

## Leadership in the Development of Infrastructure Systems in the Region

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**Abstract** Our paper discusses the theoretical aspects of researching the leadership of regional infrastructure systems. The purpose of the work is to study the leadership of the region's infrastructure systems, refine its criteria and assessment indicators.

The methodological basis of the study was the principles of spatial, regional economics, and a systematic approach. The essence of the concept of leadership in relation to the infrastructure systems of the region, based on their functional significance, is determined. The theoretical and methodological approach to researching the leadership of regional infrastructure systems and the methodological foundations for the formation of indicators for its assessment are presented.

**Keywords:** *leadership, infrastructure system, regional development*

### 1 Introduction

Modern research proves the growing role of infrastructure systems in the development of regions. The condition, accessibility, and availability of infrastructure have an impact on possible shifts in the region's economic activity, points of attraction, deployment of economic activity, opportunities for economic growth and leadership in economic development. The relevance of the study of leadership in the infrastructure systems of the region is due to the following circumstances:

- firstly, the need to achieve the targets defined in the documents of the regional, national levels, international ratings (e.g. a plan for transforming the business climate, rating of investment attractiveness, etc.);
- secondly, despite the obvious relationship between the state of infrastructure systems and the economic development of the region, leadership positions, as well as the availability of practical examples confirming these interdependencies, the theoretical study and comprehensive analysis are very insignificant;
- thirdly, the need for a systematic study of the development of infrastructure as a spatial defined mutual system of serving interconnected, interacting with each other and the external environment elements, structures or objects whose activities are aimed at ensuring the sustainable development of territories, their leadership for solving strategic problems (see Kleiner 2017; Surnina et al. 2019).

With this regard, the issues of assessing the mutual influence of infrastructure and territories and the leadership of infrastructure systems are of relevance. The aim of this work is to study leadership in the development of infrastructure systems in the region, clarifying its criteria and assessment indicators.

## 2. Infrastructure systems in regional development

The influence of infrastructural factors on the development of the regional economy has been studied by many scientists, which is most fully determined by the existing theories of regional development. In this work, the most relevant to its goal are the provisions of theories of cumulative growth, socioeconomic and spatial theories. In the context of the study, the works of Debabov (1973) should be highlighted, Efremov and Nikiforova (2008; 2014), who study the regional features of infrastructure, its impact on socio-economic development, connectedness objects with a certain territory. The connections of infrastructure with a certain territory are explored by Pykhov and Kashina (2016), highlighting the mesoscale of its development (republic, territory, region, city, village, village). The communication, connecting role of infrastructure in space is described in the works of Surina et al. (2016). A functional-spatial approach to the study of infrastructure in the system of territorial organization was proposed in the works of Yakovleva (2005). Thus, in the context of the study, the infrastructure system of the region is considered as a complex of serving interconnected, interacting with each other and the external environment elements that ensure the development of the territory.

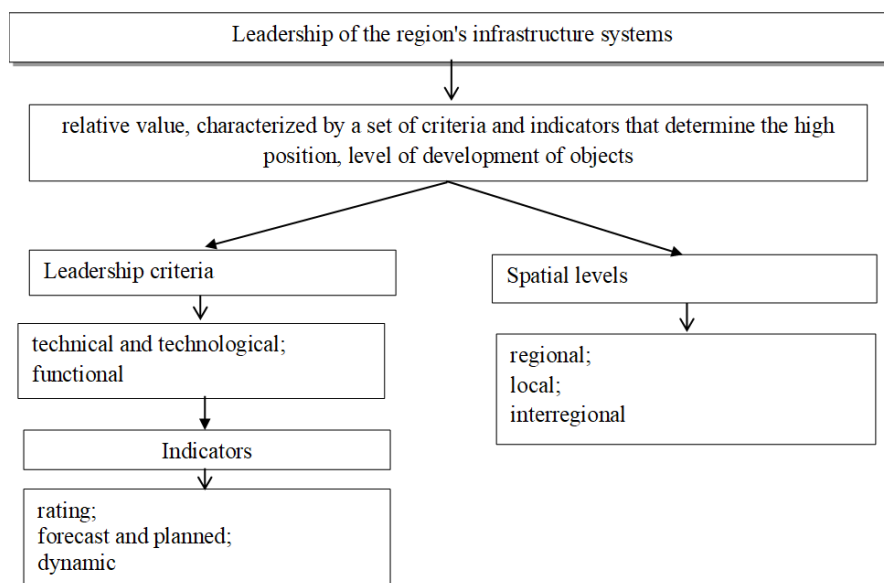
A common function of infrastructure in the framework of regional studies is to ensure that the availability of infrastructure facilities, the conditions for their functioning, the level of infrastructural security affect the parameters of the economic space, changing its configuration (Spatial development strategy of the Russian Federation 2019; The strategy of scientific and technological development of the Russian Federation 2016), capabilities and limitations, in the aspect of leadership achievement. The concept of "leadership" is associated with the definition of "leader". Leader - from the English. leader - leading, first, leading the way. The concept of leadership in the framework of economic and managerial sciences is considered as simultaneously a high position in an organization or society (Kotler 1998), a phenomenon that is involved in the economic success of large corporations (Romanovskaya et al. 2018). The subject of leadership in economic science is the qualities, criteria, conditions for its achievement.

An analysis of leadership in the region's infrastructure systems is based on a study of the essence of infrastructure, which can be most fully revealed through its content and functions that follow from the main goal of functioning - satisfying socially significant needs of society (Pykhov et al. 2015; Tvaronavičienė 2019; Popov et al. 2019). The authors distinguish the following main functions of the region's infrastructure systems: location, communication, providing, space-forming, management. These functions allow us to establish a relationship between the development of infrastructure systems and the change in the economic space of the region. For this study, providing and space-forming functions are of particular interest. At the same time, from the point of view of performing these functions, the essence of leadership of infrastructure systems may differ slightly.

The implementation of the supporting function of the infrastructure involves the creation of conditions for the development of territories, the creation of new growth points, economic facilities, the reduction of negative environmental impacts (for example, energy conservation), smoothing inequalities, and integrated development. Therefore, in the aspect of the implementation of the supporting function, it is necessary to comprehensively develop the infrastructure system of the region (Ufimtseva et al. 2016) (including various types of infrastructure). It follows from this that the leadership of the region's infrastructure systems should be considered as the region's leadership in infrastructure development based on the assessment of indicators of integrated infrastructure development.

On the other hand, the development of individual objects of the infrastructure system is not the same, therefore, competing entities that strive for leadership are distinguished. At the same time, given the influence of infrastructure systems on regional development, not only competition but also cooperation (Svetunkov 2016) becomes important, which is most fully described by ecosystem models (Moore 1996) and co-competition (Brandenburg et al. 1996). In regional development, this is manifested in the space-forming function of infrastructural systems - determining the configuration of territorial structures, objects, complexes both within the region and relative to others, their infrastructural and geographical location, depending on the level of development, technical and technological state of the infrastructure facilities. Thus, the leadership of the region's infrastructure systems is seen as the leadership (competition) of individual objects of the region's infrastructure system.

The objective and subjective conditions that determine the most complete implementation of these functions are considered as advantages in the development and distribution of productive forces (Ignatyeva et al. 2014). Providing and space-forming functions are of particular importance in the context of the development of the digital economy, digitalization, when the technical, physical parameters of the infrastructure, as well as economic conditions change. Thus, to study the leadership of the region's infrastructure systems, the determining condition is the technical state of the infrastructure facilities and their ability to ensure regional development. As indicators of these criteria, we can single out the achievement of planned forecast parameters, their dynamics. It should be noted that leadership in infrastructure systems is a relative value and its study should be based on a comparison with other infrastructure systems, their facilities, territorial levels, etc. Let us summarize the theoretical and methodological approach to researching the leadership of regional infrastructure systems (Fig. 1).



**Fig.1.**Theoretical and methodological approach to researching the leadership of regional infrastructure systems

Source: Own results

### 3. Criteria and leadership indicators of regional infrastructure systems

As a part of the modern priority directions of the spatial development of the Russian Federation, the improvement of the spatial organization of the energy (including electricity) and transport infrastructure, which we will consider as the object of study, is especially notable. Based on the adopted theoretical and methodological approach to researching the leadership of the region's infrastructure systems, we analyse the basics of constructing a system of indicators characterizing their functioning. A set of indicators for the development of infrastructure systems in the region, reflecting their status and leadership opportunities, is formed on the basis of official statistics, international and national ratings, and forecast and planning documents.

The main source of data for the study of the infrastructure complex of the region is the primary statistical data generated in the reporting of enterprises and organizations. In accordance with OKVED 2020 (NACE Rev. 2), section 35 "Providing electric energy, gas and steam; air conditioning", subsection 35.1 (including generation and transmission of electricity from generating facilities to distribution centres, as well as distribution of electricity to consumers) (All-Russian classifier of types of economic activity 2020), Section 49 "Transportation and storage". It should be noted that infrastructure, like the infrastructure system, is not a unit of statistical observation; there is no established system of indicators to assess the level and pace of development. Therefore, to study the main trends in the formation, development and leadership on the basis of official, departmental statistics and special statistical studies, dynamic and comparative estimates can be used.

Rating indicators for the development of infrastructure systems are determined in accordance with international and national ratings. The rating results allow you to organize infrastructure systems according to certain indicators in accordance with type, spatial position, etc. One of the universally recognized ratings is the National Rating of the Investment Climate (2020) in the Subjects of the Russian Federation. The rating is calculated on 44 indicators in 4 directions, incl. "Infrastructure and resources" (availability and quality of infrastructure - performance indicators and the level of infrastructure development, as well as the availability of resources for doing business and investment activities). Information on indicators is obtained because of surveys of entrepreneurs and experts, as well as using statistical data. After the formation of an array of source data, the rating result is calculated and presented at the level of indicators, factors, directions, integral index (Digital Transport and Logistics CTL 2020; The concept of digital transformation 2030; Passport of the national program "Digital Economy of the Russian Federation" 2018; Spatial Development Strategy RF until 2025; Decree of the Government of the Russian Federation 2017). Thus, the results of the calculation of indicators allow us to identify leaders in the development of infrastructure systems by regions of the Russian Federation and federal districts.

A set of forecasting and planning documents for the development of infrastructure systems - strategies, plans, development programs also provides information that can be used to assess leadership (e.g., the Russian Energy Strategy, the Development Scheme and Development Program of the Unified Energy System of the

Russian Federation, General layout of electric power facilities, Strategy development of the electric grid complex of the Russian Federation, the state program of the Russian Federation “Development of the transport system”, etc.). “The Business Climate Transformation” Plan (Order of the Government of the Russian Federation 2019), provides for the growth of key performance indicators for connecting (technological connection) to electric networks, gas distribution networks, heat supply systems, centralized water supply and sanitation systems. The information base is represented by relative indicators and the magnitude of the dynamics. Thus, based on this group of indicators, leadership is determined from the standpoint of achieving the planned parameters.

Table 1 summarizes the methodological foundations of the formation of indicators for assessing the leadership of infrastructure systems.

**Table 1.** Methodological foundations for the formation of leadership indicators of regional infrastructure systems

Type of indicators	The source of information	Types of ratings	Regional Infrastructure System Development Indicators	
			Energy	Transport
rating	Data of international, national ratings	Relative, comparative	The number of stages of technological connection to electric networks, the period of technological connection to electric networks, the availability of electricity for the population and business, provision of own energy and capacity, etc.	Construction and reconstruction, length of roads of various types, traffic volume, digitalization, throughput, etc.
dynamic	Official and departmental statistics			
forecast	Indicators of strategies, plans, development programs			

Source: Own results

Based on a study of the leadership indicators of the region’s infrastructure systems, it can be concluded that the methodology for their formation is universal and does not depend on the type of infrastructure; for the analysis, rating, dynamic and forecast-planning parameters that have relative and comparative estimates are used.

## 4. Conclusion

All in all, the study of the leadership of the region’s infrastructure systems conducted in the work allows the following conclusions to be drawn: First of all, the leadership of the region’s infrastructure systems is considered as a quantity characterizing the state of its development relative to similar infrastructure systems (their facilities) of other levels, entities, etc.

Second, an analysis of the leadership of the region’s infrastructure systems is based on a study of the essence of infrastructure, which is most fully disclosed through its functions, among which the most significant are the providing and space-forming ones.

Third, the technical condition of infrastructure facilities and their ability to ensure regional development, which are characterized by rating, dynamic and forecast indicators, become the determining criteria for researching the leadership of regional infrastructure systems.

Fourth, the methodology for the formation of leadership indicators of regional infrastructure systems is universal and does not depend on the type of infrastructure.

Fifth, on the example of energy and transport infrastructure systems, information sources, types of assessments, indicators that can be used to study leadership are identified.

Thus, the study made it possible to systematize the existing ideas about the comparative development of infrastructure systems in the region and expand the traditional approaches to assessing their condition and functioning in terms of leadership achievement.

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