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**DEVELOPMENT OF INFRASTRUCTURE
AS AN IMPORTANT FACTOR OF REGIONS'
ECONOMY STRUCTURING**

**ROZWÓJ INFRASTRUKTURY JAKO WAŻNY
CZYNNIK STRUKTURYZACJI GOSPODAREK
REGIONALNYCH**

DOI: 10.15611/pn.2015.394.21

Summary: The infrastructure role in regions' economy structuring is considered. The functions of regional infrastructure towards conducting economic structural correction are specified. It is emphasized that the functioning and efficiency of all the types of regional infrastructure is an essential and necessary condition of regions' economy structuring in the context of reaching socioeconomic development goals. The impact of different types of regional infrastructure on economic structuring is analyzed. The problems of formation and development of regional infrastructure elements are studied, taking into account the tasks of creation of regions' economy infrastructure, which will be the precondition of their competitiveness and sustainable development. The necessity of support of regions' infrastructure complexes development by the authorities is proved. The approaches to the promotion, creation and functioning of infrastructure elements of regions are formed.

Keywords: regional infrastructure, infrastructure functions, structure of the economy of a region.

Streszczenie: Artykuł pokazuje rolę infrastruktury w kształtowaniu struktury gospodarek regionalnych. Opisano funkcje infrastruktury regionalnej w odniesieniu do realizacji korekty strukturalnej gospodarki. Podkreślono, że funkcjonowanie i zdolność wszystkich rodzajów infrastruktury jest warunkiem koniecznym do istnienia struktury regionalnej gospodarki w kontekście celów rozwoju społecznego i gospodarczego. Przeanalizowano wpływ różnych rodzajów infrastruktury regionalnej na kształtowanie struktury gospodarki. Przedstawiono problemy tworzenia i rozwoju regionalnych elementów infrastruktury, biorąc pod uwagę zadanie stworzenia takiej struktury gospodarki regionalnej, która stanowiłaby podstawę konkurencyjności i zrównoważonego rozwoju. Udowodniono konieczność wspierania rozwoju sektora infrastruktury w regionie przez władze. Sformułowano podejścia do stworzenia i funkcjonowania elementów infrastrukturalnych regionów.

Słowa kluczowe: infrastruktura regionalna, funkcje infrastruktury, struktura gospodarki regionalnej.

1. Introduction

The attainment of the structural balance is one of the key tasks in the context of realization of the goals of regional economic systems' functioning and development.

A solution to this complex problem requires a comprehensive focus on the development of regional infrastructure as one of the main backgrounds for an effective functioning of region's economy and its stability as a whole. As a set of the activities and institutions creating a complex of conditions for the formation, functioning and development of the economic and social spheres of a region, regional infrastructure serves as a basis of regional economy structuring and constitutes means to ensure its structural balance.

Providing the creation of the necessary factors of effective functioning of organizations and households, regional infrastructure is able to provide a dynamism and flexibility of region's economy, promotes the formation of such a type of structure which would allow responding adequately to the challenges facing the development of regions in the modern world.

Consideration of the conditions for the functioning of modern economies through the paradigm of the post-industrial and information society leads to an increased focus on infrastructure development and its role in ensuring socioeconomic development. Especially, the regions of Ukraine are faced with this pressing problem, meeting the challenges of improving competitiveness, which is closely connected with the overcoming of the structural imbalances in the economy.

The different aspects of formation and functioning of infrastructure complexes and its elements were described in the works of the following scholars: O.N. Ilchenko, V.B. Kondratiev, N.V. Mordovchenko, M.H. Nikolaieva, O.V. Inshakov, O.H. Russkova, N.A. Dalisova, V.P. Tereshonok, H.M. Kharisova, L.H. Akhtarieva and others. At the same time, one of the unsolved aspects of the problem includes the orientation of regional infrastructure on the creation of favorable conditions for the structural transformation of the economy as a basis for the sustainable development of the regional socioeconomic system.

The objective of the present paper is to outline the functional characteristics of regional infrastructure and study its impact on the structuring of the regional economies of Ukraine.

2. The role and functions of the infrastructure of regional economy structuring

At present stage, considerable attention is paid to the development of infrastructure, and this is explained by the fact that, firstly, it is increasingly becoming an integral part of the process of reproduction, it absorbs a significant part of capital investment and labor resources; secondly, there is an increased stress on the branches of economy, servicing social production, creating financial means for decent life

activity of a population, functioning of social and international relations; thirdly, in the theoretical aspect infrastructure is a far less explored area of economy [Amosha et al. 2011, p. 631].

Infrastructure serves as a major component of the regional economic system, its nature and content is regarded in the light of two methodological approaches [Dalisova, Tereshonok 2013, pp. 132–136]: industrial (defined as a set of industries and economic activities, providing the general conditions of reproduction) and functional (defined as a particular set of institutional, industrial and social functions). In this regard, the role of infrastructure in the structuring of the regional economy is reflected in the following main points: 1) through the subordinate character of functioning, the infrastructure complex forms the general conditions of economic activity, provides the sustainable socioeconomic development of a region; 2) regional infrastructure elements impact on the formation of a tactical and strategic development of various economic activities and a region as a whole, as an integrated reproductive system.

The scholars note [Kondratiev 2010, pp. 29–36] that the impact of infrastructure on the long-term economic growth can be carried out according to five areas: 1) as a direct factor of production through a direct contribution of infrastructure industries and types of activities into production process and GDP growth; 2) as an interchangeable element of other factors of production when, on the one hand, the modernization of infrastructure can provide lower production costs, and on the other hand, the good condition of infrastructure increases the productivity of all other factors of production, expanding the range of profitable investment opportunities and stimulate the flow of investment; 3) as an incentive to the accumulation of the factors of production or increasing their productivity; 4) as a stimulus of the aggregate demand the implementation of infrastructure projects accompanied by an increase in the investment demand and demand on related sectors products; 5) as an instrument of the industrial policy encouraging business participation in the implementation of infrastructure projects, the public authorities have an opportunity to channel the investment of the private sector to accelerate the economic growth in a region as a whole. These trends discover the aspects of formation of the preconditions of economic structuring by means of infrastructure.

The impact of infrastructure on the structural transformation of the regional economy is carried out through the implementation of its core functions: 1) providing, which forms the conditions of a continuous functioning of business relationships and interaction among regional economic system elements; 2) integrative, which finds its expression in the formation of integration links among the types of economic activity, industries and local communities in a region and regions; 3) stimulating, resulting in the stimulation of economic entities development and a regional socioeconomic system as a whole.

An important precondition for the effective implementation of the following functions by the regional infrastructure is to provide its advanced development, which can form a basis for an optimal use of regional capacity, and on this ground

a basis for optimizing the structure of an entire regional socioeconomic system and its components. Further development of regional infrastructure, along with proper implementation of the already mentioned functions will enable it to realize such an important management function as targeting of the regional reproductive system development.

It should be noted that in the context of the post-industrial society formation, intensification of integration processes and new challenges, worsening of crisis phenomena in the social and economic sectors and strengthening of the external threats for the national safety of Ukraine, within the framework of the above-defined functions realization, the regional infrastructure faces a number of new tasks related to optimization of the use of regional space and available resources on the basis of the geospatial data and geographic information technologies consideration in the systems of support of the state and local self-government authorities managerial decisions; formation and implementation of the competitive advantages of regions, due to the allocation of the infrastructure capacity as an element of regional capacity; integration of economic entities at the supra-national (international transport corridors, high-speed transportation systems, global information networks), inter-regional (national transportation system, national system of gas and electric supply, alternative energy sources) intraregional (regional transportation system, regional system of public service), sub-regional (system of heating and water supply of the municipal units) levels [Kharisova 2012]; service of business processes; ensuring the consistency between institutions, innovation and investment in the concept of regions' sustainable development; involving of new technologies of waste disposal; protection of a population from the modern means of destruction; strengthening of the innovation development of enterprises and regions.

Regional infrastructure is an extensive, complex organizational and economic system, the components of which are interconnected to each other and the effectiveness of their functioning is shown in the synergistic effects when the overall efficiency is greater than the effectiveness of each element. Therefore, the modernization of regional infrastructure complex focused on the providing of the flexible response to the challenges of economic systems functioning, advanced development of infrastructure institutions should also provide a balanced development of its constituents, establishing effective relationships among them.

3. Analysis the impact of different types of regional infrastructure on economic structuring

When considering regional infrastructure as a factor of regional economy structuring, one should pay attention to the following system characteristics [Arhtarieva 2008]: 1) tenacity of purpose (to ensure, promote the successful functioning of market relations participants); 2) hierarchy (the presence of sub-systems, elements, interconnections and interdependencies among them); 3) the heterogeneity

of structural composition and functional elements; 4) uniqueness (originality, difference from other similar systems); 5) transparency (the ability to enter and exit structural units); 6) a certain autonomy of individual structural elements (business entities); 7) multidimensionality of functioning and results (versatility, multiple types of services and different effects); 8) dynamics (high degree of quantitative and qualitative changes); 9) ability to self-organize and self-develop (the ability to change its structure and properties influenced by changes in internal and external environments, the inclination to innovate); 10) multicriteriality of the assessment of efficiency (as processes in the system, and in its activity as a whole).

At present in Ukraine neither academic community nor public bodies of statistics have formed a single approach to the determining of infrastructure content and components; systematic approaches to assess their role in the development and structuring of national and regional economies are not worked out. The above mentioned issues greatly complicate the conducting of research in this perspective. The generalization of native and foreign scholars' allows identifying the following types of infrastructure:

- productive: a set of activities which creates general conditions of the placement and functioning of economic entities and providing them with production services. Productive infrastructure includes: transport complex; building complex; energy complex; communication; logistics and distribution; wholesale.

- social: a set of activities which ensures the needs of a population in social and domestic spheres (trade, food services, utilities, public services, environment protection, public transport, communications, financing and insurance of a population), social and spiritual services (education, science, culture and art, health, physical education and sports);

- market infrastructure: includes a set of enterprises, institutions and organizations which provide sustainable development and functioning of the market mechanism of economic regulation, multi-functioning business relationships, interaction among market agents, uninterrupted movement of goods, services, and various values of labor in various spheres of social reproduction. The market infrastructure includes the following types: information, consulting, service, trade, finance, brokerage, marketing, analytical, human resources, training, outsourcing, innovation, legal.

Under the conditions of the development priorities of the structural correction of the regional economies in Ukraine, the implementation of which would contribute to the sustainable development and enhance the competitiveness of the latter, it is important to form (on the basis of the optimal combination of different types of infrastructure) such a regional infrastructure matrix which, on the one hand, will be the best adapted to the specifics of the existing potential of a region, and on the other – will be an instrument of the most efficient attraction of this potential in the process of structural transformations, asking for new ways of use existing capacities.

Regional infrastructure systems are the subsystems of the overall infrastructure of an economy, and therefore, the level of the latter indicates the general situation

in a region. Thus, the quality of the overall infrastructure of Ukraine in the Global Competitiveness Index (Global Competitiveness Index, GCI) World Economic Forum in 2014 ranked 75th position, transport infrastructure 88th among 144 members of the rating [*The Global Competitiveness Report 2014–2015*]. This situation shows a significant development lag of Ukraine's infrastructure from the developed European countries. In the light of the absence of a unified methodological approach to the assessment of industrial infrastructure, we consider it appropriate to make a comparative analysis of its impact on the structuring of regional economies using such an indicator as the specific weight of the infrastructure types of economic activity (production and distribution of electricity, gas and water supply, transport and communication) in the gross value added of regions.

The conducted studies have shown a significant regional differentiation between Ukraine's regions, which, based on the data of the State Statistics Service of Ukraine, is the lowest in Zhytomyr (10.7%), Kherson (11.2%), Chernivtsi (11.3%) regions, and the highest in Odesa (27.0%), Kyiv (22.9%), Mykolaiiv (21.3%) regions (see Table 1).

Infrastructure development is one of the key factors of the investment attractiveness of regions. However, the use of infrastructure capacity focused on creating of a favorable environment for investment, and, on that basis, the structural improvement of the economy, significantly differs in the regions of Ukraine. Thus, the leading positions of the infrastructure in the formation of the investment attractiveness index of the regions was observed in 2013 in Kharkiv (1.74026), Rivne (1.71949) regions in Kyiv (1.718395) and also Donetsk (1.647185) and Lviv (1.632309) regions. The regions in which the factor affects the weakest infrastructure investment image formation and backgrounds of economy structuring are the following: Mykolaiiv (1.208012), Ternopil (1.219384), Zaporizhzhia (1.236159) (see Table 2).

One of the basic system-formed elements of regions' infrastructure which requires a special attention in the process of the structural transformation of regional economies is automobile roadways, the development level of which is measured using the index of their density. Thus, according to the State Statistics Service of Ukraine, at the beginning of 2013 the density of paved public roadways is the highest in Lviv (376 km per 1 thousand km²), Ternopil (361 km per 1 thousand km²), Chernivtsi (355 1 thousand km per km²) and Khmelnytskyi (346 km per 1 thousand km²) regions, while the average rate for the country is 275 km per 1 thousand km² [*Density of Motor Hard-surface...* 2013]. This preference should be used as much as possible when defining the priorities of regional economies structuring.

The lowest value of this index is in Kherson (174 km per 1 thousand km²) and Mykolaiiv (195 km per 1 thousand km²) regions. The significant deterrent effect on the structural transformation of the regional economies of Ukraine is produced by the poor quality of its roadways. The evidence of this vital problem is that in the World Economic Forum (2014) rating with respect to the quality of the roadways Ukraine ranks 139th position [*The Global Competitiveness Report 2014–2015*]. Under such a general situation, according to the results of the business leaders' questionnaire,

Table 1. Specific weight of infrastructural types of economic activity (production and distribution of electricity, gas and water supply, transport and communications) in the gross value added of the regions of Ukraine (2011) (Gross added value)

| Regions | Gross added value of everything on economics of the region (in actual prices) mn UAH | Gross added value of the infrastructural types of economic activity (in actual prices) mn UAH) | Specific weight of infrastructural types of economic activity (%) |
|-----------------|--|--|---|
| Ukraine | 1,165,450 | 178,208 | 15.3 |
| AR Crimea | 35,472 | 5,110 | 14.4 |
| Vinnysia | 26,622 | 4,283 | 16.1 |
| Volyn | 16,177 | 2,345 | 14.5 |
| Dnipropetrovsk | 120,469 | 14,588 | 12.1 |
| Donetsk | 138,506 | 17,834 | 12.9 |
| Zhytomyr | 19,994 | 2,141 | 10.7 |
| Zakarpattia | 16,782 | 2,179 | 13.0 |
| Zaporizhzhia | 42,168 | 6,772 | 16.1 |
| Ivano-Frankivsk | 23,303 | 4,185 | 18.0 |
| Kyiv | 51,844 | 11,885 | 22.9 |
| Kirovohrad | 18453 | 2,702 | 14.6 |
| Luhansk | 48054 | 5,845 | 12.2 |
| Lviv | 47111 | 8,047 | 17.1 |
| Mykolaiiv | 25,010 | 5,318 | 21.3 |
| Odesa | 57,175 | 15,488 | 27.0 |
| Poltava | 43,549 | 5,897 | 13.5 |
| Rivne | 17,379 | 3,658 | 21.0 |
| Sumy | 20,957 | 2,891 | 13.8 |
| Ternopil | 15,168 | 2,332 | 15.4 |
| Kharkiv | 69,396 | 10,064 | 14.5 |
| Kherson | 17,000 | 1,912 | 11.2 |
| Khmelnyskyi | 20,792 | 4,241 | 20.4 |
| Cherkasy | 24,093 | 2,945 | 12.2 |
| Chernivtsi | 11,424 | 1,294 | 11.3 |
| Chernihiv | 19,328 | 2,676 | 13.8 |
| Kyiv city | 210,220 | 30,379 | 14.5 |
| Sevastopol city | 9,004 | 1,197 | 13.3 |

Source: *Gross Value Added...* [2013].

Table 2. Position of infrastructure in the formation of investment attractiveness index of the regions of Ukraine, 2013

| Position | Regions | Point | Position | Regions | Point |
|----------|----------------|----------|----------|-----------------|----------|
| 1. | Kharkiv | 1.74026 | 15. | Vinnytsia | 1.407077 |
| 2. | Rivne | 1.71949 | 16. | Sevastopol city | 1.404837 |
| 3. | Kyiv city | 1.718395 | 17. | Cherkasy | 1.396935 |
| 4. | Donetsk | 1.647185 | 18. | Ivano-Frankivsk | 1.395737 |
| 5. | Lviv | 1.632309 | 19. | Volyn | 1.364936 |
| 6. | Chernivtsi | 1.521627 | 20. | Kirovohrad | 1.350884 |
| 7. | Zakarpattia | 1.515939 | 21. | Sumy | 1.328939 |
| 8. | Odesa | 1.475893 | 22. | Poltava | 1.310049 |
| 9. | Zhytomyr | 1.47528 | 23. | Kherson | 1.282869 |
| 10. | Luhansk | 1.467563 | 24. | Chernihiv | 1.249998 |
| 11. | Dnipropetrovsk | 1.451804 | 25. | Zaporizhzhia | 1.236159 |
| 12. | AR Crimea | 1.448616 | 26. | Ternopil | 1.219384 |
| 13. | Khmelnytskyi | 1.438226 | 27. | Mykolaiv | 1.208012 |
| 14. | Kyiv | 1.421122 | | | |

Source: *Rating of Regional Investment Attractiveness* [2013, 2014].

the best quality of roadway paving is in Vinnitsa (6.35 points), Volyn (6.3 points) and Donetsk (6.13 points) regions, and the lowest score in the Autonomous Republic of Crimea (1.6 points) and Chernivtsi region (1.8 points) (Rating of investment attractiveness of the regions (2014).

The priority of the transport infrastructure development is confirmed by the experience of the European countries, where the increasing freight traffic, construction of transport corridors, the development of the transition potential and logistics centers became a powerful catalyst for the development of regional economies.

An important condition for overcoming the structural imbalances in the development of the regional socioeconomic systems, ensuring their effective functioning and simultaneously, as the main criterion, the resources to achieve the latter acts such as human potential is the development of social infrastructure. The social infrastructure of a region is a structurally complex system, each element of which, considering the regional specificity of socioeconomic processes, contributes to the satisfaction of social needs and ensures the structural balance. Inasmuch as the limited amount of the paper cannot consider the impact of the individual elements of social infrastructure on the structuring of the regional economy, we believe it is appropriate to assess its overall effectiveness in this perspective, using such criteria as the integrated regional human development index, the calculation of which includes 33 indicators, combined into six blocks according to the basic aspects of human development: reproduction of population, social status, comfortable life, well-being, decent work, education

[*Regional Human Development* 2013, p. 54]. The conducted studies have shown a considerable interregional differentiation in this category. Thus, the regions with high value integrated regional human development index (4.1489 – 3.9988) are: Kharkiv, Zakarpattia, Chernivtsi, Lviv; above average and the average level of this indicator is observed in the Zaporizhzhia region, AR Crimea, Kyiv, Mykolaiv, Poltava, Odesa regions (see Table 3).

Table 3. Ranking of Ukraine's regions according to the integral regional human development index, 2012 Regional human development 2013

| Level | Integral regional human development index value | Regions |
|---------------|---|---|
| High | 4.1489–3.9988 | Kharkiv, Zakarpattia, Chernivtsi, Lviv |
| Above average | 3.9556–3.9106 | Zaporizhzhia, AR Crimea, Mykolaiv |
| Average | 3.8390–3.8299 | Poltava, Odesa |
| Below average | 3.7665–3.6658 | Luhansk, Donetsk, Ivano-Frankivsk, Dnipropetrovsk, Volyn, Cherkasy, Ternopil, Chernihiv, Rivne, Chmelnytskyi, Vinnytsia |
| Low | 3.5957–3.5397 | Kherson, Sumy, Kirivohrad, Zhytomyr |

Source: *Regional Human Development* [2013].

Unfortunately, in 15 regions of Ukraine the value of the integral regional human development index is below average and low. This gives grounds to pinpoint the low efficiency of the social infrastructure and its lack of impact on the reaching of the structural transformations' goals defined by the legal and regulatory documents.

The influence of the market infrastructure to improve the structuring of the regional economies through promotion of businesses showed that despite some growth dynamics of the total infrastructure (2.8% in 2013 compared to the year 2012), there is a disparity in the formation of the infrastructure in the regions of Ukraine. Thus, 35.9% of the infrastructure is concentrated in Kyiv, 10.1% – in Donetsk, 7.2% in Kharkiv regions. Then, as in other regions of Ukraine the specific weight of such objects is much lower, namely, 4.2% – in Poltava, 3.4% – in Lugansk, 2.9% in the Zhytomyr region. In Sevastopol only 1.0% in the Chernivtsi region 0.86%, in the Chernihiv region 0.8% [*Analytical Report on the State and Prospects...* 2014].

Such a situation illustrates the subsequent development of the market infrastructure in relation to the development of businesses in a region, while for the purposeful structuring of the regional economies its priority development is extremely important. In terms of innovation model of economic systems formation, it is particularly important to form the innovation infrastructure, the objects of which should become the center of the creative ideas origin, new vectors of regional development and new businesses.

4, The problems of the development of the elements of regional infrastructure and approaches to their solutions

The conducted studies have identified the following problematic aspects in the development of regions' infrastructure: the unequal access to the social infrastructure public services; high degree of the physical and moral depreciation of the fixed assets of enterprises of industrial and social infrastructure; the poor state of infrastructure facilities due to the insufficient supply of resources for their functioning; inequality of provision of various infrastructure services and facilities throughout the regions; low use of advanced technologies, new services and insufficient implementation of the modern environmentally friendly technological solutions by infrastructure companies; insufficient coordination of development and functioning of infrastructure businesses of different types of activity.

Taking into consideration the low level of the investment attractiveness of social infrastructure, high capital intensity of production infrastructure, the formation of a new paradigm of infrastructure improvement due to the technological changes, it is required to work out an effective mechanism for managing the infrastructure complex of the region.

Within the frames of such a mechanism it is appropriate to work out the strategies for the development of the regional infrastructure, oriented on the development of the infrastructure "growth points" which can create preconditions and offer options for an effective use of regional potential; ensure the synchronization of the regional infrastructure development strategy with the national infrastructure projects and public programs; use the cluster approach to stimulate the development of innovation infrastructure in the regions; start attracting private capital to implement infrastructure projects on the basis of the public-private partnerships.

5. Conclusions

Infrastructure is starting element of the regional economy, whose functional abilities will make a decisive impact on the structural optimization of the latter, both through structural contribution of the infrastructure types of activity, and through their participation in the formation of the conditions for the implementation of development priorities.

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