

ASSESSING THE VIABILITY AND RESILIENCE OF PERI-URBAN AREAS

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ABSTRACT

The aim of the study was to identify the features of the spatial development of peri-urban areas of the city of Pavlodar, which is one of the largest industrial centers of Kazakhstan, and the factors affecting the viability and sustainability. Peri-urban areas in close proximity to urban areas have many spatial characteristics. These features set them apart from other rural areas. The article analyzes and summarizes the methodological and empirical approaches of foreign authors to the study of located peri-urban areas, the mechanism of relationships in the development of urbanized areas. The necessity of studying suburban areas within the agglomeration has been substantiated. The analysis and evaluation include a review of the sources of empirical research on rural development in urban areas.

Based on the analysis and assessment of peri-urban areas of Pavlodar, factors influencing the viability and sustainable territorial development are identified. The results showed that there is a significant relationship between spatial factors and the assessments of the livability of individual peri-urban areas.

Keywords: Peri-Urban Areas, Quality Of Life in Rural Areas, Social Infrastructure, Spatial Development, Land Use, Environmental Impacts, Resource Management System, Rural Migrants, Economic Opportunities.

JEL Classification: O18, I3, R23, L26, R1

INTRODUCTION

New research shows that the prevalence of health problems is related to pollution. The reason for this is that cities are hot spots for water, soil and air pollution, which is associated with a history of industrialization and a heavy reliance on road transport. In addition, large cities play an important role in the huge consumption of ecosystem resources such as water, forests and aquatic ecosystems. More habitable settlements create a greater sense of community, and in such settlements the level of ownership and migration is lower. Most residents in each community see resilience as a factor in improving living conditions, shopping, recreation, child development, and building communities of friends and family. But it should be noted that a positive attitude towards a community does not necessarily mean that that community is a good position in terms of livability. The reason for this is that people who are unhappy with their life situations can have a positive attitude towards the community they are in.

Rural suburban districts and townships have numerous and varied problems. However, all problems do not have the same meaning at the same time, but it is clear that they all affect the quality of life and livability. The main purpose of this article is to analyze and explain the spatial factors on a local and regional scale, affecting the livelihoods and sustainable development of rural suburban districts in the Pavlodar zone.

LITERATURE REVIEW

Viability-associated with sustainability, quality of life, and place of residence (Norris & Pittman, 2000). Quality of life includes a wide range of measurable indicators and criteria (Perogordo Madrid, 2007). The criteria should be determined from a balance between social, economic and environmental indicators (Council & National Research Council, 2002). Viability should be defined in such a way that its components and factors are identified and evaluated for a particular community. Interactions between social and environmental development play an important role in the concept of viability (Congreve, 2012; Helleman & Wassenberg, 2003; Pranav et al., 2011; Reeder, 2011; Ruth et al., 2006). Viability is the link between the environment and the social life it supports (Hankins & Powers, 2009; Zanella et al., 2015; Khan et al., 2020).

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Over the past two decades, there has been an increased interest in the international community in improving the living standards of communities and a growing commitment by governments to provide structure, tools and data for planning and building livable communities (Faiz et al., 2012; Chi, 2013; Karim et al., 2020).

The Livable Communities initiative (USA) addresses a wide range of non-economic issues related to the development and quality of life in rural areas. Two of these issues are very important to rural development in the United States: conserving natural resources and controlling problems associated with settlement sprawl.

Decreasing settlement sprawl tends to be in peri-urban areas. Employment opportunities in urban areas, low property prices in rural areas, are pushing for living in close proximity to urban areas. Although this may improve the quality of life in some suburban villages, the extensive transport artery system poses major problems for rural areas, including congested roads, problems with water supply and sanitation (Reeder, 2011).

Sustainability and Ecological Land Management in Sweden. In this study, «resilience» is made up of (interactions between) five variables: local residents, community life, service level, local economic development and physical location itself. As far as local residents are concerned, their numbers, demographic (age and gender) structure and lifestyle are of great importance. Community life refers to the social interaction between the villagers and fosters a spirit of community and mutual assistance. Services such as communication, school, shopping are essential for living in villages. The economy is based on sources of income and employment. The term «physical place» refers to the landscape, and buildings in this landscape, the physical place primarily affects the local people and the economy. The attractive geographic location has proven to be one of the reasons that people continue to live in a certain area or move to it. Depending on the balance between permanent residents and guests, and whether the permanent residents are geographically or functionally integrated, the impact on the community life variable and service level is assessed. The link between physical place and economy is most obvious (Vergunst, 2003; Zhang et al., 2003).

«Rural Livable Area Assessment Index System» in China. The experimental model is implemented in the Chinese province of Henan (Wang, 2010).

Rural Livability Indicators:

- Education (is a measure for assessing the level of education in rural areas);
- measurement of living conditions, including the standard of living of people;
- medical care and health status in rural areas - ease of access to treatment;
- Measurement of social security in villages.

«Advanced Urban Metabolism» in Australia. In the Australian context, the key issue is the viability of suburban lands, their growth, given the low density of use. Many of these areas

are experiencing rapid population growth, but the lack of jobs and weak infrastructure is having a negative effect (Newman, 2004).

The concept of suburban rural areas was first used by Anglo-Saxon and American geographers in the 1940s and 1950s (Saeedi, 2004). In the late 1960s, Pryor attempted to classify the complex and varied concept used in expressing change caused by «suburban interconnection» by analyzing the different stages of land use integration. He also used this concept to express the differences between suburban and rural areas. This distinction is based on the premise that peri-urban areas have higher population densities, commercial and industrial densities, as well as higher population growth rates, increasing land-use change processes, and shifting patterns of mass communication and transport between residence and place of work, compared to the average rural and urban areas (Van Oostrum, 2013).

In this regard, in the 1970s, extensive theoretical and conceptual discussions about these concepts arose and new terms were introduced. Several scholars have tried to distinguish between the city and its surroundings. Others have tried to distinguish between peri-urban and rural-urban areas, and even some have introduced terms such as non-agricultural rural areas and agricultural rural areas to explain the differences in peri-urban areas (Kennedy et al., 2007; Swyngedouw & Heynen, 2003).

As cities grow, governments inevitably rely on converting rural spaces to urban use to provide enough space for urban expansion (Miller et al., 2013).

The main purpose of this article is to analyze and explain the spatial factors on a local and regional scale, affecting the livelihoods and sustainable development of rural suburban districts in the Pavlodar zone.

METHODOLOGY

The main goal of the research consists of two main stages:

- The first stage includes the identification of the features and factors of the spatial development of rural suburban areas of the city of Pavlodar (Pavlodar region), affecting the viability;
- The second stage, identifying criteria for assessing the improvement of rural suburban villages, as well as proposing a strategy for maintaining and improving the well-being of the territories.

The article provides an analysis of international studies, as well as a review of sources devoted to empirical studies of the development of rural areas, analysis of statistical information on trends in the development of rural suburban areas. In the course of the study, questionnaires with relevant indicators were developed and 17 experts were identified, with whom a pilot survey was conducted regarding the assessment of the quality and accessibility of basic living conditions, social services, development of territories (in 8 settlements located in the immediate vicinity of the city).

Data analysis was performed using statistical methods. Quantitative and qualitative analysis of the data was carried out using the SPSS software. To assess the reliability of the data obtained, Cronbach's alpha coefficient was used, which in this case was 0.995, which indicates a high reliability of the questionnaire.

To collect data, documentary and survey methods were used. Scientific resources such as books, research papers and projects, websites have been researched to learn from international experience. Methods of direct observation and questioning were used to collect data on individual villages, as well as statistical information and data from state authorities were studied.

The collected empirical material and its analysis made it possible to determine the spatial factors and their role in the formation of the habitability of peri-urban areas of Pavlodar.

RESULTS

The city of Pavlodar is the regional center of the Pavlodar region. Rural districts in the southeast, south and west of Pavlodar are mostly used as a site for the disposal of industrial waste and solid waste, as well as for the residence of workers who work in the city. At the same time, within the framework of the state programs «Nurly Zhol» and «Nurly Zher» in these rural districts and settlements, the construction of roadways, infrastructural communications, the development of some municipal facilities and telecommunication networks is observed. These changes in peri-urban areas have led to widespread changes in demographic, social, economic indicators. In this regard, the physical development and population growth in these rural districts and settlements is high, as well as high rates of internal migration.

Overall, the improvement in rural housing conditions in the southeast, south and southwest of Pavlodar has brought about social, economic and physical changes. Changes in agricultural land use, environmental pollution, higher land and housing prices, stagnation in agricultural and livestock activities, and social and cultural tensions in rural districts are negative consequences of this transformation

Rural districts and villages in the suburbs of Pavlodar, due to the special position of proximity to the city, have many spatial features. This feature not only distinguishes settlements from other rural areas, but also distinguishes such settlements from urban outskirts. On the other hand, they are very different from Pavlodar and affect the development of the city. Spatial characteristics affecting individual villages are as follows: population size, population growth, distance to Pavlodar, distance to main roads and main roads, share of residents, share of non-agricultural land use, origin of immigrants.

Review of spatial factors. To obtain descriptive research results, questionnaire data were entered into SPSS. Consider the estimates obtained on the basis of vitality indicators. To do this, in each village for each indicator, an average score is indicated, then, based on the assessment indicators of each dimension, indicators in each village are determined. As a result, in terms of three parameters, the mean and standard deviation of habitability in the selected villages are determined, Table 1.

Indicator	Value	Standard deviation
The economic	Feb-64	13-Jan
Social	Feb-45	24-Jan
Environmental	Jan-65	14-Jan

Source: Compiled by the authors

Settlements	Spatial Factor								
	Share of immigrants in relation to the total population	Origin of immigrants	Share of non-agricultural land use	Share of residents renting housing	Distance to the main arterial road	Distance to Pavlodar	Population of Pavlodar	Population growth	Population size
Baidala	83.42	7.15	96.97	33.4	1.5	2	360502	7.01	2493
Pavlodarskoe	36.49	32.36	37.77	29	1	3	360502	8.86	3858
Kenzhekol	92.7	69.91	92.7	42.86	3	3	360502	3.72	2178
Moyildy	36.49	32.36	36.49	29	1	3	360502	8.86	3858
Leninsky	95.26	70	95.26	35.9	2	2	360502	7.62	3663
RedArmy	47.14	66.67	47.14	33.34	2	2	360502	6.96	1182
Shakat	95.3	56.25	95.3	20	0	1	360502	5.75	544
Michurino	66.92	15.39	66.92	0	2	2	360502	1.85	706

Source: Compiled by the authors

In Table 2, we will consider the status of settlements in terms of spatial factors. Based on the indicators, estimates for each dimension are determined in each village.

Using the method that is used to analyze a set of regression with several variables, we combine factor analysis and regression in the form of various relationships and simultaneously explore them. Since visible and hidden variables can be defined as independent and dependent variables, the study considers viability as the dependent variable and the independent variable as spatial factors. Data analysis was carried out in two stages. The first step was to assess the reliability and compatibility of the preferred options. The likelihood assessment was carried out in the second stage, and the suitability was tested for modeling structural equations and testing hypothetical routes. Structural equation modeling software was used to test the hypotheses of the study and implement the conceptual model. The model interpretation consists of two parts: the first part was to interpret the hypothesis test, if the significant coefficients are not in the (between -1/96 and 1/96), the hypothesis is confirmed. In the second part (for all realized models) the interpretation of the suitability model was considered by the corresponding index.

When models are similar functions, we have the opportunity to test and evaluate the model. There are several indices for evaluating the model, which are presented in three categories: absolute, relative and adjusted.

Standardized coefficients allow direct comparisons of the relationship between the independent and dependent variables. Given the significant values that were not in the intervals (between - 1/96 and 1/96), it can be said that spatial factors influence the vitality of suburban villages.

Having studied the relationship between spatial factors and suitability for life, it was found that the criterion of significance is greater than 2 and less than -2 [-2, 2]. Consequently, there was a significant relationship between all spatial factors and living conditions. Only two factors «Distance to Pavlodar» and «The share of immigrants in relation to the total population» have a negative impact on livelihoods. This means that an increase in these two factors lowers the standard of living. The reason for this is the very strong influence of the city of Pavlodar on economic indicators. The proximity to Pavlodar leads to an increase in employment and earnings opportunities, but the heterogeneity due to the presence of immigrants in the villages leads to a decrease in the standard of living in rural suburban villages.

The results of the structural model between spatial factors and viability are discussed in Table 3.

Research hypothesis	Standard coefficient (β)	t-value	Result
Spatial factors of life activity	-0/15	-4/23	Essential
X ² =75.490, df=229, RMSEA=0.057, GFI=0.57, AGFI=0.96, CFI=0.97, NFI=0.94, RMR=0.025			

Source: Compiled by the authors

It was found that one of the characteristics that can affect the livability is the population of the rural residence. For various reasons, the population can affect life in rural areas. But in recent years, the decline in the number of settlements in Kazakhstan for various reasons, such as the country's economic dependence on oil revenues, deprivation and rural poverty, lack of professional diversity, has increased the rate of growth of migration to other regions (Bespalyy, 2021). At the same time, rural suburban settlements have been able to provide residents with great opportunities in terms of social and economic aspects. This issue has provided favorable conditions for the admission of migrants and positive population growth. Also, the size of the population of any city affects the use of amenities and various services. Consequently, proximity to cities with different populations can affect the viability of rural suburban settlements in different ways. In other words, settlements influenced each other through the distance factor.

Pavlodar, as the industrial center of Kazakhstan, has a wide and profound impact on the surrounding urban and rural settlements. One of the opportunities that are available for rural suburban settlements is the proximity to major roads. Major roads link cities to their immediate peri-urban areas. These roads also connect cities and towns with each other.

CONCLUSION AND RECOMMENDATIONS

During the study, it was revealed:

1. The placement of rural settlements in the adjacent urban areas of Pavlodar and access to urban facilities cannot guarantee the formation of conditions suitable for a comfortable life of the population. In particular, in rural suburban settlements that adjoin urban areas, due to leaving their permanent place of residence, migrants who move to the city experience many different problems and difficulties that undeniably affect their quality of life. Accordingly, the study of factors affecting the life of suburban villages is of great importance.
2. Due to the proximity of cities, rural peri-urban settlements have a number of spatial features that distinguish them from other settlements in rural areas. According to research, taking into account the influence of the spatial characteristics of the village and their impact on livelihoods is a necessary procedure. The most important implications of this model include the following: accelerated changes in agricultural use, increased immigration, and gradual linkages between townships and cities. Accordingly, the study of factors affecting the life of suburban villages can be of great importance. On the other hand, viability must be viewed as a critical issue by rural and regional development planners.
3. The aim of the research work was to present the process of the formation of livability in suburban villages, as well as to identify the spatial factors that affect the livability in these villages. The vitality of rural suburban settlements includes the accessibility, distribution and design of public space, opportunities for social participation and recreation, and the general health and economic well-being of the villagers. Through this study, it was found that rural suburban settlements face various challenges, such as urban sprawl in Pavlodar, climate change, financial problems, water scarcity, regional growth points, these problems strongly affect the viability (Bespalyy et al., 2021). The physical environment of the community must be maintained in such a way that the villagers have a habitable place to live. Viability in villages, especially in peri-urban areas, is closely linked to society within rural districts.
4. Factors such as a variety of economic activities, rising land prices in urban centers and city boundaries, expansion of communication networks, development of public transport, widespread use of cars, lack of land or a ban on land use in urban areas, the arrangement of large industrial and service subdivisions are important factors leading to uneven urban development. These factors at the stage of urban development led to the fact that a significant part of the population is located on the outskirts of cities, as well as in the dislocation of rural suburban districts and villages.
5. Peri-urban areas are places for the creation of economic opportunities, and allow their residents and newcomers to enter into a process of slow socio-economic renewal. Socio-economic opportunities arise from a range of spatial, legal, socio-cultural and economic conditions that distinguish them from the city and other rural districts, areas that are not geographically close to the city. Government policies and territorial development planning strongly affect the viability of villages, as well as affect the state of infrastructure facilities, communications, buildings and structures located in the territory of villages.

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