

DYSFUNCTIONS WITHIN SPATIAL MICROSYSTEMS. CASE STUDY: CHINTENI COMMUNE

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ABSTRACT - This paper presents the main dysfunctions encountered in a microsystem, in this case, the one of Chinteni Commune, as well as the measures proposed for the revitalization of the analyzed area and the outlining of a functional space of reduced dimensions. The identification and the analysis of the dysfunctions were realized based on several differentiated indicators, in order to be able to apprehend, as well as possible, the reality of the territory. The encountered dysfunctions were classified into four groups: dysfunctions of the natural environment, dysfunctions of the human resource and of the settlement, economic dysfunctions and dysfunctions related to infrastructure. The conclusions have proved the necessity of implementing several solutions that will lead to a desirable state of the microsystem of Chinteni Commune.

Keywords: system, microsystem, dysfunctions

INTRODUCTION

The identification and the delimitation of the analyzed territory represented the first stage of the study presented in this paper. The next step consisted in consulting the existing bibliographic and cartographic sources, as well as field research, which supported the collection of quantitative information (Mayor's Office of Chinteni Commune, Regional Directorate of Statistics Cluj).

The second stage included the analysis and classification of the collected information, using the integrated study of the geographic phenomena and processes (the regional method), as well as the elaboration of cartographic models by using the GIS (Geographic Information System) method. Thus, a series of indicators were analyzed that facilitated the outlining of the main problems encountered in the commune of Chinteni. The indicators were grouped into five classes which reflect the demographic state, the social aspects, standard of living, economic state, and the technical infrastructure of the territory.

In the final part, the proposed measures were elaborated with the purpose of improving the microsystem, as well as the conclusions that were drawn based on the undertaken study.

Corroborating the observations collected on the field, the analyzed bibliographical and cartographic materials, as well as the data offered by the Mayor's Office of Chinteni Commune and the Regional Directorate of Statistics Cluj, this paper seeks to emphasize the dysfunctions of a territory of small dimensions (microsystem) and the measures proposed for improving it. The identification of the dysfunctions represents an important premise for the revitalization of the territory of Chinteni Commune.

CONCEPTUAL CLARIFICATIONS

In a primary stage, several theoretical and methodological aspects are treated referring to the organization of the geographic space and to the rural development, aiming at defining the concepts of system, microsystem and dysfunctions, as well as the modalities these concepts were approached by

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different authors, and at highlighting the existing relationships. Based on these, several applications have been put into practice for the area of Chinteni commune.

The concept of *system* is a general and broad concept, with a wide range of definitions in the literature of specialty. Therefore, the system represents a matrix where the spaces are disposed on rows and the functional attributes on columns, with the intervention of the third dimension, that of time, which generates a hypermatrix. (P. Cocean, 2005).

The formulated conclusion is that the system is composed of a series of elements found in interaction with each other and with other elements found in the external environment as well; elements which, on their turn, form subsystems. Consequently, the system consists of many more ordered subsystems.

According to the scale of approach, systems are subdivided in two main groups: macrosystems and microsystems. Finding the place of Chinteni commune in the category of *microsystems* was accomplished on the basis of several features, common with the ones of other entities belonging to the same category having a reduced extension, a homogenous space with a simple structure and a low degree of anthropization. Due to the occupied surface, the degree of detail is much larger than the one within a macrosystem, and the changes occurred in the microsystem, as well as the ones occurring with the neighbouring territories are much easily observed. Thus, it is much easier to capture the functional elements from the system, as well as the existing dysfunctions.

It can be said that a microsystem, proportional to the dimension of the Earth, could be a multiple of 10^{-6} . Therefore, the surface of a microsystem is of 510 km^2 , and if we take into consideration only the surface of dry land, we are talking about 148 km^2 . Chinteni commune, with a surface of 98 km^2 , is registered into the category of microsystems.

According to DEX (Romanian Explicative Dictionary), the term of *dysfunction* represents the decrease in the adaptation or in the integration of a subsystem into the system to which it belongs.

POSITION OF THE MICROSYSTEM IN RELATION TO THE WHOLE

Chinteni microsystem is composed of the villages: Chinteni – the commune’s administrative centre, Pădureni, Feiurdeni, Măcicașu, Satu Lung, Sânmartin, Deușu, Vechea and Sălișteea Veche. It is located in the northern part of the city of Cluj-Napoca, having a surface of 98 km^2 .

The definition of the *rural area*, promoted by the European Charter for Rural Areas, refers to the territories with small villages and towns, where the greatest part of the lands are used as agricultural, forest and piscicultural fields, and where craftsmanship activities dominate as well, while services and the functions of recreation and entertainment are important. Therefore, Chinteni commune belongs to the category of rural areas undergoing a process of agglutination and assimilation, by being in the proximity of the city of Cluj-Napoca (12 km).

This position represents an element of favourability for the development perspectives of the commune, but also an element that determines several dysfunctions in the territory. The proximity to the regional pole has generated a “shadow”-type situation, as well as a situation of subordination. The highest volume of information and innovation is concentrated around Cluj-Napoca, determining the unequal distribution of the resources. To these, the individual historical evolution of each entity is added as well.

The spatial organization of human settlements and their evolution are primarily influenced by the economic development of the system in question, as well as by the capacity of adaptation to changes, imposed politics, or to elements of the natural environment.

The elements of favourability for the analyzed area (accessibility, natural support, existing natural resources, human resource, existing traditions) have represented the main points of attractiveness of Chinteni commune, being in opposition with the existing dysfunctions that create fundamental problems within the territory.

THE ANALYSIS OF THE DYSFUNCTIONS WITHIN THE MICROSYSTEM OF CHINTENI COMMUNE

The dysfunctions identified in the analyzed geographic space were classified, in their turn, into four groups: dysfunctions of the natural environment, dysfunctions of the human resource and settlements, economic dysfunctions and dysfunctions related to infrastructure.

a) Dysfunctions of the natural environment

As regards the micro-geographic environment, the territory of Chinteni microsystem is located on a non-homogenous land, formed of low hills, namely the Hills of Cluj, which belong to the Someş Plateau, a unit of relief with gentle slopes and separating valleys.

The presence of friable deposits (marl, clays, sands, gravels, conglomerates) in alternation with hard rocks, sandstones and tuffs, are the main elements that confer instability to Chinteni commune. The region is submitted to the phenomenon of mass shifting (land slides, collapses, mud flows), as well as to the processes of sheet or gully erosion. These processes are produced on a foundation of older instability, so that the active areas represent reactivations of certain areas of instability from the past.

In the past (Periglacial period), landslides generated a micro-relief known as “glimee”, called by the locals “goarțe”, “holoambe”, “râsipituri”, or giant hay stacks. Most of the times, following the processes of erosion, fragments of various sizes, originating in the sandstone layer, were added at the bottom of the slopes, providing a material used for construction.

According to the study conducted by S.C. Anadora S.R.L., the territory of Chinteni commune is exposed to a moderate geomorphological risk (e.g. the areas affected by superficial landslides – Nucului Hill) and to a low geomorphological risk (e.g. the areas with low intensity of sheet erosion – the majority of the areas affected by deforestation). The most extended area of eroded soils is located between the villages of Vechea and Deșu.

b) Dysfunctions of human resources and settlements

Population represents a valuable component of a territory, which is the continuous source of innovation and economic development.

The proximity to the city of Cluj-Napoca led, over time, to the oscillation in the number of population. The decline of the total population is generalized since 2000, both on temporary and on long term. However, as regards the situation of the working age population, the effect of the decline is almost immediate (medium term), producing a generalization of the phenomenon.

The new demographic trends indicate, with a high degree of probability, a significant growth of the life expectancy, and practically the category of the elderly people is significantly high.

According to the existing data of the 1992 census, the total number of the population was of 3,067 of inhabitants at the level of the entire commune (9 component localities), observing a continuous decrease so that the commune recorded a number of 2,802 inhabitants in 2009. This decrease is due to the migration of the population towards the areas that can provide a more decent living standard and development possibilities, as well as to the low birth rate accompanied by the population aging.

Therefore, the net migration recorded in 2009 was of 1.6‰. Migration represents a movement, a simultaneous transformation within the physical and socio-cultural space that involves not only the displacement from one place to another, but also presumes the “destruction” of the structures in the sending regions (depopulation of localities, loss of the autochthonous labour force, population aging).

The nature, causes, trends and the intensity of the migration phenomenon represents the object of theoretical analysis. When analyzing the nature, the causes and the consequences of migration, the starting point is found in the Marxist point of view. Marxism places in full correlation the displacement of population in search for better occupations. Migration does not occur in order to improve the people’s lifestyle conditions, but only to ameliorate, even just for a moment, their existing situation.

The depopulation of certain villages in the analyzed microsystem, corroborated with the distance from the centre of the village and also with the precarious road infrastructure, has led to the isolation of some settlements such as: Pădureni, Satu Lung, Sălișteea Veche, and to the aging of the population as well. The share of the population aged 60 and over is 24.44 % at the level of the commune, and the aging index of the population 1.30.

The phenomenon of population aging is due to the decline in birth rate and the decrease in mortality rate. The decline in birth rate and fertility represents the consequence of certain socio-economic factors: the reduction of the share of traditional households, characterized by high fertility, necessary both for the productive activity and for the assurance of the security of the elderly; the emancipation of women, their access to education and employment in the prevailing activities within the tertiary sector; the increased demands of parents in raising and educating their children that requires time and important expenses; the increase in leisure time, access to different forms of entertainment; the extensions of social security (especially in the field of pensions and of institutions of elderly care) that have reduced the role of children in supporting their parents in old age.

A new phenomenon can be currently observed as opposed to the one occurred before 1989, urban-rural migration, and the orientation of the inhabitants towards the rural space. This phenomenon is due to the expansion of the city of Cluj-Napoca, and to the increase in real estate market prices and in other domains as well. This fact is relevant by the high number of demands for construction licenses issued by the mayoralty and by the settling of residences. Thus, during 2002, seven requests for building permit applications were submitted, their number increasing to 58 in 2009. This situation is recorded with the purpose of residence settling: 55 in 2002 in comparison with 108 in 2009. The dysfunctions regarding this stage refer to the visual pollution with modern constructions that do not take into account the traditional specificity of the concerned area.

For the renewal of these localities the following are proposed: the physical revitalization of many buildings, attracting investors who, in turn, will attract a younger labour force and most probably the settling of residence in this region, granting facilities to younger people and to the investors.

Many of the dysfunctions occurred at the level of human resource is due to the economic factor and to the technical infrastructure. Therefore, migration is determined by the search for job opportunities and for a better lifestyle than what is offered within the microsystem of Chinteni; the lack of investments (in addition to the administrative factor) is also due to the precarious infrastructure.

c) Dysfunctions regarding the economic state

According to the structure of the population on economic activities, the economic state of Chinteni microsystem is the following: 82.4% of the total active population is engaged in the primary sector of activity, 12.3% in industry, and the rest in trade, administration, education, and health.

According to the quantitative data offered by the Regional Directorate of Statistics Cluj, the average number of employees on the territory of the commune is 157 persons (2009), out of which 23 are engaged in the primary sector (agriculture, forest and fishing), 45 employees in processing industry and in constructions, 27 in the field of trade and finances, 33 work in the administrative field and social security, and 29 in education (teaching staff and temporary civil staff) (Figure 1).

The high share of population working in agriculture highlights the low standard of living. The inconvenience of such a high share in the case of the analyzed microsystem and of the majority of the rural spaces in Romania is the practice of a subsistence agriculture, a not very competitive one, that primarily concerns the low endowment with agricultural equipment (even if it exists, it is overused and of low quality) and of the legal status of the proprietaries. The Land Law No. 18 of 1991 produced the excessive fragmentation of the agricultural lands, leading to the development of subsistence agriculture to the detriment of a modern and efficient one.

In villages such as Pădureni, Sălișteea Veche and Satu Lung, in addition to the previously mentioned elements, the high degree of depopulation and population aging have also an important contribution.

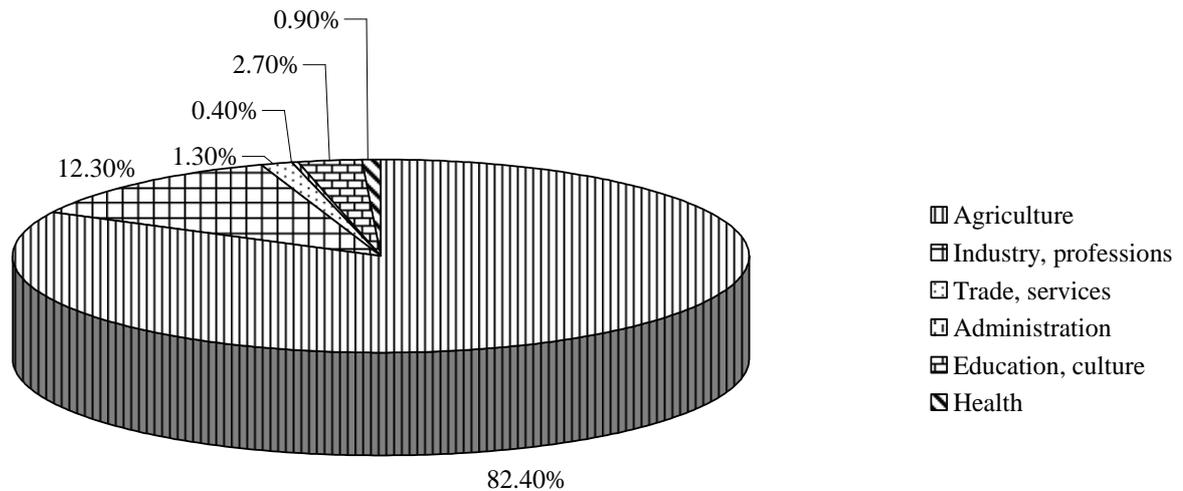


Figure 1. *Employed population by economic branches in 2009*

Source: Regional Directorate of Statistics Cluj, 2009

Demographic aging, in the absence of some firm policies of economic development and of the growth in GDP (Gross Domestic Product) that hinder the increase in the population's standard of living, generates the increase in the dependency ratio as well, which, in the case of the microsystem of Chinteni commune is 169.6‰. This situation influences the level of the labour productivity and the population's standard of living.

An economic characteristic of this space is the dependency between the type of valorisation and the natural potential (forest, agriculture, mineral resources). The economic activities, developed in time, reflect the direct relationship with the natural environment, therefore the dominant activities are animal breeding, traditional handicrafts (the production of various household objects) and the exploitation of building materials.

Due to the existing local subsoil resources (building stones, tuffs used in construction, foundry sands, marls and clays used for cement, ceramics and kaolin sands), an industry based on the fabrication of construction materials is developed in this region, favouring the activity of some companies specialized in constructions. Therefore, four companies specialized in building materials operate on the territory of the area under analysis.

The commercial function is reflected both in the evolution of the number of commercial units and the turnover of this region. The commercial activities grouped in family associations and in small NGO's are predominant. Units of consumer goods and of household use (electronics, electronic appliances) also predominate.

In the afferent villages, public food units are located (mixed shops, bars and small boutiques).

The activity of services is unevenly distributed in the territory; therefore, three of the component villages do not have any unit for delivering services to the locals. In the entire commune, there are 24 economic units (from grocery stores to companies specialized in building materials).

Health services are provided by two medical examination offices, a dentist office and, last but not least, by a veterinary office. The ratio of persons per doctor approved by the European Union is of 200 persons per doctor; however, in the analysed microsystem there are 1,500 persons per doctor. This report outlines the gaps in the healthcare system, both as regards the insufficient number of healthcare staff and the poor facilities of the healthcare unit.

The cultural and educational services are maintained by the operation of a number of four kindergartens, one primary school and two primary and secondary schools. The cultural activities are mediated by the presence of a cultural centre, of a library and by the development of cultural events such as the festival of the commune, "Sons of the Village", held in September.

d) Dysfunctions of the technical infrastructure

The density of access roads, the centralized system of drinking water supply, electric power supply, natural gas supply, and a suitable network of sewerage reflect the socio-economic development of a territory. An indicator of the population's standard of life in a certain area is represented by the amount of water used (providing good hygienic-sanitary conditions).

In order to be able to observe the level of infrastructure provision in the microregion, a detailed analysis is required on every aspect.

Access roads represent indispensable connections that ensure communication with other regions, ensures the flow of people, goods, raw materials and information. The access roads of the area under analysis are uniformly distributed and are characterized by a high density (almost every locality is connected to the polarizing centre, the village of Chinteni). The access to the commune is commonly ensured by the county road DJ 109 that makes the connection between Cluj-Napoca and Vultureni. The connections with the affiliated villages are made by means of communal roads (DC):

DC 149 Chinteni-Deuşu-Măcicaşu-Sânmartin-Borşa

DC 149 Chinteni-Deuşu-Vechea

DC 174 Cluj Napoca-Feiurdeni-Pădureni

DC 148 Cluj Napoca-Feiurdeni-Pădureni (DC174)-Satu Lung

DC 142 Sălişteia Veche-Baciu

The road network of the microregion is completed by many forestry and agricultural roads, whose function is limited due to poor consolidation. These roads (county, communal, agricultural, forestry) are linking all the settlements with the outside areas.

Paving roads with asphalt or concrete, or even gravel, is a primary condition for a civilized access and for the development of tourism that cannot be conceived without these.

There are no railways on the territory of the commune and the nearest train station is in the city of Cluj-Napoca. The road network is the only means of transport that serves people and freight transport.

The electric power supply of the Chinteni commune microsystem was achieved between 1958 and 1964, being supplied from the national electric power system. The station which powers Chinteni commune is a 220/110 KV station located in Luna. There is a 20 KV main electric power line with two ramifications: a 6 KV transmission line and, then, a 380 V one. Thus, out of the total of 1,477 households only 1,387 of them are connected to the electric power supply system. This demonstrates a relatively high degree of connectivity.

The methane gas supply within the Chinteni microsystem is achieved in a very low proportion, the degree of connectivity being of only 0.85%, this fact representing one of the major dysfunctions. Therefore, out of the total households, only 46 are connected to the natural gas supply system. The achievement of the connectivity of the domestic users and of private homes to the gas distribution network is important for the comfort of people's lives (cooking, provision of central heating, achievement of technological processes). Due to the low degree of connectivity to the gas distribution network, the combustible used for everyday activities still remains wood.

The city of Cluj-Napoca is connected to the methane gas supply system in proportion of 81.5% and the ratio in its peri-urban area ranges between 31.9% (Floreşti, Baciu) and 0.85% (Chinteni, Tăuţi). This situation proves, once again, the relationship of dependency of the peri-urban area on the polarizing centre and the lack of administrative and political initiatives in order to improve the technical infrastructure in these areas.

Drinking water supply and sewerage

There are projects for improving the drinking water supply and the sewerage network that are in the process of turning into reality in the villages of Chinteni, Deuşu, Vechea, Măcicaşu, Sânmartin and Feiurdeni. However, at the moment, there are 12 km of simple pipelines for drinking water supply

(the same length since 1990), that have a capacity of 180 m³/day, distributed only to domestic customers. Out of 1,477 household only 97 are connected to the water supply network.

Sewerage is absent in the analyzed territory.

According to the 2003 General Urban Plan, the water supply pipeline, also the main Cluj-Zalău water supply pipeline, runs through Chinteni, Vechea, Deușu, Măcicașu, Sânmartin localities, providing the opportunity of developing the drinking water distribution network.

In addition, there are local water supply sources, such as the water storage tank, located in the southern part of the village of Vechea, storing water coming from water supply catchments.

The majority of households own wells inside their courtyards, which provide the necessary daily amount of water (both for domestic and industrial use).

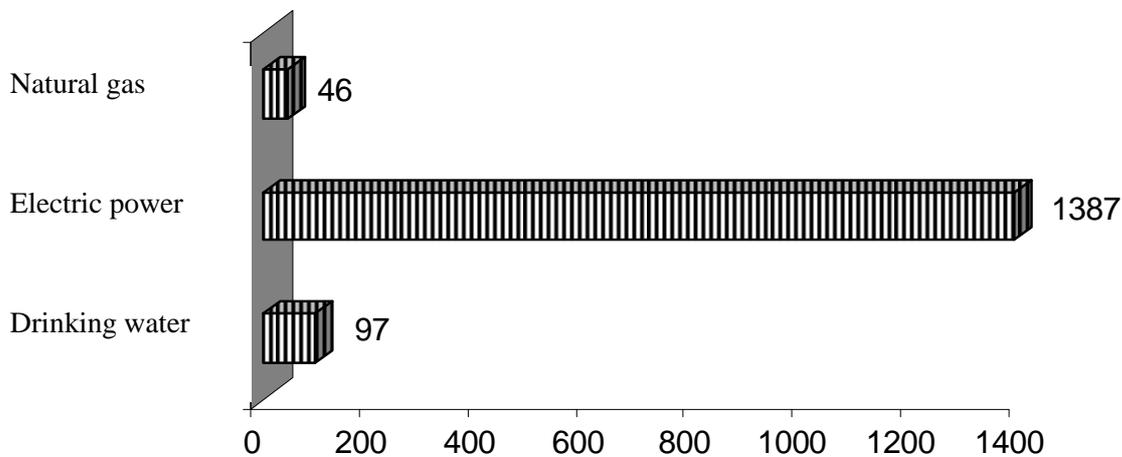


Figure 2. Total number of households connected to drinking water supply, natural gas and electric power supply networks
Source: Regional Directorate of Statistics Cluj, 2008

The analysis of the dysfunctions related to the technical infrastructure of the area has proved the low level of infrastructure provision, the existence of very few initiatives and the lack of investments intended for the improvement of infrastructure. This is why, the urgent finalization of the existent projects and the initiation of others are highly required for a desirable state of the microsystem in question. The development of the technical infrastructure will determine the emergence of new flows with impact upon the inner space and upon the adjacent areas, as well.

Measures proposed for the reduction and removal of the existing dysfunctions

The dysfunctions found within the system have numerous causes and effects, situation that requires the finding of some measures of neutralization. The centre-periphery relationship is a prime factor that causes spatial inequalities and the historic evolution of each and every entity.

The problems encountered in the microsystem must be seen as an entity, and therefore, by strengthening it, the functionality of the entire system to which it belongs becomes strong as well.

The specific objectives that were proposed and the measures taken for equipping the territory, originated in the direction of spatial development, landslide prevention, and environment protection upon the effects of these phenomena have aimed the following actions:

- afforestation and fruit-growing plantations (orchards) that are best suitable to the area, planting of mixed herbs;

- agricultural works to transform the linear flow (from vertical agricultural works) into non-linear (to horizontal ones), improvement of the natural drainage of soil through specific works (levelling);
- avoiding the loading of the floodplain with constructions (especially the ones with concrete foundation);
- elaboration of maps, together with the local and county authorities, to reveal the risks presented by the area.

Amplification of the functions performed by the polarizing centre is desired within the microsystem, as well as the improvement of the relationships with the neighbouring systems. Therefore, the following measures are proposed:

- intense promotion of the region at local and county level, by emphasizing the elements of specificity and attractiveness;
- the highlighting of the advantages that emerge from the proximity of the microsystem to the city of Cluj-Napoca;

The achievement and improvement of the technical infrastructure by:

- achieving the drinking water supply network on the entire analyzed territory by taking into account the presence of the Cluj-Zalău drinking water pipeline, as well;
- achieving the sewerage network and water filtering;
- the modernization of DJ 109, as well as the communal roads, by asphaltting and widening the roadway;
- contracting a transport company to provide transportation from/to the centre of the commune to each village;
- connecting all the households to the national electric power distribution system;
- extending the methane gas network in order to connect all the localities to the national system.

In order to improve the dysfunctions concerning the demographic component, the following measures are proposed:

- creating conditions for maintaining the young population in Chinteni commune, by supporting the development of the secondary sector, and especially of the tertiary one, which are able to provide jobs for university graduates;
- maintaining the medium qualified labour force and its engagement in the newly founded economic sectors;
- professional qualification of the autochthonous residents for the new companies and businesses that will be opened in the region;
- supporting the development of the local economy by offering facilities to the potential investors (e.g. investor discounts);
- attracting young and qualified labour force in the primary sector;
- the stabilization of young population in the rural area by improving comfort and by increasing the economic profitability (by offering financial support and granting a stable and well-paid job);
- attracting and supporting the people working in other European states to return and initiate their own productive and income-generating activities.

Measures proposed to support the development of local economy:

- promotion of different forms of association (creation of agricultural farms with an area of more than 20 hectares) that can be achieved by merging properties, having in view that properties of less than 4 hectares predominate;
- transformation of the subsistence agriculture into a modern agriculture with ecological valences by using advanced mechanization and qualified labour force;
- integration of local producers within associations of profile in the county;

DYSFUNCTIONS WITHIN SPATIAL MICROSISTEMS. CASE STUDY: CHINTENI COMMUNE

- supporting the establishment of farms and assisting farmers to meet the European standards (Satu Lung, Sălișteea Veche, Sânmartin, Deușu);
- specialization in cultivating medicinal herbs and beekeeping (Măcițașu);
- revitalization of orchards and the optimization of tree fruit production;
- modernization of orchards and increasing productivity by adapting certain advanced horticultural techniques and by introducing new proper species (advantage – the presence of the Research and Development Unit for Fruit Tree Growing Cluj);
- the creation of a natural fruit juice, canned fruits and jam factory (Măcițașu);
- creating an industrial park in the eastern and south-eastern part of the village of Chinteni;
- attract investors and develop new and modern industries based on local resources;
- support the development of the SMEs by offering business training and counselling, by providing information on how to access the EU funding programmes;
- change the perception of people towards home, crops and personal property insurance;
- improve the healthcare service by using technology and a highly specialized medical staff;
- elaboration of several programmes destined for the assistance of elderly people or of persons with disabilities (by taking into consideration the high percentage of the elderly, 24.44%);
- development and upgrading of tourism by means of an intensive promotion of the region (promotional materials, brochures, the media, advertising);
- development of cycling paths and walking trails, as well as the creation of an equitation centre located in the forest near the village of Vechea;
- the planning of the Chinteni lake and its transformation into a place of recreation that will allow the development of weekend tourism;
- the opening of a hotel unit on the territory situated between Chinteni and Măcițașu, with a capacity of 200 beds;
- the opening of a 50-bed boarding house in the village of Vechea.

CONCLUSIONS

The analysis highlighted the potential of Chinteni commune microsystem, as well as the dysfunctions that are present within. The observations on the relationships established within the territory and on the ones with the neighbouring systems have led to the necessity of creating a functional system of small dimensions.

Therefore, the specialization of several elements within the microsystem was required, that will lead to its restoration, as the specialized functions are the most dynamic, absorbing innovation, and are, in the same time, much faster.

The desideratum of this paper remains the establishment of a functional traditional system by removing the encountered dysfunctions, the achievement of a high comfort through the modernization of the technical infrastructure and the development of the local economy, yet without compromising certain traditional aspects (local customs and traditions).

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