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**DEVELOPMENT OF
ECONOMIC AGGLOMERATION
IN TRANSITION ECONOMIES**

INTRODUCTION

The Eastern European countries, so-called transition economies, are now undergoing painful transformation of their functional structure and development of market economy. In many cases, their spatial evolution and economic growth depend on the level of development of urban territorial structures such as large cities and agglomerations. These produce more than 40-50% of a country's GNP and contain more than 60% of the total population (except Moldova). The rational territorial organization and sustainable development of agglomerations are now urgent for the countries of Eastern Europe. Nevertheless, most of them have irrational branch and territorial structure as a legacy of the Soviet regime. They encounter problems in settlement and transport networks, suffer from environmental pollution and depletion of resources as well as from predominance of heavy industries and a low level of development of the social sphere.

Ukraine has faced similar problems with development of large cities and agglomerations. Thus, large agglomerations are developed without any scientifically justified spatial concept, which worsens their economic parameters and human living conditions. To solve the problems mentioned above and to create the necessary prerequisites for social and economic growth, Ukrainian geographers have proposed the concept of economic agglomeration, which includes not only the urban settlement system, but also the complex of various human activities that also agglomerate with each other in a limited urban area. The investigation of the substance and general principles of economic agglomeration as well as of the methodology of their

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rational territorial organization would assist to stabilize the national economy of Ukraine and to give potential for further growth.

THEORETICAL FUNDAMENTALS

Nowadays, agglomerations appear to be the key form of territorial organization of human activities in transition economies. Indeed, they are not only the forms of human settlement. The majority of labor forces, enterprises and services are concentrated in relatively small parts of urbanized territory having definite benefits of their location. Most of the advanced, progressive and internationally-oriented branches of the economies are developing in agglomerations more intensely. Therefore, this form of territorial organization in transition economy gains a lot of social and economic advantages of location and development of various kinds of human activities in highly communicative and comprehensively integrated environment.

According to the above-mentioned assertions, the agglomeration is a complex form of territorial development that includes not only the urban settlement system, but also industrial enterprises and social institutions. So, the previous viewpoints on agglomerations seem to be imperfect. Most of the features of this territorial formation are described by the term “economic agglomeration”, proposed by STEPAN ISCHUK and ALEXANDER GLADKEY (2005). Economic agglomeration, in contrast to “urban agglomeration” or “industrial agglomeration”, includes all components of economic complex and infrastructure with labor forces and land/natural resources.

The economic agglomeration is known to be compact in functional and territorial, technological and economic terms as well as a social integration of enterprises and institutions for various kinds of human activities based on a concentrated urban settlement system, intensive communication and a variety of relations (industrial, social, ecological and administrative). It is characterized by integrated and interdependent development and produces an additional socio-economic effect.

So, economic agglomerations integrate various industrial and agricultural enterprises, social institutions (general communal services, trade, cultural, educational, scientific, recreational and tourist spheres) as well as the infrastructure based on a united system of settlement, transportation and communication. An economic agglomeration includes the territory with a maximum concentration of the above-mentioned relations, developed around a large city or cities.

It is worth noting that development of economic agglomerations in a transition economy is based mainly on the functioning of industrial complex in large cities and their satellite towns. They are characterized by common use of the territory, natural resources, industrial infrastructure and scientific basis as well as by close relations of industrial co-operation and combination. The key branches of industry gain a lot of additional advantages in economic agglomeration due to concentration and specialization processes. The auxiliary and attendant industrial branches, which are related to the main production cycle, are also developing fast. Their integration, interrelation, innovativeness (innovative character) and modularity are rising rapidly. Moreover, the development of the social sphere, especially in the non-profit sector, is hampered due to historical factors, economic reasons and lack of administrative resources. So, most of agglomerations in Eastern Europe face economic and social problems described in the introduction. Their sustainable development

should be based on the concept of “economic agglomeration” that includes all components of human activities in a highly urbanized territory.

Economic agglomerations determine the location of the main part of productive forces in transition economies. Their development has a key impact on the national economic complex, settlement system and population growth as well as on the scientific, cultural and intellectual potential. Therefore, investigation of rational territorial organization and sustainable development of economic agglomerations is becoming more urgent.

GENERAL LAWS AND PRINCIPLES

The development of economic agglomerations in transition economies is based on objective laws and principles. According to PISTUN, M. (1989) and SLUKA, N. (1994), we can define 5 laws determining the sustainable development of economic agglomerations.

- 1) *The law of territorial concentration*, which is followed by processes of enlargement and complication of agglomeration core and development of “sub-core” (suburb) zones based on centripetal and centrifugal communications. According to this law, the concentration of population, economic enterprises and resources takes place in a small area in the central city as well as in the nearest neighborhood. The environment of comprehensive economic integration, fast communications, highly transformed landscape and concentration of labor forces develops here. Such environment creates favorable conditions for the development of various human activities.
- 2) *The law of territorial diversification between main transport lines*, which includes processes of concentration of populated places and various kinds of human activities near radial transport lines which provide communication between the core and suburbs. Certain industrial branches and economic activities that become unprofitable or non-economical in a highly-concentrated agglomeration core are driven out towards peripheral agglomerated settlements which are close to centripetal transport lines. These enterprises require large territorial resources for their development, which cannot be obtained in the central city. They also have low profitability and representativeness, imperfect technologies and obsolete equipment. They also belong to the branches which are non-specialized for central core of the agglomeration. Being located in the peripheral zone, these enterprises keep in touch with their partners in the central core via fast transport lines and fast communications but lose advantages of their profitable location.
- 3) *The law of belt-and-sector differentiation of the territory*, which consists in the diversification of the agglomeration’s territorial structure and in development of functional belts and sectors based on the central core, peripheral settlement and transport lines. Agglomeration belts develop due to different functions of the central core (basic, representative activities) and peripheral zones (additional, attendant activities). The development of agglomeration sectors is based on radial transport lines connecting the peripheral zone with the central core. They involve transport lines and nearby territories, settlements and industries closely connected with the core. Consequently, the integration processes described by the first two laws are normally accompanied by territorial differentiation processes. The central core and the peripheral agglomerated settlements gradually

acquire the same common characteristics and are divided into different belts according to these common characteristics. These belts and sectors have different specialization and trends of development, although they preserve the united organization structure and administrative system, they still maintain specific functional subordination between different parts of agglomeration.

- 4) *The law of territorial conglomeration.* This law describes the development of the relations between different structural elements of economic agglomeration and creation of a united and complex functional system on the basis of complementarity, interconsistency and ecological compatibility. These relations determine the agglomeration development. Their direction and intensity also determine the territorial borders of agglomeration, level of complexity and proportionality, effectiveness of economic development and location of different kinds of human activities.
- 5) *The law of territorial and complex-proportional organization* consists in creation of dynamic balance between natural, social, industrial, settlement and infrastructural elements of agglomeration. This balance is created on the basis of effective regional management of agglomeration. The development of regional management in transition economies is very important for sustainable development of agglomerations and other elements of territorial structure.

The analysis of general laws makes it possible to formulate the following main characteristics of economic agglomerations:

- 1) compactness of the territory and development of belt-sector structure with the central core, peripheral zone and sectors based on radial transport lines with nearby and distant agglomerated settlements;
- 2) concentration of urban settlements and economic enterprises near the central core (this process leads to enlargement and complication of the central core and development of the suburb zone);
- 3) high urbanization and population densities influencing the way of human life and processes of economic growth;
- 4) multi-structural economic activity and concentration of different functions and human activities in a small territory;
- 5) development of small, highly specialized, closely inter-related enterprises (so-called modularity);
- 6) development of different kinds of human activities of complementary character and processes of interosculation;
- 7) comprehensive integration of population and economic activities with a united purpose and social co-ordination;
- 8) high dynamism of development, communicativeness and intense communications influencing the intense development of agglomeration and quick response to various changes;
- 9) progressive character of economic development, having higher rates of growth than the other parts of the country;
- 10) high level of new natural landscape development and growth of environmental problems.

These features produce a great socio-economic effect in economic agglomerations. This effect consists in creation of highly-integrated and communicative environment of economic agglomeration, which is called "agglomeration synergy". However, agglomerations in transition economies have the unbalanced structure

and insufficient resources for their economic growth. For a long period of time they were developing according to the rules of the command-administrative system rather than to the rules of the market economy. Therefore, most of them have irrational territorial structure, unbalanced economic system and underdeveloped synergic effect.

There are some principles of agglomeration development in the scientific practice of transition economies and highly-developed countries can promote decreasing the negative consequences of the Soviet administrative system. According to DEELSTRA, T. (1998), GEENHUIZEN, M., NIJKAMP, P. (1995) and PISTUN, M. (1989), one can formulate 10 principles of rational territorial (sustainable) development of economic agglomerations.

- 1) *Disposition of economic enterprises with due regard for their functional destination, optimal location, highest profitability and social needs.*
- 2) *Limitation of excessive concentration of economic activities in the central core of agglomeration.* The core contains a lot of raw-material-consuming, power-consuming and environment-polluting industries, transit transport systems and developed industrial infrastructure. All of them have been developed in the central core of large economic agglomerations in transition economies during the Soviet period of time.
- 3) *Development of high-tech and science-intensive industries as well as of the institutions of the social sphere in the central core of economic agglomerations.* These kinds of human activities are required in the centre of agglomeration for sustainable development, balanced and rational territorial organization.
- 4) *Redistribution of functions between central and peripheral territories of agglomeration.* According to this principle, the economic and social activities which have excessively developed in the central part of agglomeration can be moved to the peripheral zone with insufficient economic development.
- 5) *Maximum adaptation of branch and territorial structure of suburban agricultural complex for the needs of the central core and urbanized regions.*
- 6) *Regional development of industrial, social, ecological and administrative relations between different belts and sectors of agglomeration.* This principle is a basis of rational and sustainable development of agglomeration territory.
- 7) *Improvement of human living conditions and development of the social complex.*
- 8) *Integration of central and peripheral administrative systems in economic agglomeration.* This principle shows that administration of central city/cities of agglomeration and administrations of other agglomerated settlements should develop a united strategy of regional management. According to this strategy, each administrative unit of agglomeration should coordinate its regional development and economic activities with common requirements of agglomeration.
- 9) *Maximum use of the achievements of scientific-and-technical progress.* All technical innovations should be adopted and used for agglomeration development.
- 10) *Rational use of natural resources and environmental protection.*

METHODOLOGY

Various methods and methodological approaches have developed for the investigation of economic agglomerations. The common methods are: the systematic approach, structural analysis and synthesis, socio-geographical modeling, statistical method, generalization, etc. Most of them can be used in our research.

The method of territorial zoning can be used to analyze all the components of agglomeration development. This method consists of delimitation of specific belts and zones in agglomeration territory with different functional structure and communication intensity. Each zone (belt or sector) of agglomeration concentrates specific industries and human activities. Therefore, according to ISCHUK, S. (2005), they are delimited by different indices of urban concentration, industrial, social and infrastructural development, distribution of transport and communication system and take into consideration administrative and territorial division of the territory. We do not describe all indices of agglomeration zoning. All readers interested in them may find complete information in our monograph "Kiev Economic Agglomeration: the Experience of Regional Management" by ISCHUK, S., GLADKEY, A. (2005). This method of territorial zoning and above-mentioned theoretical fundamentals permit us to explore the territorial structure of the Kyiv Economic Agglomeration and to distinguish general problems and trends of its development in Ukraine.

TERRITORIAL STRUCTURE OF KYIV ECONOMIC AGGLOMERATION

According to the investigations carried out by ISCHUK, S., GLADKEY, A. (2005) at the Taras Shevchenko National University of Kyiv, the Kyiv Economic Agglomeration has a completely developed belt-sector structure. There are 7 functional belts with unique specialization and territorial location (*Table 1*). Each belt includes different human activities and has specific problems of regional development. There are 5 belts located in the city of Kyiv and only 2 in peripheral zone. Indeed, the capital of Ukraine has developed as a highly urbanized and concentrated area. Kyiv has a high level of development of communications and profound integration of various human activities. Therefore, Kyiv has got a more complicated territorial structure than its suburbs.

Besides belts, Kyiv Agglomeration has some functional sectors. There are 5 sectors in the city of Kyiv and 7 in its suburbs (*Figure 1*). City sectors have developed due to internal differentiation of Kyiv. Their borders correspond to economically-planned areas of the capital of Ukraine. Peripheral sectors are based on 7 radial transport lines converging from different directions to Kyiv. Below, we will consider the territorial structure of the Kyiv Economic Agglomeration by dividing it into separate components.

The historical core of Kyiv occupies 3.6% of total city area and includes 5.2% of total population. This territory has a high level of development of domestic and international political, administrative, public management and diplomatic functions. The Supreme Council (Rada) of Ukraine, the Government, the Presidential Administration and representative offices of international organizations, embassies and consulates are located here. The historical core fulfils various religious, cultural, educational, scientific, tourist, public and business functions. A lot of historic places and architectural monuments from 11th to 20th century are to be found

here. Some of them are under protection of UNESCO (Kyiv-Pechersk Monastery "Lavra", St. Sophia's Cathedral).

Furthermore, the historical core carries out industrial functions such as machine-building and light industry. Residential areas have also developed in it.

The functions of public management including all national, regional, municipal and local authorities are concentrated here in excess. Among scientific institutions, there are plenty of humanitarian academic institutes, design centers, information and archival centers as well.

Nowadays, the Kyiv center has a highly developed network of elite mercantile businesses which is displacing the everyday and regular services. The historical core is overcrowded with transport and traffic jams that arise everyday. It continues to fulfill its industrial, transport and research-and-production functions being non-peculiar for them. The representational and metropolitan functions are still insignificant here. Moreover, some local authorities and institutes of secondary education should be removed from the city center and moved to other parts of the city.

The central belt of Kyiv (includes 4.9% of total area and 9.8% of total population) contains those institutions of science, education, trade, tourism and culture which were displaced from the historical core. A number of specialized academies, technical universities and high schools are located here. Research institutes, design offices, construction and technical institutes are also situated here.

The industrial sector is represented by the precision engineering, shipbuilding and instrument-making industries as well as light and food industries. The east side of this belt has recreational functions based on resources of the Dnieper river. Only a few separated areas in the central belt contain historical monuments and public places. A lot of outdated industries, ramshackle housing and uncovered roads can be found throughout this area. The central belt of Kyiv requires complex reconstruction and development of representative, internationally-oriented functions in the territory of ex-industrial zones. Currently, the problem of irrational transport development and communications between the Dnieper banks has become urgent.

The middle belt of Kyiv (includes 12.7% of total area and 29.1% of total population) has a highly developed industrial sector, especially machine-building, transport-building, precision instrument-making, computer-making, machine-tool, electrical engineering industries as well as radio electronics, light and food industries. There are several research institutes and also institutions of secondary and specialized education.

The main function of this belt is settlement. About 30% of total population is living here. Therefore, most territorial resources in this belt are residential areas. The main problems of this belt are insufficient municipal improvements, low quality of general communal services, environmental pollution and traffic congestions.

The peripheral belt of Kyiv (includes 29.68% of total area and 55.12% of total population) is the most populated area in the capital. More than a half of Kyiv citizens are living here. The dominant functions are settlement, general communal services and education.

There are a few industrial plants in this belt. They are located in several industrial centers specializing in heat and power supply, machine-building and general engineering, chemical and pharmaceutical industries, production of commodities and consumer goods. Some scientific research institutes are located near the industrial zones and form metropolitan technopolis. The functions of public services,

medical care and general communal services are highly developed in the peripheral belt. Nevertheless, most of them are of a very poor quality and the number of services is small. Furthermore, the main problems of the peripheral belt are environmental pollution, transport congestion, overpopulation as well as insufficient municipal improvements.

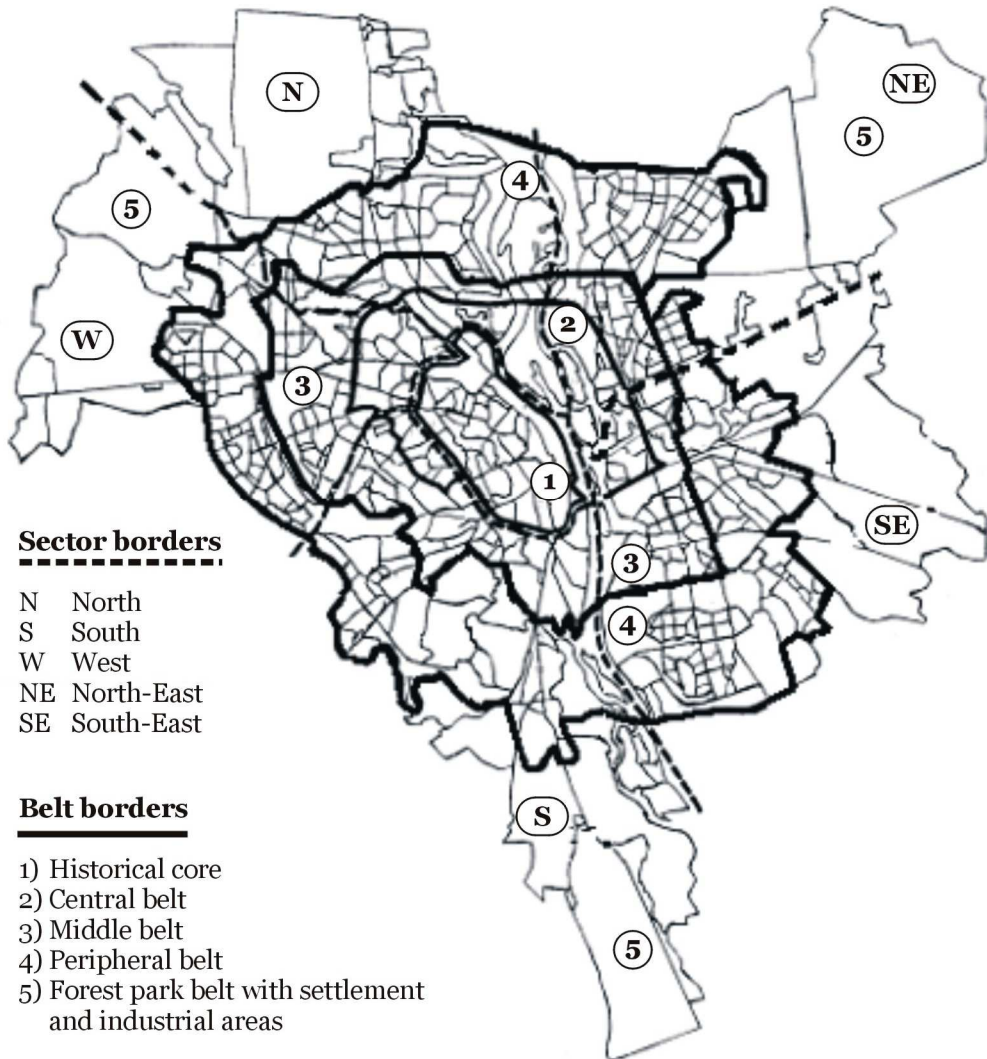


Figure 1
Territorial structure of the city of Kyiv

Table 1
Functional zoning of Kyiv Economic Agglomeration

	Functional belts of Kyiv Economic Agglomeration	Main functions and human activities
1	Historical core of Kyiv. (29.98 sq. km; 136,800 people)	Political and administrative; management; diplomatic; historical and architectural; religious and spiritual; educational; cultural; art; business; commercial; scientific-innovative functions; machine-building, instrument-making and light industries, tourism.
2	Central belt of Kyiv, bordered by historical buildings and the Dnieper river bank. (40.48 sq. km; 260,650 people)	Educational; commercial; cultural; recreational; planning-and-design and research-and-production functions; precision engineering; machine-building and instrument-making industries; machine-tool construction; electrical engineering; radio electronics; light and food industries.
3.	Middle belt of the city, bordered by circular railway (105.09 sq. km; 767,400 people)	Settlement; scientific-innovative functions; river shipbuilding; machine-building, precision instrument-making, computer-making, food and flavoring industries; sphere of everyday and regular services; specialized secondary and higher education.
4	Peripheral belt of the city, bordered by newly-erected building blocks (245.53 sq. km; 1,453,650 people)	Settlement; heat and power supply; chemical and pharmaceutical, machine-building and repair industries; light and food, timber, paper, furniture and rubber industries; industry of synthetic fabric; natural-recreation functions; scientific and technical, innovative and educational functions; sphere of everyday, regular and episodic services.
5	Forest park belt with settlement/industrial areas (405.91 sq. km; 18,300 people)	Recreational, medical and sanitary functions; specialized medical and sports functions; tourism; environmental protection.
6	The first agglomerated belt which includes neighboring suburban towns: Vyshgorod, Brovary, Boryspil, Ukrainka, Obukhiv, Trypillya, Vasylkiv, Boyarka, Vyshneve, Irpin and others. (2,354 sq. km; 788,200 people)	Settlement; power supply; powder metallurgy; machine-building, instrument-making, chemical and petrochemical industries; production of building materials; glass, porcelain and faience industries; timber, wood, pulp and paper industries; municipal services for the capital; high-intensity agriculture and food industry; hothouse market-gardening; greenhousing; scientific, specialized educational (secondary and higher), recreational and transport functions.

7	The second agglomerated belt that includes distant suburb towns and their regions: Ivankiv, Baryshivka, Fastiv, Makariv, Borodyanka and others. (10,986 sq. km; 280,400 people)	Middle-intensity suburban agriculture; light and food industries; production of building materials; timber, wood, pulp and paper industries; machine-building and instrument-making industries.
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The forest park belt with settlement-and-industrial areas (includes 49.0% of total area and 0.7% of total population) has a low level of economic development and population density. This belt keeps in reserve natural landscapes of the buffer environmental protection area and contains additional recreational, medical and sanitary facilities. The density of industrial development and population settlement is limited by sanitary standards.

Kyiv has 5 sectors of its territorial structure developed in the urban territory. We will not consider each of them in detail, but will only indicate their specialization. The northern sector is specialized in settlement function and in machine building. The western sector is also developed as the settlement area and has a lot of educational institutions. The southern sector is predominantly industrial and scientific. This is the main area of Kyiv technopolis development. And two eastern sectors also concentrate most of population and develop chemical, pharmaceutical, power supply and food/light industries.

The suburb zone of the Kyiv economic agglomeration has 2 functional belts.

The first agglomerated belt (includes 17.7% of total agglomeration territory together with Kyiv and 74.76% of total suburb zone population) has the most intense economic, labor, cultural and recreational relations with the metropolitan city. The main functions of this belt are decongesting the urban areas, supplying the agricultural and food industry products and developing the recreational green zones and parks. Many industrial enterprises of this belt (powder metallurgy, machine-building and instrument-making industries, power supply, chemical industry, production of building materials, glass, timber, wood, pulp and paper industries) have close relations with the metropolitan ones in the field of science, applied research, logistics, commercial functions, etc. There are international transport system, innovation and scientific-research organizations, educational and recreational centers in the first agglomerated belt. The latter is characterized by a high level of urbanization and a high population density.

So, the first agglomerated belt is somehow a sequential part of Kyiv. It has intensive relations with the capital in a variety of ways. The first agglomerated belt has a lot of problems. Most important of them are environmental pollution (especially near the thermoelectric power station), outdated equipment, development of unprofitable businesses, poor living conditions, lack of municipal improvements and a low level of general communal services. Insufficient development of the social sphere leads to the growth of so-called "pendulum migration" (or migration of labor forces) from this agglomerated belt to Kyiv. According to ISCHUK, S. (2005) and PISTUN, M. (1989), about 200,000 of the first belt inhabitants come to Kyiv for work every working day.

The second agglomerated belt (includes 82.30% of total agglomeration territory and 26.23% of total suburb population) is specialized in suburban agriculture, food, machine-building, chemical, timber, wood, pulp and paper industries. It plays auxiliary and attendant role in the agglomeration's economy. This belt is at a lower level of development than the rest of the agglomeration territory. Many industrial enterprises make no profit or are closed at all. This is a predominantly agricultural and depressive region. Most of progressive industrial enterprises and social institutions were moved to Kyiv or to nearby suburbs. In this belt, the process of rapid depopulation, labor migration to the central core and a decrease of economic activities is taking place. Most of the northern territories of this belt suffer from radioactive pollution after the year Chernobyl disaster. Inhabitants living in this belt have a very low income and many of them are unemployed. The territory of the second agglomerated belt needs structural economic and social changes.

There are 7 structural sectors in the suburban zone of Kyiv agglomeration. The three northern sectors are specialized in chemical industry, powder metallurgy, timber industry and agriculture. They have environmental problems and suffer from radioactive contamination. The Western and Eastern sectors are predominantly agricultural. They also have food and light industries. The most developed are the southern and the south-western sectors. The first is specialized in power supply and drastically pollutes the environment; the second is a region of high-tech industry and know-how, instrument-making industry, precision engineering, aircraft building and electrical engineering. This is part of Kyiv technopolis.

After examination of the current situation of Kyiv agglomeration development we can consider and substantiate the main directions of optimization of its territorial organization and of its sustainable development.

THE WAYS OF OPTIMIZATION OF KYIV ECONOMIC AGGLOMERATION DEVELOPMENT

According to our investigations (ISCHUK, S., GLADKEY, A. 2005), we can summarize the main ways of optimization of Kyiv economic agglomeration development.

The historic core of Kyiv needs lowering its industrial, settlement and transport functions. Main activities for this territory should be public management, international, representative, historical and cultural functions, tourism as well as the development of a cultural-spiritual and public centers. *The central belt of Kyiv city* should remain a territory of commercial and business activities, local authorities, academies of science and education. *The middle belt of Kyiv city* is a promising area of science-intensive technologies, applied science and metropolitan technopolis development. These functions can be maintained, first of all, in this belt via attracting the foreign investments. *The peripheral belt of Kyiv city* requires optimization of settlement and transport system, decrease in environmental pollution, development of general communal services and social care. *The forest park belt* is suitable for the development of recreation system, specialized sports centers and areas of nature conservation. All above-mentioned suggestions are included now in the program of "Kyiv-2020 socio-economic development".

Now let us analyze the suburban zone of Kyiv agglomeration. *The Northern sector of the suburban zone* is a territory of natural and environmental protection (after the Chernobyl disaster) and of light and food industries development (in the first

agglomerated belt). *The North-Western sector of the suburban zone* is maintained as a recreation area, region of growth of building materials production, machine-building and agricultural machine-building, timber and wood industries as well as additional educational functions. *The Western sector* requires development of agricultural complex (livestock-breeding) and food industries based on the economy of private farmers. *The South-Western sector* is charged with scientific-innovative activities and modular industrial enterprises based on Kyiv technopolis. This function will be combined with the development of additional residential areas, rapid communication and educational systems. *The Southern sector* has a large potential for further development of natural protection regions and recreation areas. This sector needs application of environmentally appropriate technologies. *The Eastern sector* will remain specialized in agriculture (vegetable-growing, potatoes-growing, dairy farming, poultry keeping and fruit growing). In addition, light and food industries and machine-building will be developed in this sector. And the last *North-Eastern sector* will be specialized in powder metallurgy, chemical and machine-building industries (which have close relations with Kyiv enterprises) as well as the agricultural complex. Additional residential areas, educational and scientific institutions and recreational areas will be developed in the sector in the near future.

CONCLUSIONS

So, we have analyzed territorial structure of Kyiv economic agglomeration and revealed specific problems of its sustainable development. These problems are the same as those in other metropolitan agglomerations of Eastern-European transition economies. Indeed, these countries encounter similar processes of privatization and commercial growth, development of postindustrial activities as well as optimization of urban territorial structure based on market economy (rather than on command-administrative system). The government support of these processes is highly required for further European integration of these countries, for development of innovative and progressive human activities as well as for improving living conditions. The concept of economic agglomeration and its rational sustainable development is one of those scientific projects which could be used by the state authorities to provide the above-mentioned measures for highly urbanized metropolitan areas. The results of the present investigations will help rationalize the territorial organization and provide better conditions for sustainable development of the key regions of economic and social growth in transition economies.

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