and more the clear trend related to the functioning and development of the contemporary organizations in conditions of increasing conflicts, crises, chaos and catastrophes. The life constantly confirms that social conflicts arise as the result of objectively existing

social contradictions, which are a reflection of its deep nature. Precisely the contradictions are the crucial driving force in society. The new forms of their manifestation impose continuously new ways and approaches to be sought for solving them.[2] Thus, at first glance imperceptibly the objective development processes gave an impetus to the birth of new directions in fundamental sciences and simultaneously of new interdisciplinary sciences, among which conflictology and social synergetics appear.[3]

The follower of the science of social conflict – the conflictology, base its world view on the idea that the conflicts are a natural phenomenon in society and the preconditions for them are laid in the realization of any one human activity.[4] Conflictology gives a possible toolbox for finding solutions of the problems posed by our modern times. Thus, the conflictology is increasingly becoming a necessity. It is because of the fact that along with the other theoretical disciplines, it has the task to assist the optimization of the functioning of the social systems. Along with other sciences, it has its place in the construction of the social strategy for forecasting and planning of the social activity.

The conflict is the kind, grade, shape, sharpness of manifestation of the contradiction. Outside the contradiction there is no conflict, and without object (material or spiritual), there is no contradiction. Seen in a broad sense, the reason for the conflict is what predetermines its occurrence, its subsequent development, and eventually its end. At the heart of the cause of each particular social conflict stands the conscious need that manifests itself as an interest. And everyone's interest leads to a conflict between entities, social groups, etc., but only the one which is connected to deficient satisfying needs. After all, the fundamental cause of any conflict comes down to the contradiction between the interests of society (individuals, social groups) on the occasion of their recognized deficit needs. The formula for the causation of the conflict could be represented as a unified three element system composed of entities, interests and activities. The interests are the instigators of the activity and the actions of the participants.

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[2] D. Y. Dimitrov, *Conflictology*, Stopanstvo, Sofia 2003, p. 34.

[3] Idem, *Juridical and non-juridical conflictology*, VelikoTarnovo 2008, p. 9.

[4] *Ibidem*, *passim*.

As an expression of the contradiction, the conflict is immanently formed by the presence of two opposing, but linked together in unity parties. In the relationship between those two parties, a conflict might be raised. Each party involved in the conflict has its own interests and goals that are contrary to the interests of the other party. Two opposite sides are struggling (defend) for their own interests, and at the intersection of these interests the conflict is born.[5]

Here is the place to clarify the affection of the synergetics in our treatment. The synergetics generally studies the open, nonlinear, evolutionary systems, mechanisms of self-organization, i.e. the mechanisms of spontaneous origination, of the stacked microscopic structures, of the super complicated systems.

The processes taking place in the field of self-organization became the subject of the conflictology and synergetics. Through the synergetics, the conflictology explores, systematizes and processes information on the nature and the causes of the conflict. It turns out that the conflict is a natural state of self-organizing social system – an attribute of the complex processes that form synergetics. Based on this, the conflict is genetically linked to the chaos, the disorganization and immanently implies a new organization. This thesis reaffirms the dialectics – the developing world is a struggle between the chaos and order.[6] The first leads the system to the point of exacerbation (conflict) due to small fluctuations; the latter ensures its functioning.

The conflict is born both inside and outside the environment of an open nonlinear system. In this system, the environment is chaotic, but in it there are stable and unstable dissipative processes. Various contradictory structures emitted from the chaos emerge. Spontaneously through chaos and the dissipation, nonlinear processes are pulsing that random and uncontrollable dissipate into space. The synergetics open up new horizons in the world, makes an effective comment of the nonlinear processes, offers new perspectives and outlines new

[5] D. Y. Dimitrov, *Conflictology*, *op. cit*.

[6] Ye. N. Knyazeva, S. P. Kurdyumov, *Synergetics: beginning of the nonlinear thinking*, "Society sciences and modern times" 1993, Vol. 2.

ways of development in the area of bifurcations. In a word, the synergetics reveals the instability and the chaos, the real causes of the crises and the conflicts.[7]

In summary, the conflict is formed by the struggle between the chaos and order, which takes place in the area of the bifurcation. In the same area the balance fades, the imbalance and the disorganization are intensified. The chaos serves as a background to these contradictory processes. One part of the intertwined processes within the area of the bifurcation is examined by the synergetics, and the other – by the conflictology.

What we said above is the basis for the formation of the synergistic conflictology. It reveals theoretically the technology of the conflict process in self-organizing open systems. Everything we stated here on the relationship between synergetics and conflictology is related to the disclosure of the potential for conflicts during the life cycle of the studied objects. Furthermore, the chaos creates an unique opportunity for the systems to be mobilized, to switch to a different level of quality and open new opportunities before them for development and security.[8]

We touched the issues associated with the conflictology and synergetics not accidentally. Conflict and the chaos increasingly master our time. It is time to give them appropriate attention. Implementation of the achievements of the theory in these areas is our immediate task.

The reasons for the real conflicts are multidimensional and require the application of the conflictological and the synergetics approaches. Thus, every conflict should be considered as multidimensional and multileveled. We can rely exactly on these two approaches when studding LPS. How is it possible to do it, why do we do it and what are the expected results if we apply them in practice – these are the main questions of the present paper. Before we move on to the presentation of our idea

[7] D. Y. Dimitrov, *Conflictology and conflictological culture*, "Economic alternatives" 2005, Vol. IV, p. 33.

[8] N. Slatinski, *A comment on: Book that is worth reading: Eric Abrahamson and David Friedman "A Perfect Mess: The Hidden Benefits of Disorder…"*, „Iztok-Zapad", Sofia 2009, http://nslatinski.org (accessed 30 March 2009).

related with the appliance of the mentioned methodological complex of scientific approaches to LPS' research, there are some other questions to discuss.

3. The role of conflictology in the suggested set of research approaches to LPS

When we talk about LPS and all the questions related to their research, especially when we have intention to defend applying of the new approaches above mentioned, we could not forget the fact that determining position in the network of connections and relationships in the structures of the LPS falls on economic relations and interests. We prefer to use Porter' definition of the cluster[9] – a geographical concentrated groups of interrelated companies, specialized suppliers, service providers, firms in their respective business sectors and also related to their work organizations (e.g. universities, standards organizations, trade unions, etc.) competing in certain areas, but together with this leading joint work. In the present paper we assume that LPS is identical with the above mentioned definition of cluster.

It could not be rejected that countless and heterogeneous interests are involved in the formation, functioning and development of LPS. The struggle between them is a prerequisite for many conflicts as leading among them are those with an economic nature. How could it be explained?

If we accept a thesis that the production of goods and services is the basis for the existence and the development of human society, the most important are the economic and social relations as they determine the nature of all other social order – political, spiritual and social. On the occasion of the realization of economic social order, different economic conflicts are inevitably manifested mostly. They are generated by the dynamics of the processes in the business and the numerous participants in them with their different interests. They take place in various spheres – in the competitive

[9] M. E. Porter, *Location*, *Competition, and Economic Development: Local Clusters in a Global Economy journal*, "Economic Development Quarterly" 2000, Vol. 14, No. 1, p. 15−34.

struggle, relationships between different businesses and state institutions, within the individual enterprises on the consumer market. Or if we summarize, the main interests are in the production, distribution, consumption and exchange of the tangible and intangible resources sphere – all of them necessary for creation of the products and services.

One of the prerequisites for the emergence of economic conflicts is usually the causes of internal and external character which determine any economic crisis. Another reason for the emergence of economic conflicts could be the clash between the contradictory interests mainly of providing organizations and consumers on the occasion of allocation and utilization of the different types of production resources – material, technological, financial, labour, and information. The competition is a major element forming the market relations. So far as it suggests, confrontation and competition between the various stakeholders naturally produces economic conflicts. It is another question which is not covered here – to what extent these conflicts could be constructive or destructive. Another reason contributing to the emergence of economic conflicts could be the inefficient structuring on the system of connections and relations between business and the state institutions, which lead to a direct negative impact on the economic activity. Here we can talk about untimely or even abusive interference of the state in the economic activity, the various existing administrative and even political barriers on one hand, and the creation of a number of secret monopolistic formations, falling under the blows of the antitrust laws, on the other hand. Competition and economic conflicts are also affected by the processes of de-monopolization and the liberalization of the foreign economic relations. The processes of privatization in the economy are another prerequisite for the emergence of economic conflict. Conflicts also arise on the consumer market, which is one of the biggest areas where conflicts are generated so far. Most frequently, exactly on the consumer market, the different interests of sellers, buyers and their formal and informal organizations are in tough struggle. Usually the contradictions there are generated by the unequal forces of these entities resulting in differing degrees of information about the object of their relationship. On the side of the seller, there are the tools of marketing, advertisement, the direct contacts with manufacturers and others,

while the buyer remains substantially limited to make a choice, which is based mostly on the information about the cost of the products or services. The protection of consumer rights, protecting the interests of sellers and manufacturers are activities in the performance of which the interests of all those subjects of marketing activities are affected and inevitably create contradictions and conflicts. Another field in which the economic interest is hardly to be met is labour. The direct cause for the occurrence of such conflicts are the changes in the relationship of the employed toward work. Therefore these conflicts could be defined not only as labour but also as production ones. We associate them to the remuneration for the work done, to the efficient performance of the assigned tasks, the assessment of work performance, the working conditions and many others. It should not be forgotten that labour conflicts are related to some of the most acute conflicts capable of leading to serious social shocks. The most dangerous and negative consequences of the development of such conflicts is that they combined with other factors, mainly economic and political, may lead to an extraordinary crisis situation in a particular organization and even in a whole industrial sector.

The existence of conflict in an organization or business does not mean that it is in crisis, as the conflict is not inevitable, but even could bring use. And if we accept that, it is a method of dealing with the controversies, method of interactions between the complex socio-economic systems. The frequent outburst of conflicts would not mean a serious problem if they are promptly diagnosed and are followed by appropriate decisions. Otherwise, the organization could not be successful and could fall in crisis.

Against the background of such contradictions and conflicts identified in the various spheres of economic activity, the role of conflictology will be increasing not only in the processes of conflict management but also their regulation, preventing, predicting, stimulation, and resolving. For all these reasons, the management of the conflicts within and between the organizations is a complex component of the process of regulation of social-production relations. This is one of the conditions necessary for the anti-crisis management.[10]

[10] L. P. Piskunova, *Economic conflictology*, Yekaterinburg 2007.

As it could be seen, the reasons and the prerequisites for the economic conflicts are very different. Their detailed consideration falls outside the scope of the present statement. However, the conclusion that LPS as socio-economic systems are under the influence of all prerequisites for the occurrence of different conflicts, remains undoubted. For this reason, currently there are no ways the LPS to be adequately examined without the tools of the conflictology and synergetics.

How could it be realized? We are sure that one of the possible ways is to apply the presented below modernized methodological complex of scientific approaches to LPS' research.

4. The need for a modernized set of research approaches to LPS

It is well known, that not only in Bulgaria the transition to a new political and economic relations cause conflicts and contradictions unknown in the history, which have led to and continue to generate systemic social crises and catastrophes.[11] This additionally gives us grounds to claim that there is an acute need for conflictological knowledge. Knowledge – both in the theoretical research of the problems with the apparatus of the conflictology, and by the application of adequate technologies in the sphere of the management. Precisely the conflicts of any nature, which accompany our life, impose the application of updated set of methodological approaches and research methods, in which the leading role is assigned to the science of social conflicts.

There are several basic scientific approaches of research which have proven their effectiveness over the years. In the practice of scientific research with success, the systemic, the complex, the situational and the historic approaches are used[12]. Usually they are applied in one degree or another in the form of components of set of different methodological approaches

[11] D. Y. Dimitrov, *Conflictology and conflictological culture*, *op. cit.*, p. 29.

[12] Idem, *Approaches to research of socio-economic systems management*, Sofia 1990.

and research methods. In this way, it creates an opportunity for a complex analysis to uncover the causes of the issues being examined above all on scientific-methodical and scientific-practical level.

Somebody may say – why "set", and why "modernized"? Undoubtedly, set because in science, the use of different methodological set has no alternative in the implementation of researches, affecting different types of complex problems in their most varied aspects and levels.

We intend to offer a set of methodological approaches to the study of LPS imposed by the systemic and complex nature of the questions which could solve, by the complexity and some other characteristics of the objects and purposes of the study. As we stated, the leading role in it is given to the conflictological and the synergetics approaches. Their place in the different studies of the LPS will find and the other classical research approaches.

The offered set is "modernized" because of the new approaches which we have intention to use. That is the answer of the second part of the above question.

The concrete offered combination of approaches aims to increase the coverage of the subject of the different studies of the LPS in order to achieve their goals and objectives.

Applying the systemic approach enables to reveal the most characteristic aspects of the researched object and helps to reduce its "redundant" complexity. Arguments in favor of the use of this mandatory for any research approach seem to be redundant.

The conflictological approach along with the appropriate conflictological methods, gives opportunity to analyze the current state of the researched LPS as fully as possible. Also it is possible with comparably high accuracy to predict their future state, the possible accompanying contradictions and conflicts in them.

The next element in the set revealed in the present paper is the situational approach. The main thesis on which it is based is that in the conditions of a dynamically changing environment, it is not possible to apply the same principles, methods, and tools of management. In any particular activity to social organizations (LPS are of that type) under the influence of external and internal factors and conditions, different situations

arise. This requires their solving by finding adequate, creative application of management theory. The situational approach implementation suggests:

1. assessment of the context of the changes affecting LPS;
2. assessment of the content of changes;
3. implementation of the process of changes;
4. a possible change of the strategy and management of changes, if necessary.

It means changing the structure, changing the culture and at the end – work with the people. If we follow these steps in LPS researches, the achieved results will be improved.

The implementation of the historic approach together with conflictological one will help to determine the stage of the life cycle, in which the studied LPS are and the possible consequences of their transformation to a qualitatively new level corresponding to the contemporary requirements.

In turn, the implementation of the synergetics approach is needed, because LPS could be defined as systems of connected companies and organizations, the significance of which as a whole exceeds the simple sum of the component parts.

The implementation of an integrated-complex approach is intended to cover the whole range of factors influencing the course of processes in the study of LPS. It serves as basis of the establishment of the tasks, whose solution is sought in achieving the goal set before research. There is also a leading role in the formulation of the research problem and the construction of any particular research.

To characterize the studied object satisfactorily from the viewpoint of the set for the study object, as well as the purposes of research and tasks, it is necessary to define the various aspects of the study, using the methods of the various sciences, and scientific disciplines.

The nature of the objects (LPS), imposed to be used at least in the following aspects for their study:

1. Legal aspects of research – study of the legal base regulating social relations in the LPS sphere;
2. The information-technological aspect of research;
3. System-integration aspect, and finally
4. Conflictological aspect.

Through the implementation of the latter, a clearer picture of the specific variety of interests, connections, relationships and interactions, contradictions and conflicts in connection with the functioning of the existing LPS, is expected.

5. Conclusions

Not coincidentally, in this paper we examined the possible set of methodological approaches to LPS studies.

In Bulgaria, the knowledge about the theory of LPS is in the beginning. There are many publications about competitive advantages of the country, geographical location, the population, the climate, etc., which are a prerequisite in order for these benefits to be utilized in the context of the ongoing processes of globalization and regionalization. It should further be deepened by the detailed research, in order to provide answers for the real problems and achievable targets that have to be placed.

LPS is a very comprehensive concept covering important connections, the complementarity between sectors, the diffusion of technologies, the habits, information, marketing and understanding the requirements of the contracting entities. Such connections seem to be essential in a competitive struggle and increasing productivity, especially in determining the guidelines and locations of the organization of new business and implementation of innovations. All these relations, connections, interactions etc., in one way or another, are subject to conflicts, chaos, and instability.

That is why the proposed modernized set of research approaches to LPS with the help of the conflictology and the synergetics set of approaches, which prove to be vital for successful implementation of scientific research related to LPS.

The cognitive and analytical capabilities, that give the conflictological approach and the conflictological methods along with the synergistic approach, allow analyzing the current state of the studied LPS as fully as possible. As well as, it is possible with comparably high accuracy to predict

their future state and the possible accompanying contradictions and conflicts. With their help it is most easily to reveal the contradictions, different interests, their bearers, and the roots of the problems.

In our opinion, the implementation of proposed set of methodological approaches of research has no alternative. Social practice in the coming years will show whether our proposed methodological set of scientific approaches is adequate to the actual situation and future developments in the sphere of LPS in Bulgaria.

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Abstract

In the present study, the issues related to the development and implementation of a methodology for investigation the feasibility of implementing the Conflictological and Synergetics Approaches in the development of LPS in Bulgaria, is addressed. The transition into the existing situation in Bulgaria in this area is imposed by the profound changes in the economic and social spheres of the society, along with the accompanying changes

at local level, which significantly changed the nature of the tasks in the field of national and especially of regional economic policy. In our opinion, in the current highly dynamics and characterized by a high degree of uncertainty and risks environment, it is very important to use all the possibilities for the realization of modern efficient economic policy and practice to secure economic security at the regional level, primarily through the development of LPS on its territory. This suggests the involvement of the science. The attempt of such involvement is undertaken in this paper.

Key words: local production systems, methodology, conflictology, synergetics.

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INSTITUTIONAL CONDITIONS FOR THE FUNCTIONING OF CLUSTERS IN BULGARIA[1]

1. Institutions and economics – introduction

According to the Global Competitiveness Report of the World Economic Forum for 2012–2013, Bulgaria is ranked 62nd in the level competitiveness out of 144 countries. At the same time, in terms of the evaluation of the state of institutions it is ranked 108th, and in terms of the extent to which clusters are developed – 87th.[2] These numbers are an indicator of the importance of the state of institutions and clusters in the overall level of competitiveness of the economy.

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[2] Global Competitiveness Report for 2012–2013, p. 14–17, http://www.weforum.org/reports/global-competitiveness-report-2012-2013 (accessed November 2013).

The aim of the present paper is to propose an approach for analyzing the institutional conditions for the functioning of clusters in Bulgaria, from the viewpoint of institutional theory. It strives to find a methodology, which can determine the key factors in cluster development within a certain local production system. We consider clusters as highly organized structures that generally arise from local production systems under certain conditions. Local production systems are traditionally regarded as evolving structures, which react to changes in the environment, but the mechanisms of their reactions are determined by processes internal for the systems. Delineating the environment of the local production systems, of their components, elements and structure is done from the perspective of modern institutional theory.

In that context, the concept "institution" has been adopted by economists from the social sciences, in particular from sociology, political philosophy and social psychology. In economic theory, the concept "institution" was included for the first time in the analysis of Thorsten Veblen. He defined it as a general, common way of thinking (stereotype of thinking) about the relationships between society and the individual and the performance of their functions. It builds up a system of social life comprised of a set of activities – at a certain time or at any moment in the development of every society. From a psychological perspective, institution can be described as the prevalent spiritual attitude (mindset), or as a general understanding of the way of life in the community.[3]

Also by an institution Veblen understands:

– common ways of reacting to stimuli,
– the structure of the production and economic mechanisms,
– the accepted acting system of social life.

Another of the founders of institutionalism, John Commons,[4] defines the institution as a collective action in restraint, liberation, and expansion of individual action. According to Wesley Mitchell,[5] an institution stands for the prevalent and, to a great extent, standardized, social habits.

[3] Т. Веблен, *Теория праздного класса*, Москва 1984, p. 201–202.

[4] B. E. Kaufman, *The organization of economic activity: insights from the institutional theory of John R*., *Commons*, "Journal of Economic Behavior & Organization" 2003, Vol. 52, p. 87.

[5] http://5ka.ru/101/849/1.html (accessed August 2013).

Within the framework of contemporary institutionalism, the interpretation of an institution by Douglas North is the most widely spread. According to this interpretation, institutions are the rules, and mechanisms, which ensure their application and the norms of behavior, which structure the repeated interactions between the individuals.[6]

The business actions of the individuals do not take place in isolated space but in a particular society. For that reason, it is of great importance how the society will react to them. In that way, deals, which are acceptable and profitable in one place, can turn out to be inappropriate in another even under similar conditions. Examples of this can be the limitations imposed on the economic behavior of individuals in different religious cultures.

The variety of internal factors influencing success and the very possibility to take a decision of some sort, in the framework of the economic and social habits, impose schemes and algorithms of behaviour, which under the specific conditions will be the most effective ones. This set of rules, mechanisms for their enforcement and control over their observance builds up schemes and matrices of behavior of the individuals and forms the institution.

The concept of "institution" and "organization" are interrelated. According to Douglas North, institutions are the rules of the game, and organizations are the players. In their activities, organizations follow the rules of the game, but cannot, whatsoever, to influence them. In spite of that, their aim is to win the game, and not to regulate it.[7]

In accordance with the institutional theory, the rules (formal and informal) are some kind of norms, deliberately introduced restrictions, which are observed, can be observed or followed by large groups of people or as T. Veblen calls them "habits of thought".[8] These are widely accepted and protected guidelines, which forbid or permit a certain type of activity of an individual (or group of individuals) in their interaction with other

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[6] Д. Норт, *Институты и эконоический рост: историческое введение*. *Тезис*, Т. 1, Вып. 2, Москва 1993, p. 73.

[7] Д. Норт, *Институты, идеология и эффективность экономики*. *От плана к рынку: будущее посткоммунистических республик*, Москва 1993, p. 307.

[8] T. Veblen, *The Preconception of Economic Science*, [in:] T. Veblen, *The Place of Science in Modern Civilization and Other Essays*, Russel and Russel, New York 1961, p. 143–-157.

individuals or groups. The rules, making up the institutions, have sense only when they are accepted by more than one individual. From that perspective, each institution is a set of certain rules, but not every rule is an institution.

According to Elinor Ostrom,[9] the rules determine what actions or situations are necessary, forbidden or permitted for the participants (organizations or individuals).

The rules include:

– possible roles of the participants

– the position the participants and the order in which it changes,

– actions, for which participants are obliged or are not obliged to undertake,

– results, for which they are obliged or are not obliged to achieve.

The rules set the framework within which the participants make a choice, and do not prescribe or impose the choice. The rules stipulate:

– set of roles and the number of the agents, which can perform a certain role,

– technology of the choice, among the participants who are candidates for one or another role and the change of the positions,

– results and costs of the alternatives,

– set of strategies accessible for the participants in a certain role in the interaction with the other participants,

– function of taking a decision for each situation,

– permitted channels and forms of communication among the participants, which perform one or another role.

By means of the set of rules, a classification of institutions in terms of: the obligation to observe the rules – formal (official) and informal (unofficial); the hierarchy and the various aspects of social development – economic, political, legal and social, can be made.

The informal (unofficial) institutions are the unrecorded habits, traditions and stereotypes of behavior. Such are, for example, the principles of business and professional ethics, religious precept and customs or ideological formulations. The preservation of the informal institutions is related

[9] Э. Остром, *Управляя общим. Эволюция институтов коллективной деятельности*, Мысль, ИРИСЭН, Москва 2011 (orig. *Governing the Commons: The Evolution of Institutions for Collective Action*, 1990), p. 86–89.

to the culture, which, in terms of our analysis, can be seen as a set of values and norms, which determine the behavior of the individual. As advantages of the informal institutions we can consider:[10]

1. Possibility of adaptation to the changing conditions preferred inside the community and other exogenous and endogenous changes;
2. Possibility of imposing various sanctions in each particular case.

The shortcomings of the informal institutions lie in the fact that they are often characterized by varying interpretation of the rules, by impairing the effectiveness of the sanctions, and the emergence of discriminating rules.

Formal institutions are the written laws. The main difference between the formal and the informal institutions lies in the extent of their manifestation. The extent of manifestation of the formal rules is related to their written character and the presence of experts engaged in controlling their application. The significance of the formal institutions increases with the more sophisticated division of labor, and respectively, with the more complicated nature of social structure. Their importance is strengthened by the fact that they are a means of generalization and fixation of the great variety of specific rules. It is common to classify formal rules in a hierarchical order, where the rules of a higher order determine the content of the rules of lower order. The advantages of formal rules are:[11]

1. Formalization of the rules makes it possible to broaden their normative function. That allows individuals to reduce costs for information, makes the sanctions for breaking these rules understandable, and eliminates the controversies they contain;
2. Formal rules can counteract discrimination;
3. Formal rules provide a mechanism for dealing with those individuals, who as members of the society gain certain benefits, but refuse to bear the costs related to them.

The classification in terms of hierarchy, or the interaction between individual – institution can be built on the basis of the three level scheme of analysis proposed by Oliver Williamson. At the first level there

[10] Ц. Колев, *Основи на общата теория за стопанството*, ЕКИУ, Пловдив 2011, p. 45–47.

[11] O. E. Williamson, *Hierarchies, Markets and Power in the Economy: An Economic Perspective*, "Industrial and Corporate Change" 1995, 4(1), p. 21–49.

is the interaction of the individuals. At the second – interactions of the institutions of various types, which are institutional arrangements. At the first level are those, that form the institutional environment.[12]

According to the terminology proposed by D. North, an institutional alliance is an agreement between an individual and/or a group of individuals, or business entities. That agreement determines the ways of cooperation and competition. An example of an institutional alliance is most of all the contract – voluntarily established by the economic agents rules of exchange, rules of functioning of the markets, rules of interaction of the internally hierarchical structures (organisations). There are hybrid forms of institutional alliance combining features of both market and hierarchical interaction. The institutional environment is a combination of underlying social, political, judicial and economic rules, defining the frame of human behavior and institutional arrangements. Components of the institutional environment are the rules of social life, the functioning of the political sphere, fundamental legal norms such the Constitution, codes, laws, etc.

The main links between the different levels show:[13]

1. The effect of the individual on institutional arrangements. As far as institutional arrangements by definition are voluntary agreements, preferences and interests of the individuals, the latter play a decisive role in the establishment of institutional arrangements. That process, of course, takes place within the framework of a particular institutional environment. Depending on what behavioral prerequisites the business agent adopts, the observed institutional arrangements will differ;

2. The influence institutional arrangements have on one another. The nature of such interaction is quite varied: the behaviour of the different organisations affects the character and type of market – market structure;

3. The effect of institutional arrangements on the institutional environment. A typical example of such interaction are the distributing effects of the institutions. For example, an institutional alliance, which ensures that there is a benefit for its participants can lead to the formation of the so

[12] http://portal.agun.kz/e-books/content/lN8GxS9yXZch6dxMUbPm/pages/Tema 2.6.htm/ (accessed June 2013).

[13] М. Марков, *Учебен речник по институционална икономика*, Издателски комплекс УНСС, 2012, p. 29–30.

called groups of special interests. It is a number of individuals, interested in the preservation and the increase of the benefits gained. In some circumstances such a group is capable of influencing the legislative process in order to pass a law, formalizing the gain of benefits resulting from the aforementioned private agreement;

4. The effect of the institutional environment on institutional arrangements. The nature of that connection results directly from the definitions of institutional environment and institutional alliance: the rules, comprised in the institutional environment, determine an unequal amount of costs for forming various institutional arrangements. If with a certain type of alliance there is a ban in the general rules, then the costs for the individual, who decides despite the ban to enter such an alliance, increase. Respectively, the expected benefits decrease;

5. The effect of institutional arrangements on individual behaviour. Although institutional arrangements are formed by business agents on a voluntary basis, unforeseen circumstances can change the situation and a decision, which has already been taken, can be unprofitable for the individual. That can lead to losses for the other party, which exceed the benefits from the initial agreement. In such cases there is a mechanism for enforcing the enactment of the alliance and preventing the incurrence of unjustified social losses;

6. The effect of the individual on the institutional environment. Individuals influence the institutional environment in two basic ways: first, through participation in the election of governing state bodies, second, through forming institutional arrangements, which affect the institutional environment;

7. The effect of the institutional environment on the individual behaviour. That effect is felt through the underlying rules both directly, for example through the laws, and through the formation institutional arrangements.

Within the institutional environment there can be supraconstitutional, constitutional and business rules, as suggested by Douglas North.[14]

[14] D. North, *Five Propositions about Institutional Change*, [in:] *Explaining Social Institutions*, eds. J. Knight, I. Sened, The University of Michigan Press, Michigan 1998, p. 15–27; Д. Норт, *Институты, институциональные изменения и функционирование экономики*, Начала, Москва 1997, p. 17–28.

Subordination to the rules is expressed through the hierarchy of the normative acts, passed by the bodies of the executive power. On that basis the law determines the principles and strategies of behavior, and by-laws specify these principles as a mechanism of action. The general rule is that norms of lower order specify and reveal the content of the norms of higher order.

All components of the institutional environment are rules, determining the order and comprise "subordinate" rules. Similar "metarules" can have both formal and informal character. The general and difficult to change informal rules, which are rooted deep in the history and life of the different peoples, the prevalent stereotypes of behaviour, religious beliefs and cultural specifics, which often are not even realized by the individuals, are called supraconstitutional. They determine the hierarchy of values, shared by the society as a whole, the attitude of the political power, the psychological mindset of cooperation or confrontation, of social status, etc.

Constitutional rules perform two important functions. At the first place, they set the hierarchical structure of the state and, secondly, set the rules for decision making about the formation of the organs of state power. Constitutional rules can have both formal and informal character. For example, the rules about the succession of power in monarchy can have the form of unwritten custom or tradition, and the rules for voting in the election of a legislative organ can described in detail in a law or a code.

The rules, which directly determine the forms of organisation of business activities, are called business rules. These are the general framework, within which business agents form institutional arrangements and take decisions about the use of resources i.e., cooperate or enter into competitive relations. At the basis of the business rules there are the rights of property and responsibility.

2. Research context and method

Despite the great importance of the issue, at the moment in Bulgaria there is no comprehensive systematic study of the institutional environment, in which Bulgarian clusters function. The European Cluster Laboratory set

up in 2007 follows their development and functioning and that of the other European clusters, but the problems of the institutional environment have not been studied yet. The reasons for that situation are of complex nature. Firstly, a leading factor for the normal functioning of the institutional environment is the legal system, which is a very complex subject of analysis. Although the government deliberately influences the work of the clusters, that by rule happens within the framework of the normal legal regulation of business activities. In Bulgaria clusters are not the object of special legal regulation and they are formed and function in compliance with the general requirements of civil law. That matter is subject only to qualitative analysis and that makes research difficult. For that reason, we suggest the use of fuzzy logic systems for the study of these problems, which provide good tools for quantifying quality information.

Fuzzy logic systems are defined as intelligent systems for decision making, which are capable of dealing with uncertainty, inaccuracy and partial authenticity of the quantity and quality information available. Fuzzy logic systems ensure higher effectiveness and robustness of the managerial decisions that have been made. The effect of the fuzzy logic systems is analogous to the behaviour of a group of highly qualified experts with experience in the area of research, which make informed decisions in conditions of uncertainty.[15]

Determining the potential for a viable cluster to emerge from a particular production system is based on the subjective knowledge of experts about the institutional characteristics of the system and the available statistical information about the business entities that make it up. Expert assessments are represented through linguistic variables (with values of little, average and big respectively), which by nature are quality not quantity variables. That naturally leads to the idea of assessing the prospects for a particular production system using fuzzy logic.

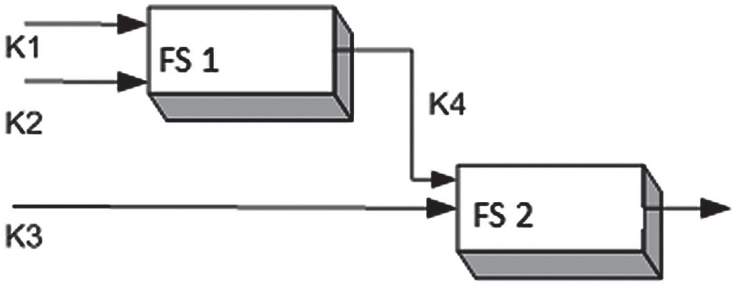
Different approaches are possible. One of them is to develop a hierarchically fuzzy expert system, within which, for example, three quality criteria of analyzing the prospects of a local production system have been defined:

[15] П. Златева, *Комплексен финансов анализ на фирмата чрез размита експертна система*, сп. Финанси, 2006, III, No. 1, Прил. към бр.1, p. 239–251.

1. Market prospects of the system – K1;
2. Effectiveness of the legal framework in the sector of industry – K2;
3. Economic efficiency of the business entities – K3.

The above criteria are interpreted as linguistic variables, which are input for the fuzzy expert system.

In this case, a hierarchical expert system is used and it includes two levels and two fuzzy subsystems. Thus, the logical rules, which arise from the relationship of the three input variables, are distributed in two knowledge data bases. That structure of the fuzzy system allows a more accurate representation and coding of expert knowledge, as well as an easier clarification of the rules. A generalized image of the two-level hierarchical system is shown in Figure 1.



FS 1 – fuzzy system 1
FS 2 – fuzzy system 2

Figure 1. Two-level hierarchical fuzzy system of assessing the prospects of the client

Source: П. Златева, *Комплексен финансов анализ на фирмата чрез размита експертна система*, Финанси, 2006, III, No. 1, Прил. към бр.1, p. 240

The first and second level of the hierarchical system under consideration includes one fuzzy subsystem. Each subsystem has two inputs and one output.

For the first subsystem the input are the two linguistic variables (basic criteria):

1. "Market prospects of the system" – K1;

2. "Efficiency of the legal framework in that sector of industry" – K2, and as output there is the linguistic variable "Prospects for the external institutional environment of the system" – K4 (intermediate complex criterion).

The subsystem at the second hierarchical level has the following input variables (one intermediary complex criterion and one basic), as follows:

1. "Prospects for the external institutional environment of the system" – K4;

2. "Economic efficiency of the business entities" – K3.

As the output of the fuzzy subsystem, the variable "Estimation" is introduced. The latter is the output for the whole fuzzy expert system. It is the final complex assessment of the prospects for the local production system.

As it is known from the theory of the fuzzy sets, linguistic variables can take different quantity or quality connotation (little-big; low--middle-high, etc.). In fuzzy systems these variables are considered to be sets (therms) with a certain degree of appurtenance to the specific value. Functions of appurtenance different in form are defined (triangular, trapezoidal, etc.).

In this case the input variables (the three basic criteria) are represented by means of three fuzzy sets for the two subsystems: "Little" ("Little" – L), "Middle" ("Middle" – M), "Big" ("Big" – B) level.

The input variables (the intermediate complex criterion and the final complex assessment) of the subsystems from the first and second level of the hierarchical fuzzy system are defined with five sets: "Very Little" ("Very Little" – VL), "Little" ("Little" – L), "Middle" ("Middle" – M), "Big" ("Big" – B) and "Very Big" ("Very Big" – VB).

In this paper, all linguistic variables are assigned with normal triangular functions of appurtenance. All input variables (K1, K2, K3, K4) change within the interval [0, 10], and the final complex estimate ("Estimation") – in the interval [0, 100]. The form of the linguistic variables is shown in Figures 2 and 3.

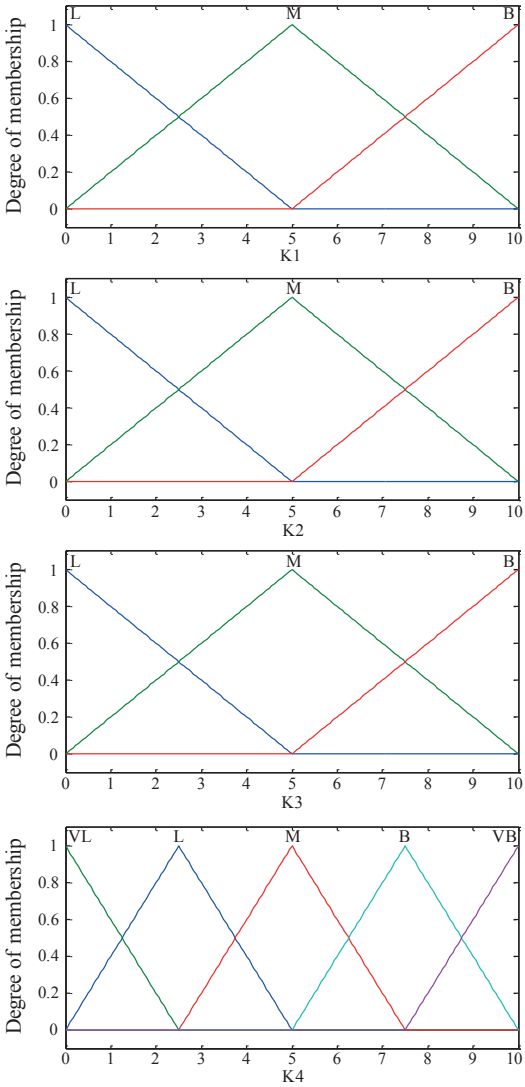


Figure 2. Form of the input linguistic variables (K1, K2, K3, K4)

Source: П. Златева, *Комплексен финансов анализ на фирмата чрез размита експертна система*, Финанси, 2006, III, No. 1, Прил. към бр.1, p. 248

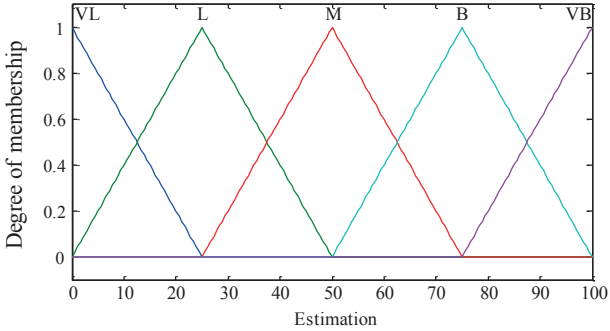


Figure 3. Form of the output linguistic variable "Estimation"

Source: П. Златева, *Комплексен финансов анализ на фирмата чрез размита експертна система*, Финанси, 2006, III, No. 1, Прил. към бр.1, p. 248

The rules for making a conclusion in knowledge data bases are defined by means of "If – Then" logical forms. Nine rules are included in the first fuzzy subsystem, and 15 in the second. Some of these rules are as follows:

IF [K1 is Little] and [K2 is Little] THEN [K4 is Very Little]
IF [K1 is Little] and [K2 is Big] THEN [K4 is Middle]
IF [K1 is Middle] and [K2 is Little] THEN [K4 is Little]

IF [K4 is Very Little] and [K3 is Big] THEN [Estimation is Middle]
IF [K4 is Little] and [K3 is Middle] THEN [Estimation is Little]
IF [K4 is Middle] and [K3 is Big] THEN [Estimation is Big]
IF [K4 is Very Big] and [K2 is Little] THEN [K4 is Middle]

The hierarchical fuzzy expert system for complex assessment of the opportunities a client presents to the firm is projected in Matlab environment, using Simulink and Fuzzy Logic Toolbox. The two subsystems are built up in the "Mamdani" variant of fuzzy systems. Classical max/ /min procedures of processing the rules and method of defuzzying – center of gravity have been used.

The output surfaces for the first and the second fuzzy subsystems in three dimensional space, with coordinates (K1, K2, K4) and (K4, K3, Estimation) respectively, are shown in Figure 4.

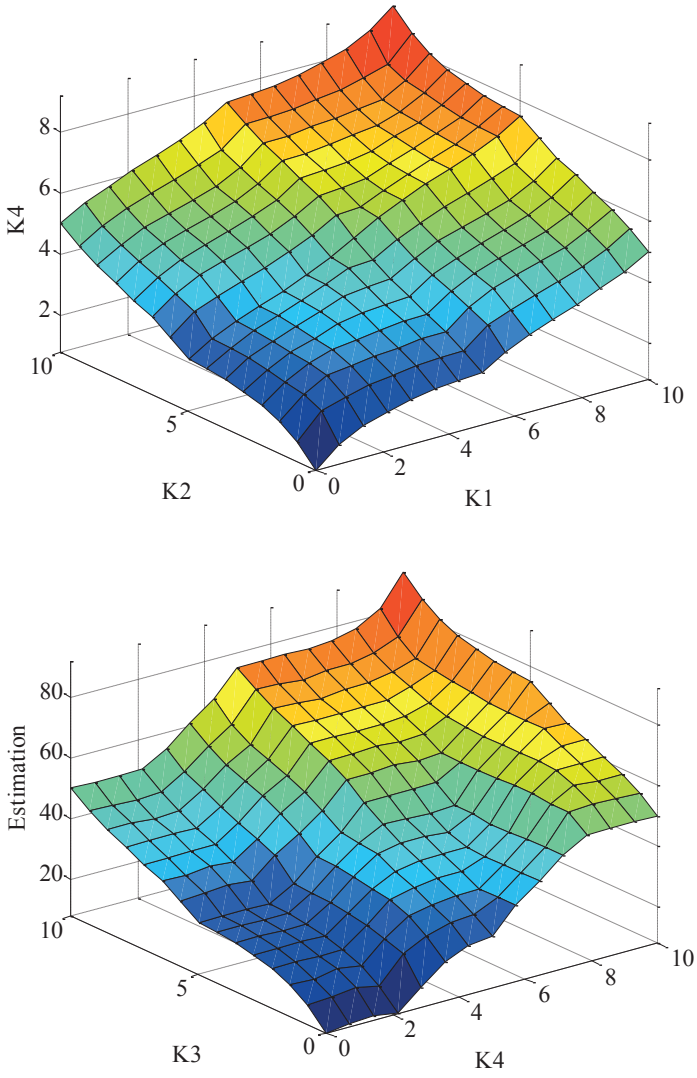


Figure 4. The output surfaces for the first and the second fuzzy subsystems

Source: П. Златева, *Комплексен финансов анализ на фирмата чрез размита експертна система*, Финанси 2006, III, No. 1, Прил. към бр.1, p. 250

The initial fixed values of the input variables, which are subject to fuzziness, can be obtained on the basis of an analysis and appropriate statistical processing of data collected through questionnaires completed by experts.

The particular value at the output of the hierarchical fuzzy system is the final complex estimate of the potential of the local production system to give rise to a viable cluster. Therefore, the output value of the fuzzy system can play the role of an indicator and to facilitate the making of more informed managerial decisions.

There are other variants of hierarchical expert systems with fuzzy logic, which are able to process more input variables, transforming them to the higher hierarchical levels. In these cases, output results can also be represented by means of three dimensional planes, similar to the ones that have been shown above. Data of this type is appropriate for further processing in various types of information systems.

In some cases it is better for the final result to be a quantity estimated set in a preset interval. The value of the estimate is interpreted as a characteristic of the assessed institutional environment.

For the purposes of the present study, such a model can be represented in the following way:

$$I = w_1.FI + w_2.InI$$

where:

I – is a general characteristic of the institutional environment

FI – evaluation of the state of formal institutions

InI – evaluation of the state of informal institutions

w_1, w_2 – are weights.

The idea is to apply a model with fuzzy logic, which allows using the knowledge and experience of experts. The parameters of the model – the input values for assessing the state of institutions (formal and informal), as well as their weights are determined by experts. The same is valid for w_1 and w_2.

In the model under consideration, a general characteristic of the institutional environment (I) is measured as the weighted sum of two integral factors: an estimate of the state of formal institutions (FI) and an estimate

of the state of informal institutions (*InI*). We suggest that the state of formal institutions (*FI*) is assessed on the basis of three basic factors, for example: viability of the legal forms of cooperation in the cluster – X_1; efficiency of the system of solving disputes – X_2; efficiency of the tax authorities – X_3. The second integral value – the estimate of the state of informal institutions (*InI*) can be obtained by taking into account the following main factors: ethicality of the firms in this sector of industry – Y_1, the competence of management – Y_2, qualification of staff – Y_3.

The linguistic variable "Factor level" is introduced in five fuzzy subsets: "Very Little", "Little", "Middle", "Big" and "Very Big". All variables vary in the interval [0, 10] and are defined with trapezoidal functions of appurtenance. Each linguistic variable F_i (X_i or Y_i), $i = 1, 2, 3$, has the respective function of appurtenance m_{ij}, $j = 1,\ldots5$, to the five fuzzy subsets, as follows:

$$\mu_{i1} = \begin{cases} 1, & 0 < F_i < 1.5 \\ 2.5 - F_i, & 1.5 \le F_i < 2.5 \\ 0, & 2.5 \le F_i \le 10 \end{cases} \qquad \mu_{i2} = \begin{cases} 0, & 0 < F_i < 1.5 \\ F_i - 1.5, & 1.5 \le F_i < 2.5 \\ 1, & 2.5 \le F_i < 3.5 \\ 4.5 - F_i, & 3.5 \le F_i < 4.5 \\ 0, & 4.5 \le F_i \le 10 \end{cases}$$

$$\mu_{i3} = \begin{cases} 0, & 0 < F_i < 3.5 \\ F_i - 3.5, & 3.5 \le F_i < 4.5 \\ 1, & 4.5 \le F_i < 5.5 \\ 6.5 - F_i, & 5.5 \le F_i < 6.5 \\ 0, & 6.5 \le F_i \le 1 \end{cases}$$

$$\mu_{i4} = \begin{cases} 0, & 0 < F_i < 5.5 \\ F_i - 5.5, & 5.5 \le F_i < 6.5 \\ 1, & 6.5 \le F_i < 7.5 \\ 8.5 - F_i, & 7.5 \le F_i < 8.5 \\ 0, & 8.5 \le F_{ki} \le 1 \end{cases} \qquad \mu_{i5} = \begin{cases} 0, & 0 < F_i < 7.5 \\ F_i - 7.5, & 7.5 \le F_i < 8.5 \\ 1, & 8.5 \le F_i \le 1 \end{cases}$$

The complex estimation of the general characteristic of the institutional environment (*I*), based on the proposed fuzzy logic model, is done as follows:

$$I = w_1.FI + w_2.InI = w_1 \sum_{j=1}^{5} r_j \sum_{i=1}^{3} w_i^x \mu_{ij}(X_i) + w_2 . \sum_{j=1}^{5} r_j . \sum_{i=1}^{3} w_i^Y \mu_{ij}(Y_i)$$

Weights from the basic factors (w_i^X and w_i^Y) in the complex estimate are chosen on the basis of expert knowledge and empirical observations. Vector $r = (r1, r2, r3, r4, r5)$ with five coordinates, is introduced in the formula for estimating I, and has the form: $r = (1, 3, 5, 7, 9)$. For the linguistic variable – general characteristic of the institutional environment (*I*) there are also five levels as shown in Table 1.

The value we obtain for I shows the characteristics of the institutional environment in the studied options. The higher value of variable I is related to a more favorable state of the environment.

Table 1. Characteristics of the institutional environment

I intervals	Values of the characterization of the environment
$8 < I \leq 10$	Extremely favourable
$6 < I \leq 8$	Highly favourable
$4 < I \leq 6$	Middle favourable
$2 < I \leq 4$	Highly unfavourable
$0 < I \leq 2$	Extremely unfavourable

Source: Г. Забунов, Д. Велев, П. Златева, *Компютърно базирана система за управление на отношенията с клиенти, Строително предприемачество и недвижима собственост*, Сборник доклади от 26-та научна конференция с международно участие, Изд. "Наука и икономика", Варна 2011, p. 117–125.

The value obtained for I shows the degree of attractiveness of the institutional environment in a particular production system. A higher value of variable I shows higher attractiveness of the environment.

3. Expected results

Until now, studies of Bulgarian clusters and local production systems in line with the institutional theory have not been made. The proposed method has not yet been tested in a field study. In relation to a forthcoming study of the possibilities of forming a cluster in the sphere of facility management, a survey was conducted with experts in the field. One of the aims is to approbate the model of general characterization of the institutional environment proposed in the paper. Facility management is a relatively new business in Bulgaria and there are no pronounced regularities in its spatial location – there is no reason to consider it as a local production system. Concentration of firms in the sector is observed in the big cities of the country and in some special production areas (energy sector, copper extraction, etc.). Interviews were held with members of the Bulgarian Facility Management Association, which is the only professional organization in the sector. Even at this very early stage it was noted that, according to the respondents the lowest value among the input variables has the X_i factor. This means that the main problem for forming a cluster in the sector, according to them, would be a not good enough legal regulation of the forms of interaction in the cluster. On that basis we can formulate the hypothesis that in Bulgaria the laws regulating the activities of the objects of social economy are not sophisticated enough. That, in turn, leads to the insufficiency of social capital in the interaction of the business organizations in their attempts to form structures of the network type.

4. Conclusion

An attempt has been made to find a quantitative approach in processing quality information with the aim to analyse the institutional environment of the functioning of the clusters from the perspective of the modern institutional theory. Models with fuzzy logic, which are applicable in that specific area, have been proposed. Institutional theory applies analysis with quantity methods in institutions, but most often at the level of business rules. The present paper can be viewed as the first step in the development of a whole approach, in which the supraconstitu-

tional and constitutional rules are modelled and studied through systems with fuzzy logic, and the business rules – through quantity models, which have been established in the theory and practice.

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Abstract

Local production systems are traditionally regarded as evolving structures, which react to changes in the environment, but the mechanisms of their reactions are determined by processes which are internal for them. Delineating the environment of the local production systems, their components, elements and structure – is done from the perspective of modern institutional theory. That matter is subject only to qualitative analysis which makes research difficult. For that reason, we suggest using fuzzy logic systems for the study of these problems, which provide good tools for quantifying quality information.

Key words: local production systems, institutions, fuzzy systems.

Olga Burmatova*

ENVIRONMENTAL AND ECONOMIC DIAGNOSTICS OF THE LOCAL PRODUCTION SYSTEMS[1]

1. Subject, purpose, objectives and main functions of ecological and economic diagnosis of the region

Regional environmental and economic diagnosis[2] has an important place among the elements of the mechanism of forecasting and environmental management in the region. On the one hand, the importance of regional environmental and economic diagnosis is determined by the possibility of obtaining a more adequate and sufficiently comprehensive assessment of the environmental situation within a given territory. This

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[2] We use the term "environmental and economic diagnosis" in order not to confuse it with the term "ecological diagnostics" used in the indication ecology, which means the study of the role of living organisms and changes of the conditions of their environment.

in turn, is essential to strengthen the validity of selection of priorities of environmental issues and to develop a conservation strategy. On the other hand, the tools of the regional environmental and economic diagnosis can be used as a set of criteria for evaluating the efficiency of current environmental policy in the region from the standpoint of achieving its goals and objectives.

In this context, we identify the term "region" with the term "local production system" (LPS), whose one of the important feature is its "manageability". Accordingly, it requires the presence of the subject and object for management by local and regional authorities in the process of conducting a deliberate policy, aimed at maximal utilization of available opportunities in its socio-economic development. Thus the local production systems are widely understood here both in terms of coverage area and from the standpoint of the possible forms of organization of production on the given territory. Accordingly, there can be municipalities, but also industrial centers and industrial nodes; territorial production clusters; free economic zones; growth poles, technoparks and technopolises; regions of new economic assimilation, formed on the basis of the long-term program approach to planning and management, etc.

In the structure of each LPS one usually distinguishes three main subsystems – economic, environmental and social. Accordingly, there are three groups of indicators for the characteristics of theses sub-systems – economic, environmental and social. Further we shall focus primarily on environmental indicators in relation to economic and social factors.

Each LPS has its specific characteristics, that are determined by the local natural, economic, social and other conditions. It seems to be necessary that development of each territory should be based on its own strategy how the use of natural resources and provide environmental protection; in more general terms – a strategy for sustainable development. The choice of a conservation strategy largely determines the content of the regional environmental policy. An effective environmental policy requires the development of quantitative assessments of the state of the environment at the country and its regions. Such estimates are needed for informed selection of priority issues, to ensure environmental security of the social and economic development at different territorial levels.

One of the solution to the above problem is to develop the tools of regional environmental and economic diagnosis. It is based on a system of indicators characterizing the ecological processes in the region. This system includes a set of parameters designed to provide an adequate assessment of the state of the environment in a particular region.

The subject of the environmental and economic diagnosis includes the identification of problematic environmental situations and problematic areas in the framework of LPS's.

Under the problematic environmental situation we should understand an established combination of the most important parameters that characterize the environment of the region, as well as the conditions governing this state. An important aspect of the regional environmental situation is to identify the most environmentally dangerous objects and their combinations. For the objective characteristics of the environmental situation in any region, one requires a variety of information and its appropriate treatment and allowing for the analysis of the environmental impact of various industries and their territorial combinations. First of all, it is necessary to analyze carefully various factors that influence the formation of the ecological situation. Identification of problematic environmental situations is based on the analysis of the initial state of the environment in the region. This is especially true for environmentally disadvantaged regions, as it allows to identify "bottlenecks" to environmental positions and forward capabilities in the first place to their undoing.

Problematic areas are the parts of the region with high-risk environmental conditions, threatening to the normal state of the environment (that is satisfying environmental standards). Problematic area is the result of applying a problematic situation on the economic, climatic and other features of a particular region. Identification of problematic situations and areas allows to establish the factors and conditions that contribute to the complication (or threat of disruption of normal) state of the environmental situation in the region and require a response from the government in the form of the development and implementation of appropriate measures to environmental regulation.

Ecological and economic diagnosis is focused on detection of deviations in the environment of the region, due to human activities, on the condition of meeting the environmental requirements. In other words, it is oriented

to detect the "environmental illness in the region" and various environmental "pathologies", arising primarily from the effect of the operation of production facilities. Identified pathologies, in turn, determine the approaches to the formation of a regional mechanism for the implementation of environmental policies, allowing a more informed choice of priorities to implement conservation strategies, and to solve problems and prevent the proliferation of new ones.

It means that the results of diagnostics are intended to serve the regional authorities as the necessary signals to how they should act in the prevailing conditions. In other words – in what directions (i.e. while overcoming "bottlenecks") they should work primarily to direct efforts and resources.

According to this, the regional ecological-economic diagnosis should include:

1. Diagnosis of the environmental situation in the region, especially caused by the characteristic critical parameters of the actual state of the environment;
2. Assessment of adverse changes in the natural environment under the influence of economic and other activities, and the identification of key issues from the point of view of solving specific problems of environmental regulation of regional development;
3. Prediction of possible changes in environmental conditions envisaged under the influence of socio-economic development and risk assessment of ecological threats.

As a result, it is possible to establish in which direction and how to transform the environmental situation and some environmental problems in the region.

The main goals of ecological and economic diagnostics are:

1. Identification of existing and potential variations in the environment (compared with standards);
2. Analysis of the causes of various pathologies in the state of the environment. Evaluation of negative changes in environmental conditions and identification of key environmental issues;
3. Prediction of the environmental situation in the region and risk assessment of ecological threats;
4. Development of a set of environmental measures aimed at improving the environmental situation in the region.

The achievement of these goals is possible by means of solving a number of interrelated problems, among which are the following:

1. Tracking of regions with difficult environmental situation, selection of regions in the need of increased attention of the authorities for active environmental protection;

2. Assessment of the ecological potential of the region, as we as the ability to adapt its economic development to the conditions of the environment;

3. Identification of the possible consequences of a change in the state of the environment in different variants of environmental policy in the region;

4. Identification of the weak points in various parts of the region in terms of the severity of the environmental situation and setting priorities in the formulation of environmental policy;

5. Comprehensive analysis of the various activities in terms of their possible implications for the environment, which allows identification of potential problems and their measurement;

6. Assessment of environmental risks and classification of areas by the nature of environmental hazards.

Conducting environmental-economic diagnosis of the region is possible by implementing the following key steps:

1. Description of the initial state of the environment in a particular territory with taking into account existing anthropogenic pressures;

2. Identification of the situation in the region (for example, assignment to a particular type of environmental situations, depending on the nature of environmental conditions);

3. Assessment of the state (usually over something taken as a state of "normal" or "average", i.e. the state of meeting the requirements of environmental standards);

4. Analysis of the causes of ecological hazards, the knowledge of which can provide the correct ways of avoiding them.

It seems that the regional environmental and economic diagnosis intends to provide:

a. formation of the initial database for the analysis and evaluation of the current state of the environment in the region. The latter assures starting position in the development of environmental strategy and the environmental policy;

b. selection of the necessary levers of management by the ecological and economic interactions in the region in accordance with the desired change in environmental situation through the formation of the required environmental protection measures;

c. possibility of evaluation of environmental performance over a certain period and the environmental and economic efficiency of the chosen system of environmental protection measures.

Thus, the use of instruments of regional ecological and economic diagnosis is designed to address the following issues:

1) for a quantitative evaluation of various environmental aspects of the socio-economic system of the region and the impacts of human activities on the environment;

2) to monitor the region's environment over time;

3) to determine in which direction a (positive or negative) change of the environmental situation is expected, in order to choose the possible ways to correct the socio-economic development in the region.

Finally, the logic of the regional environmental and economic diagnosis can be represented as a chain of links, starting with the analysis of the initial state of the environment in the region and ending with a definition of instruments and measures to the desired environmental regulations, and healthy environment (Fig. 1).

In general, the regional eco-economic diagnosis is an element environmental strategy making and a component of state environmental policy.[3] The main functions of the regional environmental and economic diagnosis in shaping environmental policy in the region as well as expected results are shown in Figure 2.

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[3] В. Лексин (2003), *Региональная диагностика: сущность, предмет и метод, специфика применения в современной России (вводная лекция предлагаемого учебного курса)*, "Российский экономический журнал", № 9−10, p. 64−86; С. Н. Бобылев, С. В. Соловьева (2003), *Методические рекомендации по разработке и внедрению индикаторов устойчивого развития регионального уровня*, ERM, Москва, p. 36; *Индикаторы устойчивого развития России (эколого-экономические аспекты)* (2001), ред. С. Н. Бобылева, П. А. Макеенко, ЦПРП, Москва, p. 220; *Новый взгляд на богатство народов. Индикаторы устойчивого развития* (2003), пер. с англ. С. Н. Бобылева, В. И. Сидоренко, 2-е изд., Весь мир, Москва, p. 128.

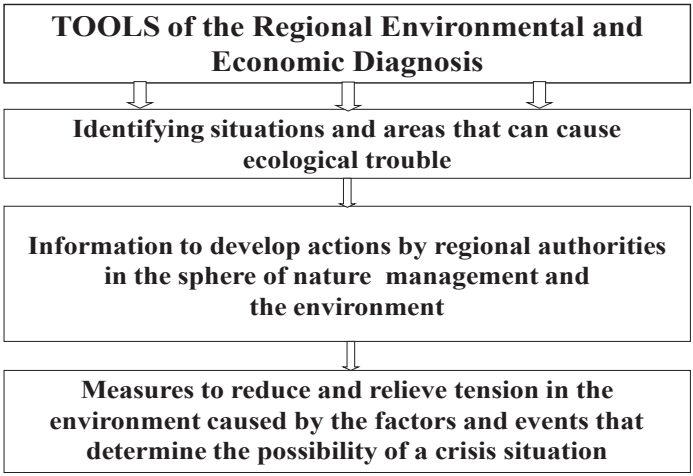

Figure 1. Sequence of actions for using the regional environmental and economic diagnosis

Source: own composition

Conducting environmental and economic diagnosis requires a large amount of various data. Therefore, environmental and economic diagnosis should be considered in close relation to environmental monitoring, the organization of which is essential conditions for life support of any region. Creation and operation of a special system of supervision and control of the changes of the environment under the influence of human activities, provide the information base needed to identify the causes and sources of adverse changes in the environment and to predict possible changes in the environmental situation of the region. Thus, the results of environmental monitoring are informational basis of environmental and economic diagnosis of the region.

With the help of the environmental and economic indicators, it seems possible to quantify the various parameters describing the regional economic system in terms of the environment and natural resources. This provides information and analytical base for more efficient management of natural resources and development of environmental policies in the region.

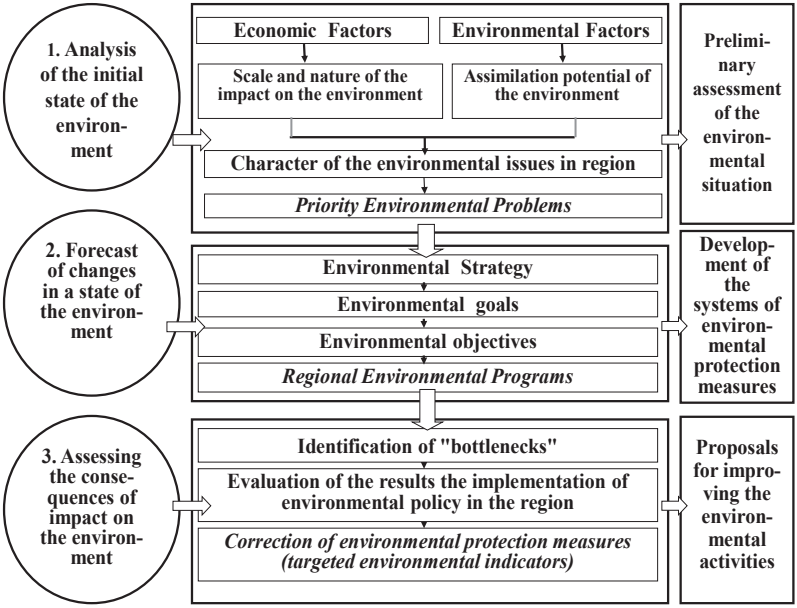

Figure 2. Functions of the regional environmental and economic diagnostics in shaping environmental policy

Source: own composition

With the help of the environmental and economic indicators, it seems possible to quantify the various parameters describing the regional economic system in terms of the environment and natural resources. This provides information and analytical base for more efficient management of natural resources and development of environmental policies in the region.

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Such a framework should include at least the following three groups of data:

1. Describing the actual state of the environment;

2. Assessing changes in the natural environment under the influence of economic and other activities;

3. Predicting possible changes in environmental conditions, envisaged under the influence of socio-economic development and risk assessment of ecological threats.

Availability of appropriate information systems, formed on the basis of the calculation of environmental indicators, is essential to make timely decisions to prevent possible negative environmental consequences of economic activity in a given region, as well as the formation and improvement of the regional environmental policy. This system is the necessary starting point for the justification and development of programs of environmental activities, the choice of priorities in their implementation, and the comprehensive substantiation of the main directions of environmental policy in different regions.

2. Structure of the system of regional environmental and economic indicators

System of regional environmental and economic indicators of primary importance, in our view, should include indicators that characterize: 1) the state of the resource and environmental (or natural resources) potential of the area and the extent of its use, 2) the impact on the environment and the character of change, 3) the state of health of the population in relation to the environmental situation.

In other words, in formulating environmental policy of the development of individual regions one should first analyze the existing environmental condition of the territory, assess its resource and environmental potential and extent of its use. Then, one should identify "bottlenecks" in the formation of the environmental situation, to measure ecological capacity of the territory, assess carrying capacity of the natural environment, its potential "accept" human impacts, perform typology of the region have achieved the degree of economic stress, etc.

The system "regional economy – environment" can be divided into two main subsystems – resource and ecological (or natural resources) and socio-economic.

In the analysis of the resource and environmental subsystems, the focus is on assessing the impact of development of the productive forces of the quantitative and the closely related qualitative depletion of natural resources of various kinds. Quantitative depletion of natural resources is accompanied by a reduction in their reserves due to high production rates and utilization of resources. Qualitative depletion is particularly an effect of pollution of the environment, which leads to its degradation.

To characterize the state of the resources and environmental potential of the region, a set of indicators that determine the degree of nature intensity of production can be used. For example, one can apply indicators that reflect the level of consumption of natural resources and the level of disturbance of ecosystems as a result of economic activity (per unit of output). Also, corresponding figures in per capita terms can be informative here, as well as macro characteristics that express the relationship between the demand for natural resources and their availability (provision of resources). Examples of indicators of this kind usually have relative level (per capita, per unit of gross domestic product and per unit of gross regional product) of consumption of energy and other resources.

The system of indicators includes also such characteristics of the environment as individual ecosystems and protected areas. These include the quality of air and water, land area (both in natural and altered state), forest areas form the point of view of their productivity and the degree of its preservation, the number of species threatened with extinction, etc.

In the socio-economic sub-system there are interesting indicators characterizing the effect of the development and distribution of productive forces in the environment, taking into account demographic factors, impacts of changes in the economic activity of the natural environment for the production and public health. To reflect these interactions, indicators of the level of economic development and environmental well-being and quality of life (including the length of a person's life, his or her health, etc.) can be used.

Generalizing criterion of the permissible load for the environment can be an indicator of economic capacity of local ecosystems. This indicator is intended to serve as a guide for the first-approximation in the search of the optimal trajectory of economic development in a particular area. This does not preclude the use of additional criteria of environmental acceptability of each economic project. Assessment of the use of the economic capacity of the territory takes

into account the scale of contamination and state of natural objects. It can serve as a starting point to support priorities in the implementation of environmental activities in the development of forecast of social and economic development of the regions, targeted programs and investment projects.

The proposed system of regional environmental indicators should reflect the strategic environmental priorities and the key environmental issues, facing the leadership and the population of a given region, and focusing on critical areas of the region and the environmental activities:[4]

1) Environmental pollution;
2) Ecological potential of the region;
3) Resource potential of the region;
4) Waste of production and consumption;
5) Anthropogenic impact on the environment (for the purposes of comparative analysis of the regions) and its features;
6) Resource and energy capacity of production;
7) Economic damage from environmental pollution;
8) Investment in environmental protection;
9) Health of people in connection with the environmental situation.

More complex ecological and economic indicators, including characterization of their relevance and content are given in the Table 1.

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[4] *Индикаторы устойчивого развития Томской области*, ред. О. В.Козловской, 2-е изд., перераб. и доп., STT, Томск 2003, p. 30; Г. Е. Мекуш, Е. В. Перфильева, *Индикаторы устойчивого развития Кемеровской области*, РОО "ИнЭкА", Новокузнецк 2004, p. 24; О. П. Бурматова (2003), *Региональная экологическая диагностика как механизм устойчивого развития региона (на примере Новосибирской области)*, [in:] *Сибирь в XXI веке: альтернативы и прогнозы развития*, материалы научно-практической конференции, в 2-х частях. Часть 1: *Красноярск: Красноярский государственный университет*, p. 269–279; О. П. Бурматова, *Эколого-экономические индикаторы в системе управления регионом. Стратегическое управление пространственным развитием субъектов Федерации и городов Сибири*, ред. А. С. Новоселова, ИЭОПП СО РАН, Новосибирск 2009, p. 248–268; О. П. Бурматова, *Формирование системы региональных эколого-экономических индикаторов. Воспроизводственный потенциал региона*, материалы IV Международной научно-практической конференции, Ч. II, отв. ред. К. Н. Юсупов, РИЦ БашГУ, Уфа 2010, p. 30–39; Т. А. Акимова и др., *Основные критерии экоразвития*, Издательство Росэкоакадемии, Москва 2009, p. 54; I. Serageldin, *Making Development Sustainable. From Concepts to Action*, "Environmentally Sustainable Development Occasional Paper Series" 2008, № 2, The World Bank, Washington D.C., p. 340.

Table 1. Environmental and economic indicators potentially useful in the studies on local production systems

Spheres of LPS	Indicators	Significance	Characteristics
1	2	3	4
Environmental contamination	1. The amount of pollution emitted into the environment per unit of GRP	The high concentration of industrial enterprises that raise the amount of pollutants into the environment, posing a threat to human health. Increase in the concentration of pollutants in the environment can lead to poor quality of air and water, and quality of life	The index includes: • air emission from stationary and mobile sources, • the amount of pollutants collected in ponds with sewage, • volume of waste of production and consumption. Improving air and water quality is an essential aspect of promoting sustainable development. Reduction of pollutants of the environment per unit of GRP is characterized by: • sustainability of the technologies, • efficiency of the gas treatment equipment • reduction of energy production, • improving the quality of the environment, • reducing the negative impact of the economy on health.
	2. Index of air pollution	Air pollution index (API) represents a comprehensive assessment of chemical pollution of the atmosphere. It takes into account the contribution to the pollution of many substances and provide the level of pollution by a single number.	In calculating the API hazard class chemical polluters are taken into account. In this case, the actual average concentration of the substance is given to the degree of air pollution with sulfur dioxide. Thus the API is calculated as a fraction of the maximum permissible concentration (MPC) of sulfur dioxide. For comparability, the values of the API must be calculated for the same number of substances in each region. The calculation of the API in Russia are usually carried out for at least 5 or more the most

Environmental contamination (cont.)		API is used in the environmental air monitoring to characterize the state of air pollution in the cities of the Russian Federation.	significant pollutants, including suspended solids, nitrogen oxides, sulfur dioxide and benz(a)pyrene, ozone, formaldehyde, phenol, lead, etc. In accordance with the methods of assessment, the level of air pollution is high, with the value of the API from 7 to 13, and very high in the API, equal to or more than 14.
	3. Index of water pollution	Water pollution index (WPI) is used to determine the contamination of the water basin. WPI calculation identifies the classes of water quality of surface water, depending on the level of WPI.	WPI is an unweighted arithmetic mean of the function, including a number of maximum 6 elements (or components). Moreover, among the components parameters such as BOD5 and dissolved oxygen must be present. Selecting the other 4 parameters depends on the extent of the excess of the MPC.
Ecological potential of the region	1. Climate potential	Favorable climate forms, on the one hand, the comfortable conditions affecting human wellbeing and health. On the other hand, it has an influence on the environmental situation, determining the mechanism of adaptation of natural systems to human impact, in particular the nature of the dispersion of pollutants in the atmosphere, transfer of pollutants in the air etc.	The annual amount of solar radiation per unit of area, frost-free period, the annual range of mean daily air temperature (in the warmest and coldest months), wind speed, calm, natural wind patterns, temperature inversions, atmospheric pressure, and other anticyclones.

Table 1. (cont.)

1	2	3	4
Ecological potential of the region (cont.)	2. Geomorphological conditions	Influence the formation of the carrying capacity of the atmosphere, the nature of the environmental situation.	Ruggedness of terrain, slope, intensity of weathering, landslides, mudflows, slides, avalanches, etc.
	3. Hydrological conditions	Determine the adaptive mechanism of water bodies to human impacts, including degradation of harmful substances in water reservoirs, transfer of pollutants in rivers and other	Annual rainfall, the water exchange rate, flow rate, humidity, fog, smoke, general water supply area etc.
	4. Soil conditions	Influence the formation of the carrying capacity of soils, decomposition and accumulation of harmful substances in the soil, etc.	Thermal treatment of soils and their ability to self-purification, the content of biologically active components, the presence of permafrost, wetlands, etc.
The resource potential of the region	1. The primary biological productivity of natural vegetation	Plant capacity as a set of natural vegetation, is used as a resource for industrial and agricultural production, recreation, and other human activities.	Productivity of natural forests, medicinal and food plants, wild fruits, berries, mushrooms, etc. Natural forestry potential as natural farming, which is closely linked to the general water-heat regime of territory and by the level of biological productivity of vegetation.
	2. Comprehensive agricultural potential	Characterizes the conditions for agriculture.	Soil quality, character of the relief, heat and humidity, rainfall patterns, reliability, weather conditions, etc. Agricultural industrial capacity – the amount of active temperature minus the amount of the average daily temperature must be greater than 10°C.

The resource potential of the region (cont.)	3. Land resources	Characterize the conditions of use of land resources.	1. Agricultural areas 2. Territory for the industrial construction (including manufacturing infrastructure) 3. Territory for civil engineering 4. Area is not disturbed by economic activities 5. Growth of specially protected areas 6. Other areas (under the green zones), etc.
	4. Water resources	Denotes the amount of surface water available for use for industrial and domestic use	The annual flow of rivers, the annual precipitation.
	5. Animal resources	Characterize the reserves and combination of the animal resources.	Fish stocks and other marine animals, game animals.
	6. Mineral resources potential	Characterize the reserves and combination of the mineral resources.	Reserves of different types of resources: fuel, energy, raw materials (metal and non-metal). The utilization of the resource potential (level of consumption of natural resources, the rate of depletion, resources, nature-production, etc.).
Wastes of production and consumption	1. Number of untreated industrial and domestic wastes	Reflects an assessment of the system of waste management. Large amount of waste that accumulate in the environment, creates a dangerous situation that could cause a state of emergency with severe consequences for human health and the environment.	The indicator shows: • sustainability of the technologies, • consumption of resources, • effectiveness of the waste management system, • quality of the environment (indirectly), • impact of the economy on health (indirectly), • environmental risk of production. Increasing degree of processing and disposal of waste –is an important aspect of promoting sustainable development of cities and regions, as well as reduced environmental risks of waste accumulation. The positive dynamics of indicators of this kind characterizes sustainable development of the region.

Table 1. (cont.)

1	2	3	4
Wastes of production and consumption (cont.)	2. Waste indices	Used to assess the environmental impact of economic development of certain regions. Characterize the proportion of different types of waste in the total mass of waste and toxicity.	Include: • index of household waste. It is the ratio of the mass of waste to total waste produced by society (for the country and its regions). The volume of waste reliably reflects the level of private consumption. Accordingly, the higher the value of this ratio, the higher the level of consumption in the region. Index of household waste can serve to characterize efficiency of natural resources (how much of natural source material is consumed in order to produce a unit of production for human consumption) • index of hazardous waste. Defined as the ratio of toxic and hazardous waste to the total waste generated in the region. Characterizes the level of toxicity of wastes.
	3. Environmental indicators of technological processes	These indicators reflect the quantitative and qualitative parameters of waste (waste with different technologies).	Calculated as the total volume of the output of various components of waste (gaseous, liquid, solid), and concentrations of the respective components in the waste divided by the MPC of the individual components of waste released into the environment. Indicator environmental processes can be useful in comparison of traditional and advanced manufacturing processes in terms of assessing their wastelessness.

Human impact on the environment	1. The composite index of technological loads	This index can be used as an integral criterion for ranking the regions and determination of their categorical nature in depending on the environmental problems.	It is the arithmetic mean of the partial indices of the four types of loads: 1) release of harmful substances into the air, 2) polluted waste water into water bodies, 3) transformation (non-agricultural) landscapes of urban areas, 4) agricultural transformation of landscapes (plowing). Defined as the ratio of the actual value of the indicator for each subject of the Russian Federation with the correction factors to the estimated magnitude of the average of one subject of the Russian Federation.
	2. Particular index of technological loads	Indicator shows the pollution on the regional level, depending on the level of development pressure.	Defined as the ratio of the total amount of release to the environment pollution of various species in a particular region per unit of urban areas in the region to the total volume of output from all sources of pollution to the environment in the country in per unit of the urban area in the country as a whole.
	3. Tension coefficient of environment situation	Indicator shows the pollution by region of the country, depending on the level of development pressure per unit of urban area.	Calculated on the basis of particular index of anthropogenic impact on urban areas with taking into account of population in the region and in the country.
Resource and energy capacity of production	Resource consumption and energy intensity of GRP	This indicator is a fundamental indicator in the system value of goods and services. Characterizes the "heaviness" of the structure of the economy (high share of extractive industries and heavy engineering) and the presence of backward technologies.	Economic indicator of the amount of consumption of resources: water, raw materials, fuel and energy (fossil fuels and refined products, converted to standard fuel on certain factors) per 1 thousand of GRP. Shows a decrease in the dynamics of the consumption of natural resources, primarily through the use of resource-saving and energy-saving technologies.. Reduction of resource and energy characterizes sustainable development of the region.

Table 1. (cont.)

1	2	3	4
Economic damage from pollution	Indicators of economic damage from pollution	Damage from pollution is the actual and potential losses of the economy, caused by the environmental pollution (including additional costs to eliminate the negative consequences of pollution), as well as losses due to deteriorating health, reducing the duration of working life and the lives of people . To damage from pollution are economic and non-economic losses associated with a more rapid deterioration of engineering structures, buildings, corrosion of materials, increased incidence of people, reducing crop yields, reduced productivity of livestock, etc., phenomena is caused by biological, physical and chemical contamination of the environment.	Figures include the costs of pollution: • air (the valuation of losses caused by air pollution, given the relative aggressiveness of the ingredients emissions), • surface water (the valuation of losses caused by pollution of water bodies, taking into account the relative hazard of pollutants in waste water), • soil (the valuation of losses caused by soil contamination and waste disposal), • forest (the valuation of losses caused by forest destruction and degradation of their functions in connection with the contamination of the environment), • subsoil (the valuation of losses caused by disturbed and contaminated subsoil).
Investment in environmental protection	The volume of investment in fixed assets in environmental protection	This indicator describes a general level of investment activity in the region in the environmental field, including the structure of sectors (industry, agriculture, construction, transport, etc.). Its dynamics shows the possibilities of the investment potential of the region for the development of environmental management.	Indicator shows the amount of funds in the environment-oriented facilities by all sources of funding. The positive dynamics of the indicator characterizes the level of sustainability of development of the region.

Source: own composition.

In addition to these indicators, as additional indicators of environmental management in the region one may take such factors as increasing share of environmentally friendly products (produced by environmentally-oriented technologies), increasing share of resource-saving technologies in production, increase in the share of environmental costs of total production costs, increase in the revenue of territorial environmental funds, increase of the share of equity in natural resource conservation activities, and increase in the share of the regional budget line devoted to finance conservation measures.

The system of regional environmental indicators should also include indicators of the region's contribution to the formation of global environmental situation (greenhouse gas emissions, the formation of ozone and acid rain, etc.) and its participation in the trans boundary movements of all kinds of pollution.

Above indicators of environmental impact, as a rule, are not reportable statistical indicators, although in most cases their calculation is based on the use of official statistics. On the one hand, these indicators allows to add the existing statistical database in the field of environmental protection. On the other hand, they provide opportunities for the analysis of ecological processes in the region.

3. Main properties of the regional environmental and economic indicators

Environmental indicators are important not by themselves, but as an instrument for achieving environmental policy objectives, providing the base for analyzing specific environmental situation in a particular area, in order to make conclude about the state of the environment in the region. The reasons for their formation is thus to build a basis for undertaking necessary actions in the field of preservation of the environment and natural resource management in the region.

Obviously, each region should develop its own system of environmental indicators, since composition of which depends on the specificity of the region – its natural, economic and social conditions, especially

the territorial organization of production and development prospects. Composition of indicators suited to the specificity of the region allows also formulation of its own environmental objectives and character of tasks.

Because each region is characterized by its own specific conditions of the environmental situation, it is impossible to develop and implement environmental policies, not having a precise information about exact ”pain points” on environmental issues of the given region, as well as an identification of significant deviations from the standard state and in consequence, deciding what special measures are needed to relieve bottlenecks in the current environmental situation. These regions should be the subject of priority in the allocation of public funds for the implementation of various regional environmental programs.

Adequate assessment of the state of the environment in a given region is possible only through a set of indicators (and not any single indicator), because universal parameter describing adequately the environment, has not been found.

Regional environmental and economic indicators, as part of the general system of regional indicators are intended to provide quantitative estimates reflecting the dependence of the relationship between the economy, the individuals and the environment, characterizing the connection “effect – change – impact – state – required environmental protection measures”. Identification of the appropriate chain relationships, following from source of environmental impacts to the environment itself, allows arising different kinds of impact on the environment and all kinds of negative consequences of such exposure in a territory. This, in turn, causes the selection of the necessary nature protection and other measures.

Among the methods of accounting and estimating the impact of human activity on the environment, quantitative approaches have a special place. They allow to characterize various aspects of the changes in the state of various elements of the natural environment in a formalized way, as well as they help to assess the environmental situation within the territories of different levels of complexity, different scale of the influence of various factors and conditions, the dynamics of the process, etc.

Therefore, development of environmental indicators is very important for quantifying the effect of different mechanisms of human activities

and their adverse effects on the environment. Only those indicators for which a cause and effect of relationships and dependences are installed, can serve as an adequate measures for the environmental assessment procedures.

In our opinion we should not seek to the formation of the widest possible range of different indicators. What is much more important, they allow to characterize the state of the environment in a complex way. However, there is always a need of abandoning the use of indicators that overlap. In other words, the indicators should be informative and their set should adequately reflect the state of the environment.

In accordance with this, the following key features of approach to the choice of set of environmental indicators used to assess the state of the environment, should be assured.[5]

First, indicators should be representative, which means that it should be possible to select from a set of their most important indices, (i.e. those that provide new and useful information needed for more informed decision-making process in the region). However, they should not give bias towards one or another aspect of the state of the environment of a particular disease.

Secondly, it is advisable to operate with such environmental and economic indicators that are simple and convenient for their practical use. They should be simply interpreted and their application should be clear that they describe.

Third, the environmental and economic indicators should reflect the change of parameters in time, and catch up with significant variations of a given phenomenon. In other words, they must be characterized by their dynamics.

Fourth, environmental and economic indicators must satisfy the requirement of the availability and reliability of data. This means that the information used to calculate the indicators can always be obtained and (including affordability), it should be available on a regular basis (once a year or two years), as well as should be trust worth.

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[5] Т. А. Акимова и др., *Основные критерии экоразвития*, Издательство Росэкоакадемии, Москва, 2009, p. 54; I. Serageldin, *Making Development Sustainable. From Concepts to Action*, "Environmentally Sustainable Development Occasional Paper Series" 2008, № 2, The World Bank, Washington D.C., p. 340; Е. А. Лобанова, В. В. Гаврилов, *Экологические показатели в управлении природоохранной деятельностью в России*, URL, //http://gisa.ru/12430.html/.

Thus, the effectiveness of the environmental and economic indicators is largely determined by the reliability of methods used to collect and process information, which makes the close relationship between the regional environmental diagnostics and environmental monitoring. The ecological and economic diagnosis serves as a tool to form an opinion on the state of environment in the region, which contains the signal for action, and environmental monitoring – as a means of continuous monitoring of the environment.

Proposed list of regional environmental and economic indicators is designed for use by regional authorities as a tool to monitor activities in the field of sustainable development in the region, assess the effectiveness of environmental protection and the implementation of timely completion and adjustment of activities aimed at achieving the environmental objectives of the territory, in case this activity will be not sufficiently effective.

In general, the results of environmental and economic diagnosis of the region are considered to be an important element of the information-analytical basis of environmental policy. They need, first of all, characterize the state of the environment in the region, but also identify trends; visual assessment of regional environmental problems. What is more, they can be helpful in the selection of specific regional issues that require urgent attention of state and municipal governments to create and implement a system of activities required to prevent and manage the existing adverse environmental situations. One of the main purposes of regional environmental and economic diagnosis is to measure both actual and projected environmental situation in the region.

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Abstract

The article describes the subject, aims, objectives and basic features of the ecological and economic diagnostics at the regional level, applicable in the context of the research on local production systems. For these purposes, characteristics of the main stages of the ecological-economic diagnosis are considered. Further, the structure of the system of regional ecological and economic indicators and their properties are given. The functions of the regional ecological and economic diagnostics in shaping environmental policy are shown. Also, main features of the approach to the choice set of environmental indicators

to assess the state of the environment and a number of requirements that they must satisfy are highlighted. Finally, regional ecological and economic diagnostics is regarded as a "must-have" item of the development of environmental policy.

Key words: diagnostics, indicators, regional development, environment.

PART II.
POLICY AND REGIONAL CONDITIONS OF LPS' FUNCTIONING

Marta Ulbrych[*]

REINDUSTRIALIZATION AS A MEAN OF IMPROVEMENT OF COMPETITIVENESS OF THE EUROPEAN UNION[1]

1. Introduction

Contemporary global economy and accompanying rapid acceleration of technological development are demonstrated by, among others, industrial civilization being superseded by economy based on knowledge and information. General tendency to increase the importance of services is mirrored by decreasing importance of industry both in employment share and GDP creation, in most countries with relatively high income level. The development of financial, legal and marketing services is, however, directly connected with industrial production process as its integral part. This relation is clear because services based on activity of companies depend to a large extent on demand from industry.

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Moreover, in developed economies offshore outsourcing of industrial production takes place, to those parts of the world where labor costs are relatively lower.

This phenomenon is a result of globalization and regionalization processes in global economy, which are accompanied by trade liberalization and border opening to enable free flow of capital, which results in creation of more efficient manufacturing centers. Application of new technologies, which enable limitless communication, development of services and withdrawal from mass and labor-intensive production and turning to more innovative industry are of course the result of natural development process. Technological progress makes production process more routine, not requiring the employment of highly qualified workers. This allows the transfer of industry to areas where lower costs and more flexible conditions of business activity are guaranteed. However, these phenomena cause changes in many branches of economy, including impact on labour market, changing the scope and the structure of demand, and as a result lead to employment reduction in industry. Additionally, the development of industrial production was disrupted by the global economic crisis, which lead to increase in social problems, mainly in unemployment, becoming more permanent. Minimizing current instabilities requires, among others, more active support for national industry. Past support for manufacturing industry, motivated by social reasons, more than often turned out costly and ineffective. Current tendencies in global economy, with decrease in economic growth and pressure from international competition, emphasize the necessity to create proper formal conditions supporting long-term growth and development of industry.

Both in member states and on the EU level, various initiatives are taken up, which are directed at intensification of actions as far as support and redefining of industrial policy functions. The European Commission adopted, in October 2012, a strategy for reindustrialization of the European Union, assuming an increase of industrial production share in the GDP of the EU. The study aims at presenting the effects of industry restructuring and perspectives of success in the context of the strategy accomplishment, i.e. economic revival.

2. The phenomenon of deindustrialization. Third industrial revolution

Postindustrial nature of contemporary world gives rise to a thesis saying that economic systems undergo deindustrialization. Yet, when analyzing the phenomenon, controversies arise around the essence and definition of the term. The term deindustrialization itself has negative connotations. The phenomena observed do not lead to elimination of industry from the structure of economic macro-systems, but are characterized by evolutionary changes being expressed by transition from capital-intensive industries to knowledge-intensive industries. Beginning in the mid 1970s, a change in the manner of industrial production has been taking place. Previous paradigm of mass and standardized industrial production has been replaced by a post-Fordism approach characterized by high quality, diversified production. As a result, the role of traditional industries has decreased to the advantage of modern industries – ones based on advanced technology, also called advanced technology industries, producing and processing knowledge i.e. knowledge-intensive.[2] Such evolution in the direction of economy based on knowledge does not lead to elimination of production as a form of manufacturing, but results in increasing role of services and decrease of human involvement in many stages of production process. Deindustrialization understood in such way is a natural characteristic of economic development and results from maladjustment of industrialization in its previous form to different quality of new conditions of operation and development of industry, connected with scientific and technical progress[3]. These issues have been analyzed by the European Economic and Social Committee, applying the following distinction:[4]

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[2] A. Wieloński, *Od industrializacji do reindustrializacji*, Uniwersytet Warszawski, Wydział Geografii i Studiów Regionalnych, Warszawa 1998, p. 13, 23.

[3] K. Kuciński, *Dezindustrializacja w procesie rozwoju gospodarczego*, http://www.sgh.waw.pl/ katedry/kge/mdp/atomnewsitem.2007-05-05.0652955173/deindu.pdf/, p. 5 (accessed 03.12.2012).

[4] European Economic and Social Committee, *Opinion of the European Economic and Social Committee on the scope and effects of company relocations***,** 2005/C 294/09, p. 3.

– absolute deindustrialization, which results in a drop in employment, production, profitability and industrial resources in industry as well as a decrease in industrial goods export and creation of a lasting trade gap in this sector;

– relative deindustrialization, understood as a decrease of industry's share in economy, reflecting the process of structural changes as far as the relation between the productivity of industry and the services sector.

The latter approach, presenting a relative decrease of the role of industry and its smaller direct share in creation of national wealth to the advantage of services, may be treated as restructuring. The process of transformation of systems based on industry into those dominated by serviced is not a substitute to industrialization, but it is complementary to it. On one hand, part of industrial activity is taken over by service-oriented business entities, but simultaneously structural changes in industry create demand for services in general and for services with new functions.[5]

The definitions presented above allow to define deindustrialization as a phenomenon connected with complete and cumulative decrease of industrial production's share, expressing itself in reduction of: added value created in industry, generated gross domestic product, export value and employment. Current changes should be connected with servicization i.e. relative decrease of industry, being a consequence of dematerialization of production.[6] These are expressed by structural transformations within a given economy and then they do not mean the disappearance of economic base of the country, but only a change in its position within the system of macroeconomic links. This, of course, gives rise to consequences severely perceptible at local and regional levels. In a long period, however, the economy usually benefits from the restructuring carried out. Reasons for these phenomena may also be connected with the globalization process and relocation of industry, which it causes, form countries with higher production costs to countries with lower production costs. Such situation may, in extreme cases, lead to deindustrialization.[7]

[5] K. Kuciński, *Dezindustrializacja*…, p. 2.

[6] W. Gierańczyk, *Problematyka definiowania zmian w tendencjach lokalizacyjnych przedsiębiorstw przemysłowych w dobie globalizacji*,"Prace Komisji Geografii Przemysłu", No. 11, Warszawa–Kraków 2008, p. 88–89.

[7] K. Kuciński, *Dezindustrializacja*…, p. 4.

The phenomena described concerns individual economies in various degrees, which depends on their stage of development and the level of international links. There is no doubt, however, that the era of domination of industry in its previous form is passing. Application of labor-saving technologies and increase in labor efficiency, leads inevitably to change in the nature and structure of industrial production. Literature defines this stage of global economy development as the third industrial revolution, which means:[8]

– transition from industrial era based on exploitation of natural resources to the knowledge-based era;

– use of new technologies in communications, which allow to build global economy and even render it necessary;

– continuing process of privatization and deregulation of markets through abandonment of ideas, propagated by theoreticians of communism, about collectivization, centralization and state monopoly.

The idea of the third industrial revolution was popularized by J. Rifkin, but similar observations of contemporary phenomena and conclusions drawn from them may also be noticed in other studies, by A. Toffler or L. Thurow, among others. The authors agree that an information industrial revolution is currently taking place, which leads to fundamental changes in the socio-economic system.

J. Rifkin claims that great industrial revolutions in the history of the world took place when a meeting between a new communication technology and a new energy system occurred in time. This relation and its dynamism is the basis of infrastructure, the existence of which is necessary for proper functioning of economy. In the 19th century, the use of steam power in the typography and a railway network produced infrastructure which lay foundations for the first industrial revolution. Then, at the beginning of the 20th century the internal combustion engine, supported by electric communication, initiated the second industrial revolution. This allowed the world to enter the era of mass production of industrial goods, including cars, which in turn caused compression of time and space. The foundation

[8] T. T. Kaczmarek, *Globalna gospodarka i globalny kryzys*, Difin, Warszawa 2009, p. 60–61.

of the third revolution is the connection and mutual penetration of communication technology and renewable energy sources. The current evolution stage is supported by five integrated mainstays:[9]

– switching to renewable energy sources;

– construction of micro power plants on the basis of local renewable energy sources;

– application of technologies permitting periodic energy storage;

– the use of the Internet to transform the power grid into an energy exchange network – with such system, surplus energy will be transferable to other network users;

– modernization of transport, enabling it to be powered with fuel cells and electricity.

Fears about the future of overly exploited planet are of course real, but the presented claims and the perspective of them being put into practice seem to be distant. Development of renewable energy is probably a rational alternative to coal or oil produced energy, especially in the context of energy source mineral resources shrinking. However, a question concerning possibilities of meeting the requirements of industry and individual consumers by the green energy only, appears. General savings in this area seem to be necessary both on the level of enterprises and households. It requires a different approach in the whole economic system. Continuation of the application of a paradigm treating profit as a dominant value contradicts the proposed assumptions. J. Rifkin emphasizes a need of creation of a civil society and promotion of collective co-habitation models. Gaining public, market and, above all, civil capitals and making use of them will allow for transformation of the world into an economy of the third revolution, a post-coal era.[10] However, he also notices that since the time of crisis in 2008, more and more western countries turn their perception towards the third industrial revolution. The case of the European Union deserves special attention, as it never underestimated the matter of environment protection and undertook various

[9] J. Rifkin, *Trzecia rewolucja przemysłowa. Jak lateralny model władzy inspiruje całe pokolenie i zmienia oblicze świata,* Wydawnictwo Sonia Draga, Katowice 2012, p. 57–62.

[10] *Ibidem*, p. 364–365.

actions aiming at transformation of infrastructure in the direction of balanced economy. J. Rifkin's idea has been accepted by the European Union and included into its long-term plans[11].

3. Structural changes in the European economy

As it has been emphasized, remodeling of sectoral economic structure, where industrial activity gives way to services, is an effect of the processes of globalization and integration. EU's economy structure develops in accordance with a worldwide trend of increasing share of services in GDP creation at the expense of the production sector (Table 1).

Table 1. EU structural change 1997–2009

Sectors	Agriculture, fishing and mining	Manufacturing	Electricity, gas and water supply	Construction	Market services	Non-market services
Share in GDP in 2009	2.4	14.9	2.4	6.3	49.9	24.1
Shares of GDP between 1997 and 2009	–1.3	–4.9	–0.2	0.7	3.8	1.9

Source: European Commission 2011, *EU industrial structure 2011. Trends and Performance*, Publications Office of the European Union, Luxembourg 2011.

Contribution of the industrial production in GDP formation has been falling systematically since the 1980s. At the end of the 20th century, in 1997, this indicator still amounted to 20% of GDP and has regularly been reduced, to 15% in the period of recession in 2009. Market services,

[11] In the strategy A "Stronger European Industry for Growth and Economic Recovery" one can read that innovation and technical progress rate made the world face a great breakthrough in industry. There is convergence of several new technologies, which make the foundations for new industrial revolution based on green energy, ecologic transport, new production methods, new materials and intelligent communication systems (COM(2012) 582 final, p. 3).

in 2009, were responsible for 50% of GDP and their importance grew by 3.8 percentage points in comparison with 1997. In the case of non-market services, growth of almost 2 percentage points was also observed. Agriculture's share decreased by 1.3 percentage points and the share of the two remaining sectors remained relatively stable.

The function of industrial activity in the European Union also decreases as far as labour resources activation (Table 2). In 2012, over 72% of the employees worked in the services sector, which is 8.2% percentage points more than in 1997 and 1.4 percentage points more than in 2009. Simultaneously, a fall of employment in industry by 5.3 percentage points took place, in comparison with 1997 and by 1.2 percentage points in comparison with 2009.

Table 2. Employment in EU by activity branches in 1997, 2009 and 2012 (in % of total employment)

Year/branches	Agriculture	Industry	Services
1997	8.1	27.9	64.0
2009	5.4	23.8	70.8
2012	5.2	22.6	72.2

Source: Eurostat, *Employment Growth and Activity Branches*, http://appsso.eurostat.ec.europa.eu/ (accessed 15.10.2013).

Significant differences in employment between member states are also worth noticing. In case of the industry sector, the discrepancy in 2012 spanned from 15.6% in Greece to 36.6% in the Czech Republic. Analysis of changes in industrial production in the European Union clearly shows that both in the share in GDP creation and in employment, the role of industry is decreasing to the advantage of services. The change of employment structure between these sectors is explained, among others, by the difference in productivity rate caused by development of production technologies, which, in industry, takes place faster than in services.[12]

[12] In literature, as one of the main reason of deindustrialization, is given the faster growth of productivity in manufacturing than in services (R. Rowthorn, R. Ramaswamy, *Deindustrialization – Its Causes and Implications*, "Economic Issues", No. 10, International Monetary Fund, Washington 1997, p. 11).

Structural transformations noticed above significantly influence the industrial scenery, but do they let define this process as deindustrialization? Undeniably, the labor-intensive industry gives way to knowledge-intensive industries characterized by higher added value. This is why, when analyzing industrial potential, apart from the number of employed in industry, another important criterion should be taken into account, which is gross added value. The former is crucial when it comes to labor-intensive industries, the latter, however, is better for describing industry that is more technologically advanced with high spending on research and development.[13]

Further analysis will focus on selected indicators, which present changes found in the EU industry in the years 2002 – 2012. Data showing the number of employed in industry present a decrease of the analyzed indicator in this period (Figure 1). Note that it even has not pick up with the recovery of production in 2010.

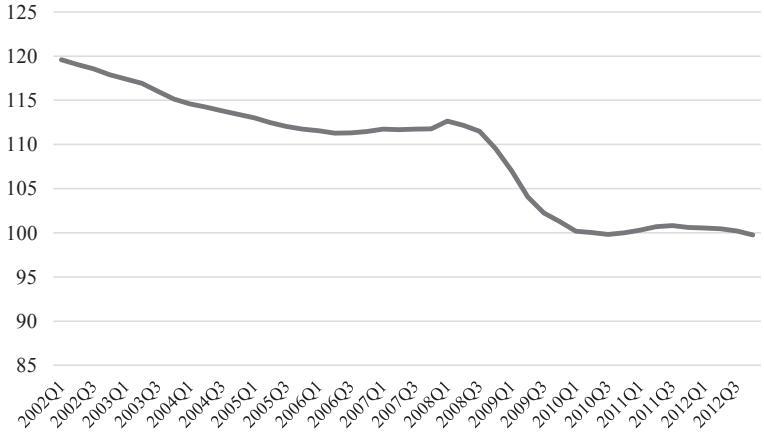

Figure 1. Employment (number of persons employed) in industry seasonally adjusted (2010 = 100)

Source: Eurostat, *Labour input in industry***,** http://appsso.eurostat.ec.europa.eu/ (accessed 15.10.2013)

[13] T. Rachwał, K. Wiedermann, W. Kilar, *Rola przemysłu w gospodarce układów regionalnych Unii Europejskiej*, "Prace Komisji Geografii Przemysłu", No. 14, Warszawa–Kraków 2009, p. 32.

Economic growth rate in the analyzed period was subject to significant fluctuations. After annual average growth of 2.6% in the years 2002–2007, recession was noticed in the following years (Figure 2).

It was especially severe in 2009, when a decrease of GDP by 4.5% was noted. Total gross added value grew, in individual years, at a rate similar to GDP. Industry is the sector of economy that is especially vulnerable to changes in economic situation. In the period of weakened economic growth, dynamics of gross added value generated by industry decreased at a much higher rate than total added value – in 2009 these changes amounted to –13.6% and –5.5% respectively.

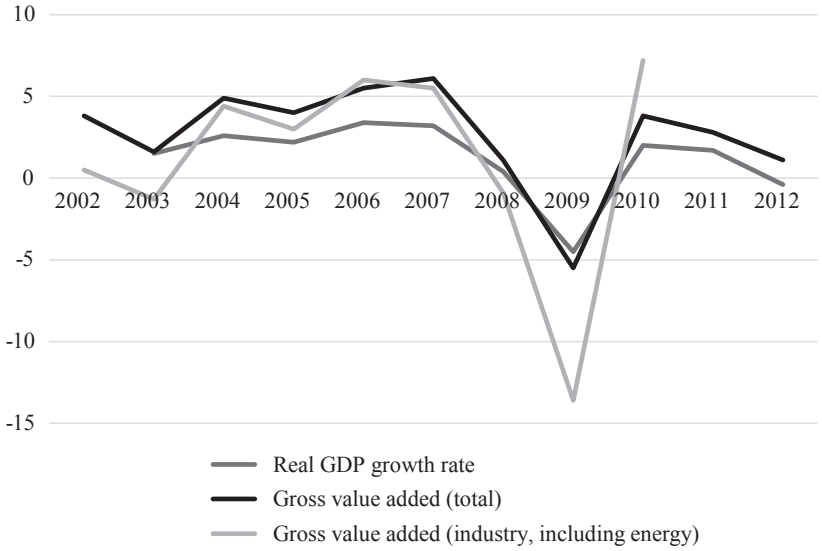

Figure 2. Real GDP growth rate, gross value added in all and gross value added in industry in 2002–2012 (percentage change on previous year)

Source: own calculation based on Eurostat datas: http://epp.eurostat.ec.europa.eu/ (accessed 15.10.2013)

Also, a decreasing share of industry in total gross added value is worth emphasizing. In the period of 2002–2007, industry was responsible for 20.45% of generated added value, whereas in the years

2008–2010 for 18.9% only. However, the change in the year 2010, when an increase of 7.2 percentage points of added value generated in industry, and tendencies noticed in this area before the crisis, let risk an assumption an optimistic forecast as far as direction of changes. The more that since 2005 the industrial production index has developed much more favourably for EU high-tech technology manufacturing than for industry as a whole.

High-tech technology manufacturing production increased by 26% between the first quarter of 2005 and the third quarter of 2012. Similarly, the medium-high production was an increase by 7%. While for industry as a whole the level of production in 2012 was almost the same as in 2005. Medium-low technology and low-technology production even shrunk during the observation (–5%; –6%).[14] In order to evaluate the effects of the developments, Figure 3 presents an overview of the size of the four technology levels in the value added at factor costs of total manufacturing for the EU-27 in 2010. According to data, high-technology production and medium-high technology production accounted for 12% and 35% in total manufacturing.

Of course the dynamics of described process seems to be different across countries. General, the changes in EU industry can be defined by three concomitant evolutions: the decline in manufacturing employment, the lower contribution of manufacturing sector to GDP and increasing contribution of services to GDP. The analysis of the dynamics of the value added in the last decade shows that with the exception of 2003 and 2009, it was positive, which does not allow to confirm the thesis of universal and absolute deindustrialization of the European Union. Pace and direction of changes of these amounts stress the fact, that when facing international competition, the European industry must be innovative, so it can generate development. This situation also determines the method of EU's competitive advantage building, which should currently be based on high added value sectors. Decreasing role of industrial activity remains a problem when it comes to direct jobs creation and activation of resources. Classical economic theories

[14] T. Jaegers, C. Lipp-Lingua, D. Amil, *High-technology and medium-high technology industries main drivers of EU-27's industrial growth*, Eurostat Statistics in focus 1/2013.

assume that production based on new technologies is in fact labour-saving, but at the same time, due to growth of efficiency, it increases production capacity. Greater supply of cheaper products generates demand. Initial fall in employment caused by implementation of technologies is balanced by reception of extra labour force required to meet the increased production levels. Yet, reality rectifies this assumption, as growth in productivity did not lead directly to increase in the number of jobs. The discrepancy between the improvement of efficiency and the employment level is mostly visible in industrial production – basically, manufacturers may produce more goods with smaller number of workers.[15]

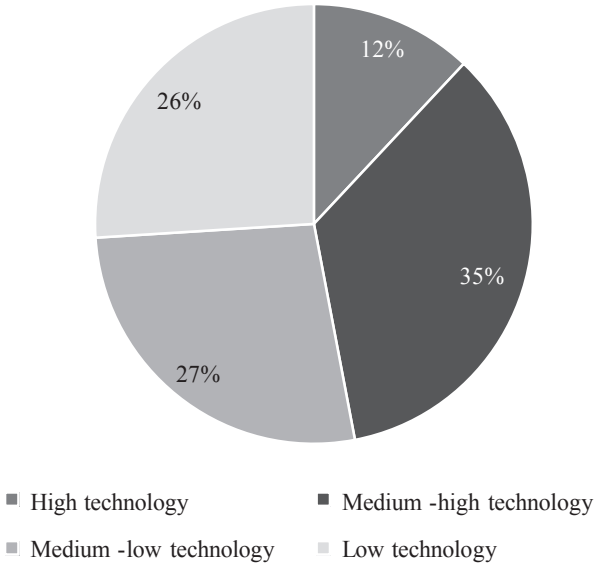

Figure 3. Share of different technology levels in total manufacturing, value added at factor costs, EU-27, 2010

Source: T. Jaegers, C. Lipp-Lingua, D. Amil, *High-technology and medium-high technology industries main drivers of EU-27's industrial growth*, Eurostat Statistics in focus 1/2013

[15] J. Rifkin, *Trzecia rewolucja*…, p. 352–354.

4. The idea of reindustrialization of the European Union

Counteracting against tendencies leading to decrease of industry in production and employment is becoming an important challenge for the European economy. EU's policy towards the risk connected with the deindustrialization process is closely interrelated to activity for adaptation to structural changes and particularly emphasized within the industrial policy. The matter of European industrial policy returned in successive stages of single market formation, but it was not treated as a priority. It gained treaty bases in the Treaty of Maastricht, which, in title XIII: Industry, lists targets which condition improvement of competitiveness of the European industry and emphasizes the need to provide conditions necessary for its development. In its guidelines, the European industrial policy consists of coordination of member states actions and it is closely connected with general socio-economic policy, and its contents also include initiatives taken up within other policies.

Current debate surrounding the industrial policy has been caused by the results of the 2008 crisis. Low level of economic growth of the European countries as well as a growing number of interventions by authorities became an inspiration for the ongoing discussion which has been included in the Europe 2020 Strategy. *The Strategy for Intelligent and Balanced Development Promoting Social Inclusion* is a continuation and expansion of the formula of the so-called new industrial policy produced in the framework of the Lisbon Strategy of 2000. The only possible reaction to the results of the economic crisis, growing international competition, society aging and climate changes is intensification of innovation processes.

Economy based on knowledge, which is eco-friendly and uses available resources effectively, is to be the source of economic growth. For the accepted priorities to be put into practice, seven initiatives were prepared, including a project entitled *An Integrated Industrial Policy in the Globalization Era, Putting Competitiveness and Sustainability at Centre Stage*. Its aim is to stimulate economic growth and jobs creation through upkeep and support of strong, diverse and low-emission industrial base. The idea of integrated policy means that it includes cooperation

of different policies of the European Union and emphasizes the necessity of cooperation and coordination of actions between the European Commission and the member states.

The key role of industry for the growth of the Union's economy and its overcoming of crisis was then emphasized in the reindustrialization strategy, adopted in October 2012, entitled *A Stronger European Industry for Growth and Economic Recovery*.[16] It is an update of a statement of 2010, assuming an increase of industrial production share in the EU's GDP to 20% in the year 2020. Industrial policy reinforcement should be based on four mainstays which include the following:

- stimulating new investments in technologies and innovations,
- improvement of the internal market functioning,
- increased access to financing,
- promotion of human capital and skills development.

R&D activity is treated as a priority. Stimulating investments, both in initial stages of implementation and in popularizing new technologies, requires development of proper technical regulations and internal market rules and the infrastructure they are accompanied by. Providing proper framework conditions for investments is particularly desirable in the context of building EU's advantage, resulting from the fact of EU being a pioneer. This strategy may ensure high productivity, rational resources management and significant market share. The European Commission proposes directing investments and innovation at six priority areas of activity with great growth and employment potential, which include: advanced production technologies as far as ecologic production, key supporting technologies, bioproducts, balanced industrial, construction and resources policy, green vehicles and intelligent networks. Actions within the framework of these key elements allow for creation of infrastructure necessary from the perspective of needs of a new industrial society whose development will depend on new energy and information technologies.

[16] The European Commission, Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and Committee of the Regions, A *Stronger European Industry for Growth and Economic Recovery*, Brussels 10.10.2012, COM(2012) 582 final.

Striving for improvement of the internal market functioning focuses on improvement of the single market, competitiveness support, stimulating the internal market of new technologies, intellectual property rights protection and cooperation with international markets. The internal goods market is an important tool for increasing of the EU's competitiveness, however, there still exist administrative and regulation barriers in the form of not harmonized technical regulations, labeling systems or rules for mutual recognition of member states legislation. Within the action plan for support of entrepreneurship, the greatest emphasis is put on development of small and medium enterprises, above all in relation to utilization of the potential of single digital market. In the era of knowledge-based economy, intellectual property rights gain special importance as well as creation of conditions of their protection. Considering international context and tendencies, observed in emerging economies, to employ protection and discrimination practices, the Commission will still aim at ensuring that the formulas of mutual market access, developed at WTO, are observed.

Development of European industry is dependent on accessibility to capital required for carrying out of innovative investments aiming at competitiveness improvement. Meanwhile, access to capital market and ability to obtain loans are significant barriers for enterprises development, especially for small and medium ones. Improvement in this field is to be achieved through support from the public sector and improved directing of public funds as well as eliminating obstacles as far as private assets flow and facilitating cross-border flows.

Finally, development of human capital and its skills has key importance for the success of the industrial policy. Economic crisis results hit the European labor market exceptionally hard. The main issue is to face this situation by creating new jobs and this may be achieved with better coordination of proper economic policy areas and actions within this scope on the EU level as well as on the member states level. It is also necessary to foresee needs and to better adjust the education system to the requirements of changing industry.

The essence of *A Stronger European Industry for Growth and Economic Recovery* is the finding which emphasizes that "a strong industrial base is necessary for the wealth and economic success of the European

Union".[17] The main target is to improve the framework conditions which allow the industrial potential of the EU to be reinforced. Active industrial policy focused on investments and innovation should result in fast production and markets development. When creating bases for reindustrialization of Europe, synergy seems necessary between individual areas of the EU policy as well as coordination and synchronization of activities undertaken by the Union and the member states.

5. Summary

The decreasing role of industry in Europe and its offshore outsourcing to developing countries does not mean the sector's decline, but seems to be a natural effect of economic development. Quoting Schumpeter, it results from a process of creative destruction, which is a part of a capitalist system. However, it causes difficulties in the form of slower economic growth. Previous production organization gives way to innovation abilities in the area of technology. The aim of the European Union is to support industry in introducing innovative solutions which are also adapted to environmental requirements. The Union, proposing new programs, presents high activity in providing formal circumstances for balanced growth. Negative influence of the crisis on several EU member states and worsening perspectives for the global economy resulted in a necessity to revise industrial policy. The presented idea of reindustrialization aims at facilitating and accelerating Europe's transformation into a competitive economy which takes the social and environmental aspects into consideration. More effective industry is a leading sector stimulating economic growth, which should contribute to jobs creation.

However, confrontation of these optimistic ideas with reality requires drawing of more cautious conclusions. Industrial transformation and a drop in employment, which accompanies such transformation, are not compensated for by creation of a sufficient amount of jobs in services and modern industry branches. The current situation on the European labor market, high unemployment rate among young and educated people who should be leaders of innovation and development, is one of the most disturbing

[17] *Ibidem*, p. 5.

phenomena. Transferring industrial production outside Europe, to developing countries with lower business activity costs, is dictated by regularities of changes in economic structure, but it also gives rise to socially unwanted phenomena, especially for regional and local economies.

In the era of industries based on the potential of human capital, the reindustrialization strategy correctly stressed the importance of knowledge and creativity as the driving force of competitiveness. Mature industry is not able to offer price competitive products as compared to those manufactured in developing countries. What remains, is to generate innovative industrial products with new functions and uses. However, the perspective of integrated and unanimous actions within the European Union is doubtful. Diversity of socio-economic development levels, of industrial base and of reactions to economic crisis and its effects cause increase in economic nationalism in individual countries. Paradoxically, these phenomena emphasize the need to define and implement the reindustrialization strategy as a process stimulated by conscious decisions of the authorities. Partnership between the European Union, its member states and industry is necessary in order to accelerate investments in new technologies which are the basis for creating Europe's competitive advantage in the new industrial revolution.

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Abstract

Industry in the European Union is undergoing significant changes connected with technological development, offshore outsourcing to developing countries and the process of servicization. What is more, the global economic crisis disrupted the development of the European industry, and the industrial production dynamics in 2009 decreased in all member states. The consequences of the crisis have placed European industry in a difficult economic position to carry out the necessary efforts to increase competitiveness through technological change and innovation. Facing growing challenges and negative tendencies, the European Commission approved, in 2012, the reindustrialization strategy which emphasizes key importance of industry for possibilities of economic growth and jobs creation. The study presents goals accepted and tools allowing adaptation to structural changes as well as achieving competitive advantage.

Key words: reindustrialization, regional competitiveness, European Union.

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BENCHMARKING OF CLUSTER-TYPE LOCAL PRODUCTION SYSTEMS IN THE WORLD ECONOMY AND UKRAINE

1. Introduction

Having entered the 21st century, humanity determined its main global development targets in the UNO's Millennium Declaration. Thence began the movement towards achievement of the eight Millennium Goals, one of which being the development of "global cooperation for development". The experience of developed countries proves that allying businesses and organizations in clusters is an effective form of modern global cooperation.

The proliferation of cluster forms in the world economy has occurred only recently, over the period no longer than the last twenty years. During this time, they have revealed great opportunities for overall economic growth, especially in terms of employment and innovation. At the same

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time, it has become clear that cluster forms could play a larger role in business processes only if they were supported by global cooperation aimed at their improvement. The matter in question is the creation of strong competitive clusters, that entail the amalgamation of enterprises located within a certain territory, with the aim of increasing their competitiveness and promoting the social and economic development of the region.

2. Local production systems of cluster type and their classification

Recent decades have been characterized by qualitative changes in business activity, among which an important place belongs to tendencies of forming long-term direct relations among enterprises, science and research, research and development and educational organizations, state authorities, etc. The unification of entities within a business environment is based on using the location factor and local resources, leading to creation of various local production systems. They are also oriented at generating the synergy effect of partnering.

The creation of local production systems allows small and medium enterprises to increase their competitiveness on the national and world markets by using advantages of small-scale forms of business activity. That is, local production systems unite agents of market relations on the basis of network approach, which includes the similarity of their target objectives, the use of state support measures, attraction of investments, activation of innovation capacity, and development of partnering ideology.

The term ‘local production systems’ is widely used in the economic practice of France, where it originated. LPSs are associations of enterprises and organizations of cluster type. Subversions of such an approach can be found in other countries as well. Thus, in the Russian Federation, networked business associations are being created. Among their various types, one can identify business networks identified as groups of companies that were “united in order to increase the effectiveness of using the resources and specific advantages for realization of business projects.

By using mostly horizontal ties and mechanisms of specialization and inter-complementarity, they generate additional opportunities for achievement of better results".[1]

In Ukraine, the processes of business structures combination have traditionally been carried out based on the concept of the territorial-production complexes. These were a "combination of interrelated and mutually conditioned production components of a certain territory, which provided for the formation of a certain economic effect".[2]

The economic effectiveness of such an association was ensured by forming stable production, infrastructural, technical and technological, purchasing and distributional ties among separate enterprises, and by developing cooperation, combination and specialization of production. In view of the heterogeneity of natural, labor, and infrastructural resources, the functioning of territorial-production complexes was developed on principles of multi-branch diversification. The strengthening of functional interdependence among complex participants was provided based on concentration and agglomeration of various kinds of production and complex use of raw materials and waste.

Although the concept of territorial-production complexes contributed to economic development in the conditions of planned economy, it also had some drawbacks having negative impact on final outcomes in the conditions of emerging market economy. It did not fully considered the operation of market mechanisms of income generation, as well as the effects of a number of important social and infrastructural factors, limiting the processes of increasing production effectiveness. During Soviet times, generally inefficient production, technical and technological inter-firm relations were formed within the territorial-production complexes (TPCs) of the local level. The problem was that they were directorial in nature, which often contradicted the profitability requirements and economic feasibility of production. Such formation of productive ties

[1] A. Asaul, *Methodological aspects of forming and developing entrepreneurial networks*, Gumanistika, Saint Petersberg 2004 (in Russian), http://www.aup.ru/books/m497/4_1.htm/.

[2] I. Ishchuk, *Geography of industrial complexes* (in Ukrainian), http://pidruchniki.ws/1921022638450/rps/osnovni_naukovi_pidhodi_vivchennya_promislovih_kompleksiv/.

among enterprises led to economically unjustified limitation of the circle of affiliated companies and subcontractors of the main company, as well as to purposefully loss-making supply of low-quality, technologically inadequate and low-innovative products, which can be explained by the fact that such inter-firm ties were driven not by economic effectiveness and technological necessity, but by other factors of mostly planned and structural nature. A significant drawback of local territorial-production complexes in the Ukrainian economy of the Soviet period was that they were not aimed at priority formation of high-technology innovative types of production.

The transition of the modern Ukraine's economy to radical transformation renews the need for implementing new organizational and economic technologies of managing territorial and regional development based on creation of territorial associations of inter-connected enterprises and organizations also known as clusters. This form has been acquired over the recent decades by local production systems (networks) in all of the countries. These processes develop in Ukraine as well, although delays with economic reforms restrain them. According to expert evaluations, major obstacles on the way to broad clusterization of the Ukrainian economy consist in "absence of consistency in macro- and micro-economic policy; irrational use of resources; double taxation in production and sales of cluster produce; absence of willingness (and partly incapability) to restructure large state enterprises; unstable legal system which to a large extent does not reflect the conditions of globalisation; unsatisfactory use of public-private partnering; almost total absence of infrastructure necessary for clustering".[3] Another urgent questions in Ukraine are the choice of the concept that can be used for establishment of clusters in a certain location, the ways of optimising their structure, the need for creation of additional structures, the outcomes that must be reached in the process of their functioning, and the role of the state in cluster operation.

[3] S. Sokolenko, *Dynamics and perspectives for the development of innovation activity based on clusters in the countries of Black Sea Region in the 21st century*, 2010 (in Russian), http://ucluster.org/sokolenko/2010/05/dinamika-i-perspektivy-razvitiya-innovacionnoj-deyatelnosti-na-klasternoj-osnove-v-stranax-prichernomorya-v-xxi-st/.

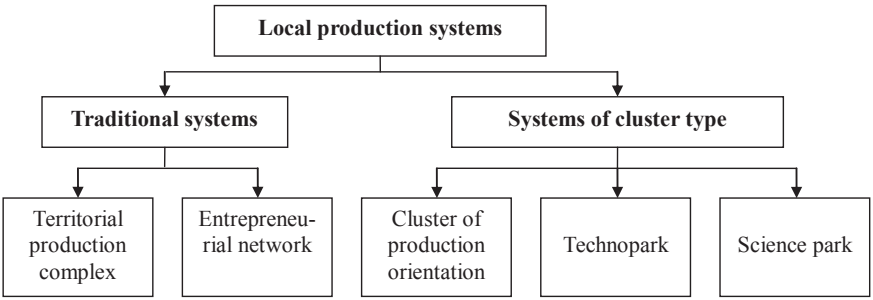

Figure 1. Classification of local production systems

Source: own composition

In considering local production systems, it is feasible to single out traditional LPSs that were formed and functioned under various socio-economic conditions in industrial societies, and LPSs that emerge in the post-industrial economy. The traditional types of local production systems include territorial-production complexes and business networks. Under the conditions of Ukraine and former USSR countries, these systems are characterized by a rather moderately fixed to certain territorial parameters. It was rather often that a territorial and production complex consisted of several local production systems. For example, the cotton growing enterprises could be located in Uzbekistan, whereas cotton and paper mills – in Ukraine and Russia. Moreover, territorial and production complexes and business networks, as a rule, combined not multiple but large enterprises and excluded small and medium-sized businesses.

In general, local production systems of cluster type can be divided into three most popular groups: industrial clusters; science parks; and techno-parks. Industrial clusters are local territorial association of business entities of the classical type, which fully corresponds with the definition given by M. Porter. In 1993, he wrote that "clusters are geographically concentrated groups of affiliated companies, specialised suppliers and service suppliers, companies in respective branches, as well as related organisations (for example, universities, standardization agencies, trade unions) in certain industries that compete, but at the same time perform joint

work".[4] In analysing the modern world experience of clustering, Ukrainian researchers have identified clusters as "local-hierarchical unions of technologically and geographically connected companies, financial and other business structures, which created an optimal organisational form of consolidating their subdivisions within separate regions, with the aim of minimising their costs, and thus, increasing their competitiveness on the national and world markets".[5]

The networked form of interaction between the innovation and technological centers and the industry aimed at joint fulfilment of science and technology innovation projects is the feature that makes technoparks be recognised as local production systems of the cluster type. They function within a specifically assigned arranged territories and include organisations and companies that cover the whole innovation cycle.

It is also feasible to consider science parks as local production systems of the cluster type as well, since they coordinate the flows of knowledge and technologies among universities, science and research institutions, companies, and markets. Finally, science parks give rise or contribute to growth of innovation-based networks of companies.

3. "New Regionalism" and the development of theoretical aspects of clustering

The modern processes of clustering and prediction of their future forms can be initiated and managed mainly in view of the phenomenon of "new regionalism". First of all, we should take into account that – as emphasized by M. Keating, the ideologist of the concept – "new regionalism" is characterized by two interrelated features: it is not confined to borders of the national economy and forces interconnected regions to compete, but does not give them a new role in the international division of labor.[6]

[4] M. Porter, *On Competition*, Williams, Moscow 2000 (in Russian).

[5] O. Burmych, *Technological modernisation in the European economy*, O. S. Burmych, O. D. Lukyanenko, Y. H. Panchenko, V. I. Chuzhykov (eds.), KNEU, Kyiv 2013 (in Ukrainian).

[6] M. Keating, *New regionalism in Western Europe*, "Logos" 2003, No. 6 (40), p. 81 (in Russian).

In view of this, the most prominent global trend is the empowerment of regions, which leads to transfer of functions from the national level to domestic structures.

However, the phenomenon of "new regionalism" affects administrative division and interregional competition. The most important is the fact that the formation of regions is not limited by national boundaries, but can include a part of the territory of another country. These processes were most common in Europe, manifesting themselves in the creation of Euroregions. Along with that, in the conditions of new regionalism intensifies the competition between regions of different levels for the development of resource potential and higher living standards.

In view of the internal processes taking place in global space, we can anticipate the initiation and proliferation of the new trends that will manifest themselves in self-formation of new regions and elimination of the existing intra-regional local formations of the industrial, network and administrative type. Clusters can be the driving force behind this Schumpeterian "creative destruction": in bringing together local actors, they at the same time are facing the administrative obstacles brought in by the conflict of interests of the managers of regional and local authorities. As noted by T. Bal-Woznyak, "in a market economy, the state is playing a supporting role, regardless of the prevailing type of coordination structure. The problem of coordination functions of the state not only leads to its limited participation in economic processes, but also testifies to the unreliability of coordinating actions of state institutions and alternative cost of this process expressed by the category of transaction costs".[7] This statement in its general interpretation can possibly be addressed to authorities of territorial levels.

When analyzing the role of clusters in the framework of "new regionalism", two directions of their creation must be considered. On the one hand, they are initiated by the state, municipal and local authorities. In this case, the network is usually subordinated to principles of program and target management mainly adhering to planned-economy philosophy, and it is limited by the boundaries of local government's competence. Another approach is connected with the initiatives of business structures

[7] T. Bal-Woznyak, *Economic networks as effective mechanisms of coordination of innovation activity*, Mizhnarodna ekonomichna polityka, KNEU, Kyiv 2011 (in Ukrainian).

which do not only need to coordinate and form a chain of interaction in order to achieve the goal of association, but also to convince the regional authorities and other territorial structures in the expediency of clustering or certain social and economic actions. Along with that the bureaucratic factor comes into force, which can inhibit the processes of cluster creation and affect its outcomes. The exit from this "vicious circle" could be found in creation of a new type of administrative structures within the cluster area. At that, two approaches are probable, when mainly socio-economic functions are secured to the new administrative unit, whereas public services related to information and legal providing remain with the "old district" (registry office, police, real estate, etc.). Analogous to such an approach is creation of election districts, the limits of which do not always coincide with the recognised territorial and administrative division.

Clusters as territorial entities can develop within the paradigm of "new regionalism" from the standpoint of somewhat unconventional perspectives for modern economic geography. This does not mean that geo-space as a physical attribute (geographic distance) loses its value. For the economy, it only remains as an indefinite "container" of the Brownian movement of business processes. Within its environment emerges an homogeneous geo-space of local environments (fillers) of social and economic, political, legal, and environmental institutions in the form of relationships, norms and bodies of administrative, economic and social status. Depending on the state of development of these spaces, clusters can be formed, the shape of which will be determined by local peculiarities. Clusters can create the critical mass necessary for competitive success of respective regions.

Theoretically, it is feasible to predict other processes in the development of the idea of "new regionalism" as well. Currently, there is some subordination of regions to challenges of globalization that will be increasing with time. Economic, administrative, political and other organisational forms of regions' functioning should provide for their competitiveness. In case when their functioning turns out to be incapable of responding to global challenges, this will testify to moral obsolescence of the existing regional order, which consequently will require the search for new functional approaches until more sophisticated and modern forms are found. Obviously, the destruction of long-term, age-old permanence of regional

divisions and formations cannot be excluded. Under conditions of globalisation, regions must acquire new qualities that will enable them to achieve the status of strategic players on the world market in order to transform into active autonomous subjects of the international system of competitive interaction. However, to reach this goal in the coming decades, the developments in new forms of regionalism will have to go through a network of changes and transformations. The most revealing in this respect is the experience of Finland, where re-transformation of regional structures from the bottom up occurred upon the condition that new structures would represent the interests of at least 20 thousands of inhabitants. Today, similar processes are taking place in Estonia, where local communities will have to find solutions for creation of new local territorial formations by 2017. Should their efforts turn out unsuccessful, the decision will be made by central authorities.[8]

As a type of obsolescence of the systems of territorial-administrative division of regions and new structures that were established on their basis, one can consider the problem of bankruptcy of the bodies of territorial administration. In this aspect, there will be a need to determine the causes of bankruptcy – whether it occurred in result of the incapability of elective bodies and their executive bodies to manage the region or in result of the obsolescence of the existing system. Depending on that, there can be two solutions: re-elections or formation of a new regional entity. If political parties are unable to present the program of overcoming the regional development divide and provide for its realisation, there appears a need to include the competition mechanism, including its elements of reorganization and change in the organisation and management of the region. For this type of bankruptcy, some form of protectorate by other regions and elements used internationally in the case of the default of the state would be appropriate.

Finally, in the aspects of interplay between regions and clusters there is another line of competition. These structures, on one hand, are destined to interact, because the success of cluster organization is the basis

[8] Report of Dr. Matti Raudjärv at the International Conference "Clusters in the development of the world and Ukrainian economy", Kallithea (Greece), September 18−25, 2013.

for resolution of socio-economic problems in the region. On the other hand, the bureaucratic mechanism of regional governance can "restrain" or simply hinder the development of cluster economy. For such situations, a dispute resolution system should be developed.

As a mechanism of solving the problems of cluster production systems development and regional development, one can consider the mechanism of combining large regions within the province. This aspect has already attracted the attention of Ukrainian researchers, but did not gain enough popularity. As noted by I. Brykova, "further thorough complex analysis is required for the mechanism of the impact of global processes of social development on positioning of the regions in the hierarchy of international competitive relations, and accordingly, determination of the factors of increasing the regional competitiveness in the conditions of global competition. In addition, of great importance become issues of the development of theoretical foundations of the strategy of increasing international competitive status of national lands in the long run".[9] The area-oriented approach can become the basis for transformation of national territorial units into strategic players in the global markets by means of using cluster forms in their internal economic structure. This is a promising direction supported by the fact that since 2003, the Management Development Institute which studies the competitiveness of countries, initiated the inclusion of certain regions in the rankings of the *Global Competitiveness Yearbook*. As a separate position, the Yearbook lists such territories as Bavaria, Catalonia, Île-de-France, Lombardy, Maharashtra, Scotland, Sao Paulo, and Chae Young. This emphasizes a special role of areas in the development of not only national, but also world economy, their competitiveness, leadership and influence as independent players. Here, it is appropriate to refer to expert opinion of the European Commission, which believes that "despite the existence of competitive and non-competitive firms in each region, there is always a common boundary environment that affects the formation of the competitive status of all local firms".[10] It is more

[9] I. Brykova, *Determinants of international competitiveness of national regions in global economic space*, 2007 (in Ukrainian), http://iepjournal.com/journals/7/2007_1_brykova.pdf/.

[10] Sixth Periodic Report on the Social and Economic Situation and Development of Regions in the European Union, Brussels 1999, p. 5.

efficient in the developing countries in the direction of expanding regional autonomy on questions of the development and implementation of regional competitive advantages.

Therefore, globalization assigns the status of strategic world market players to national regions, transforming them into active autonomous subjects of the international system of competitive interaction. In this context, the issue of providing for the competitiveness of national regions defined as their ability to meet the challenges of the global environment by identifying, creating and developing local competitive advantages acquires extreme significance.

4. Clusters as a moving force of prosperity in a global economy

Globalization leads to changes in the forms of local organization of production. In the world economy, new forms of fragmentation are developing, with integration processes enhancing within them. Initially, they mainly covered groups of national economies and manifested themselves most clearly in the creation of the European Union, where foreign economic relations of member countries focused primarily on their cooperation partners. However, the boundaries of such entities are also quite large and need to be supplemented by integrated local formations, because in economics, one cannot keep company with the entire world at the same time unless there are matching interests in production and sales of products and services.

Taking advantage of national economic openness sets certain preconditions for companies, which are forced to choose those locations for their business activity that offer better business environment for their needs. The larger the global markets, the higher the probability that resources will be allocated in more attractive areas, stimulating the formation of local specialization and creation of clusters. In their turn, by gaining higher competitiveness clusters promote creation of new clusters by means of forming the needs for additional services or appearance of new niches for creation of local production systems.

An archetypal example of the region where strong clusters in many high-tech fields are generated is the Silicon Valley of the United States. Huge results were achieved by strong European clusters that were created on the basis of American experience. They specialize in financial services (London), flower growing (Holland), biological pharmaceuticals (Denmark and Sweden), and other products and services. At that, it should be noted that in many countries, cluster policy began to emerge at the regional level earlier than at the national level. For example, back in the 80s, such lands as Baden-Württemberg, Bavaria, North Rhine-Westphalia in Germany initiated the programs aimed at fostering networks that unite science and business. Instead, federal government initiated the first program in the mid 90s.[11] This testifies to the fact that, given the strong regions in economic and administrative aspects such as German lands, regions and not the center can become a "trigger" for the development of important directions.

Inclusion of the state in the cluster policy is largely connected with the need to finance specific joint projects. Usually, it was limited to promotion of self-organization and formation of clusters in the economy of regions. This can be illustrated by the example of programs aimed at support of clusters in France, which focused on the development of local production systems (fr. «Systèmes productifs locaux»). It provided the possibility to receive subsidies of 37.5 thousand Euros per cluster on average. The conditions of financial support were relatively soft: formation of a cluster organization that united its founders.[12] They could spend money on a wide range of costs, including branding, export support, self-organization of companies, universities and local authorities; gaining experience for future large-scale implementation of programs. In 2006−2008, thanks to successful development of programs on local production systems, they were followed by the program «Competitiveness

[11] *Cluster policy in Europe. A brief summary of cluster policies in 31 European countries*, 2008, http://www.clusterobservatory.eu/system/modules/com.gridnine.opencms.modules.eco/providers/getpdf.jsp?uid=100146/.

[12] P. Martin, T. Mayer, F. Mayneris (eds.), *Public support to clusters: A firm level study of French "Local productive systems"*, University of Paris I, 2010, p. 4, http://perso.uclouvain.be/florian.mayneris/rsue.pdf/ (accessed 08.01.2014).

clusters», with financing of 1.5 bln euros, that expanded the range of supported cluster initiatives. It offered financing for specific cluster programs, which were formed and proved their effectiveness.

Strong clusters located regionally proliferated their activities in the global economic space in the aspects of staffing, technology and investments. They are typically servicing global markets and cooperating with other regional clusters that provide additional contributions to global value chains. Finally, specialization is deepening in local spaces. In the case of slow inclusion in this process, the risks of regions lagging behind in economic and social development and appearing depression increases.

When assessing the development of cluster systems in developed countries, it should be noted that on one hand they promoted economic development in view of the global conditions of the last decades, but on the other hand they needed to adapt to the challenges faced in the 20s of the XXI century. However, international statistical studies of T. Bal-Woznyak did not confirm significant advances in the context of innovativeness, especially in the new EU member countries.[13] There is a hypothesis about the larger impact of innovativeness on bridging the development gap by means of reducing the level of benefits from intensification the transition processes from the resource-based economy to network economy based on knowledge.

The aim of the "Europe 2020" strategy was to enhance economic power of the European Union and the level of well-being of its citizens. As stated in the conclusion of the European Council: "Our efforts should be more focused on the development of EU competitiveness, productivity, growth potential and economic convergence. The new strategy concentrates on the key areas: knowledge and innovation, more sustainable economy, higher employment level and social inclusion".[14]

In order to maintain high living standards and their further improvement, Europe launched a search for new organizational forms for clusters that would ensure progress in the field of innovation. This entails requirements

[13] T. Bal-Woznyak, *Economic networks as effective mechanisms of coordination of innovation activity*, Mizhnarodna ekonomichna polityka, KNEU, Kyiv 2011 (in Ukrainian).

[14] *European Council approved Strategy Europe-2020*, "Eurobulletin" 2010, No. 4, April, p. 16.

that Europe should become more productive in generating new ideas to reduce the gap with the U.S. and Asia in terms of innovative development. Thus, European clusters develop towards transformation into powerful catalysts of this process, functioning as inter-connected territorial centers.

Current views on the role of clusters are defined in the "European Cluster Memorandum" as "regional centers of concentration and specialized companies associated with one other by multiple canals that create favorable environment for innovations. They make "open innovations" possible: namely the creation and improvement of new ideas in the network consisting of companies and organizations that cooperate with each other. These groups of companies and organizations contribute to elimination of the obstacles to transformation of new ideas into new products and generating maximum benefits from globalization".[15]

5. Regional development and clusters in Ukraine

The strategic development of Ukraine is mostly realized according to programs of governmental parties, because there is no long-term program approved at the parliamentary and governmental level. In the foreign economic space, the country operates according to the laws that govern the world and European integration. The implementation of development programs declared during the election campaigns of President of Ukraine and Verkhovna Rada is realized by periodic passage of laws that lay the basis for certain changes or (in the terminology of the majority party) "reforms". However, gradual development in spite of periodic aggravations and failures in the economy as a whole or in separate areas, is still taking place.

In the economic development of the Ukraine, regions gradually turn into main actors in implementation of socio-economic programs in the field of economy, infrastructure, healthcare, education, culture,

[15] *The European Cluster Memorandum. Promoting European Innovation through Clusters: An Agenda for Policy Action*, The High Level Advisory Group on Clusters, YEAR, http://www.vinnova.se/upload/dokument/VINNOVA_gemensam/Kalender/2008/Klusterkonferens_jan08/European%20Cluster%20Memorandum%20Final.pdf/ (accessed 08.01.2014).

and so on. However, these changes have not become systematic and balanced in nature, thus, intra-regional problems, such as excessive imbalances, structural anachronisms, increased depressive developments, and low interregional cooperation, remain generally unresolved. Among the government documents aimed at improving the legal regulation of development, one can pay attention to the "Concept of state regional policy", approved by the Decree of President of Ukraine on May 25, 2001; the Law of Ukraine No. 2850-IV of September 8, 2005 "On promotion of regional development"; "State strategy of regional development until 2015", approved by the Cabinet of Ministers of Ukraine on July 21, 2006, No. 1001; Resolution of the Cabinet of Ministers of Ukraine as of June 24, 2006, No. 860 "On approval of development indicators monitoring of the regions, districts, cities of the republican importance in the Autonomous Republic of Crimea and of regional significance for recognition of depressed areas". At the same time, still remain uncertain the basic principles, approaches and instruments of state regional policy; directions and sources of institutional and legal providing of territorial development; and foundations of reforming the administrative and territorial structure.

Although there is some legal providing of regional development, its state regulation and stimulation remains largely beyond the scope of permanent systemic influence. In general, one can observe divergence of priorities in accordance with electoral preferences of voters, which prevents and obstructs the development and realization of effective regional policy. Under these conditions, the vast majority of regions has found it promising to use cluster forms of development supplemented with creative inclusion of the experience of developed (especially European) countries. Today, we can observe the tendencies to creation of production clusters of regional significance that are subordinated to priority goals of regions' development and increase in their competitiveness. At the same time, local clusters are being established in the cities, districts and villages, structuring the economic space and solving the problems of local significance. It is high time to form clusters of the world and European kind that are capable of having essential influence on the overall national development and aimed at assuring the leadership of Ukraine in certain areas.

Worth acknowledging is that in Ukraine, the creation of clusters is slowed down by insufficient normative and legal support. Currently, the matter in question is the feasibility of broad use of clusters in economic development, rather than real steps towards providing of the institutional basis of their systemic formation. Definitions of terms and documents supporting the need for a cluster-based, innovation-oriented industry model were given in the 2003−2011 State program for industrial development adopted in July, 2003.[16] However, this task was not performed in practice. Later, in 2008, the Cabinet of Ministers of Ukraine approved the Concept of draft Program for Development of Industry in Ukraine by 2017, which indicated the need to "develop the normative and legal basis for the creation and implementation of the model of cluster organization of industry".[17] However, these decrees did not create any systemic legal framework for clustering.

The weakness of legal support for clustering did not stop these processes in general. Taking into account international experience and scientific achievements of foreign and Ukrainian scientists, the practice of cluster approach to economic development in Ukraine is constantly evolving. European and American firms were involved to explore the possibility of clustering in Ukraine. For example, *Monitor Group,* the consulting company created by M. Porter, the founder of cluster theory, studied the economy of Donetsk region and revealed more than 40 clusters in its economic base. Among the most competitive of them, the research identified metallurgy, engineering, construction and agriculture. However, the priority should be given to two main branches of the region – metallurgy and agriculture with processing, while the others can be considered later.[18] Meanwhile, the example of Donetsk region shows that Ukraine possesses large reserves for implementation of cluster forms

[16] Decree of the Cabinet of Ministers of Ukraine No. 1174 as of July 28, 2003 "On approval of State program of industry development for the years 2003 to 2011", http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?page=1&nreg=1174-2003-%EF (in Ukrainian).

[17] Decree of the Cabinet of Ministers of Ukraine No. 947-p as of July 9, 2008 "On approval of the Conception of the project of All-state target economic program of industry development for the period before 2017", http://zakon.rada.gov.ua/cgi-bin/laws/ main.cgi?nreg=947-2008-%F0&p=1222860236039635 (in Ukrainian).

[18] O. Lyakh, *Forming of the ecologically-oriented construction cluster in an old industrial district*, O. V. Lyakh, O. I. Oseredchuk (eds.), "Visnyk of Donetskoho Universytety. Seria B. Ekonomika, Pravo" 2011, Special issue V. 2, p. 50 (in Ukrainian).

for local production systems development. This is especially true for metallurgy, coal, machine building, chemical industry and energy due to high coefficient of production localization by branch of industry and specialization (Table 1 and Table 2). Similar situation is observed in other regions of Ukraine: in the conditions of planned economy, enterprises of certain branches were assigned by central authorities to separate regions, and this inherited dependency has not yet been removed. Meanwhile, it is necessary to take into account modern tendencies in structural shifts as well.

Table 1. Coefficients of production localization by branch of industry in Donetsk region

Branch	2007	2008	2009	2010	2011
Food Industry	0.38	0.35	0.40	0.38	0.40
Chemical Industry	0.74	0.72	0.64	0.56	0.60
Metallurgical Industry	2.11	2.02	2.29	2.16	2.22
Extractive Industry	1.49	1.42	1.74	1.30	1.29
Mechanical Engineering	0.76	0.78	0.92	0.97	0.88
Power engineering	0.60	0.61	0.71	0.64	0.61

Source: N. B. Balabanova, *The use of cluster structures in increasing the competitiveness of the region*, "Visnyk of Mariupolskoho derzhavnoho universytetu. Seria: Ekonomika" 2011, Issue 4, p. 29 (in Ukrainian).

Table 2. Coefficients of industry specialization in Donetsk region

Branch	2007	2008	2009	2010	2011
Food Industry	0.56	0.56	0.62	0.61	0.61
Chemical Industry	1.11	1.16	0.98	0.90	0.93
Metallurgical Industry	3.15	3.25	3.52	3.47	3.43
Extractive Industry	2.23	2.28	2.67	2.08	1.99
Mechanical Engineering	1.13	1.25	1.42	1.56	1.36
Power engineering	0.90	0.98	1.09	1.03	0.94

Source: N. B. Balabanova, *The use of cluster structures in increasing the competitiveness of the region*, "Visnyk of Mariupolskoho derzhavnoho universytetu. Seria: Ekonomika" 2011, Issue 4, p. 29 (in Ukrainian).

The analysis of publications suggests that in the context of territorial entities and separate industries, clustering is expanding unevenly. It has gained most proliferation in construction, tourism, food, and clothing industry. Ivano-Frankivsk has successfully launched such clusters in tourism and souvenir production as "Suzirya" and "Wool-made blankets and other arts and crafts in the Carpathian region" specializing in manufacturing articles of sheep wool. Rokytne district (Rivne region) established a wood processing cluster; Kherson region – transport and logistics cluster "The Southern gate of Ukraine"; Poltava – the cluster for ecologically clean baby foods "Poltava"; Odessa – the cluster for organic agriculture and green tourism in the Danube region; Kharkiv – the cluster of pig breeding and meat products; and Sevastopol has registered 7 cluster groups, including recreational "Chersonese" and "Baidary tour".[19] Worth adding is that in Sevastopol a new approach to creation of local production systems was formed. It manifested itself in the establishment of one mega-cluster "Sevastopol" based on seven cluster associations, and which is expected to generate huge synergy effects.

Clusters were established and are successfully operating in all areas of construction industry in Ukraine. The first cluster "Podillya" was established in the city of Khmelnytsk in 1998. It united more than 30 construction-related companies located in Khmelnytsk region, almost all of which still continue cooperation and provide jobs for nearly five thousand people. The cluster fulfills original orders both in Ukraine and abroad within the framework of Polish-Ukrainian Program for Business Cooperation.[20] The creation of the construction cluster in Khmelnytsk became possible thanks to availability of mineral resources used in construction industry, as well as relevant scientific, production and human capital. And the least

[19] V. Zakharchenko, *Competitiveness of Ukrainian regions: cluster approach*, V. Zakharchenko, S. Zakharchenko (eds.), "Krayeznavstvo. Geohrafiya. Turyzm", 2012 (in Ukrainian), http://www.vmurol.com.ua/upload/publikatsii/nauka/pdf_2012/Concurentospromozhnist_regioniv_Ukrayini.pdf/.

[20] S. Sokolenko, *Dynamics and perspectives for the development of innovation activity based on clusters in the countries of Black Sea Region in the 21st century*, 2010 (in Russian), http://ucluster.org/sokolenko/2010/05/dinamika-i-perspektivy-razvitiya-innovacionnoj-deyatelnosti-na-klasternoj-osnove-v-stranax-prichernomorya-v-xxi-st/.

role was played by the fact that in a city of Khmelnytsk, there are large financial flows due to the fact that over the past decade, it developed large wholesale markets.

While the experience of "Podillya" cluster can be viewed as entry on the international market in the form of exports of construction services, Kharkiv region together with Belgorod region of the Russian Federation created a trans-border Euroregion construction cluster "Slobozhanschina". It consists of the representatives of local authorities, enterprises, and infrastructural institutions, public organizations, construction organizations specializing in design services, manufacturing of building materials, construction, maintenance, reconstruction and capital repairs of housing, civil and industrial facilities in Belgorod and Kharkov regions. Organizers of the cluster were Belgorod regional fund for small business support, Belgorod State Technological University named after V. G. Shakhov, JSC "Kharkiv Regional Entrepreneurship Support Foundation", and Kharkiv State Technical University of Construction and Architecture. The main tasks that are solved within the framework of cluster are to decrease the cost of operations and to improve the quality of construction products, development of new types of construction products, materials and technologies, the introduction of international standards of quality management system ISO 9001 in the construction industry, and the growth of commissioning objects (including residential) of higher quality.[21]

The example of Khmelnytsk region, demonstrating the combination of efforts within the cluster business organization for the purpose of increasing its competitiveness, is becoming increasingly popular in Ukraine. Regional administrations and entrepreneurs consider Khmelnytsk region as a training center to find the most suitable models of exploiting competitive advantages in their regions and industries. Thanks to this occurs gradual growth of clustering processes. The most persistent and dynamic of them during the last decades were able to achieve some success.

The successful initiatives that have been operating over the past ten years thanks to combination include Khmelnytsk Regional Association "Sewing cluster" registered in 2001. It includes the enterprises of light

[21] *The construction cluster of Euro-region "Slobozhanshchyna"*, http://www.mb31.ru/page/klaster_slob/ (in Ukrainian).

and textile industry and Khmelnytsk National University and the "Student house of models". The enterprises in the cluster moved away from mass production of uniforms and began to build their model line, rationally dividing markets among themselves.

Another cluster, "Kramatorsk jewelry" has been successfully operating since 2010, specializing in consumer goods. The cluster was founded by owners of the jewelry factories and the Chamber of Commerce in Donetsk region. In this model, the purpose is to diversify the local economy and to perform branding of the area as a national center of machine engineering, The union initiated a hard work on training and improving qualifications of personnel. In 2011, the cluster enterprises' directors, managers, representatives of advertising departments organized 14 seminars and training sessions. In March 2011, the working visit of representatives of the cluster to Germany took place. During the visit, they studied the experience of applying the German jewelers' cluster model, as well as the trends and directions of European jewelry design. The experience of innovative and evolutionary changes in the jewelry industry of Ukraine were presented in August 2011 at the thematic meeting of the "KAIDZEN-club on the problems of development of small and medium business in Ukraine". In September, the jewelry cluster was presented as a business association at the CIPE (Centre for International Private Entrepreneurship) project conference "Development of the potential of business associations in Ukraine", attended by representatives of the Chambers of Commerce and business associations of Ukraine, Russia and Belarus.[22]

There appears to be much interest in the local production systems of the seaside regions. The Ukraine, being a maritime state, has seaports in the Azov-Black Sea basin, which are the essential element necessary for creating a competitive national transport system. However, the industry has been lacking structural reforms for the last two decades, whereas state enterprises have higher-than-normal obsolescence of their fixed assets. These circumstances become favorable environment for non-transparent privatization and proliferation of the illegal network of private marine terminals. However, the freight traffic and the number of invest-

[22] Information about the status of work on small business support in Donetsk region in 2011.

ment projects aimed at development of ports are rapidly growing. However, due to the lack of interaction with other transport sectors, especially with the railway, there is no correspondence between the capacities of ports and port infrastructure.

All this created such an economic situation, that should be solved with the help of maritime clusters. At the current stage, the research aimed at creation of such a cluster model that will be capable of ensuring the increased role of maritime transport in the country's economy is being realized. One of the models known as "national maritime cluster" was presented by the State Administration of Maritime and River Fleet. It consists of a system of maritime clusters: the Danube (the ports of Reni, Izmail, Ust-Danube); Odessa (the ports of Odessa, Ilyichevsk, Yuzhny, Belgorod-Dnestrovsky), Mykolaiv (ports: Nikolayev, Oktyabrsk, Kherson, Skadovsk); Crimean ports: Evpatoria, Sevastopol, Yalta, Kerch); the Azov sea (ports of Mariupol and Berdiansk). The organizational potential of such a project is determined by such elements as technological maturity in strategic. project and program management, clarity of future vision, and the first step of the project. It is believed that this structure of national maritime cluster provides flexibility in management, planning and coordination of individual clusters and significant improvement of the competitiveness, and more even load of ports.[23]

Another concept of marine clusters creation is based on the regional approach and bottom-up initiative. It involves the functioning of two groups of clusters: emerging clusters and pre-clusters or agglomerations. Emerging clusters belong to second stage of cyclical cluster development, which consists in the fact in the region there are a few companies that are combined to specialization in the 'key' field and expand the overall prospects for cooperation.[24] Seaside clusters specialize in fishing industry, maritime

[23] B. Kozyr, *Cluster systems in the projects of seaside trade ports development in Ukraine*, Management of complex systems development. Collection of papers, No. 6, Kyiv National University for Construction and Architecture, Kyiv 2011, p. 99−102 (in Russian).

[24] I. Kolesnik, *The prospects of development of regional marine clusters in the Ukraine*, "Visnyk Donetskogo Natsionalnoho Universytetu. Seriya B: Ekonomika i pravo" 2011, Vol. 1, p. 131−136 (in Russian).

transport and logistics. This corresponds to the experience of the Canadian program of support to sea clusters and Norwegian program on creation of conditions for the development of "maritime industry" cluster. The use of the pre-clusters in the system of marine management focuses on informal association of small and medium-sized businesses of the shipbuilding and ship-maintenance sphere. In the conditions of the crisis, their mission is to form a competitive network of companies that provide for the successful development of the region based on location- and industry-specific competitive advantages.

In the economic space of trans-border regions increases the importance of cross-border cooperation based on forming a unified innovation infrastructure, ensuring the effective use of local scientific and technical capacity, creating conditions for modernization of industry and its rapid development.[25] This is typical of the Danube territories after entry of Romania into the European Union and the resulting appearance of new opportunities generated by the united Europe. The above-mentioned clustering projects in the Danube area are being developed for the Ukrainian side only, which somewhat limits their effectiveness in view of the uniqueness of the region, which possesses one of the major transport arteries of Europe. For the development of clustering strategy, it is necessary to take into account the location of the Danube region on the crossroads of important international routes from Europe to Asia, including three commercial sea ports (Reni, Izmail, Ust-Danube), 2 ship-repair plants, State shipping company JSC "Ukrainian Danube shipping company", 4 railway stations, a locomotive depot, a number of road transport enterprises and airport "Izmail". According to expert reports, it is necessary to establish a training and information-analytical cluster in the region in order to acquire the skills and experience in analyzing the implementation of local production systems and to carry out further formation of various clusters on the territo-

[25] In fact, in border regions, this can be especially true for the seaside territories, where good chances exist for the appearance of "growth poles" (according to F. Pareto), which emerge close to dominating industries acting as engines of growth. The domination effect leads to the outcome that industries that are engines of growth stimulate the catching up of affiliated industries, generating production growth and innovations.

ries of the Euro-region "Lower Danube" (Ukraine, Romania, Moldova).[26] The attracting of foreign investments to the Danube region should contribute to resolution of such problems as restoration of the technological base of regional enterprises, modernization and reorientation of the existing industries that are idle. At that, the priority should be given to those directions of development that include the improvement and expansion of transport networks and ports, as well as expansion and diversification of export-oriented business.

6. Scientific parks of Ukraine in the system of local production systems and their development prospects

The creation and functioning of Ukrainian scientific parks is carried out in accordance with the Law of Ukraine No.1563-VI "On Scientific Parks" of June 25, 2009. Scientific parks are defined as legal entities created based on the initiative of higher education institutions and/or scientific institutions by means of combining the contributions of the founders with the aim of organizing, coordinating, and controlling the process of development and implementation of the projects of scientific parks. Its partners may be business entities that have to sign the corresponding agreement. The priority directions of a scientific park should economically and socially construct scientific, technical and innovative activities that are consistent with the purposes of its creation, take into account the needs of the region and be consistent with the laws "On priority directions of development of science and technology" and "On priority directions of innovative activity in Ukraine".

Research of the problems of scientific parks development is carried out by many Ukrainian and foreign scientists. Among them, we would like to mention B. Andriyan (theoretical foundations of scientific parks);[27]

[26] S. Kovalenko, *Trans-boundary cooperation of Ukrainian Danube area within the cluster model*, "Visnyk socialno-ekonomichnyh doslidzhen. Collection of articles" 2009, No. 38, p. 96–97 (in Ukrainian).

[27] V. Andriyanov, *Science parks. South-Eastern version*, "Vneshnyaya torgovlya" 1990, No. 9, p. 33–35 (in Russian).

M. M. Ivanov, S. R. Kolupaev (methods of science and innovation management in the U.S.);[28] A. G. Karataev (operation of science parks in the developed capitalist countries);[29] V. K. Vasenko (world experience of the strategy and development of free economic zones in Ukraine);[30] V. I. Ljashenko, A. I. Zemlyankin, I. J. Pidorycheva, T. F. Berezhna (infrastructure of science parks);[31] O. A. Mazur (Ukrainian and international experience of technology parks);[32] V. Seminozhenko (parks and experience of innovation economics);[33] D. V. Tabachnik (Ukrainian and international experience of technology parks),[34] and others. However, the practice of creating technoparks has not become widespread enough, although some experience was already accumulated, which provides grounds for future development of their network.

The first scientific park "Kyivska Politechnika" was established at the National Technical University "Kyiv Polytechnic Institute" by the Law of Ukraine No. 523-V of 22.12.06 on Science Park "Kyiv Politechnika" with the aim of organizing massive innovation activity directed at intensifying the processeses of development, production and implementation of high-technology products on the domestic and foreign markets, increasing revenues to state and local budgets, accelerating innovation development of the Ukrainian economy. This law was of pilot importance for the formation of regulatory rules and basic principles governing the activities of scientific parks.

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[28] M. Ivanov, *The USA: Management of Science and Innovations*, M. Ivanov, S. R. Kolupayev (eds.), Izdatelstvo "Nauka", Moscow 1990 (in Russian).

[29] A. Karataev, *Science parks in developed capitalist countries*, "Vneshnyaya torgovlya" 1990, No. 9, p. 13−15 (in Russian).

[30] V. Vasenko, *Free economic areas: the development strategy*, monograph, Vydavnytstvo "Dovkillya", Sumy 2004 (in Ukrainian).

[31] V. Lyashenko, *Prospects of development of science parks as elements of infrastructure for small innovative business in Ukraine*, V. I. Lyashenko, A. I. Zemlyankin, I. Yu. Pidorycheva, T. F. Berezhna (eds.), "Visnyk Ekonomichnoyi Nauky Ukrayiny" 2012, p. 89−109 (in Ukrainian).

[32] O. Mazur, *Technological parks. World and European Experience*, O. A. Mazur, V. S. Shovkalyuk, "Prok-Biznes", Kyiv 2009 (in Ukrainian).

[33] V. Semynozhenko, *Technological parks in Ukraine: the first experience of innovation economy formation*, "Ekonomika Ukrainy" 2004, No. 1, p. 6 (in Ukrainian).

[34] D. Tabachnyk (ed.), *Technological parks. World and Ukrainian experience*, Vydavnytstvo Tp IEZ, Kyiv 2004 (in Ukrainian).

The creation of the scientific park "Kyivska Politechnika" attracted 55 foreign and local technology companies, almost 100 research groups and laboratories of Kyiv Polytechnical Institute producing competitive know-how, more than 20 engineering faculties offering high-quality personnel for companies, several venture and investment funds, which if necessary invest in start-up projects. The science park attracts ever more students that not only work for its companies, but also create their own small enterprises for commercialization of their own inventions and projects within the framework of the scientific park's business incubator.

During 2005−2010, the participants of the technopark "Kyivska Politechnika" commercialised more than 150 new products and technologies. Among the achievements of the park one can mention the following: a complex of computer technology instruments that protect the user from indirect electromagnetic radiation; strategic planning and systemic management of sustainable development of megacities of Ukraine; energy-efficient Eco-house with complex use of renewable and alternative energy sources; technology of production of new dietary foods of sanative and preventive action; micro-satellite; technologies of low-cost titanium production, etc.[35]

Organization and activity of the park is realized in accordance with three main elements of the "triple helix" model, which was developed in 1996 by Henry Etzkowitz, professor of Stanford and Edinburgh universities and includes such elements as universities, business and the state.[36] In the case of the scientific park "Kyivska Politechnika", only two elements are actively involved – the university and the manufacturing sector (American companies Netkracker, USPolytech, EPAMSystems; "European Institute of Innovation Technologies" (London), German Research Center "Eurocentrum"; Ukrainian companies – Group DF, "Datagroup", "Technologies of nature", "UAVIA", Kherson enterprise "Sudmash", concern "Ukrpozhservis", Kyiv enterprise "Meridian" and others). In its

[35] *Research universities as centers for innovation development of the country*, "Dzerkalo tyzhnya" 2011, No. 2, http ://www. dt. ua/articles/73711#article/ (in Ukrainian).

[36] I. G. Dezhyna, V. V. Kiseleva (eds.), *The state, the science and business in the innovation sphere of Russia*, Institut ekonomiki perekhodnogo perioda, Moscow 2007, 184 p. (in Russian).

turn, the state did not show any interest in the work of the country's first scientific park. Although it could place orders for creation of high technologies in such critical areas, as resource and energy saving; biotechnology for food and agricultural sectors; information systems for effective management of different parts of society, etc. Such a policy could have contributed to reduction of high-technology imports into Ukraine in these directions.

The network of Ukrainian scientific parks expanded, however, their impact on formation of the innovation economy is still impossible to realize. To monitor the processes of functioning of scientific parks, it is expedient to determine their network. In scientific literature, the following science parks are described:[37]

– "Aerospace innovative technologies", created in 2010 within the framework of the EU project "Support to knowledge-based and innovative enterprises and technology transfer in Ukraine" at the National Aviation University, Kyiv);

– Kyiv T. Shevchenko University, created at the end of 2010 by the research institutions of the National Academy of Sciences of Ukraine (Institute of Archeology; Institute of Bioorganic Chemistry and Petrochemistry; O. Palladin Biochemistry Institute; Institute of Geochemistry and Mineralogy named after M. P. Semenkov; E. O. Paton Electric Welding Institute; Institute of History of Ukraine; Institute of Metal Physics named after G. Kurdyumov; Institute of Microbiology and Virology named after D. K. Zabolotny; Institute of Organic Chemistry, Institute of Applied Physics; Institute of Materials Science named I. M. Frantsevich; Institute of Information Registration; Institute of Theoretical Physics named after M. M. Bogolyubov) and higher educational establishments of the IVth level of accreditation (Kyiv National T. Shevchenko University and National University of Food Technologies);

– "AGROECO" created on the basis of the Institute of Agroecology and Environmental Economics of the National Academy of Agrarian Sciences of Ukraine (IAEE NAAS of Ukraine) with the participation

[37] V. Lyashenko, *Prospects of development of science parks as elements of infrastructure for small innovative business in Ukraine*, V. I. Lyashenko, A. I. Zemlyankin, I. Yu. Pidorycheva, T. F. Berezhna, "Visnyk Ekonomichnoyi Nauky Ukrayiny" 2012, p. 89−109 (in Ukrainian).

of the Institute of Agroecology and Environmental Economics NAAS of Ukraine; Institute of Sugar Beet and Energy Crops NAAS of Ukraine; Institute of Hydraulic Engineering and Land Reclamation NAAS of Ukraine; National Scientific Centre "Institute of Agriculture" NAAS of Ukraine; National Scientific Center "Institute of Mechanization and Electrification of Agriculture" NAAS of Ukraine; Institute of Agricultural Microbiology NAAS of Ukraine; National Scientific Center "Institute of Agrarian Economy" NAAS of Ukraine; Darnytsya center for assistance of investments, innovation and high technology; Kyiv Regional State Administration; National University of Bioresources and Environmental Science of Ukraine.

The researchers tend to share a viewpoint that some parks should be classified as scientific parks, because in this way they can gain more privileges associated with such a status.[38] In particular, among such parks are "Kyiv Politechnika", "Textile" based at Kherson National Technical University; "Agrotehnopark" at the National University of Food Technologies, and "Yavoriv" at National University "Lviv Politechnika".

Taking into account the existence of a developed network of educational institutions of the highest level of accreditation in Ukraine, research and development institutions, as well as formation of the modern business environment, we can assume that in the near future new powerful scientific parks will be created. Currently, a project aimed at creating a network of scientific parks in Donetsk region has been elaborated. The realization of this goal will entail the use of franchising replication around the nucleus of the network: Donetsk Scientific Center of National Academy of Sciences of Ukraine, Ministry of Education and Science of Ukraine, regional offices of the Chamber of Commerce and Industry of Ukraine in Donetsk and Luhansk.[39] In general, pilot projecting entails a choice among three possible ways of organization: (1) on the basis of a scientific

[38] L. Nemets, *To the question of technoparks operation in the world and in Ukraine*, L. Nemets, N. Hryshchenko (eds.), "Chasopys socialno-ekonomichnoyi geografiyi. Mizhregionalnyi naukovyi zbirnyk" 2010, No. 8, p . 62 (in Ukrainian).

[39] V. Lyashenko, *Prospects of development of science parks as elements of infrastructure for small innovative business in Ukraine*, V. I. Lyashenko, A. I. Zemlyankin, I. Yu. Pidorycheva, T. F. Berezhna (eds.), "Visnyk Ekonomichnoyi Nauky Ukrayiny" 2012, p. 89−109 (in Ukrainian).

institution; (2) on the basis of higher educational institution of the IVth level of accreditation; and (3) on the joint basis of a scientific institution and higher educational institutions of IVth level of accreditation. The recommended approach is the "bottom-up" approach, when science parks are formed by scientific institutions and universities of the IVth level of accreditation by joint initiative, given that authorities provide political support. At the second stage, the process of duplication will be done: the duplicates of scientific parks in another town of the region will be created under condition that the pilot scientific park has reached its objective. The third stage entails using the franchising replication in the form of a transfer based on commercial or other contract basis of the developed and tested scheme of functioning and duplicated scientific parks in order to establish similar parks in other cities and districts of Donetsk and Lugansk regions.

7. Conclusions

At the post-industrial stage of development, the world economy is observed to enhance the rates of regionalization. An important factor of its growing significance was the creation of local production systems of the cluster type. Today, they are represented by production-oriented clusters, technoparks and scientific parks. They all share a similar feature – the orientation towards ensuring of the innovative development. However, production enterprises are represented in different ways.

The Ukraine has started to introduce local production systems much later than these processes have started in the developed countries. Nevertheless, clusters, technoparks and scientific parks are currently being created in all regions of Ukraine, even though the country has so far failed to create strong clusters. At least the interest in realizing clustering initiatives is growing in Ukraine, which can be proved by the amount of efforts put into development of competitive cluster associations both in traditional and high-technology industries. Compared with European countries, the clustering policy has not yet become an element of economic reforms initiated by the government.

Solving the tasks of increasing the role of cluster systems in the economic development of Ukraine requires that cluster systems be created at the regional level. In this article, we study some directions of such activity, in particular new approaches to regional policy, creation of production factors and scientific parks. On the other hand, worth admitting is that Ukraine should apply the whole set of effective forms of territorial development, which were not subject of research in this work: creation of industrial districts, innovation clusters, alliances, partnerships and other local production systems and territorial-production complexes. At that, we should keep in mind that local production systems of the cluster type are not the panacea for solving all problems of the Ukrainian economy. Along with that, without the use of their advantages and opportunities, it is currently impossible to successfully finish the transformation period in the development of the national economy.

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Abstract

In this paper, the authors review local production systems that emerge and function on the basis of clustering principles of organization and cooperation. The authors develop the theory of new regionalism and show that formation of regions is not limited by national boundaries, but can include a part of territory of one or more countries. The authors single out certain aspects of self-formation of new regions, as well as elimination of the existing ones. In the methodological aspect, clusters are studied as a driving force of prosperity in the conditions of globalisation. The authors systematize the normative and legal foundations of clustering in Ukraine, and analyse the tendencies of Ukrainian clustering in production, construction, tourism, transport and logistics, services sectors, and in coastal regions. Finally, the authors study the state and prospects for development of science parks in Ukraine.

Key words: local production systems, cluster policy, benchmarking, Ukraine.

Edward Stawasz*

TRANSFER OF KNOWLEDGE AND TECHNOLOGY IN THE REGION OF LODZ

1. Introduction

For innovation activities to be effective, businesses need to get access to external sources of applied knowledge. It is important especially to smaller economic operators as their human, technical and financial resources are more limited. Among external sources of knowledge, regional science and research area, including universities, may be extremely useful. Knowledge transfer between universities and business, conditions of its effective and efficient course are currently the subject of vivid interest of science, politics and innovation management practice. It concerns research areas such as university entrepreneurship, regional innovation systems and open innovation models.[1]

Knowledge and technology transfer is an important element of regional innovation system because it impacts its efficiency and ability to meet the requirements of modern knowledge-based economy focused

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[1] L. Leydesdorff, M. Meyer, *The Triple Helix of university-industry-government relations*, "Scientometrics" 2003, Vol. 2; A. Nowakowska, *Regionalny wymiar procesów innowacji*, Publishing House of the University of Lodz, Lodz 2011.

on the improvement of innovation and competitiveness of the local economy and its individual actors.[2] It is important to adjust institutional solutions and practices in technology transfer to local economic and institutional specificity and to differentiated innovation needs of local businesses and the R&D sphere or innovation business environment. Thus, experience and the potential of regional technology transfer centres, their profile and networks of contacts decide on their quality and usefulness for regional innovation system.

The paper aims at describing and assessing practices involved in knowledge transfer between universities and business as well as institutional background of technology transfer on the example of the Lodz Region. The study uses results of own research and analyses and materials relating to the INNOPOLIS, RSI LORIS 2005−2013, RSI LORIS PLUS, BIOS, RSI LORIS 2030, Development Strategy of the Lodz Region, generally available statistical analyses and others.[3]

2. Knowledge transfer between universities and business in the region

Applied knowledge (innovative ideas) is at the grass roots of innovation. It is a precondition for innovation in business. Sources of innovation can be divided into internal (own), external and mixed.[4] Own resources

[2] E. Stawasz, *Transfer wiedzy w układzie uczelnie wyższe – przedsiębiorstwa w regionie łódzkim*, "Problemy Eksploatacji" 2012, Vol. 3; K. B. Matusiak, *Budowa powiązań nauki z biznesem w gospodarce opartej na wiedzy. Rola uniwersytetu w procesach innowacyjnych* [Building science and business cooperation in knowledge-based economy. Role of universities in innovation], Warsaw School of Economics Publishing House, Warsaw 2010.

[3] *Regionalna Strategia Innowacji Województwa Łódzkiego RSI LORIS 2005−2013*, LORIS, Lodz 2004; A. Rogut, B. Piasecki, *Regionalna Strategia Innowacji RSI LORIS PLUS*, Lodz 2008; *Strategia Rozwoju Województwa Łódzkiego 2020 – Projekt*, Board of the Lodz Region, Lodz 2012; *Szczegółowy opis osi priorytetowych Regionalnego Programu Operacyjnego Województwa Łódzkiego na lata 2007−2013*, Lodz 2011; *Regionalna Strategia Innowacji dla Województwa Łódzkiego LORIS 2030*, Lodz 2013; *Badanie potencjałów i specjalizacji polskich regionów. Województwo Łódzkie* (BPPWŁ), ROT of the Lodz Region, 2013.

[4] J. Bogdanienko, *Innowacyjność przedsiębiorstw*, Publishing House of the UMK, Torun 2004; I. Łącka, *Współpraca technologiczna polskich instytucji naukowych i badawczych z przedsiębiorstwami jako czynnik wzrostu polskiej gospodarki*, Publishing House of the Zachodniopomorskie University of Technology, Szczecin 2011.

include internal analyses of a company, staff creativity. For an innovation company the exclusive ownership of solutions is the main asset while high uncertainty of unwanted outcomes, long delivery period and high costs are disadvantages. External sources are studies conducted outside of the company, licences, takeovers, and *joint venture* companies. External technical thought is the simplest way of acquiring new solutions, effective and implying little risk, although it may make a business dependent on technology suppliers.

Transfer of external solutions can be described as *supplying market with technologies*.[5] It is a specific case of the communication process, often an interactive one, full of various feedback loops between the originators and recipients of knowledge.[6] It includes all sorts of solutions diffusion and technical education. Knowledge transfer entails the transfer of information necessary for one operator to replicate the work of another operator. Such information can take two forms: technical (engineering and scientific knowledge, standards) and procedural (e.g. legal, confidentiality agreements, patents, licences). In most cases it is a market process, where technology is purchased and sold. Knowledge transfer means a given portion of technical or organisational knowledge is transferred, together with *know-how* relating to it, for economic (commercial) purposes. Knowledge transfer can be commercial or non-commercial.[7] Non-commercial knowledge transfer includes, e.g.,: (1) knowledge transferred free of charge, studies, internships, etc. (2) professional associations, (3) mutual transfer of licences, (4) knowledge shared within companies, international holdings. Commercial transfer of knowledge is connected with knowledge and technology transfers between operators, who have no structural links and includes: (1) hard transfer, (2) licensing inventions, utility models and *know-how*, (3) information and the so called tacit knowledge.

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[5] A. H. Jasiński, *Innowacje i transfer techniki w procesie transformacji*, Difin, Warsaw 2006.

[6] K. Santarek, J. Bagiński, A. Buczacki, D. Sobczyk, A. Szerenos, *Transfer technologii z uczelni do biznesu. Tworzenie mechanizmów transferu technologii*, Polish Agency for Enterprise Development, Warsaw 2008.

[7] Ch. Grimpe, H. Fier, *Informal university technology transfer: a comparison between the United States and Germany*, "Journal of Technology Transfer" 2010, Vol. 35, p. 637−650.

Knowledge is transferred mainly between science and research sector and business through a specific bridge linking the two worlds and bringing various economic, market, organisational, educational, etc. benefits to both parties. Partners in knowledge transfer, depending on the situation, are: R&D institutes, small and medium-sized enterprises, public institutions and private individuals. What is characteristic of science and industry collaboration (universities and business) is the variety of cultural and organisational arrangements in both spheres (different motivations, objectives and operational modes, results assessment criteria, etc.). It creates lots of difficulties in establishing relations and continuing efficient cooperation in knowledge transfer.

Knowledge transfer from the public sector of science and research to business takes place through numerous channels and organisational forms:[8]

– joint research and special targeted projects implemented in cooperation with businesses;
– research commissioned by companies,
– licences for various types of intellectual property, *know-how*,
– advice, opinions, expert opinions, reviews and scientific and technical dealings,
– technical staff exchange, training courses,
– spin-off businesses,
– scientific and popular publications, patent descriptions,
– conferences, seminars, fairs; training courses,
– informal scientists' contacts,
– staff mobility schemes (exchange/staff transfers from science to business and reverse), students' placements,
– information about new technologies, initiating transfers,
– support to innovative initiatives in SMEs,
– initiating cooperation networks,
– developing a system to support innovative undertakings and entrepreneurship.

[8] P. D'Este, P. Patel, *University – industry linkage In the UK: What are the factors underlying the variety of interactions with industry?*, "Research Policy" 2007, Vol. 36, p. 1295−1313.

Regional innovation policy plays an important role in knowledge transfer from the public R&D sector, universities included, to business. In functional terms, the policy provides a specific platform for cooperation of various organisations and institutions in the region, which have as their major (or one among many) objective the development of innovative entrepreneurship in the region. The list of such institutions includes: regional (provincial, county and local) authorities, regional development agencies, universities, R&D institutes, innovation centres, financial institutions, consulting companies, manufacturing and service businesses, etc. Within such a regional structure a specific network emerges linking all entities involved in innovation and technology transfer. Regional innovation policy is focused on demand aspect of innovation, where interactions among businesses, especially SMEs and science, research and technology are required. It results from the vicinity and more trust in partners originating from the same area, who subscribe to identical values identified by the same cultural factors.[9] Services for the transfer of knowledge and innovation within the system universities – local businesses are rendered mostly by regional institutions from innovative business environment, commercial providers active within the broadly understood area of entrepreneurship, innovation, technology transfer and commercialisation. Current state and development perspectives of this area of economy, the quality and scope of services have an increasingly bigger impact on the transfer of knowledge and innovation of individual companies and the economy as such.[10]

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[9] A. Jewtuchowicz, *Terytorium i współczesne dylematy jego rozwoju*, Publishing House of the University of Lodz, Lodz 2005; A. Nowakowska, *Regionalny wymiar...*; S. Shane, *Government policies for encourage economic development through entrepreneurship: the case of technology transfer*, [in:] S. Shane (ed.), *Economic development through entrepreneurship. Government, university and business linkages*, Elgar, Cheltenham 2005.

[10] E. Stawasz, *Realizacja i integracja polityki innowacyjnej i przedsiębiorczości (wybrane problemy na przykładzie regionu łódzkiego)*, [in:] A. Nowakowska (ed.), *Budowanie zdolności innowacyjnych regionów*, Publishing House of the University of Lodz, Lodz 2009.

3. Analysis of science and business collaboration

3.1. Knowledge transfer between universities and businesses in the region of Lodz[11]

Speaking of how in practice knowledge is transferred between universities and business, we may distinguish seven patterns (see Fig. 1). They are dominated by simple, little advanced solutions. Placements within the framework of cooperation in training and education available to students, academic staff, employees from companies and other individuals are the most popular (40.5% of cases). They are followed by knowledge transfer between universities and businesses under research contracts (23.8%) and as a part of informal cooperation, i.e. placements, which take place without the consent of both interested parties (9.5%). Informal cooperation usually consists in free-of-charge use of university research infrastructure and results of studies without the consent of the university or in organising training courses in university facilities.

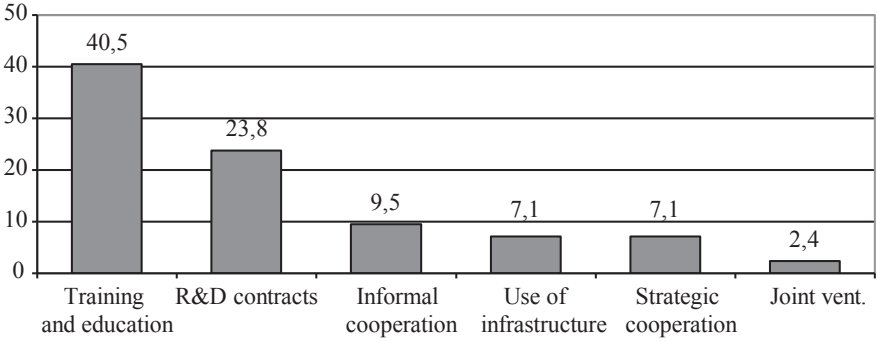

Figure 1. Types of knowledge transfer (percentage of all practices)

Source: own study

[11] In the paper we used results of empirical studies conducted in the period 2010−2011 within the framework of an international project "Innovation Policy in University City Regions – INNOPOLIS" (INTERREG IVC Programme) delivered with the involvement of the Author by the University of Lodz.

Other types of science – business knowledge transfer are much more rare. We may list here knowledge transfer as a part of the use of infrastructure (7.1% of cases) or as a part of strategic cooperation between universities and businesses (only three cases – 7.1%). There was only one case of knowledge transfer from a university to business, which took the form of a joint venture, which is considered a very advanced type of knowledge transfer.

Practical knowledge transfer between universities and business in the Lodz Region was initiated in top-down arrangements within the framework of the innovation policy in the region either by the universities or by businesses themselves. The analysis of how knowledge transfer is initiated in the Lodz Region shows that the impulse, first and foremost, comes from universities (67.6% of cases), mainly under various economic cooperation programmes. Every sixth case (18.9%) was initiated by businesses and every seventh resulted from innovation programmes in the regions (13.5%). Among 7 cases initiated by business there are four, which fall under contract-based (research) cooperation and three cases of informal cooperation. In turn, among 5 cases initiated under innovation schemes, there are four based on research contracts and one case of training and education type.

Knowledge transfer practices between universities and business in the Lodz Region were analysed in terms of their duration and reproducibility (under different circumstances and in different institutions). When it comes to the duration, two groups of practices were distinguished: long-term (over 6 months) and short-term (less than 6 months) ones. The analysis shows that short-term practices dominate – 4/5th of all cases. Longer lasting practices, i.e. the most useful for knowledge transfer, account for only 1/5th of all cases. All of these cases consider knowledge transfer between universities and business within the framework of contracts or long-term strategic cooperation.

More than 4/5th of all cases (82.6%) are reproducible, meaning they can apply to different circumstances and different operators. Hence they can be disseminated in the Lodz Region as the so called “best practices”. Only 17.4% of cases were irreproducible and hard to disseminate. These were mainly the cases of knowledge transfer between universities and businesses under informal cooperation.

There are two types of scope of knowledge transfer between universities and business, i.e. direct cooperation between the two parties and cooperation, in which third party, e.g. local offices, other stakeholders, are involved. The first type, when knowledge transfer takes place between universities and business, dominates (77.1% of cases). More parties have been reported in only 22.9% of cases. Half of them were covered by contracts.

In terms of the impact of analysed practices of knowledge transfer between universities and business, we distinguished direct effects consisting in knowledge transfer and indirect effects, which help initiate knowledge transfer. Analysis of how knowledge is transferred from universities to business in the region suggests that indirect effects dominate (62.9% of cases). Direct knowledge transfer was reported in a bit more than 1/3rd of cases. That illustrates the weakness of knowledge transfer between universities and business in the region. Only every third case of cooperation resulted in direct transfer of knowledge. These were the cases of contract-based cooperation, informal cooperation and strategic cooperation, i.e. long-term arrangements. The remaining 2/3rd are cases of potential knowledge transfer as they just initiate the process.

The analysis also demonstrates that practices around knowledge transfer between universities and business in the Lodz Region entail little risk of failure, that is true of almost 70% of analysed types, for which no or minimum risk of failure was found out. Only 30% of analysed practices were bearing medium risk of failure. Noticeable risk of failure appears usually in the following cases:

– cooperation with the engagement of a third party, e.g., a business environment or technology transfer organisation, government agencies (80% of such cases),

– cooperation initiated top-down (formally), where both sides, i.e. the university and the company are sort of „forced" into knowledge transfer (60% of cases),

– cooperation under research contracts, usually entailing high risk of failure.

University – business knowledge transfer allows both parties achieve a series of scientific, research, educational, economic, organisational and market benefits. Businesses benefited relatively more (97%) than universities (88%).

Both sides of knowledge transfer pointed to different benefits:

1. For businesses the benefits were:

a) scientific and research, connected with the acquisition of new or improved knowledge for the company (43% of businesses); we must note that acquired knowledge in the majority of cases was implemented in practice (60% of such businesses), which confirms high practical value of knowledge transfer,

b) organisational, connected with developing the skills of employees and improving operational strategy (34% of businesses),

c) economic, connected with improved economic performance, e.g., reduction of the cost of production, charges for services (23% of businesses),

d) market oriented, connected with commercialisation of knowledge and improved market position of a company (6% of companies).

2. For universities the benefits were:

a) economic, income for their services (43% of universities),

b) educational, relating mainly to the possibility of finding placements for students (43% of universities),

c) scientific and research, connected with the development of knowledge in cooperation with business, e.g., testing and laboratory tests of technology in companies (20% of businesses),

d) organisational, connected with the development of scientific staff (9% of companies),

e) market, relating to the commercialisation of knowledge originating from the university (6% of universities).

The above overview of benefits indicates that businesses focused on scientific, research and organisational benefits, while universities on economic and educational advantages.

3.2. Innovative business environment organisations

Local and regional organisations, which support their beneficiaries, referred to as *innovation and entrepreneurship centres* (abbr. IEC) are an important link in contemporary systems of technology transfer in Poland.[12]

[12] A. Bąkowski, M. Marzewska (eds.), *Ośrodki innowacji i przedsiębiorczości w Polsce. Raport 2012*, Polish Agency for Enterprise Development, Warsaw 2012.

Innovation centres promote and incubate innovative entrepreneurship, technology transfer and deliver pro-innovation services, mobilise entrepreneurship of academic community and encourage to science and business collaboration. This group of support centres includes: technology transfer centres, university business incubators, technology incubators, e-incubators, technology, science, research, industrial and technology parks, and technopoles.

Since the beginning of systemic transformation in 1990, the number of innovation and entrepreneurship centres in Poland grew systematically (with the exception of the period 1998−2000) to arrive at 821 active centres in 2012, including: 40 technology parks and 14 park-based initiatives, 29 technology incubators, 73 pre-incubators and academic entrepreneurship incubators, 58 incubators of entrepreneurship, 69 technology transfer centres, 68 seed capital funds, 10 networks of business angels, 86 local and regional borrowing funds, 55 credit guarantee funds, 319 training, advisory and information centres. The number of innovation centres was 280, meaning 34.2% of the total population of innovation and entrepreneurship centres. EU membership and access to structural funds particularly mobilised the development of support organisations. The biggest increase was recorded in the category of technology parks as well as seed capital funds, pre-incubators and incubators of technology. It is indicative of considerable saturation of the Polish economy with IEC centres.[13]

The IEC network, which supports the innovation of regional economy and technology transfer in the Lodz Region, is well developed in quantitative terms.[14] In 2012 in the region there were forty eight innovation and entrepreneurship centres, including sixteen innovation centres. These are foundations, commercial law companies, associations and other. They operate on *non profit* basis or commercially.

Specialist services offered as a support to innovation and technology transfer in the Lodz Region include:

– assistance in establishing innovation start-ups,
– advice and training for SMEs,
– economic promotion of concrete industries or sectors at regional level,

[13] *Ibidem*.

[14] The paper uses results from expert opinion by E. Stawasz, P. Głodek, *Przygotowanie modelu transferu technologii w regionie łódzkim*, University of Lodz, Lodz 2012.

– matching partners: science–business,

– technology transfer and commercialisation, technological and patent advice,

– assistance in financing economic undertakings, access to European funds.

When analysing the availability of the services of such centres we compared the number of inhabitants and the number of companies in the region with the number of centres. On average, there is one centre of any type per 52.8K inhabitants and 4,761 companies, which is a bit below national average. The share of innovation centres in the total population of innovation and entrepreneurship centres was 33.3% (below national average) in 2012. There was one innovation centre per 14.3K companies (14.2K for the country).

The overview of activities of organisations, which support technology transfer and innovation in the region shows that most of them focus mainly on the promotion of innovation, advisory services and information to businesses, less on financial support to innovation start-ups. That is indicative of mostly "soft" nature of regional support system to technology transfer as these organisation concentrate on promotion, information and intermediary services in seeking financial support. Services in technology transfer vary depending on the type of the centre.

In technology parks services in technology transfer relate first of all to matters pertaining to the protection of intellectual property rights for companies, advisory assistance in technology implementation and intermediary services in contacts with technology originator or recipient and, the least, in technology evaluation on order of business sector. Technology incubators offer incubation services and access to EU funds; they fill in business space with sound commercial businesses. Similar services are offered by pre-incubators and academic incubators of entrepreneurship, which, on top of that, offer training courses. Technology transfer issues occupy little prominent places on their priority lists. Technology transfer centres identify the following objectives of their activity: commercialisation and technology transfer (technology transfer to economy, commercialisation of results of research, contacts with business people to promote technology transfer, the development of academic system of technology transfer) and managing intellectual property (protection of research results, making patent rights available, licence and implementation agreements).

Strong concentration of regional infrastructure of innovative business environment in the Lodz agglomeration (16 out of 10 centres operate in Lodz agglomeration) is its weakness as innovation centres are missing in towns with some academic and industrial potential (Skierniewice, Piotrkow Trybunalski, Radomsko and Sieradz). There is also too much competition among these institutions and a very individualistic approach. The scale of activities is too small, organisational and financial foundations too weak, experience in technology transfer not sufficient, poor contacts with academic and business environment and international links. In particular the staff potential, experience and profile of university technology transfer centres do not match the potential of universities they work for. Attention should be paid to the potential and scope of activities of the Lodz Regional Science and Technology Park in Lodz which have been increasing since 2012 making it the leader of the technology transfer system in the Lodz Region.

Activities of regional IEC are little coordinated, especially in the area of technology transfer and entrepreneurship and support to innovative undertakings. Innovation has not got enough support in regional innovation and entrepreneurship policy. As a result, there are insufficient instruments for building an area of research, innovation and technology transfer in the region, developing the so called innovative entrepreneurship environment or effective support for modern labour resources (human capital) and knowledge transfer mechanisms.

4. Conditions for technology commercialisation and transfer in the region

The development of technology transfer in the Lodz Region is shaped by two categories of factors, which act in opposite directions and can be identified as:

1. *Driving forces* – which positively impact transfer and commercialisation processes. They can be treated as opportunities and new possibilities that generate foundations of knowledge-based economy.

2. *Barriers* – all restrictions and disturbances to smooth operations of the system of transfer and commercialisation, which block cooperation between scientific institutions and business and innovative entrepreneurship.

Both of the above categories of factors can be put in order in four the following areas: (i) *structure* – objective changes in the environment, new structures and institutions, which create foundations of knowledge-based economy, (ii) *system* – characteristics resulting from binding legislation, regulations and innovation and entrepreneurship policies, (iii) *awareness and culture* – dissemination of knowledge on processes, their understanding and approval, (iv) *competence* – capabilities and efficiency of the participants of the system in delivering and managing innovation.

The key problem of building an efficient technology transfer system consists in eliminating barriers, which hamper its effective operations and development in the region:

1. *Structural barriers* – connected first and foremost with the specificity of the sectors of economy, science, R&D and support offered by the Lodz Region. They also arise from the absence of strategies or policies leading to, e.g., inappropriate allocation of the EU funds, low competences of public administration or poorly developed regional growth poles. The major identified structural barriers in the regional technology transfer system are: excessive red tape and formality of support mechanisms funded by the EU, favouring technical infrastructure at the cost of entrepreneurship and technology transfer services, poor consolidation of the technology transfer system, immature market of new business ideas, lack of local demand for innovative products, universities oriented at the development of little practical education services.

2. *Awareness and culture-related barriers* – relate to the lack of trust or stereotypes. They result from the lack of awareness and little approval for innovative attitudes. The group includes barriers such as: low intensity of contacts and cooperation between business community and scientific institutes (often these contacts are informal), little involvement of scientific institutions into the development of innovative solutions that they could offer and lack of commercialisation initiatives.

3. *Systemic barriers* – connected with over-regulation, too many legal acts and frequent changes in legislation. This category includes barriers, such as: lack of common visions, how regional innovation policy could

translate into social and economic development, regulations concerning the protection of intellectual property rights make it difficult to generate benefits from future commercialisation.

4. *Competence barriers* – refer to public administration, local authorities and administration, universities, business people as well as the staff and management boards of supporting institutions. These barriers may be connected with State aid, various aspects of intellectual property, available pro-innovative services and the development of the part of financial market dedicated to support innovations, which often go far beyond competences of people dealing with such broad subject.

When it comes to the *driving forces* of technology transfer system in the Lodz Region, their role seems to be not more than moderate in stimulating the development of the system. Relatively the best is the situation of competence factors, however, they play little visible role in the development of regional technology transfer system. Against this background, relatively good assessments were given to structural and systemic factors. The lowest scores were given to awareness and culture-related factors. In this last case it is clear that social awareness, policy, economy and their impact on technology transfer in the region are lagging behind the most.

Among *structural factors,* the most important are EU funds, which create new possibilities of financing undertakings leading to economic growth, including the development of entrepreneurship, innovation, technology transfer, technology centres development, developing pro-innovation services, education, training, etc., systemic changes, development of entrepreneurship, FDI inflow and Poland's EU accession intensified competitive pressure in regional economy and substantially altered operating conditions for local businesses by stressing the need of innovative behaviour, resetting local business to new growth factors connected with the state-of-the-art technology, higher know-how expenditure and the development of human resources as extensive growth possibilities have almost reached their limits.

In the group of *systemic* factors, the development of *venture capital* market institutions, in particular in its the weakest link connected with investing in innovative businesses at early development stages (*seed* and *start-up*), has got some importance.

Among *awareness and culture-related* factors support to academic entrepreneurship is relatively important as it gives hope to overcoming common belief that commercial tests go against the principles of R&D works and, as such, are improper for the representatives of science. Universities, through their staff, relatively often get involved in support programmes and in the management thereof. Managers of innovation centres are present or past university employees.

Among *competence* factors, internationalisation of the activities of innovation centres and share in international projects improve the knowledge about models, processes and strategies connected with know-how and technology transfer, build up skills in moving around on international markets, improve experience and competence of managers and owners of Polish companies in product development policy, marketing, financial and knowledge management.

The overall assessment of the driving forces and barriers in the system of technology transfer in the Lodz Region suggests that the barriers are stronger than driving forces, which develop the system. It means there are serious difficulties in the functioning of the transfer system in the region. Driving forces are still too weak to give a significant impulse for its development.

Barriers are stronger than the driving forces in all analysed areas of the technology transfer system. This is the sign of difficulties in all areas of the system with sending development impulses. Relatively the biggest problems are connected with structural and awareness and culture-related factors. The smallest obstacles were observed for competence and systemic factors.

5. Conclusions

The analysis of knowledge transfer practices between universities and businesses in the Lodz Region shows that simple, little advanced practices prevail, which are initiated mostly by the universities under various regional economy collaboration programmes. They usually relate to short-term cooperation in training and education. In most cases they are reproducible, meaning, they can be used in different circumstances and by different entities. Hence, they can be disseminated in the region of Lodz as the so called. „best practices". Dominant format of cooperation implies knowledge transfer between universities

and business. The outcomes are mainly indirect and remain at the beginning of knowledge transfer process. That is indicative of the weakness of knowledge transfer between universities and businesses in the Lodz Region.

Strong concentration of regional infrastructure of innovative business environment in the Lodz agglomeration is its weakness as well as too much competition among these institutions and a very individualistic approach. The scale of activities is too small, organisational and financial foundations too weak, experience in technology transfer not sufficient, poor contacts with academic and business environment and international links. In particular the staff potential, experience and profile of university technology transfer centres do not match the potential of universities they work for. Activities of regional IEC are little coordinated, especially in the area of technology transfer and entrepreneurship and support to innovative undertakings. Innovation has not got enough support in regional innovation and entrepreneurship policy, which translates into insufficient support for knowledge transfer mechanism.

The above presented analysis of conditions connected with observed driving forces and barriers in the system of technology transfer and commercialisation in the Lodz Region shows that barriers in technology transfer and commercialisation are much more powerful than factors identified as driving forces. That is true of all areas of the system. It means there are substantial difficulties in the functioning and development of the technology transfer and commercialisation system in the region. Driving forces are still too weak to provide sufficient impulse to the development of the system. Relatively the biggest obstacles are observed with respect to structure, awareness and culture. The smallest obstacles are experienced in the area of competences and system.

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Abstract

The paper presents the current status of business and university collaboration in knowledge transfer and the institutional aspect of technology transfer system on the example of the Lodz Region. It outlines the practices of knowledge transfer between universities and industry, including the effects and benefits of knowledge transfer for both cooperating parties. Second part of the paper is the description of regional infrastructure of innovation environment and the third one explains the conditions (driving forces and barriers) of technology transfer and commercialisation in the Lodz Region.

Key words: innovation, knowledge transfer, university-business cooperation, institutions, region of Lodz.

Vladia Borissova*

INTELLECTUAL PROPERTY ROLE FOR THE LOCAL PRODUCTION SYSTEMS EFFICIENT FUNCTIONING IN TIMES OF CRISIS[1]

1. Introduction

The topic is determined by the global reorientation of the economy into a knowledge economy, based on the Europe 2020 – Europe's Growth Strategy. In this document, traditional resources such as labor and capital are supplemented with the resource of knowledge as a key factor to the economic prosperity on both micro and macro level. Intellectual property is increasingly becoming a crucial factor for the development of new production and expansion of market positions. The knowledge economy is based on such resources like knowledge, creativity

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and talent of the human capital and its creative results in both the material and non-material production and its functioning creates positive economic effects and sustainable economic growth. In this regard, managing the economic crisis on both macro and micro level depends on the selected direction of economic development. Reorientation of the national economy to new economic resources that can help to reduce the "speed" of entering into crisis and eventually help it exit it, requires the implementation of new models of business behavior for economic operators, especially for small and medium enterprises (SMEs), the big business companies and other participants in their functional units such as clusters and local production systems (LPS).

The new business models, which require the use of knowledge and creativity as a production resource, implement intellectual property as a key economic factor for business development. Business enterprises reorient their activities to creation of innovation or to external purchases of such, as a mean to handle the economic crisis. The business survival process in a state of global, national and regional economic crisis, requires from companies to be flexible in managing the decision making process for creating intellectual property or external acquiring it in taking into account the changes of the conditions and the environment of their market activity.

In this changing economic environment the role of the new economic recourses such as creativity and knowledge becomes very essential. Those resources allow flexibility and dynamic of the business activities. Which is a crisis are very valuable and competitive advantages.

Creativity as a process is determined by the knowledge and talent of the human capital. Talent is an inherent or not human quality, which can be enhanced and extended to grade functionality by the acquisition of knowledge. This is important because the acquisition of knowledge helps the optimization of business by giving professional qualification to the human capital and thus helping it to meet the business needs. And though talent is a quality that is not a subject to cultivation, it is a process that forms a way of thinking and stimulates creativity of the individuals. In other words, the principle that relates to knowledge is "accumulation" or – the more knowledge, the more creativity, more innovation, more

intellectual property, more competitive advantage, and more economic growth. It is important to note that most of knowledge required for business purposes is formed in higher education institutions. This regularity is essential, because at this stage the government policy is structurally important for the future development of the business (which industries are national priorities for strategic promotions and what is the government higher education policy for the point of view of the preparation of professionals for them).

Educational and research activities are related to intellectual property by training highly qualified personnel and development of innovations. They are related to the formation of the so-called "intellectual capital", which is a major economic resource.

Creativity as a process is related to the formation of new ideas and their practical application to the production of original and functional scientific and technological innovations. Once the creative results are objectively presented, they become potential objects of intellectual property. Every technological innovation initially arises as a description of the idea of its creation. This description takes usually a form of scientific elaboration, sketch, schedule, etc. which has no three-dimensional innovation objective form as a product yet. Creative results i.e. innovations are always intellectual property but differ in their form. Thus, a innovation for product can be IP protected as an invention, another innovation for process, which doesn't present new capacity of productivity, but optimizes the old one, would be IP protected not as an invention, but as "know-how". The object of intellectual property is determined by the type of innovation and its industrial or commercial use (for example, a trade innovation can be protected as a trademark, an object of intellectual property).

In this regard, intellectual property specifies the economic aspects of creativity as a resource. Thus, it may be industrialized and turned into a product that satisfies social needs. By the industrialization of creativity, the economic characteristics of intellectual property contribute to the development of entrepreneurship, by promoting innovation and increasing productivity, which leads to economic growth.

2. Intellectual property as a factor for economic growth and as an economic resource

The economic characteristics of intellectual property make it an important factor for economic growth. The link between creativity as a process, its results and the market realization of their economic potential is realized exactly through intellectual property. Intellectual property is the basic for the functioning of any business. If business is commercial-oriented, such as a distribution company, the intellectual property is in the way it's managed, in the trademark, in the product design, even in the list of customers or price offers. Regardless business is production-oriented, such as the production of cars with the usage of own technology, design or with the usage of licensed technology, but under its own trademark –all of them refer to intellectual property issues. Creative industries are perceived as a term that is identifying the industries whose businesses are primarily oriented towards the creation and management of intellectual property. Creative industries are built on the basis of a complex work network of creative enterprises, organized in a meaningful direction for economic sectors. Creative enterprises are those involved with the creation and commercial exploitation of creative products (innovations), labeled as intellectual property, they generate wealth, increase employment and expand trade in the material and non-material production sectors.

Creative industries are defined as a broad alliance of creative, innovative activities that become a center of economic policy and planning and are seriously state budget encouraged by the government in many countries. A global trend in national policy is to determine the creative industries and their network structures such as clusters and LPS, because they generate economic value that can be measured with purely economic indicators like domestic product, added value, employment, imports and exports of production. This is an important indicator how knowledge-based industries contribute to the pace of economic growth.

In this context, the international trade with products based on intellectual property for the period 2005−2010 increased with 9.7%. The value

of the international exports is about $ 624.4 billion in 2010, representing 4.9% of total global trade.[2]

Except being an important economic resource, intellectual property is also a way of protecting business innovation, and hence it's a tool for optimum realization of their economic potential. Intellectual property, depending on the area of the economy it is created, can be represented by industrial property objects – these are innovations in the sector of material production. This sector is mainly occupied by conglomerates whose business is focused on high-tech manufacturing and SMEs whose business is predominantly scientific research. Clustered network structures of enterprises in the material production sectors are distinctive mainly for the chemical industry, machine building industry, food industry and others.

Local production systems based on the use of intellectual property in the field of material production are mainly companies with their own research and development activity or those who act as representatives of large international corporations who transfer their technology to them and give them business set guidelines for functioning and market positioning. An evidence of the importance of intellectual property as an economic resource and as factor for economic growth in a time of crisis is the tendency inherent for the domestic market where the business leaders are namely enterprises based on intellectual property management. Because of their flexibility they become the attraction center for the formation and functioning of cluster structures and LPS.

Beside foreign representatives, there also companies in local innovation and development businesses, who have developed a LPS using external funding sources through grants from the European Union fund programs. In the latter case, the company forms an economic advantage by working on preliminarily specified technologies and predefines process, which again is intellectual property (such as for example milk and dairy activities based on Dutch technology). These companies operate on the principle of acquiring technology from outside the company by obtaining license.

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[2] Updated research paper, not published yet of the: V. Borissova, coll., *The contribution of the creative industries into the economic growth of the Bulgaria*, research paper, UNWE, 2007.

In the area outside the material production (the cultural sector and R&D sector) the role of intellectual property in economic growth in times of crisis is even more palpable. Traditionally, this sectors was seen as predominantly subsidiary sector, relying heavily on the state budget and a passive participant in the creation of value in the national economy. In the transition to a knowledge economy, more and more businesses began to actively participate in the creation of value to the end product created in the cultural sector and R&D sector. Even in 2007 the contribution of businesses operating in the sector outside material production towards the added value in Bulgaria is 2.41% of the total[3]. The figures are proof that the area outside material production can not only pay for itself but can also actively participate and contribute to the economic growth of the country.

This means that the entrepreneurs which identified intellectual property and succeeded to properly manage it to their own interest, realize economic advantage over those who rely on traditional business methods and economic resources. This sector is characterized mostly by clustered network structure of the business; and in terms of the film industry in Bulgaria there is a quite distinct major local production system, which acquires even regional character. Large clusters in the non-material production are formed by the publishing, musical, radio TV industries, including the software industry.

Intellectual property covers two major groups of objects according to the sector in which creativity is manifested. The group in the sector of material production is industrial property (inventions, utility models, industrial designs, trademarks, geographical indications, know-how, new plant varieties and animal breeds). The group outside the sector of material production is a subject to copyright and related rights (such as scientific and literary works, photographs, music, architectural objects, films, artworks, domain names, audiovisual works, radio and television programs, videos, sound recordings and performances, and etc.).

The objects of intellectual property as an economic resource are present in the company balance sheet in "intangible assets" section. The intangible nature of the objects of intellectual property is due to the innovative

[3] See V. Borissova, coll., *The contribution of the creative industries into the economic growth of the Bulgaria*, research paper UNWE and Ministry of culture, UNWE, 2007.

characteristics of information they contain. This fact determines the objects of intellectual property as part of the merchant's property (the business unit) and positions them in balance sheet as intangible assets. The life cycle of the asset depends on the time required for its wear. In the majority of intellectual property objects, it occurs with the obsolescence of the information they contain, rather than their physical wearing out.

The composition of business enterprises beside rights and duties includes the so-called factual relationships, that are not a legal entity. They are economic relations between the trader and his clientele. When intellectual property (for example one trademark or design) is internally created, developed and enforced by the company, it is a part of her factual relationship until the moment it is evaluated. The direct link between the holder of intellectual property and the customers is realized through objects of intellectual property and due to the trade monopoly. Intellectual property can be created inside the company as a result of scientific and technical development activities conducted by its structural units (such as invention).

Another possibility for the enterprise is to acquire intellectual property outside of the legal ground, for example by merger, acquisition or purchase of companies, where the intellectual property travels with the asset at cost. This is because the value of the asset can be determined by the cost of the acquisition. Although there is an expense on the purchasing of the object of intellectual property, there are no liabilities because the acquired object goes with a trade monopoly by which the asset's value will rise in the future.

Main characteristics of intangible assets are:

– uniqueness in terms of invested intellectual labor and creativity for their creation,

– susceptibility to moral obsolescence , which is then not physical and is not as a result of its use,

– reproducibility – the economic potential of intellectual property allows multiple use of the asset simultaneously by a number of persons in different territories,

– over-profitability, generating excessive profits.[4]

[4] See B. Borisov, *Licensing trade*, UNWE 2003.

Essential characteristic of intellectual property is also that the objects can be reused by several different companies at the same time, on the same or different territories. The use is always against a consideration in accordance with the commercial terms of business. For the majority of businesses, intellectual property is an essential part of their marketing (trademarks, industrial design, etc.). With proper identification and management of intellectual property in the enterprise, it could become a mean to overcome the negative effects over the business in the global economic crisis on local and national level.

3. Economic benefits from the use of intellectual property for business

The economic benefits from the use of intellectual property as a resource lie in the possibilities that the intangible nature of its objects grants to businesses. The economic advantages for the enterprises are licensed trade and trade monopoly.

The licensed trade is possible only for intangible objects, such as the objects of intellectual property. Licensing trade is the most cost-effective form of exploitation of the intellectual property objects as intangible assets. When licensing intellectual property, it is not alienated, but permission is given for its use for a specified time, in a given area against a consideration. Licensing enables multiple realization of the consumer value of the object at the same time both by the holder of the right and its users – the licensees. An object can be used by several persons simultaneously, with or without the involvement of the licensor. It depends on the type of the license.

The granting of a license is a strategic approach for the trade monopoly holder to optimally use the economic potential of the object. Licensing is a way to expand the market and maximize the excess profit realization for the term of protection of the intellectual property object.

After obtaining IP protection for the owner of the IP right over the IP objects the trade monopoly is granted. This exception to the practice of free market relations, where monopoly is unacceptable, is due to the fact that the innovation protected with intellectual property is a result of the intellectual efforts of a person or a group of persons and that the result of its economic ex-

ploitation will generate goods that will satisfy public needs. Trade monopoly is the "public reverence" to innovators because through it they satisfy public needs. However, to maintain the public interest and simultaneously tolerate creativity, trade monopoly is limited in time and space of action. But regardless of this, the presence of trade monopoly gives businesses a competitive edge and undeniably important prerequisite for economic growth.

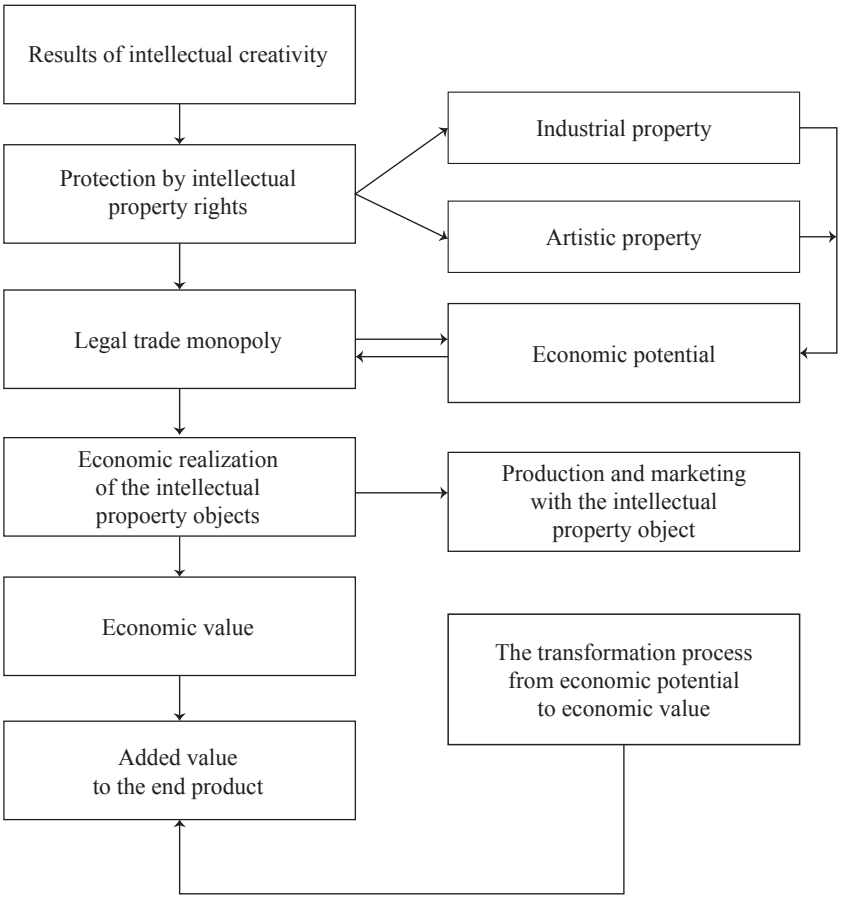

Figure 1. Economic aspects of IP

Source: own composition

Intellectual property objects have intellectual potential that is granted into the hands of one person in the form of trade monopoly, after obtaining legal protection, i.e. patenting, registration or automatically from the moment of their creation, regarding to artistic works. From this perspective, the legal protection provides its holder with a trade monopoly for the production and marketing through the use of the protected object within the territory of a given market.

In this regard, the economic benefits of owning a trade monopoly for business can be derived in the following areas:[5]

– realizing excessive profits. The trade monopoly holder benefits from the economic advantage to realize significant reductions in the manufacturing process of the production implementation of the object, for instance by reducing production costs and time compared to those of his competitors. Consequently, the trade monopoly holder except the average profit margin also realizes additional profits;

– maximizing the mass of profit. The mass of profit is maximized by the fact that on the market many people are looking for one product, but only one company offers it. This means that the "demand" belongs to the holder of the trade monopoly, which allows him to manage two significant market factors: volume and price of the offered goods. The optimal combination of production volume with price is a prerequisite for the realization of the maximum amount of profit gained;

– protection of investments. Obtaining trade monopoly means protecting the investments made for the creation of intellectual result (the innovation) Trade monopoly provides the time and calmness needed to launch production, including the incorporation of new production facilities. Conditions for the development of research in the production process of the object are created in order to improve certain characteristics and parameters, or develop another innovation;

– conquest of markets. Trade monopoly is a mean of conquering competitive markets. Offering new products manufactured at low production costs and time, from one source at a price consistent with the public eligible expenditures, will inevitably lead to the establishment of a stable market positions.

[5] See: B. Borisov, *The intellectual property of the industrial firm*, UNWE, 2006.

The economic potential and the intangible nature of intellectual property objects makes it possible to use them as retrieving, subject matter of pledge, means for securitization of the company's assets and an opportunity for public-private partnership.

4. Business models to cope with the economic crisis for enterprises using intellectual property as a resource

Besides shifting towards expanding product range or product mix, the other opportunities in a crisis are: buying ready innovation (acquisition of license), retrieving, pledging or securitization of the company's intellectual property.[6]

4.1. Retrieving of intellectual property

When business suffers from unfavorable economic environment and cannot reorient production process to new resources, products and markets, then its intellectual property can provide such an opportunity. Prerequisite for the implementation of this business model of behavior is the intellectual property to belong to the enterprise, to have provided protection and to have a positive reputation. For example, the enterprise has its own innovation that cannot integrate into the production process, as it requires replacement of the entire production capacity. A condition for the company to retrieve the innovation is to own it, have a patent for it and not be rejected as unfit to market. Another example is a company with a well reputed brand that is registered and has developed brand value. It is possible that the enterprise have its own new and original design, for which it has already obtained a commercial monopoly through its registration.

[6] For example, the enterprise that developed and established the world-famous brand "Victorinox", for the production of Swiss knives had to survive in the economic crisis and the extremely unfavorable market environment. The company expanded its product range based on developed complementary product and process innovations, leading not only to survival but even to sustainable business development.

In such cases, companies who own intellectual property that cannot become part of their main business activities because of technical, economic or business reasons, can retrieve that intellectual property, which will expand the scope of their business. And as experience has shown, in a crisis the surviving business is the one who is broad and flexible enough to be changed or extended. The retrieving of intellectual property provides the business with the opportunity to expand.

For the implementation of this business model, the prerequisite is a legislative base that the intellectual property objects can be a subject of a kind (non-monetary) contribution in the composition of the assets of the enterprise that is being set up or already is established as such. Subject of the retrieving may be objects of industrial property like inventions, utility models, industrial designs and trademarks. For non-monetary contribution objects of artistic property can be provided, which are works of science, literature and art.

The retrieving itself as a contribution can be made in two different ways. First, it may be executed directly as an asset, partition or money given by the importer of the contribution. The importer must be a bank or other financial institution. They have the right to retain the object for a period of time during which the money provided against intellectual property must be returned. The special feature for this type of kind contribution is that the non-monetary contribution is not an object, but the right to use the retrieved intellectual property. This is a form of a license where the holder of the right (the enterprise that retrieves) becomes a partner in another company with another business and another market position while maintaining its business and even creates prerequisites for survival in a crisis.

The retrieving as a business model is a prerequisite for regional development and may even stimulate the formation and support the functioning of LPS. Such opportunity exists for the municipalities that have identified their intellectual property and have taken the necessary actions for its protection. The suitable intellectual property management from the municipality can lead to positive economic effects by stimulating environment for the development of public-private partnership. The intellectual property of a municipality are: the name of the city, names of localities and neigh-

borhoods, crest or emblem of the city, monuments, landmarks, mineral waters, places and crafts with traditional elements, cultural events, websites, domain names, inventions, technical and software solutions, design and more, which are created in local companies or from municipal funding. In this context, retrieving the intellectual property of the municipality in the property of an enterprise in its territory would lead to the following positive results:

– improvement of the financial situation of the municipality by receiving the distributed dividends on its equity investment in companies located in its territory;

– if the municipality traditionally has a good reputation for certain goods or services, improvement of the competitiveness on its territory as a result of the use of intellectual property of the municipality as a guarantee of origin and quality. For example flat sausage Karlovska or Asenovgradski wine mavrud or Karnobatska grabe rakia or mineral water Gorna Banya.

4.2. Intellectual property pledge

Another business model of behavior of enterprises in the context of economic crisis is intellectual property pledge. This business model is corresponding with the dynamic market environment, where rapid decision-making and strategic business management changes are an essential condition for its survival. The pledge does not guarantee 100% security, but extends the possibilities for collateral, which expands the opportunities for lending of the enterprise, which accelerates the turnover. The more guarantees can be given, the more credits you can be obtained.

A subject to the pledge can not only be an object, but also rights. The contract is consensual, i. e. there is no real transfer of intellectual property. The advantages of this business method are that now the pledgor can use the stake intellectual property in their business. Failure to submit the subject matter of the pledge is to the advantage of the pledgee as well. If so, he is released from the obligation to care for the preservation of the bet.[7]

[7] According to the Bulgarian legislation.

Due to the fact that company retains intellectual property that is pledged and against which it received funding and can continue to use it (e.g. innovation or trademark), it can increase the size of the object of the pledge by invoking another significant benefit of the pledge. If the enterprise needs additional funding or fails pledge certain intellectual property, it may pledge its future production, but only for the current or the next year after the pledge. The restriction is in the interest of the pledgor, as his obligation to return the pledge does not extend to all of his products. The pledgee may be any individual or legal person, i.e. another enterprise to which there is a due consideration, bank, investment fund or individual.

4.3. Securitization of intellectual property

The intellectual property securitization is possible in legislative conditions and in developed financial markets. Securitization is done through an investment stock company, like Real Estate Investment Trust – REITs, which converts illiquid receivables into securities (stocks or bonds), by which they buy them from their holders. This process is called securitization. Securitization of intellectual property can be applied by an enterprise that has licensed its intellectual property to another company, i.e. they are in a licensor and licensee relationship and the latter due to royalty. In this situation, if the licensor needs fast financing with money in cash, he doesn't have to wait for their monthly license fee. The licensor can provide the entire amount of receivable due for the period of the license of the REITs against which to issue shares or bonds. So REITs buys the receivables (the license price) of the holder against the price of the securities, which subsequently offers for purchase to the investors in the capital market. Securitization of intellectual property is also possible in the absence of licensing relations, but with the opportunity to define the future revenues from the use of trade monopoly on the object for a certain period of time. Based on such a market research, quantified future revenues become a subject to securitization for which the entity receives liquid assets. For example, the securitization of the revenue from trademark use which the enterprise will implemented in five years. The trademark is assessed

as intellectual property and on the basis of the trade monopoly and its positive reputation, its future profitability is determined, which has become the subject of securitization, i.e. the enterprise does not have to wait for five years to receive money in cash from its own trademark, it gets them right away from the REITs.

5. Conclusion

Intellectual property is increasingly becoming more important to the economic growth of the business and the economy as a whole. Its identification as an economic resource, its protection and management as an intangible asset of the company, are definite preconditions for business competitiveness and prosperity. In times of economic crisis or highly competitive market environment, intellectual property is a factor for economic growth that provides a variety of business models, mediating the formation and operation of enterprises in network structures such as clusters and local production systems. The intangible nature of intellectual property enables these network systems to withstand the changes in the economic environment through implementation of new, flexible business models.

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Abstract

The topic is determined by the global reorientation of the economy into a knowledge economy, traditional resources such as labor and capital are supplemented with the resource of knowledge as a key factor to the economic prosperity. Intellectual property is increasingly becoming a crucial factor for the development of new production and expansion of market positions. Reorientation of the national economy to new economic resources that can help to reduce the "speed" of entering into crisis and eventually help it exit it, requires the implementation of new models of business behavior for the SMEs, the big business companies and other participants in the clusters and the local production systems (LPS).

Thus the IP specifies the economic aspects of creativity as a resource it may be industrialized and turned into a product that satisfies social and cultural needs. By the industrialization of creativity, the IP economic characteristics contribute to the development of entrepreneurship, by promoting innovation and increasing productivity, which leads to economic growth. This article observes the IP as a factor for economic growth and as an economic resource and the upcoming economic benefits from its use for the business. The appropriate business models to cope with the economic crisis for enterprises using IP as resource.

Key words: local production systems, intellectual property, knowledge economy, creativity.

Mariia Lyzun*

TECHNOLOGY PARKS AS AN ELEMENT OF LOCAL PRODUCTION SYSTEMS' FORMATION[1]

1. Introduction

The competitiveness of the national economy which is based on the increasing role of innovation becomes of strategic importance under conditions of the globalization process. Innovations are one of the determinants of the effective production of goods and services, and thus provide a stable competitive advantage at the market. In the developed countries, technology parks are main elements of the infrastructure providing the innovative model of the national economy. They form a core infrastructure for the scientific and technological activities, fulfilling the function of the propulsive force for the innovation development.

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In world practice, the variety of terms is introduced to define the technology parks. Among them: science park, high-tech (industrial) park, research park, cyber park, innovation center, R&D park, technological incubator, etc. appear. Despite such a wide diversity of terms, there are minor differences between some of them. However, the common approach is to define such terms as equivalent. The use of the different terms depends primarily on the country: in Germany – technology park, in the UK– science park, in the USA – research park, in France and Japan – technopoles, etc.

Creation of technology parks is based on the idea of a comprehensive high-tech industry under the creation of the new technologies. The important conditions for technoparks' development are the existing R&D technology potential, the availability of the skilled labor and venture capital market.

2. Some theoretical backgrounds of technology parks

The International Association of Technology Parks defines the technology parks as an organization managed by professionals whose primary purpose is to improve the welfare of the community by promoting the culture of innovation and competition among the innovative businesses and research organizations.[2] To achieve this, technoparks stimulates and manages the flow of knowledge and technology between the universities, research institutes, companies and markets.

Under the Law of Ukraine "On Special Regime of Innovation in Technology Parks", technology park (technopark) – is a legal entity or group of entities which act under the joint venture agreement without creation of the new legal entity and without joining of deposits in order to create an organizational basis for the introduction of the developed high-tech projects in manufacture of the globally competitive products.[3]

[2] C. Wessner, *Understanding Research, Science and Technology Parks: Global Best Practice*, Committee on Comparative Innovation Policy: Best Practice for the 21st Century; National Research Council: Report of a Symposium, 2009.

[3] Закон України "Про спеціальний режим інноваційної діяльності технологічних парків", від 16.07.1999, № 991-XIV.

The modern technology park is regarded as a territorial integration of science, education and production in the form of a union of scientific organizations, design bureaus, educational institutions, manufacturing companies or their divisions to accelerate the development and usage of the scientific, technological and technical advances.

The activity of all technology parks occurs under the following three basic models: American (the USA, the UK), Japanese and mixed (France).[4]

The American model of technology park is based less on public funding and uses more variety of the private investment. In the Western Europe the bulk of funding for the technology parks is carried out by the state: the United Kingdom – 62% Germany – 78%, France – 74%, the Netherlands – 70%, Belgium – almost 100%.[5] In the USA and the UK there are three types of technology parks:

– science parks;

– research parks, developing innovations only to the stage of the technical prototype;

– incubators (in the U.S.) and innovation centers (in the UK and the Western Europe) within the frames of which the universities rent out the land, premises, equipment for the startup companies.

The American concept of the technology parks is widely used as the base model of the creation of technology parks worldwide, but local features should be also taken into account.

The Japanese model of technology parks is based on the public support and associations of commercial companies. According to this model, the construction of the new cities is predicted – so-called technopoles. The first of such projects appeared in 1982, when 19 areas were selected, equally spaced on the four islands of the country.[6] Technopole has a clear list of "parameters": the location in a 30-minute drive from the parent city (with a population at least 200 thousand people) and within 1-day drive from Tokyo, Nagoya or Osaka; the area should not exceed 500 square miles; the modern enterprises, universities and research centers are combined with living area; the harmony with the local traditions and natural conditions. Technopole

[4] *Під парасолькою технопарків*, http://www.madein.dp.ua

[5] І. Чудаєва, *Технопарки світу: основні моделі та типи*, "Вісник Східноєвропейського університету економіки і менеджменту" 2010, Випуск 2 (8).

[6] *Ibidem*.

has its own binding statute. The creation of technopoles is funded mainly at the regional level – by means of the local taxes, fees, grants of corporations and various incentives provided by the central government. The core for a number of technopoles (Hiroshima, Kagoshima) is the construction of the scientific towns like Tsukuba. But still some of them are based just on the expansion of the scientific and engineering faculties of the local universities. The majority of universities create centers of "frontier technologies" – joint research incubators and venture capital.

The mixed model of scientific parks represents French "Sophia Antipolis" – the largest of them is located on the Riviera on the area of over 2 000 hectares, employing about 6 000 people.[7]

As of today, more than 2 000 technology parks and business incubators function throughout the world. The bulk of them are concentrated in the U.S., China, Russia, the UK, Germany and others. The first technological parks were an American phenomenon, which emerged in the 1950s to meet the needs of the entrepreneur researchers. Particularly the first technological park was based on Stanford University and being known latterly as the Silicon Valley.[8]

In general, the development of the technology parks in the world can be divided into 2 stages:

1. 1950 – the first industrial parks in the United States and its embryonic forms in Europe;
2. 1980 – the second wave of the technology parks creation in the U.S. and Europe and the emergence of technology parks in Japan and other Asian countries.[9]

The first technology parks in Ukraine have been established in 2000 for combining the science and the production activities at Paton Institute for Electric Welding, Institute for Single Crystals and Lashkariov Institute for Semiconductors and Physics.[10]

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[7] *Під парасолькою технопарків*, http://www.madein.dp.ua

[8] Т. Черницька, *Регіональні виміри міжнародного науково-технічного співробітництва*, "Міжнародна економічна політика" 2013, № 1 (18), p. 105−127.

[9] І. Чудаєва, *Технопарки світу…*.

[10] І. Дерид, *Сутність і функції технологічного парку як об'єкта інноваційної інфраструктури*, "Вісник Харківського національного університету ім. В. Н. Каразіна" 2008, № 802, p. 11−15.

The rapid development of the global process of technology parks creation reached the highest level in the second half of the 80s of the last century. At that time, 23.38% of the existing technology parks were created according to the International Association of the Science Parks.[11]

3. Technology parks in the context of LPS

Technology parks in the structure of the local production systems should be considered from the two perspectives:

– firstly, the local production systems need technology parks as sources of the new ideas, inventions and discoveries that have the potential to become innovations and launch the first stage of the product life cycle;

– secondly, the most industrial parks are the gravity centers that are able to initiate the powerful centripetal forces that lead to the formation of a new local production system within the technopark's radius of influence.

While the first aspect is adequately represented in the economic literature, the second one is not fully considered.

Indeed, the local production systems based on technological parks have a number of advantages, the main of which can be classified into three groups (Figure 1): generation of innovation, productivity growth, the creation of new start-ups.

The innovations generated by the technological parks are often not related to the main activity of the local production system, leading to the creation of the new technological departments or even companies. Newly established firms may have the form of joint ventures and belong to the parent company, but often they became the independent competitors towards their initiators.

The innovations affect the localization of production because they stimulate the economic and social growth. R. Florida argues that firms and workers tend to migrate to the centers of the knowledge creation.[12] There is also an inverse relationship – the localization due to the territorial

[11] Т. Черницька, *Регіональні виміри...*

[12] R. Florida, *The Rise of the Creative Class And How It's Transforming Work, Leisure, Community and Everyday Life*, Basic Books, New York 2002.

proximity of the cluster's members, creates the favorable conditions for the transfer of knowledge (close professional contacts, "kitchen effect" etc.) that influence on the innovation intensity.

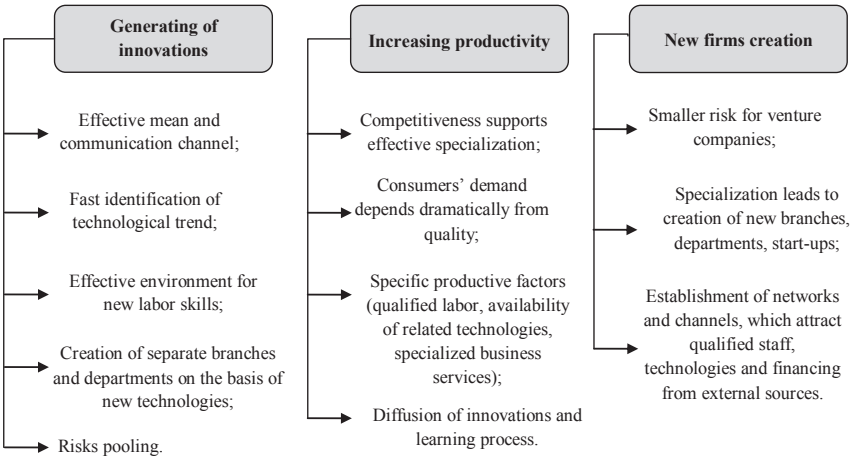

Figure 1. Advantages of LPS built on the technoparks' basis

Source: І. Ліщинський, *Агломераційні форми міжнародної та просторової економічної інтеграції України*, [in:] О. І. Амоша, С. С. Аптекар, М. Г. Білопольський, С. І. Юрій, *Структурні реформи економіки: світовий досвід, інститути, стратегії для України*, монографія, Економічна думка ТНЕУ, Тернопіль 2011, p. 591–605

The localization is a prerequisite for the further diversification by means of the economy of scale. In less populated areas there is usually a closer relationship between the social and economic elements resulting in the considerable homogeneity of the system. In contrast, the effect of the love of variety always attracts the new producers and consumers by expanding the boundaries of these local production systems.

J. Jacobs also notes that the diversification expands the range of the system components possible combinations.[13] The newly created combinations give an incentive to generate the social changes. This

[13] J. Jacobs, *The economy of cities*, Random House, NewYork 1969.

process is cumulative; it means that the diversity creates even the greater diversity. According to the Nemeth and Brown theory, the diversification prevents the group formulaic thinking which reduces the risks associated with the sudden changes in the environment.[14] There is also an inverse relationship between the innovation and the diversification. The creation of an innovative product or even a new industry is connected with the growth of specialization in production of each member of agglomeration within the existing sectors, leading ultimately to increased diversification of the overall system.

Thus, structures which are based on the technology parks forms linkages between different sectors and can become important centers of innovation and economic growth poles.

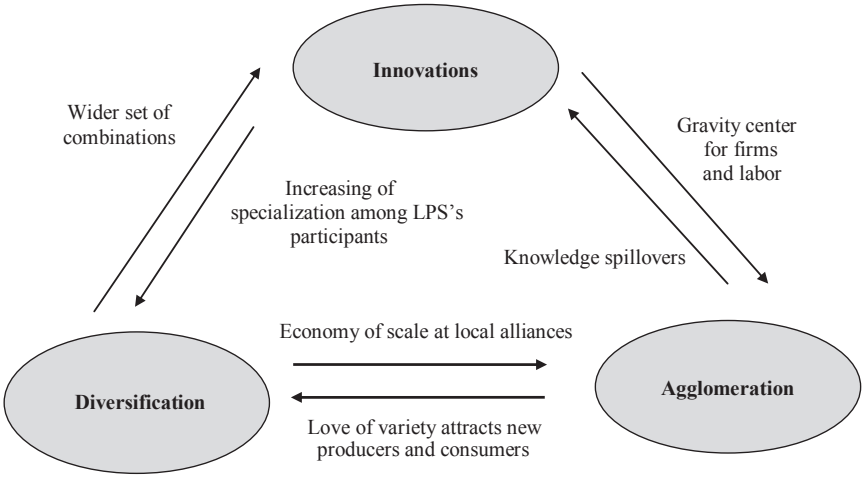

Figure 2. The relationship of innovations initiated by the technology parks, diversification and agglomeration among the members of the local production systems

Source: author's modification of: R. Florida, *The Rise of the Creative Class And How It's Transforming Work, Leisure, Community and Everyday Life*, Basic Books, New York 2002

[14] C. Nemeth, *Better than individuals? The potential benefits of dissent and diversity for group creativity*, [in:] B. Nemeth-Brown (eds.), Oxford University Press, Oxford 2003, p. 63−84.

Technoparks are the institutional basis for the local producers "nurturing" by forming an organic cooperative networks with the regional innovative institutions including industry, academic science, local self-governments, creating the strategies and plans which meet the special circumstances and characteristics of the region and by discovering the knowledge-based and small-but-technologically-capable businesses. Thus, the promotion of small business by technological parks may have the following forms:

– business supports: securing the state-of-the-art equipments and facilitate sharing them; support for production and prototyping; provision of office space, technical and managerial consulting service; support for local and global marketing; nurturing and supply of the capable workforce, etc.;

– business creation: discovering renowned technological businesses and support for business creation; technological transfer and commercialization of transferred technologies; securing high-tech businesses;

– technological innovation: discovering and promoting innovative technologies through industry-academy-research cooperation; vitalizations of the technological transfer and transaction; education and training of new technologies, etc.[15]

The influence of technology parks' formation on the regional competitiveness, revitalization of local authorities in order to strengthen the cooperation between the actors of the local production systems are presented in Figure 3.

Thus, under the current conditions, the economic growth at both regional and national levels requires creation of the appropriate conditions and mechanisms which encourage the innovation and application of its results in the economic practice. Worldwide experience shows that the process of the local production systems establishing is crucial for the regional development and the technology parks are catalysts that contribute to the formation of the knowledge-based industries and form the scientific and technical core of the entire economy. The innovative activity of the companies which are the parts of the local production systems, including the technology parks, is more intensive. Technological park is an effective form of the convergence of science and industry, which reduces to minimum the cycle "research-development-implementation". They concentrate highly qualified

[15] Korea Technopark Association, http://www.technopark.kr/eng/technopark/fnr.php?pn=1&sn=2/.

personnel of the various fields of activity – scientists, developers, researchers, analysts, engineers providing the possibility of inter-industry research. They are usually equipped with the unique facilities, data centers, labs creating the excellent conditions for the research and scientific experiments.

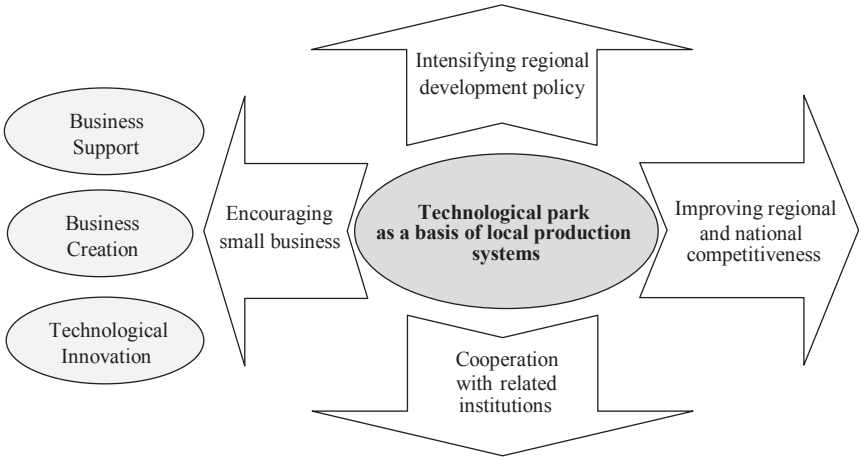

Figure 3.Technopark as a structural element of the local production systems

Source: author's modification of: http://www.technopark.kr/eng/technopark/fnr.php?pn=1&sn=2/

4. Conclusions

Thus, technology parks are the main propulsive force for the regional development proving their ability to attract and retain the intellectual resources and lead to the technological innovation and competitiveness increase.

However, it should be noted that no matter how large is technology park, its impact on the regional economy is limited. Therefore, local authorities should be interested in a complex approach creating local production systems of enterprises in the district as a whole.

It will provide spontaneous generation of range local chains of interrelated partner companies working together. Obviously, there are no ready recipes,

but it can be argued that the support of the regional structures on the base of technology parks could contribute to the consolidation of local business networking. Same as increasing the level of mutual trust between participants in the future cluster can initiates a gradual transition to a more risky projects.

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Abstract

Theoretical bases of technology parks and related terms are considered. American, Japanese and mixed models of technology park are researched. Advantages of local production systems based on technological parks are investigated. The relationship of innovations initiated by the technology parks, diversification and agglomeration among the members of the local production systems is depicted. The influence of technology parks' formation on the regional competitiveness is represented.

Key words: technology park, local production system, research and development, innovations.