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Research paper

Improvement of Functional Planning Organization of Rural Settlements in Suburban Zones

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Abstract

The purpose of the article is to define the principles of functional and planning organization of suburban rural settlements (SRS) and to determine the main techniques corresponding with them.
Researches, which were conducted, and analysis of existing experience of formation of settlement planning structure and summarizing research and methodics literature determined allocation of principles of unity with central city, functional specialization, alternativeness and systematics of town-planning documentation updating.
The following methods guarantee implementation of them: organic integration of objects of small business and service into the production-residential and production-service formations as new design objects, formation of new town-forming functions of settlements: businesses, services, recreations; formation of different functional types of SRS, considering dependence of plan structure on external transport corridors and natural features; forming SRS with a number of functions: monofunctional, bifunctional, multifunctional; identification of the most suitable way of development of SRS according to the defining factors of development and its gradual formation as certain type, the choice of the defining factors of development and mark assessment based on the defining factors of development; transformation of structural parts of the settlement and their re-profiling into a different function.
Recommendations for improvement of functional and planning organization of different SRS types have been developed.

Keywords: *suburban zone; functional planning organization; suburban rural settlements (SRS); principles of unity with central city, functional specialization, alternativeness and systematic of town-planning documentation updating*

1. Introduction

Changes in society and social and economic transformation, which nowadays occur in rural areas of our country cause a number of problems: interrelation of planning and land management issues, low density of building up of rural settlements, absence of places of employment and conditions for the reproduction of human capital. This is often detected in expansion of the territory of villages with reduction of the population of settlements and consequently density of building up and settlement of villages. These processes also exist in suburban villages. Therefore it is important to research the processes, which occur in suburban villages, as well as development of principles and techniques concerning improvement of their functional planning organization.

1.1. Review of Research and Publications

Substantial volume of researches concerning rural planning and principles of villages formation were investigated before the end of XX century: Vinshu I.A. (1986), Bagirov R.D. and Mahanko B.A. (1980), Zakovorotnaya T.A. (1988) etc.

Nowadays significant contribution into research of social economic development of rural settlements, particularly suburban, was made in works of economic geography by Nefyodova T.G. and Treivish A.I. (2002), Kovalyov O.P. (2009) etc. Works of the following authors are known: Dmytrenko A.Yu. (2006), Ogonyok V.O. (2013), Pustovyetov G.I. (2003), Stepanyk A.V. (2011), Yatsenko V.O. (2015) etc. research of the latter concerns town-building problems of rural settlements.
However nowadays sufficient attention doesn't focus on research of suburban rural settlements in town-planning science.

1.2. The Purpose of the Work

The purpose of the work is to develop the basic methods in accordance with the defined principles of functional and planning organization of suburban rural settlements.

2. Statement of the Main Material

The evolution of the architectural-spatial structure and functional-planning organization of rural settlements has come a long way, marked with complex transformations of socio-economic and

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ideological paradigms of development. These changes are also characteristics of rural settlements in the zone of influence of big cities, influencing all structural elements of the settlement: residential zone, public centre, green and production zones. There often is another zone – recreational –in the rural settlements today. The research of the current situation of the SRS in the zones of influence of central city of Ukraine has found that these changes occur in all of elements of the SRS, but first of all they occur in the production and cultural and domestic services. Specific weight of production territories is decreasing instead the residential zone considerably expands in most SRSs. Moreover, this expansion takes place both at the expense of the release of production sites, and shared agrarian lands, due to significant increase in areas of SRS with a general decrease in rural population. Although the demographic situation in the SRS is more stable compared to peripheral regions, however, the above-mentioned problems also occur.

2.1. Current Trends in the Rural Settlement Development

There are current trends in the development of the rural settlements: there is transition from the total hierarchy to the creation of local systems on the level of resettlement; on the level of social infrastructure – from a step-by-step state to a competitive private one; on the level of production – from agro-industrial hubs to the production environment of rural settlements. The latter manifested in the formation of new city-forming functions of settlement: business, service, and the creation on their basis of production residential and production-service formations which are organically integrated into the inhabited environment of the village and do not require significant sanitary gaps. The contents and structure of inter-settlement relations are changing in the conditions of decentralization of society and strengthening of the role of local self-government: their hierarchical character turns into equal partnerships and mutually beneficial relations between the communities of central cities and SRS. New city-forming objects of service, recreation, tourism are the basis for the formation of both the elements of the SRS environment and new functional types of these settlements.

2.2. Main Types of Existing Suburban Rural Settlements

Certain types of SRS have their natural basis of formation, socio-economic, demographic and historical features. It is possible to identify certain priorities of the development of each SRS which may be the following: reconstruction and increase of qualitative level of existing elements of the environment; creation of new elements in organic unity with existing ones; change in the function of the SRS caused by disaggregation, reshaping or liquidation of production; creation of new SRS – cottage settlements within villages that have ceased to function. The following was found after conducted examination of SRS situated on the territory of Poltava's suburban zone (up to 20 kilometers in a radial delineation from the downtown):

– SRS are partially or completely transformed into satellite settlements of the city centers which are identical to urban residential areas in functional mission. However, unlike the latter, they are not provided with appropriate socio-cultural and domestic infrastructure. Poltava, as the highest hierarchical level of the resettlement's system, performs part of these functions;

– a significant part of the residential area of the SRS begins to develop with essentially new modern buildings which belong to urban residents;

– there is a partial or complete reshaping of certain SRS into rural settlement of country type or medical and tourist with a developed recreational function;

– the production zones of the central city are situated on the territory of separate rural settlements;

– 2 – 3 agricultural farms, small agricultural enterprises or other objects of business and production appear in the place of liquidated production zones.

Today much of the SRS especially those that were not the centers of agricultural enterprises lost their production divisions. Vacated territories are used mainly for new housing construction, which leads to expansion of the residential territory at the expense of production.

The tendency of recent decades is spreading of elite cottage towns, settlements-recreation complexes and farmer settlements in suburban areas of large and the most important cities. Cottage settlements as the second dwelling of central city residents began to appear in Ukraine from the beginning of the 2000s. This is a complex of 30 – 50 and more residential buildings with a developed infrastructure and united with a certain architectural and planning concept in the most general form. The planning structure of such settlements is different from a compact with a rectangular-quarterly scheme of streets to branchy curvilinear which are organically fit in the environment.

The conducted analysis has determined that the planning and functional structure of cottage settlements went through formation stages:

– unorganized building up of vacated sites in rural and country settlements;

– gradual transformation of country settlements into modern residential with permanent residence;

– construction of cottage settlements on lands withdrawn from agrarian lands, or on the site of rural settlements which have ceased to exist.

Cottage settlements, which are designed on free territories, have a number of advantages compared to with spontaneous development. This is the availability of the general layout of building which provides for a complex of transport and engineering infrastructure with exploitation service, specialized guard, a public center with a wide range of services (a fitness center, swimming pool, beauty shop, supermarket, health and wellness center, etc.). The clubs of interest: for fans of golf, for aquatic lovers, for lovers of equestrian walks etc. are kinds of cottage settlement of recreation type.

2.3. Principles and Techniques of Functional and Planning Organization of Suburban Rural Settlements

These are the following principles which supplement each other and are interconnected:

– unity with central city-centre;

– functional specialization;

– alternativeness and systematics of town-planning documentation updating.

The following techniques guarantee implementation of them: organic integration of objects of small business and service in the production-residential formations and production-servicing formations as new design objects; formation of new town-forming functions of settlements: business, service, recreations; formation of different functional types of SRS, considering dependence of plan structure on external transport corridors and natural features; forming SRS with a number of functions: monofunctional, bifunctional, multifunctional; identification of an optimum way of development of SRS according to the defining factors of development and its gradual formation as certain type, the choice of the defining factors of development and mark assessment for possible functional and planning scenarios: production, satellite settlement and recreational, comparison of these scenarios and choosing one of them as a strategy for the development of the SRS; transformation of structural parts of the settlement and their re-profiling into a different function.

The principle of town-planning documentation updating is implemented in the following techniques: monitoring of changes in the planning and functional organization of villages and their borders for the purpose of timely updating, identification of problematic zones between the central city and territorial community of

SRS, monitoring of the transfer of types of land usage into a different status, prevention of allocation of green zones especially of natural reserve fund for residential and industrial building.

One or two techniques may be applied to realization of two-three principles simultaneously. Well, the principle of alternativeness is closely connected with three: with the principle of functional specialization and the latter is connected with the principle of unity with the central city. Thereby the alternativeness of town-planning solutions and the choice of which is the best for specific natural and town-planning conditions is provided.

The following methods are proposed for its providing: implementation of the production and residential and production and service formations, organization of direct and shortest connections with the environment, land management and the network of engineering communications.

These methods of suburban rural settlements formation arebased on a number of functions: monofunctional, bifunctional, multifunctional; identification of an optimum way of development of the SRS in accordance with the defining (priority) development parameters and its gradual formation as a certain type: satellite, recreational or industrial and its subtypes, which is confirmed by mark assessment of the defining parameters of settlements development (Table 1).

Table 1: Main Functional Types of Suburban Rural Settlements

Main functional specialisation	Serial number of type	Type of suburban rural settlements
Recreational	1	for tourism and recreation
	2	holiday village
	3	sports and health
	4	cottage settlement with a sports and recreation centre
	5	cottage settlement with family-friendly boarding house
Satellite	6	with organized recreation
	7	with unorganized recreation
	8	dwelling-type settlement
	9	cottage settlement
	10	with a production base
Production	11	farmer settlement
	12	agrarian
	13	agro-industrial
	14	industrial

Methods of formation of various functional types of SRS, formation of new city-forming functions of settlement, considering dependence of planning structure on external transport corridors and natural features provide the principle of functional specialization. The formation of a functional type depends on the zonal and recreational zoning of the suburban zone and availability of transport corridors (Fig. 1).

Within the urbanized environment of the 1st belt of the suburban zone it is proposed to develop mainly satellite settlements with a mixed type of development, holiday villages for urban inhabitants, and if the production and recreational resources are available – also production (farming) and recreational settlements.

In the 2nd belt, it is proposed to develop large settlements of the traditional type (agrarian ones), farmer settlements, industrial settlements of mixed type – agro-industrial. In natural or recreational environment, it is advisable to develop settlements with recreation facilities, in which it is possible to place farms of environmental protection purposes. In the natural environment, objects of the natural reserve fund are also allocated, on the border of which environment protection farms and recreational settlements can be developed.

These methods provide both the principle of alternativeness and the principle of functional specialization. The defining parameters of development of the SRS territory as priority are determined as a result of research of their social and demographic situation and features of the territory and are estimated on the basis of quantitative and qualitative indicators according to a conditional scale of points (1 – 7), by Kuzmenko T. Yu. (2014, 2015).

These are the following parameters: natural features of the territory, availability of the natural reserve objects, social and demographic: population, number of employees in the central city, labor supply: able-bodied employees and able-bodied unemployed of working age; number of production facilities within the village; town-planning: distance to the central city, transport infrastructure, free land resources, housing stock: free and used seasonally, etc. (Table 2).

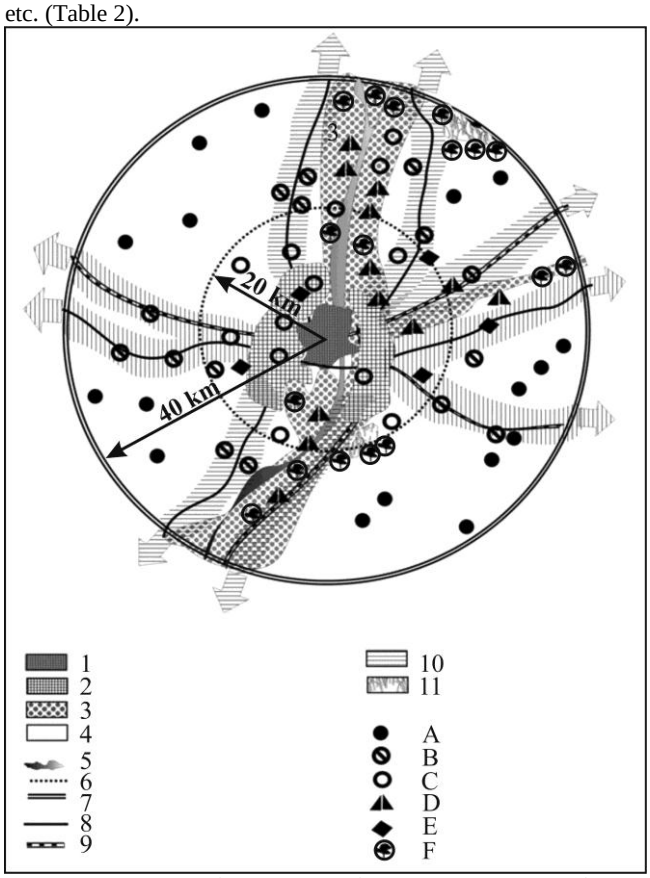


Fig. 1: Scheme-model of recommended functional specialization of suburban rural settlements. 1 = city-centre, 2 = urbanized environment, 3 = natural environment, 4 = agrarian environment, 5 = natural reservoirs (rivers, lakes etc.), 6 = boundary of the 1st belt of suburban zone, 7 = boundary of the 2nd belt of suburban zone, 8 = roads, 9 = railway, 10 = transport corridor, 11 = natural reserve objects. Recommended types of suburban rural settlements: A = agrarian, B = agro-recreational, C = satellite settlement, D = recreational, E = holiday village, F = nature reserve.

Table 2: Recommendations on Choosing the Type of SRS

Main functional specialisation	Type of SRS (serial number)	Defining parameters of functional specialization												
		Natural features, + –	Recreational objects, + –	Land fund for development, ha	Land stock, ha	Population, people	Free labour resources, people	Employment in the city-centre, %	Distance to the city-centre, km	Population dynamics, + –	Seasonal housing stock, %	Free housing stock, %	Production facilities, + –	Transportation links, + –
Recreational	1	+	+	≥20	≥2	≥200	4-6	–	–	–	≥10	4-6	–	–
	2	+	+	–	≤30			–	≥20	–		≥10	–	+
	3	+	+	2-5	≥10		≤3	–		–			–	+
	4	+	+	≥15	≥30		10-20	–		–			–	+
	5	+	+	≥80	≥50	≥250		–		–			–	+
Satellite	6	+	–	≥20	≥10	≥200	≤20	≥30	≥20	–	≥20	–	–	+
	7	+	–			≥500				–	20 – 200	–	–	+
	8	–	–							–		–	–	+
	9	–	–							–		–	–	+
	10	–	–				≤50			+		–	+	+
Pr	11	–	–	–	≥10	≥100	≤10	+	10	–	–	–	+	+

	12	–	–	–			50 -80	+		+	–	–	+	–
	13	–	–	–				+		+	–	–	+	–
	14	–	–	–				+		+	–	–	+	–

At the same time, the planning scheme of the village with the location of the public center is designed depending on the external transport corridors (the term was introduced by Zakovorotnaya T.A., 1988), which determine the formation of the following planning schemes of villages: transit, deadlock and nodal. Development of predominantly linear planning structure, nodal – compact or branchy, deadlock-compact, free, rectangular-quarterly occurs at the transit scheme.

The principle of functional specialization is also provided by the following methods: the choice of defining parameters of development of SRS and their score for a certain scale for the three possible scenarios of development: satellite settlement, recreational or production functional types, comparison of these scenarios and the choice of the most favorable on bigger sum of points.

The principle of alternativeness is shown by the following methods: the transformation of structural parts of the settlement, their re-profiling into a different function (Fig. 2), the formation of SRS with the number of functions, for example: recreational settlement with the production base, settlement-satellite with a recreational function, recreation settlement with the farm, etc.

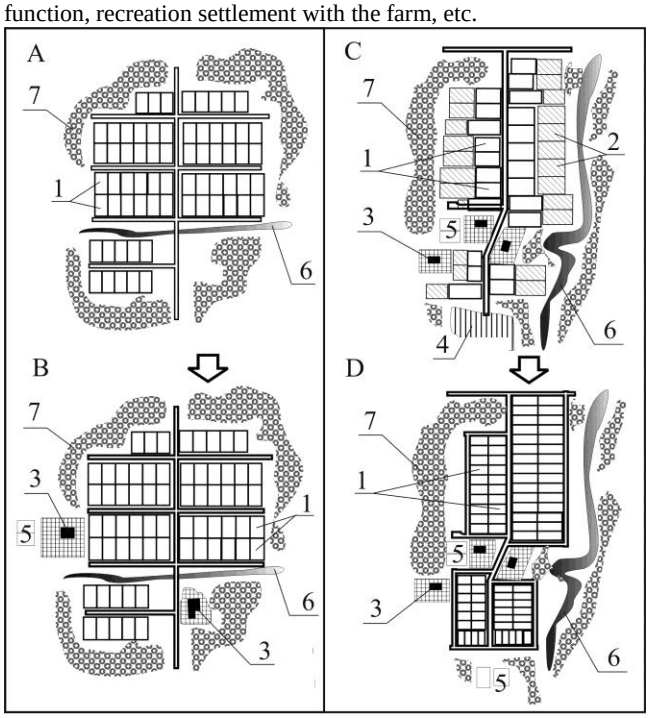


Fig. 2: Examples of transformation of suburban rural settlements functional planning structure: from the holiday village (A) into the suburban rural settlement with necessary social infrastructure (B); from the settlement that has lost agrarian function (C) into the recreational settlement (D). 1 = plots of individual houses (permanently or seasonally used), 2 = additional vegetable garden plots, 3 = public centre, 4 = production zone, 5 = sports grounds, 6 = natural or artificial reservoir (river, lake, pond etc.), 7 = forest.

It is also possible to find alternative options for specialization and functional planning organization in order to choose the most suitable one, as an opportunity to provide sustainable development of the settlement.

The principle of systematic updating of town-planning documentation provides compliance of modern changes of planning structure and functional organization of SRS with regulatory requirements and current legislation.

2.3. Recommendations for Improvement of Functional and Planning Organization of Different Types of Suburban Rural Settlements

The aforementioned principles and methods became the basis for the development of methodological recommendations on the rational organization of the functional and planning structure of suburban rural settlements, depending on the choice of their functional specialization (Table 3, Table 4 and Table 5).

The recommendations relate to the development of separate functional zones of suburban rural settlements, the ordering of their functional zoning, the improvement of transport infrastructure and the planning structure of settlement, the system reconstruction of cultural and domestic services in accordance with the determining parameters of the development of functional specialization, their qualitative and quantitative indicators.

Table 3: Recommendations on Improvement of Functional Planning Structure of Recreational Settlements

Type of SRS (serial number)	Typological signs of settlements						Recommendations on improvement of functional planning structure
	Population, people	Free housing stock, houses	Seasonal housing stock, houses	Recreational and tourist potential, objects	Land stock, ha	Land for residential development, ha	
1	≥50	4-6	4-10	1-3	2-10	2-5	Formation of the family-friendly boarding house, the tourist base (camping)on the free territories
2	≥100	10-20	21-30	>1	10-20	10-15	In the 2nd belt of suburban zone – organization of a holiday village
3	≥50	15-30	4-10	1-3	2-10	2-5	Formation of the sports and recreational base on free territories
4		10-20	15-30	>1	15-30	50	In the 1st belt of suburban zone – organization of a cottage settlement with a sport and recreational base
5	≥200	≥30	4-10	4-6	40-50	16-20	Usage of free housing stock for: a) family rest; b) formation of tourism and recreational zone

Table 4: Recommendations on Improvement of Functional Planning Structure of Satellite Settlements

Type of SRS (serial number)	Typological signs of settlements							Recommendations on improvement of functional planning structure
	Population, people	Number of employees in the city-centre, people	Free labour resources, people	Seasonal housing stock, houses	Land for residential development, ha	Land stock, ha	Recreational and tourist potential, objects	
6	>200	≥20	<20	>30	1-3	≥10	≥1	Formation of the bi-functional housing zone
7	>300	>20	<60	3-5	5-15	3-5		Formation of the service infrastructure between the SRS and the seasonal housing zone
8	>1000	100-200	<100	6-15	3-5			Increase in development of density of residential area, expansion of the service infrastructure, improvement of the territory
9	200 - 1000 and	≥350	<200	≥25	≥16	10-50	1-3	Organization of the cottage settlement with an expanded

	more						service facilities
10		20-100	≥200			≥1	Formation of the new production facilities in the production area

Table 5: Recommendations on Improvement of Functional Planning Structure of Production Settlements

Type of SRS (serial number)	Typological signs of settlements					Recommendations on improvement of functional planning structure
	Population, people	Free labour resources, people	Land stock, ha	Availability of production facilities	Land for residential development, ha	
11	<100	4-10	2-5	1-2	2-5	Organization of the farmer settlement on the site of non-functioning production zone
12	100-500	15-80	5-10		≥1	Conversion of the agrarian suburban rural settlement of traditional type to 2 – 3 farms
13	200-500	15-250	15-30	4-6	10-15	Formation of: 1) the agro-industrial production with the processing workshop; 2) the production area; 3) the housing-production units that do not require sanitary-protective zone
14	≥1000	50-250	40-70	≥10	≥50	Formation of the new production facilities of urban branches of industry into the 1st belt in existing non-functioning production zone

Recommendations on the rational organization of the functional and planning structure of suburban rural settlements have been developed, depending on their type, methods of improving their functional and planning organization have been tested and confirmed on the example of the Poltava region, Ukraine.

3. Conclusions

In the conditions of radical socio-economic and political changes in Ukraine and the exacerbation the problems of modern rural settlements, the study of rural settlements in the zone of influence of large cities (with population from 250,000 to 500,000 people) of the regional level needs special attention. So far, these settlements have not been a subject of scientific research in theoretical works. This led to their consideration in the study as a special town-planning type with the introduction of the concept of "suburban rural settlement" (SRS). Study of the regularities of influence of the city-center and local resources on the formation of the functional and planning organization of these settlements allowed to develop a scientifically based approach to the selection of strategies for the development of suburban rural settlements, which is associated with the specialization of them in the system of settlements in the suburban zone.

The main components of this approach are:

– definition of modern trends in changes in the functional and planning organization of suburban rural settlements (on the example of the Poltava region);

– identification of parameters that determine the total effect of factors of functional differentiation of suburban rural settlements (the following groups of parameters are distinguished: recreational and tourist production, demographic, transport and migration, land resources);

– improvement of typologies of suburban rural settlements with identification of their main types and subtypes;

– definition of principles and techniques of functional and planning organization of suburban rural settlements;

– identification of defining typological features, which are favorable for the choice of its perspective functional specialization;

– verification of developed recommendations on improvement of functional and planning structure of the suburban rural settlements on the material of the studied region.

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