

## Surface Infrastructure Development of Astana Sub-urban Area as Part of the Functions of the Central and Local Authorities

Yevgeniya P. Zadvorneva,<sup>†\*</sup> Nadezhda N. Meleshenko,<sup>†</sup> Rassul A. Karabassov,<sup>‡</sup> Aizhan A. Ismailova,<sup>§</sup> and Natalia V. Kishko<sup>†</sup>

### Abstract

Infrastructure development of Astana suburban area remains imperative for the complete provision of comfortable life activities of the population. The principal objective of the research is to analyse the infrastructure development of Astana suburban area as part of the functions of central and local authorities. The authors assessed different groups of the infrastructure factors which finally allow concluding the extent of efficiency of the measures regarding the modernisation of the system of agro-food supply. To accomplish the objectives, necessary calculations are conducted in the research through the weight ratio method for the factors' assessment. The authors found that the provision of Astana suburban area population in various aspects will be most efficiently performed through the conclusion of the long-term agreement on the cooperation of the state authorities with the rural commodity producers. It was established that among the factors that contributed to the development of engineering and transport ground infrastructure, there was water supply, roads and public transport network. The most significant importance among environmental factors belongs to air pollution, water and soil. The complex assessment of the suburban area infrastructure allows to implement socio-economic zoning of the territory and unite them by the similar features into the assessment zones and sub-regions. The regional authorities implement the state programmes, carry out direct work with the economic entities, and provide the information to the higher-level authority. It was determined that the local authorities in the structure and content dealt with particular aspects of the agro-food market functioning.

**Keywords:** Factors of Infrastructure, 'Weight' Ratios, Infrastructural Provision, Surface Infrastructure Development, Supplies

<sup>†</sup> Department of Economics, Saken Seifullin Kazakh Agrotechnical University, 010011, 62 Pobedy Ave., Astana, Kazakhstan,

\*Corresponding Author, Email: [zadvorneva7@mail.ru](mailto:zadvorneva7@mail.ru)

<sup>‡</sup>Department of Marketing, Saken Seifullin Kazakh Agrotechnical University, 010011, 62 Pobedy Ave., Astana, Kazakhstan

<sup>§</sup> Department of Management, Saken Seifullin Kazakh Agrotechnical University, 010011, 62 Pobedy Ave., Astana, Kazakhstan

## Introduction

The processes of providing Astana population with food are a complicated economic system. In this regard, a special role is played by the organisational issues of planning and managing the development of the complex, organisational forms of implementation of the city's food supply. The research proves the efficiency of the central and local authorities in the regulation of the infrastructure development processes.

The authors determined the interconnection between the diversified public needs and opportunities of Astana suburban area, which is the capital of the Republic of Kazakhstan. On condition that there is a large number of various factors, for the complex assessment of the infrastructure, it is necessary to develop a system of specialised knowledge and its parameters. These values should correspond to a particular level, that is, they should have a 'single horizontal assessment'. The fundamental indicators of the factors have different measurement units which cannot be mathematically assessed, so it is reasonable to range the factors according to the homogenous nature of their properties and assess them according to the scoring system (Vertakova et al., 2005). We conducted a quantitative assessment of the city's suburban area infrastructure components using several criteria for each factory (Atanelishvili & Silagadze, 2018; Silagadze, 2018).

The consequence of the application of the weight ratio method is presented using the following steps (Zadvorneva, 2018) – the assessment criteria are formed; the value range for each criterion is contingent on a particular scale; the experts assign the weight ratio for each criterion; the results of the criteria assessment in relation to the weight ratio are determined; the groups of criteria are defined; the groups of criteria are assessed in relation to the significance ratio; the results of each group are summarised; the results are grouped by the highest and the lowest sum of factors (Kryukova et al., 2016). In light of these arguments, the following objectives drive this research:

- Probe the assessment factors for the method of determining the infrastructure arrangement of the suburban area of Astana;
- Single out groups of factors;
- Determine the "weight" ratios by the criteria of infrastructure improvement of the suburban area;
- Single out "problematic sectors" of development and infrastructure arrangement of the suburban agro-food complex;
- Determine the objectives of the marketing department and their impact on the development of infrastructure arrangement.

The following section discusses the review of the literature and teases out the gap that our research aims to address.

## Literature Review

Infrastructure is an objective reality, the development of which affects the course of economic processes. It represents a public service provided to all economic subjects on a common basis. Any organisation would benefit from the use of infrastructure facilities. Funds for the development and maintenance of infrastructure are usually withdrawn from the budget of the entity for which it is established and operates.

All economic schools recognise the fact that infrastructure is "... the main component of any system as the material basis of business processes" (Bondarenko, 2014: 290). A number of scholars have buttressed the infrastructure's definition as a material basis for the economy functioning (Nosova, 1983; Limonov, 2016; Krasovskiy et al., 1980), etc. Seemingly, there are also scholars who reinforce infrastructure's definition as a nationwide service to business structures functioning (Yashev, 2007; Cherniavskiy, 1979). The listed approaches reflect the progress of scientific knowledge of infrastructure from the creation of material support to a complete infrastructure system. At present, institutional, innovation, engineering, consultation, information and other kinds of

infrastructure started to exist in the independent form (Yegorov & Beketov, 2002; Stukach & Ushakova, 2015; Frolich et al., 2018).

N.D.Kondratiev, a representative of the Russian branch of institutional and social direction in economic science, said that the average life of production buildings determined the duration of a long cycle of infrastructure development. Their necessary replacement at the exit from a prolonged recession requires resources accumulation. The possibility of radical new investments brings the economy to the next stage of growth (Kondratiev et al., 2002).

P. Rosenstein Rodan introduced the concept of "infrastructure" in the economic literature (1944: 27), who defined it as "a set of general conditions that ensure the favorable development of private entrepreneurship in the main sectors of the economy and meet the needs of the entire population", included in the infrastructure of the "basic sectors of the economy..." (Rosenstein-Rodan, 1961: 34). Some scientists argue that the infrastructure system is in constant interaction with other systems of the region's economy and has with them direct and inverse ties which are subject to changes in time and space (Kazakhstan's strategy of joining 50 most competitive countries of the world, 2017; Silagadze, 2017). The others say that the agriculture infrastructure besides roads, warehouses and storage, also included the systems as "... infrastructure, directly involved in material production, does not create any final product, but live labour increases national income, although it does not change the material form of consumer value" (Krasovskiy et al., 1980: 53). According to the authors, a more complete list of factors of infrastructure development is revealed by A.V. Nikiforov (Nikiforov, 2002; Walker, 2018). These are:

- market factors that develop entrepreneurial activity in construction, infrastructure, service and other businesses and ensure the rapid growth of the suburbs;
- socio-organisational and socio-cultural factors including administrative forms of

management in suburban areas and social structuring of the population;

- socio-cultural factors promoting living in the suburban area as the most comfortable and acceptable for the population;
- ensuring social factors, including the development of infrastructure of consumption and recreation as well as the formation of appropriate consumer and recreational behaviour.

The main elements of the institutional infrastructure of the market are public governing authorities; NGOs; development institutions; cooperatives; commercial organisations engaged in production, scientific, information and legal support of market participants; financial and credit organisations, etc. Thus, the institutional structure coordinates and motivates market activity, and the market infrastructure creates conditions for market activity. Against these backdrops, this research aims to examine surface infrastructure development of Astana Sub-urban Area as a part of the functions of the Central and Local authorities. In the following section, we discuss the materials and methods.

### **Materials and Methods**

The list of factors is made up of the following schemes: factors' criteria are the quality indicators while the assessment vector is a quantity indicator. The task is concluded in the comparison of the various criteria's assessment vectors by different infrastructure sites in different settlements of the suburban area. For the factor assessment vector, we apply the scale from 0 to 10. The main factors of the city's suburban area infrastructure development, which determine the differences in the conditions of their functioning include— stability of agricultural production and its sustainable development; material-technical and scientific support of the agro-food sector; social conditions of the rural population's living; level of development of cultural-domestic service of population; transport accessibility to the labour and cultural-domestic centers; level of engineering equipment; landscape value of the

territory; environmental condition; etc. (Daribaeva et al., 2012; Shulenbaeva et al., 2013; Kaskataev & Zholmukhanova, 2013; Stukach et al., 2015; Gritsenko & Lukyanov, 2014; Zadvorneva, 2016; Kussaiynov et al., 2016). All the factors are united into groups for a complex assessment of the sub-urban area infrastructure development (Vasiliev, 2015; Zadvorneva, 2017; Zadvorneva, 2018; Onyusheva et al., 2018), which are as follows:

- FPI – factors which assess the component of production and promotion of the agricultural products to the regional market. These are the factors which regulate the reproduction process (Martin, 2011; Masahisa, 2011; Muesshoft, 2013).
- FSO – factors which assess the social needs of the suburban area. These are social life environment and the opportunities for functioning in the system.
- FFS – factors which assess the socio-functional connections of the territories which are a significant set of conditions which generally determine the living environment and the satisfaction of the population's needs.
- FIT – factors which assess the engineering-transportation equipment. The concept of infrastructural development implies the presence of opportunities to interact with the participants through the services and means of communication.

- FES – factors which assess the environmental situation in the territory. An essential condition here is a set of rules and the interaction between a human and nature. By the satisfaction of the needs in the factors of environment, we mean water, air, recreation, and absence of harmful emissions (Daumler, 2013; Damrongchai & Ron, 2010; Hausermann & Strom, 2014).

The research findings are narrated in the following sections.

## Results

### Assessment of Infrastructure Factors

As a whole, all groups of factors ensure the balance and sustainability of the system. A significant part of these indicators is obtained using the method of the expert assessments. As for the material base, resources, production volumes, and the indicators of the sphere of services – they are obtained based on the quantitative measurements, and some of them are derived from the information of the State Statistical Service (Concerning the Food Safety: Law of the Republic of Kazakhstan, 2007; Concerning State Regulation of the development of the agro-industrial complex and rural territories, 2005; Concerning the Approval of the Regional Development Program of regions until 2020, 2014; Commercial Code of the Republic of Kazakhstan, 2017). Assessment of 41 factors of the surface infrastructure development of the city's suburban area is presented in Table 1.

**Table 1: Assessment of Astana Suburban Area Infrastructure Factors**

No.	Name	Criterion	Score
F1	Agricultural Production	Diversified Production with Processing	3
		Agricultural Production without Processing	2
		Plant Growing Only or Animal Farming without Processing	1
F2	Increase in the Agricultural Production Volumes over the past five years	Two and More Kinds of Products	3
		One Kind of Products	2
		Absence of the Factor	1
F3	Promotion of Agricultural Products	Decrease of the Commercial Risks	7
		Decrease of the Transactional Costs	6

		Creation of the Conditions Necessary for Singing the Contracts on the Goods Supply	5
		Assistance in the Transfer of Ownership for Goods	4
		Assistance in the Transportation of Goods	3
		Creation of the Conditions for the Goods Promotion	2
		Adjustment of the Synergies between the Agro-industrial complex Spheres	1
		Absence of the Promotion	0
F4	Availability of the Services at the Enterprises (agrochemical, veterinary, consultative, and informational)	100 %	3
		75 %	2
		50 %	1
F5	Availability of the Production Infrastructure in the Territory	Sufficient	3
		Mean	2
		Low	1
F6	Risk of Poor Crop	One time per 10 years	3
		One time per 7 years	2
		One time per 5 years	1
F7	Financial Resources	Own Funds prevail	3
		Presence of Own and Loanable Funds	2
		Loanable Funds Prevail	1
F8	Labour Resources	Presence	3
F9	Capacities of the Enterprises	more than 75 % workload	3
		50–75 % workload	2
		less than 50 % workload	1
F10	Valuable Agricultural Lands	Irrigated Lands	3
F11	Fertile Lands	Soil Bonitet more than 30	3
F12	Other Agricultural Lands	Soil Bonitet less than 30	1
F13	Housing Stock	New Multi-Floor Houses with All Modern Conveniences	3
		One- and Two-Storeyed Houses with Partially All Modern Facilities	2
		One-Floor Buildings and Cottages prevail	1
F14	Cultural-Domestic Servicing including		
F15	Kindergartens	Availability Radius up to 1 km	3
		Availability Radius up to 5 km	2
		Availability Radius more than 10 km	1
F16	Schools	Availability Radius up to 1 km	3
		Availability Radius up to 5 km	2
		Availability Radius more than 10 km	1
F17		Presence of Sites	3

	Cafeterias, cafes and restaurants	Serviceable Site is beyond the Walking Distance Zone	2
		Absence of Sites	1
F18	Domestic servicing	Presence of Sites	3
		Serviceable Site is beyond the Walking Distance Zone	2
		Absence of Sites	1
F19	Shops	Presence of Shops	3
		Shop is beyond the Walking Distance Zone	2
		Absence of Shops	1
F20	Cinemas, theatres	Presence of Sites	3
		Serviceable Site is beyond the Walking Distance Zone	2
		Absence of Sites	1
F21	Hospitals, polyclinics	Presence of Health Care Institution	3
		Beyond the Walking Distance Zone	2
		Absence of Health Care Institution	1
F22	Business Centers	Presence of Site	3
		Beyond the Walking Distance Zone	2
		Absence of Site	1
F23	Universities, Colleges, Scientific and Project Organisations	Presence of Site	2
		Absence of Site	1
F24	Water Supply	Presence	2
		Absence	1
F25	Canalisation	Adjacent to the Sewage Networks	2
		No Sewage System	1
F26	Heat and Hot Water Supply	Presence	2
		Absence	1
F27	Gas	Presence	2
		Absence	1
F28	Electricity	Presence	2
		Absence	1
F29	Suppliers	Presence	2
		Absence	1
F30	Road Network	Adjacent to the Nationwide Railroads	3
		Adjacent to the Regional Railroads	2
		Adjacent to the Railroads of the District	1
F31	Public Transportation Network	Railroad Stations and Bus Stops are available	3
		Only Railroad Stations/Bus Stops are available	2
		Public Transport is not Available	1
F32	Landscaping	Plants and Forests are Available	3
		Only Plants are Available	2
		Not Enough Plants in the Territory	1
F33	Sanitation	Sanitation of the Territory is 1 time per year	1
		Not Conducted	0
F34	Compliance with the Construction Standards	Housing Density is Close to the Standard	3
		Presence of incomplete construction, waste grounds, ruins, and misuse of the land	2
		Absence of Buildings and Surface Infrastructure Development	1

F35	Distance between the Settlements	0.5-Hour Accessible from Astana	3
		0.5- Hour Accessible from the District Center	2
		Far from any Population Hubs	1
F36	Distance between the Settlements and Labour Sites:	For Agriculture: less than 15 km	4
		more than 15 km, but less than 25 km	3
		more than 25 km, but less than 40 km	2
		more than 40 km	1
		For Production: less than 1500 m	4
		more than 1500 m, but less than 2500 m	3
		more than 2500 m, but less than 4000 m	2
		more than 4000 m	1
F37	Interconnection of the Territory with the System of Public Services of the Central Part of the Rural District	Less than 5 km	6
		More than 5 km, but less than 10 km	5
		More than 10 km, but less than 15 km	4
		More than 15 km, but less than 25 km	3
		More than 25km, but less than 40 km	2
		More than 40 km	1
F38	Interconnection of the Settlements and the Recreational Territories	Less than 10 km	5
		More than 10 km	4
		More than 15 km, but less than 25 km	3
		More than 25 km, but less than 40 km	2
		More than 40 km	1
F39	Air Pollution	Harmful Substances: less than 0.8 MCL	3
		0.8-1.0 MCL	2
		more than 1 MCL	1
F40	Water Pollution	BOD Water Quality: BOD 0–2	3
		BOD 2–4	2
		BOD more than 4	1
F41	Soil Pollution	General Indicator Zo: less than 1	3
		1-10	2
		10-100	1

The reduction of the scores to the single proportioned scale, that is, 'weight' scale, is necessary for the free data operating (Vertakova et al., 2005). The 'weight' of the factor is determined by the method of expert assessments, regulatory documents, availability of the production and specialised infrastructure of agro-food sector, by the production itself, the availability of all the resources, capital costs, accessibility of the places of labour, culture-

domestic services, and availability of the engineering network. Assessment of the importance of a factor in the entire assessment of the suburban area infrastructure is determined individually for each settlement (Aydpakelov, 2017a; Aydpakelov, 2017b).

#### **Determination of Weight Ratios**

Weight ratios are calculated as follows: we united the factors into the groups, amount of which

should be equal to one: F1-F6 is the value of the production and production infrastructure; F7-F9 is the value of the suburban area resources; F10-F12 is the value of the land resources of the agricultural production sector; F13-F23 is assessment of social factors; F24-F34 is an assessment of the factors of engineering-transportation surface infrastructure development; F35-F38 are factors of the settlements' functional connections, and F39-F41 are environmental factors. The average weight ratio is calculated through the division of the

same name expert assessment factors' sum to the number of experts, that is, the average value is deduced. There is a particular calculation for F15-F23 factors when the ratios sum up to one but are in the CDS (F14) system, which has its weight ratio in the group. In this regard, it is necessary to assess factors F15-F23 separately, and then to standardise the indicator according to weight F14. The calculation of the weight ratios is presented in Table 2. 24 experts took part in the assessment.

**Table 2: Determination of Weight Ratios by the Criteria of the Suburban Area Surface Infrastructure Development**

Factor		Expert No.										Weight Ratio
No.	Name	1	2	3	4	5	6	7	...	24	Sum	
1	2	3	4	5	6	7	8	9	10	11	12	13
<b>F1-F12</b>	<b>Factors of Production and Production Infrastructure including the AGS Production Material Base</b>											
F1	Agricultural Production	0.1	0.1	0.1	0.1	0.2	0.1	0.35	...	0.15	1.2	0.15
F2	Increase of the Production Volume	0.1	0.1	0.15	0.15	0.1	0.1	0.15	...	0.1	0.95	0.119
F3	Promotion of Products	0.1	0.1	0.2	0.1	0.1	0.2	0.2	...	0.15	1.15	0.144
F4	Availability of Infrastructure Services	0.1	0.2	0.15	0.1	0.1	0.1	0.05	...	0.1	0.9	0.113
F5	Sites of Production Infrastructure	0.45	0.3	0.3	0.45	0.3	0.3	0.2	...	0.4	2.7	0.337
F6	Risk of Poor Crop	0.15	0.2	0.1	0.1	0.2	0.2	0.05	...	0.1	1.1	0.137
F7	Financial Resources	0.7	0.2	0.3	0.3	0.5	0.5	0.1	...	0.3	2.9	0.362
F8	Labour Resources	0.1	0.5	0.35	0.55	0.2	0.2	0.4	...	0.3	2.5	0.313
F9	Capacities of the Enterprise	0.2	0.3	0.35	0.15	0.3	0.3	0.5	...	0.4	2.6	0.325
F10	Irrigated Lands	0.15	0.5	0.35	0.73	0.5	0.5	0.5	...	0.4	3.63	0.454
F11	Fertile Lands	0.35	0.4	0.35	0.22	0.4	0.4	0.3	...	0.3	2.72	0.34
F12	Other Agricultural Lands	0.5	0.1	0.3	0.05	0.1	0.1	0.2	...	0.3	1.65	0.206
<b>F13-F23</b>	<b>Social Factors</b>											
F13	Housing Fund	0.25	0.6	0.55	0.7	0.6	0.6	0.6	...	0.4	4.3	0.538
F14	CDS including:	0.75	0.4	0.45	0.3	0.4	0.4	0.4	...	0.6	3.7	0.462



F15	Kindergartens	0.1	0.05	0.05	0.04	0.04	0.03	0.05	...	0.1	0.46	0.058
F16	Schools	0.1	0.08	0.05	0.08	0.06	0.06	0.07	...	0.09	0.59	0.073
F17	Cafeterias, cafes and restaurants	0.1	0.04	0.02	0.01	0.02	0.02	0.02	...	0.06	0.29	0.036
F18	Domestic Servicing	0.1	0.02	0.04	0.01	0.03	0.03	0.02	...	0.02	0.27	0.033
F19	Shops	0.1	0.11	0.1	0.08	0.08	0.08	0.09	...	0.1	0.74	0.092
F20	Cinemas and theatres	0.07	0.02	0.04	0.01	0.03	0.02	0.025	...	0.09	0.305	0.038
F21	Hospitals	0.07	0.05	0.06	0.04	0.06	0.06	0.06	...	0.04	0.44	0.055
F22	Business Centers	0.06	0.01	0.04	0.01	0.02	0.04	0.025	...	0.05	0.255	0.033
F23	Universities and Colleges	0.05	0.02	0.05	0.02	0.06	0.06	0.04	...	0.05	0.35	0.044
<b>F24-F34</b>	<b>The Factor of Engineering and Transport Improvement</b>											
F24	Water Supply	0.06	0.09	0.08	0.22	0.1	0.06	0.08	...	0.25	0.94	0.118
F25	Sewage System	0.05	0.09	0.06	0.1	0.1	0.06	0.08	...	0.07	0.61	0.076
F26	Heat Supply	0.06	0.09	0.07	0.08	0.1	0.06	0.057	...	0.06	0.577	0.072
F27	Gas	0.06	0.07	0.04	0.08	0.1	0.06	0.063	...	0.04	0.513	0.064
F28	Electricity	0.06	0.09	0.1	0.15	0.1	0.06	0.09	...	0.03	0.68	0.085
F29	Suppliers	0.06	0.06	0.05	0.04	0.09	0.05	0.03	...	0.03	0.41	0.051
F30	Roads	0.17	0.09	0.2	0.19	0.09	0.18	0.25	...	0.02	1.19	0.149
F31	Public Transportation Network	0.18	0.08	0.1	0.04	0.07	0.17	0.15	...	0.15	0.94	0.118
F32	Planting	0.12	0.07	0.15	0.02	0.08	0.05	0.08	...	0.15	0.72	0.09
F33	Sanitation	0.09	0.06	0.08	0.03	0.1	0.15	0.05	...	0.05	0.61	0.076
F34	Compliance with the Construction Standards	0.09	0.21	0.07	0.05	0.07	0.1	0.07	...	0.15	0.81	0.101
<b>F35-F38</b>	<b>The Factor of Functional Connection of the Settlements</b>											
F35	Connection between the Settlements	0.26	0.25	0.25	0.09	0.3	0.25	0.08	...	0.2	1.68	0.21
F36	Connection of the Settlements with the Labour Hubs	0.23	0.3	0.35	0.45	0.3	0.25	0.3	...	0.3	2.48	0.31
F37	Connection with the CDS	0.27	0.25	0.25	0.26	0.2	0.25	0.5	...	0.3	2.28	0.285
F38	Connection with the Recreation Territory	0.24	0.2	0.15	0.2	0.2	0.25	0.12	...	0.2	1.56	0.195
<b>F39-F41</b>	<b>Environmental Factors</b>											
F39	Air Pollution	0.3	0.3	0.25	0.65	0.5	0.6	0.3	...	0.2	3.1	0.387

F40	Water Pollution	0.3	0.3	0.25	0.2	0.3	0.2	0.28	...	0.2	2.03	0.254
F41	Soil Pollution	0.4	0.4	0.5	0.15	0.2	0.2	0.42	...	0.6	2.87	0.359

At the adjustment of the scores to the single unified significance of the factors in group F1-F6, the greatest weight ratio is noted by the experts regarding the sites of production infrastructure. Among the F7-F9 factors, weight ratios seem to be almost the same – by a third, while they were higher among the financial resources. Among the factors of engineering-transport improvement F24-F34, water supply, roads and public transportation network are distinguished by high ‘weight’ ratios; the environmental factors F39–F41 have a high value: air, water and soil pollution. The indicators of each factor of the assessment considering the weight ratios are determined according to the following formula:

$$H_p = B_p \times K_v \tag{1}$$

Where  $H_p$  is a weight indicator of the assessment factor;  $B_p$  is score;  $K_v$  is weight ratio.

‘Weight’ ratios are determined for each factor. So, the transition of the score assessment to the weight one by the factor of ‘agricultural production’ is calculated as follows:

$$1^{st} \text{ category} - 3 \text{ scores} - 3 \times 0.15 = 0.45;$$

$$2^{nd} \text{ category} - 2 \text{ scores} - 2 \times 0.15 = 0.3;$$

$$3^{rd} \text{ category} - 1 \text{ score} - 1 \times 0.15 = 0.15.$$

The determination of weight indicators of each factor allows to sum up various indicators and divide them into units.

**Assignment of the ‘Weight Ratios’ to the Factor Groups**

The second step in the assessment of the suburban area infrastructure development was the assignment the weight ratios to the factor groups by the experts. Subjectively, each group was assigned a ratio of weight (significance), because the groups are not equal (Table 3).

**Table 3: ‘Weight’ Ratios of the Factor Groups in Assessment of the Suburban Area Infrastructure Development**

Expert No.	FPI	FSO	FFS	FIT	FES
1	0.40	0.10	0.10	0.15	0.25
2	0.30	0.2	0.10	0.20	0.20
3	0.12	0.25	0.20	0.25	0.18
4	0.30	0.20	0.17	0.17	0.17
5	0.30	0.30	0.10	0.20	0.10
6	0.18	0.20	0.15	0.22	0.25
...	...	...	...	...	...
24	0.18	0.25	0.22	0.1	0.25
Sum	6.12	5.19	3.63	4.38	4.71
‘Weight’ Ratio	0.255	0.216	0.151	0.182	0.196

The indicators of assessment of each group of factors, taking into account their ‘weight’ ratios, are determined according to the following formula:

$$Y_p = F_p \times K_{v2} \tag{2}$$

where  $Y_p$  – ‘weight’ ratio of the group of assessment factors;

$F_p$  – summed weight ratio of the indicator assessment factors;

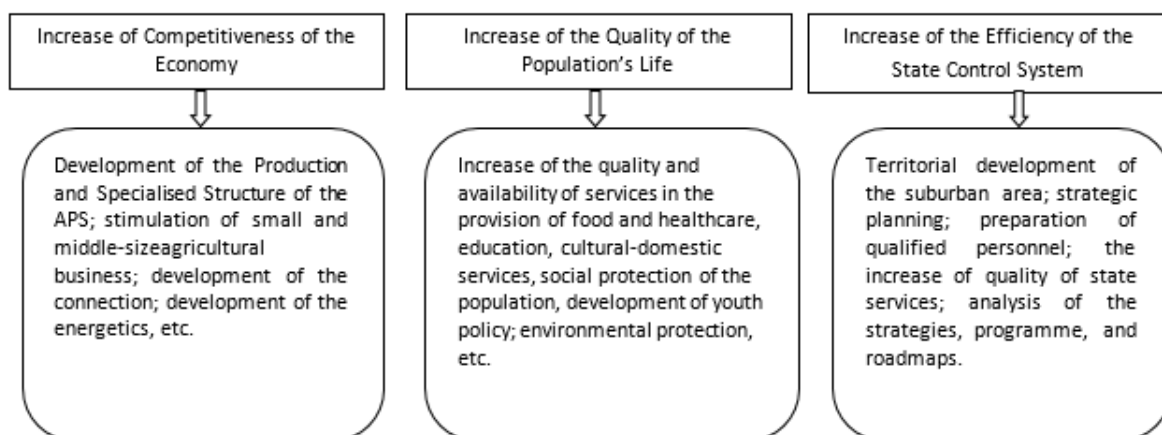
$K_{v2}$  – ‘weight’ ratio of the group.

**Table 4: Structural Correlation of the Assessment Zones of the Astana Suburban Areas Infrastructure Development**

Assessment Zones	Assessment Interval	Number of Settlements	Structural Correlation, %
If the interval is equal to 0.52			
Well-Developed	Above 3.96	5	11.0
Sufficiently-Developed	3.42–3.95	26	56.5
Underdeveloped (Emerging)	3.10–3.41	15	32.5
Total	–	46	100.0
If the interval is equal to 0.31			
Well-Developed	Above 4.00	4	8.7
Developed	3.91–4.00	2	4.3
Sufficiently-Developed	3.71–3.90	8	17.4
Poorly-Developed	3.40–3.70	17	37.0
Underdeveloped (Emerging)	3.10–3.39	15	32.6
Total	–	46	100.0

Having assessed all the factor groups, we present the summary (Table 4) from the assessment of the suburban area settlements' infrastructure development. For its calculations, we used the information of the electronic IDs of all the suburban area settlements. The indicators of the complex assessment of suburban districts infrastructure are based on summing the probably integrated indicators of the

independent individual assessments by the group of factors, taking into account their significance (OECD, 2013; European Commission, 2007; Popper, 2007; OECD-FAO Agricultural Outlook 2015-2024, 2015). Using the assessment, it was determined that the direction of the infrastructural development and the development of the agricultural sector production (Figure 1).



**Figure 1: Highlight of the 'Challenging Development Sectors' in the Suburban Agro-Food Complex Infrastructure Development**

**Discussion**

The issues of Astana suburban area development are included in the system of the

central and local authorities' functions in the Republic of Kazakhstan (State programme of industrial-innovative development of the Republic of Kazakhstan for 2015-2019, 2013; State

programme of development of the agro-industrial complex of the Republic of Kazakhstan for 2017-2021, 2016; State programme of the Republic of Kazakhstan "Agribusiness – 2020", 2013; Ushakov et al., 2017).

Under the control of the RK Ministry of Agriculture and its departments, there are 19 Republican state enterprises including Phytosanitary, republican veterinary laboratory, aviation base, selection centres, fish factories, project institutions, Kazagreks JSC, Astana Kus JSC, Kazgerkus JSC, KazAgro JSC NMH, 39 Republican state establishments and 450 territorial inspections. The Republic of Kazakhstan is a unitary state with a 2-level control system. The first level is the administrative-territorial units of general state subordination; the second level is the state control over the agriculture and rural territories, being supervised by the local administration (Strategical Plan of the Stable Development of the City of Astana to 2030, 2006).

An important role is played by the solutions and programmes of agriculture and rural territories adopted at the national level ( Akhmetshin et al., 2018a; Akhmetshin et al., 2018b; Krylatykh, 2011; Nosova, 2016; Sharafutdinov et al., 2018).

An important position in the regulation of the suburban area infrastructure development is occupied by the Department of Marketing and Processing of agricultural products of Agricultural Administration of Akimat of Akmola Oblast State Entity, performing the following functions:

- Elaboration and implementation of the regional programmes on the development of the agricultural products' processing;
- Implementation of the complex of works connected with the activities of the enterprises which deal with the agricultural products' processing;
- Implementation of the policy on the expansion of the networks of the processing enterprises;

- Monitoring of the service centres in the regions of the suburban area;
- Coordination of the rural consumption cooperatives and the activities of the service organisations in the APC sphere;
- Creation of the conditions for the formation and development of competitive production, their modernisation, and transition to the international management quality systems for the agricultural products processing;
- Participation in the subsidisation of the costs of the agriculture products' processing enterprises for the production of the deep processing products;

These are the following tasks of the Department of Marketing and Processing of the Agricultural Products of the RK Ministry of Agriculture:

- Collection and distribution of the information on the state and development of the agricultural complex into the authorised bodies regarding the issues of development of the agriculture products' processing;
- Implementation of the measures on the formation of the food belt around Astana;
- The organisation of the regional exhibitions and fairs of agriculture products;
- Monitoring of the agricultural products of the sales market and development of the information-marketing system in agriculture;
- Creation of the conditions for functioning and development of the APC information-marketing system;
- Monitoring of the prices for the essential food products and crops grown in the territory of Akmola Oblast;
- Implementation of the measures on the distribution and introduction of the

innovative APC experience of the region financed by the local budget.

The local authorities in the structure and content deal with particular aspects of the agro-food market functioning. The regional institutions which govern the agro-food market of Astana ensure the complex approach to the regulation process not to the full extent. Namely “...the forms of state support, coordination and cooperation, control of local authorities more than fully revealed the category of the interaction and increased the efficiency of the cooperation between the local and state authorities” (The Statistics Agency of the Republic of Kazakhstan: 1).

### Conclusion

Thus, the strategy of the agro-food complex modernisation and provision of the regional population with high-quality food is ensured due to:

- consistent development of the institutional infrastructure of the agro-food complex,
- provision of all the phases of the suburban APC reproduction with the infrastructural sites,
- state support of the suburban agricultural producers as part of the World Trade Organisation;
- provision of ‘green box’ containers;
- support of the cooperation between the agricultural producers;
- development of the material and technical base.

According to the results of the assessment of the groups of infrastructure factors, one can define the tasks of further development. In particular, there should be formulated the priorities in the activities on overcoming the challenges of the suburban agro-food complex infrastructural development and social provision of the Astana suburban area population’s life activities.

The developed methods of the assessment of the infrastructure factors allows to judge about the efficiency of the measures on development of the infrastructure institutions in the system of the agro-food supply. An efficient mechanism of

cooperation between the government and the agricultural producers can be long-term Agreements on the Trade-Economic and Social Cooperation.

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