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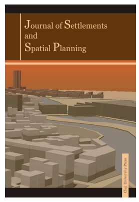

Operational Structures in Urban and Rural Strategic Development

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A B S T R A C T

Settlements development is an ongoing process and besides being conditioned by extrinsic and intrinsic factors it is also conditioned by the evolution of a set of parameters that should call for a selective adoption of specific development actions. When designing a strategy for the development of urban/ rural settlements it is not enough to just perform an overview of the status of constituents, subsequently revealing dysfunctions and problems, which would be later covered by the strategy through a set of proposed programs, measures and projects. This type of approach can be regarded as outdated and limited. Therefore, due to the inconsistencies between the written measures and the practical results in the field our aim was to develop an integrated logical scheme, containing parameters, indices and threshold values to methodically address the highly complex systemic structure of settlements in the process of development. This should represent the foundation for the diagnosis and for further simulations of development depending on the changing development parameters. This proposed logical scheme, consisting of assessment units and their parameters, would help specialists improve the quality control of development strategies and know real-time changes occurring in the settlement system due to changes registered in the values of parameters. We debate on the need to develop a multi-criteria assessment tool useful in designing the future development of settlements and the results show a possible model of logical scheme and its inner structure.

1. INTRODUCTION

Development is the feature of each geosystem's evolution in the geographical space. This is the response geosystems give to the availability of free energy in space, whereas the complexity of development is proportional to the amount of free energy existing at a time. Development is a long-lasting process, subject to laws governing the organization of matter in the geographical space, fact that makes development consistent with the organization of matter. Like all system processes, development is dynamic and a function of its dimensions and components [11]. Natural components of the geographical space are self-organizing as compared to the man-made ones, which are just partly self-organized and in need of strategic development through spatial planning [7]. The organization capacity of the human factor is also limited and directly and primarily dependent on the knowledge available at a given time (concepts, methods, and level of accessibility to raw or processed information), plus the resources and technology.

Settlements development is a man-made process conditioned by the need to increase the quality of life of the population, the need to adjust to environmental changes, and by the available knowledge in the field, resources and current technology. If, in the past, settlements development would be purely dictated by the need to solve the current and inherent problems, in today's knowledge-based society era we employ various analyses and forecasting tools that eventually become part of a local development strategy. Local development strategies aim to answer the challenges of globalization and the need to coherently develop in relation with national and regional policies and the local realities [17], [18], [19].

Strategy has today become the key tool used to coordinate and drive settlements development, highly consistent with sustainability, and it is the result of research and design work previously carried out by specialists such as urban planners, geographers, architects, engineers, etc. It thus seeks to integrate the three-fold societal aim of socio-economic and environmental development through continuous and participatory planning, debate and investment [14]. It involves multi-criteria assessments, diagnostic analyses and the conceptualization of a strategic development framework that includes a set of objectives, programs, measures and projects, all proposed for implementation to complete every stage of the medium and long-term envisioned development process.

Theoretically, it appears that all strategies *are* flawless but after their implementation and as the time passes, we can still find that several problems remained to be solved, others have amplified or triggered others, all of which planners did not think would be possible. The costs with the implementation of strategy often go beyond the allocated budgets and subsequently some of the measures, programs and projects being sometimes delayed or even not implemented. We thus can infer that something does not work properly in the mechanism of elaborating the development strategies since they do not reach the purpose for which they were designed and further development is still done by the patterns of the past.

The circumstances and shortcomings of a development strategy are making the actual steps harder to be made, thus affecting negatively the settlement development, by being delayed or compromised. Not having established a clearly defined and comprehensive set of parameters, indicators and threshold values that would determine the development of settlements is yet another major cause that leads to partial and poor quality results. By clearly indicating this set of operational elements included by the multi-criteria analysis and by identifying all types of links between them in an integrated logical scheme would lead to the clearer visualization of expected results beforehand, would set the prerequisites for creating a complete information foundation from which development strategy should start. Thus, development strategies would significantly improve qualitatively while their implementation would have much more visible effects in the development of settlements, and also this would solve the other problems mentioned above related particularly to the implementation process. Therefore, the main objective of this paper is to debate the need and suitability to develop a multi-criteria assessment tool as a logical scheme based on a complex and complete set of parameters, indicators and thresholds limit values to be employed in the planning of settlements development.

2. THEORY AND METHODOLOGY

Today, more than ever before in the history of human civilization, we approach and discuss the issue of sustainable development. This concept has been highly ranked to the status of paradigm and it represents the guideline for the development of human society and yet another challenge for the development strategy planners, who are constantly seeking ways and solutions for the sustainable development of settlements. But what would be the best ways and solutions to achieve this goal? We believe that we first should turn from practicing circumstantial urban planning to smart urban planning completed by the whole range of methods of analysis, design and cutting-edge technology solutions that it implies.

Conjuncture planning addresses development in a fragmented manner trying rather to solve the resulting effects of an ongoing inconsistent development and not solving the causes. This form of urban planning, which represents a legacy of the past, approaches settlements as a group of structural elements and not as functionally integrated structures, and their well-known results are: amorphous urban structures, environmentally unfriendly, unable to adapt to change, expensive, generating discomfort, incapable of self-regulation, vulnerable, ineffective, repulsive, and strongly spatially segregated, etc. Smart urban planning is primarily based on an exhaustive knowledge of the status and dynamics of settlements transposed into a complex and complete set of parameters, indicators, indices and threshold values structured as an operational array, plus a set of related principles. Smart urban planning principles have been defined by Benninger (2001) while creating a new vision for the approach of settlements development [6].

These principles, ranked by importance, are the following: balance with nature, balance with tradition, appropriate technology, conviviality, efficiency, human scale, opportunity matrix, regional integration, balanced movement, institutional integrity. These principles, however, if not accompanied by adequate informational support in the assessment and planning of settlements development, will only remain principles.

The operational logical scheme for the evaluation and monitoring of settlements development along with the guiding principles of smart urban planning will thus give meaning to the sustainable development paradigm and create a new framework for it to materialize in practice.

2.1. The development strategy – support for the coordination of settlements development

The development strategy is a scientific tool developed by a team of skilled planners in collaboration with representatives of the local authorities and community to guide the development process of a settlement. Thus, it represents a complex informational aggregate that guides and establishes the gradual decision-making in the development process. Decision-making is a function of all partners contributing to the elaboration of strategy and it involves the design of strategy, the definition of policies and the implementation [11]. After the elaboration and adoption of the development strategy, local authorities are responsible with their implementation, yet without having the opportunity to make significant improvements thereof. If the development strategy is not appropriately rooted in the geographical, economic and social reality of the settlement and if, for various reasons, planners do not receive complete or enough information about it, we cannot then expect any development strategy to meet all the anticipated qualitative valences. Practice revealed that in order to improve the mechanism of strategic local development there are several aspects to be considered and adjusted (Table 1).

These aspects are mostly related to the first steps of the strategic planning (diagnosis and strategy design stages), which proves that without a proper foundation the results are highly like to disappoint, the strategy failing to meet their original purpose. However, we cannot omit the importance of the implementation stage, which bridges the theoretical objectives to the practical desired outcomes of the strategy and which many times stands out as the main reason of failing if not properly handled due to the high difficulty of the process [13].

Table 1. Main shortcomings that contribute to failing the strategic planning of local development.

	Traits related to the components of strategic planning and development and decision-making process
National strategy-related regulation framework Local authorities competences Selection of designers and planners Assessment criteria Strategy elaboration Implementation process	- wrongfully address settlements as merely a sum of structural elements and not a functional and highly technical systemic structure; - lack of integrated vision in performing the multi-criteria analysis of the current state, triggering simplistic conclusions without highlighting the interdependency of the structural elements of settlements; - brief and mostly qualitative results after the multi-criteria assessment omitting aspects of reality in the field; - missing links between assessment results and strategy, making strategies only partly anchored in the reality (in some cases designers using the analysis conclusions only as an additional argument and not as a reference to substantiate the forwarded objectives, programs, measures and projects; - frequent lack of scenarios for the implementation of strategy; - implementation stages often incorrectly proposed; - proposing the strategy, yet without covering and considering the entire range of issues that development depends on; - the liberalization of planning strategies – they can be designed by non-specialists who mainly focus on profit and not on quality; - the inability of public authority to implement the strategy for various reasons: incompetence, irresponsibility, corruption, disinterest, etc.

In 2005, The World Bank Group had the initiative to elaborate an instrument to support policy and administration reform in local governments in Central and Eastern Europe, which to be used to train local authorities, specialists and community representatives involved in designing and strategic planning of local economic development (LED) [9]. Furthermore, to support this training course, they developed the primer for local economic development, in which the five-stage sequence process of LED strategic planning is thoroughly explained and offering valuable guidelines to be followed to achieve best results throughout the 5 steps: 1) organizing the effort; 2) local economy assessment; 3) strategy making; 4) strategy implementation and 5) strategy review [10]. Along with the defined stages and actions deciphered to be operated, we would like to add and insist on several essential actions to be performed to bring the added value to the development strategy and ensure the integrated approach of the large array of issues, which are listed in Table 2.

Leaving aside any other causes that may weaken the quality of a strategy (carelessness, incompetence, corruption, or shortness of time, etc.) one of the major causes that can spoil their quality is not to employ a complex and complete set of parameters, indicators and threshold values that needs to be included in the multi-criteria analysis in order to provide an accurate reality picture from which to further plan the development strategy. Today, it still appears that this standard instrument has not yet been developed and properly acknowledged, professional planners guiding themselves by several very general rules in designing the strategy, whilst the choice on what types or set of indicators should be used is left up to their will. However, given that development strategies are not commodities that must look perfect and have certain quality to face competition but they are rather unique products developed for profit, professional planners greatly minimize the set of parameters and indicators analyzed and thus the forwarded conclusions are mostly general, as general as the development strategy resulting from these actions is.

Table 2. Proposed measures and actions to improve strategic planning of local development.

Strategic planning steps	Essential measures and actions
1). Organizing the effort 2). Local economy assessment 3). Strategy making 4). Strategy implementation 5). Strategy review	define the conceptual framework of settlement development; define the international, national and regional context of development; develop a multi-criteria analysis of the current situation in the case of all structural elements of settlements; diagnose the problems and dysfunctions found in the organization and functioning of the settlement; assess the availability and accessibility of resources necessary for development; set goals and time frame for the implementation of the new development strategy; define and decide on the type of strategy to be implemented in accordance with SWOT analyses (defensive strategy focused on fighting against the prevailing risks and eliminate weaknesses or offensive strategy based on valuing the opportunities and strengths that settlements benefit of); identify priority and subsidiary development axes and the corresponding measures, programs and projects; identify the relevant responsible actors for development and funding sources; plan the stages of implementation in accordance with: objectives and time frame established and expectations of the beneficiary; formulate strategic development scenarios based on possible contingencies and forecasting analyses with a view to the changes that would occur in the values of the main internal and external development parameters; assess the costs, benefits and impact of the already adopted development strategy and subject to implementation.

Table 3. Add-ons for better use of indicators in the development strategy design and implementation.

Strategy phase	Methodological issues
1). Diagnose 2). Strategy design 3). Implementation 4). Monitoring	methodology of choice and calculation of indices; guidelines for the interpretation of results; a thorough presentation of the typology of problems and dysfunctions that may appear based on the comparison of results with the threshold values; guidelines on how to address problems and dysfunctions; methodology for the selection, development and adoption of the most suitable type of strategy to be implemented; a framework for designing the development strategy; a framework for the implementation of strategy; a framework for the assessment of the territorial, social, economic, infrastructural and environmental impact generated by the implementation of strategy.

Since it is imprudent to use a single statistical indicator no matter how relevant it is to achieve a classification and/or a judicious hierarchy [1] it is necessary to define the complete set of parameters, indicators and threshold values and include them in the multi-criteria analysis and also to acknowledge them in a guide of good practices that would include the several methodological issues that would enhance the outcomes of the implementation of development strategy at local or regional level (Table 3).

Multi-criteria analysis identifies goals or objectives and then seeks to spot the trade-offs between them aiming ultimately to identify the optimal policy to be implemented [16]. Thus, there is a chance that settlements development process could be significantly improved or even tailored to the real needs and expectations of current beneficiaries – the local communities.

2.2. Parameters, indicators, indices and threshold values in settlements development

A fundamental step in the elaboration of development strategy is the evaluation of state and dynamics of the components of settlements. At this stage, we process the required set of operational elements (parameters, indicators, indices and threshold values) in order to structure the informational foundation of the strategy. There is currently a wide variety of such operational elements available in the literature, defined, yet not grouped as a single integrated set of indicators. The purpose of an integrated system of indicators is to generate capacity to collect and use data in support of public policies at national and local levels essential for the elaboration of sustainable development strategies [2]. They are necessary and prove effective in the ex-ante evaluation, monitoring and impact assessment after the implementation of strategies [15]. This assemblage would create further opportunity to also develop the logical scheme (matrix) that would simulate the internal dynamics of the settlement system, thus proving the relevance of the objectives set, the effectiveness of the measures proposed, the possible impact of the implementation of strategy and of all the changes occurring during the implementation and ex-post, and the sustainability of the strategy overall. Therefore, the operational elements would represent a set of parameters, indicators, indices and threshold values organized in *research units* (RU) corresponding to each major settlement subsystem.

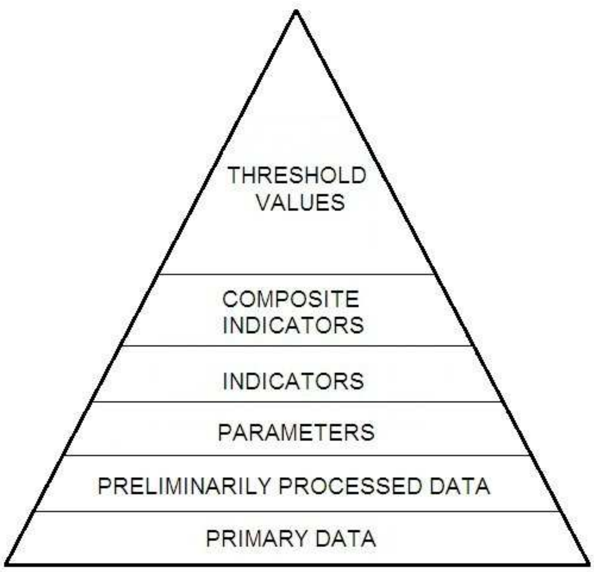

Fig. 1. Structure of the informational pyramid.

They are an integral part of the informational pyramid and are hierarchically ranked to match the level of information they deliver starting from the foundation (raw data) and up to threshold values at the top of the pyramid (Fig. 1).

1). The primary data (PD) reveal the first-hand information and result from reviewing, direct measurements or indirect determining. Primary data collection is the most expensive stage but also the most important and vulnerable, the analytical and decision-making processes depending entirely on the quality of these records. Primary data collection can be handled by specialized institutions and/or also by private means. Primary data collection has developed in time, covering an increasingly high range of the most essential aspects of reality, but it is far from being complete and integrated. Most of the deficiencies are found especially in the case of peripheral geographical areas and related territorial systems. In this case, the quality and accuracy of primary data depends directly on the type of procedures for collection, storage, transfer and integration into databases and the periodicity of collection. The main issue of data collection is to be able to take snapshots of data at the time of delivery and benefit from information in real time. Such data collection systems are more and more developed in the case of technical systems (e.g. transportation and communication, industrial manufacturing processes, etc.) but they are partially developed or even missing in the case of social systems. This results in limited access to primary data or in the inability to collect certain data that proves important in the overall development scheme.

2). Preliminarily processed data (PPD) represent the first form of primary data aggregation, achieved by centralization, sorting and classification, clustering on statistical intervals or estimates of central tendency of statistical series. The main source of these preliminary data is the different statistical reports released by public bodies that are in charge with the monitoring, collection and primary processing of data and information. In addition, there are other public authorities involved in the management and planning of subcomponents of the territory, settlements, economy, resources and technical infrastructure that operate verifications, analyses and monitoring, release various estimates, all resulting in a series of preliminarily processed data. The importance of primarily processed data in the evaluation process lies in the large amount of work and time for their operation. However, the major problem of such data is their accuracy, the high acquisition costs and the fact that they cover a fairly narrow range of territorial realities, especially in case of the issues related to the development of settlements.

3). The *parameters* (PR) are the particular values registered by of a system, a phenomenon, which are used to characterize some of their properties in comparison with the baseline values.

4). Indicators (I) are numerical expressions (expressed by absolute, mean or relative values) resulting from a distinctive formula, which are used independently or in correlation with others in the analysis and assessment of a territorial reality. A datum or variable observed becomes an indicator only once its role in the evaluation of a phenomenon has been established [12]. They are clearly defined to quantitatively express a specific content or feature of a natural, socioeconomic or technical process or phenomenon, whilst their importance in the research process is given by the functions they perform: measurement, comparison, analysis, synthesis, estimation and verification [5].

5). Composite indicators (CI) result when individual indicators are aggregated into a single index [16], on the basis of an underlying model of the multi-dimensional concept that is being measured. A composite indicator measures multi-dimensional concepts (e.g. competitiveness, e-trade or environmental quality) which cannot be captured by a single indicator. Ideally, a composite indicator should have a theoretical framework, which would allow for the individual variables to be selected, combined and weighted in a certain manner so as to reflect the dimensions or structure of the measured phenomena [4]. The use of indices in the field of sustainable development facilitates the understanding and interpretation of indicators of a given phenomenon, particularly for the public [12].

6). (Control) Threshold values (CTV) represent the maximum, minimum, normal and specific values of parameters, indicators and indices that characterize the state of an object, process or phenomenon. They are informative and guiding, they stimulate or limit the decision making process and they are the result of long-time monitoring of the behaviour of a structure, process or phenomenon. In the informational pyramid, threshold values are designed to set the quantitative and qualitative significance of the parameters, indicators and composite indices that would further deliver accurate information about the status, structure and dynamics of a system. In engineering and technology fields threshold values represent reference values, whereas in social and economic fields they are indicative limit values, and they are found both in legislation and in various studies and specialized research. In the assessment and development of settlements the existence of threshold values has the same role and importance as in the engineering and technical design, even if settlement subsystems have a much broader level of tolerance, although not infinite. If they are clearly defined and employed, they can indicate, select, limit, block or control the expression of variables and generate correctly interpreted information to further provide relevant background for a development strategy.

3. RESULTS AND DISCUSSION

3.1. The importance of parameters, indicators, indices and thresholds values in the diagnosis of dynamics and organization of settlements

Human settlements are geographically complex systems that consist of a multitude of natural, social and technical subsystems. These subsystems have some degree of autonomy in their organization and operation but they are they also deeply interconnected, both horizontally and vertically with an operational settlement.

This interconnection generates groups of subsystems with particular designation in supporting all functions of settlements (housing, economic production, maintenance, rest and recreation, communication, protection, etc.). Their typology and structure are constantly subject to change, adaptation and adjustment as to appropriately fit the purpose for which they were implemented. All these activities are the result of organizational activities undertaken in compliance with the previously formulated development strategies.

None of the subsystems of settlements have self-organizing properties except for those belonging to the natural environment. Hence, they are tributary to the human ability to organize them, which depends on the set of real time information, resources, and level of technology and knowledge available at the time. Thus, understanding the organization of geographical space and of geosystems represents the ultimate premise to properly implement the necessary planning measures and achieve sustainable development [8]. Outside this permanent organizational framework of subsystems of settlement fulfilling the current needs and the set of factors that provides their existence and development, settlement would become amorphous structures, subject to disintegration and absorption into the natural subsystems.

All efforts to properly organize the subsystems of any settlements for them to perform their function judiciously are highly significant and they usually increase along with the size of the settlement. If we also take into account the maintenance costs then we realize that much of the current existential efforts are dedicated and consumed by human society exactly for this purpose, of habitat organization. On the other hand though, we find that these efforts are justified and they deserve to be taken when settlements perform all the functions for which they were created and provide people with an attractive environment for the daily life.

To achieve this goal, however, it is required first to perform a preliminary planning of the organization of these subsystems. A priori appropriate designing can always rely on and be performed by using comprehensive and most realistic information.

It is known that information is highly perishable in time and many of the processes and phenomena leave no informational fingerprints behind. This means that, in this knowledge age, one of the main basic activities human society should perform is to collect and store data and information, as these could subsequently serve both to understand reality and proceed to a large array of adaption actions. This is how the organization of settlements works, as well. A proper organization of the subsystems of settlements is based on the existing data and information. The more complex and complete this set of data and information is, the more accurately we can perceive reality and define the way the organizational actions should be taken.

To know, however, what sets of data and information we need to properly design the subsystems of settlements, it is necessary first to know their organizational structure. The knowledge level on the organizational structure of settlements has lately developed spectacularly, being the study topic of not only geographers and planners but also of many other social and technical sciences. Also, every science field that studies settlements has developed their own set of assessment parameters and indicators some of them being also found and employed in many other research fields. Therefore, we currently have sufficient available theoretical knowledge about the organizational and functional structure of rural or urban settlements, parameters, indicators and threshold values. Yet, what is not currently regulated is that unitary set of parameters, indicators and threshold values, derived from all the research fields related to the study of settlements. Overcoming this stage would create a single tool to be applied in case of all unit assessments subsequently obtaining the same results. We believe it is time to make a concerted effort to merge all these individual and individualistic approaches and aggregate them into a common set of assessment parameters, indicators and threshold values and create an operational logical scheme that would simulate the behaviour of the settlement system. Public policies begin by formulating a strategy. At this level, the system of indicators designated to be used in the specific policy must measure the achievements made to fulfil the proposed objectives. After the implementation of the policy, indicators are used for monitoring the strategy and eventually become assessment tools of that strategy [2]. The substantial benefits of such merger would generate advantages and opportunities as presented in Table 4. Finally, such an approach is not only necessary, but it is also justified in order to create the premises to comply the settlement development with the new paradigm, that of resource-based development.

Table 4. Advantages of using a complete set of indicators in the development strategy design and implementation.

Crt. no.	Advantages of using a complete set of indicators in designing and implementation of development strategies
1.	Formulate a standardized assessment framework of settlements.
2.	Create prerequisites to substantially improve the quality of projects and development strategies.
3.	Increase the involvement level of all research fields in the study of settlements for the elaboration of development projects and strategies.
4.	Reduce the unpredictability, assumptions and the influence of random factors in the development, management and control of the settlements.
5.	Create a new assessment and perception tool for the structure of settlements.
6.	Streamline and significantly improve the work of researchers and designers in the field.
7.	Create the prerequisites for the development of new tools and techniques for collecting, primary processing and storing data and information.
8.	Allow for the periodic assessment of the status and behaviour of settlement subsystems in order to make constant adjustments.
9.	Allow for the development of good practices guides for the easier knowledge transfer to designers, database administrators, territorial analysts, government officials, public authorities responsible with the administration.

3.2. The logical scheme of the simulation of internal dynamics of the settlement system

The accurate perception of the state and dynamics of settlement systems cannot be done properly by only performing an individual analysis of a limited set of indicators as it is usually made in most cases when designing a development strategy. This lies in the high complexity of this type of geosystem and it is conditioned by the multitude of inner structural elements. One-dimensional analyses can only lead to general conclusions and subsequently the measures, programs and projects of the development strategy will also be nonspecific and broad, proving ineffectual in the end. Therefore, it is necessary to develop a logical scheme of simulation of the internal dynamics of settlements geosystem whose structure would contain the following:

a). A comprehensive set of variables to be considered in the multi-criteria analysis, consisting of raw data and parameters;

b). The complete set of indicators and composite indices that are to be used to assess the status and dynamics;

c). The full set of threshold values for the state and dynamics of settlements;

d). The designated relations of determination and subordination between variables, indicators, composite indicators and threshold values.

The structure of such logical scheme must be correlated with the informational pyramid and adapted to the current needs of assessment and development. These needs are determined by the rapid changes occurring in the internal structure of settlements and also by the urgent need for inclusion of planning process in the sustainable development paradigm. The structure of logical scheme must result from a debate between all the professionals involved in the analysis and planning of the geosystem's development and subsequently be unanimously accepted as the basic tool in the multi-criteria analysis – the only one able to generate relevant informational outputs in the strategic planning. Much more, after completing the structure, identification of relations and functional testing, such logical scheme can be converted into a digital tool that would permanently monitor the settlements, strengthening the capacity of relevant stakeholders to manage local development strategies [15] and enabling public authorities make real-time decisions in accordance with the changes occurred and displayed by this monitoring system, the without being necessary to periodically elaborate new development strategies. For exemplification, such electronic monitoring tool can be compared with those used in rail and air, traffic control industrial transportation dispatches or other such systems.

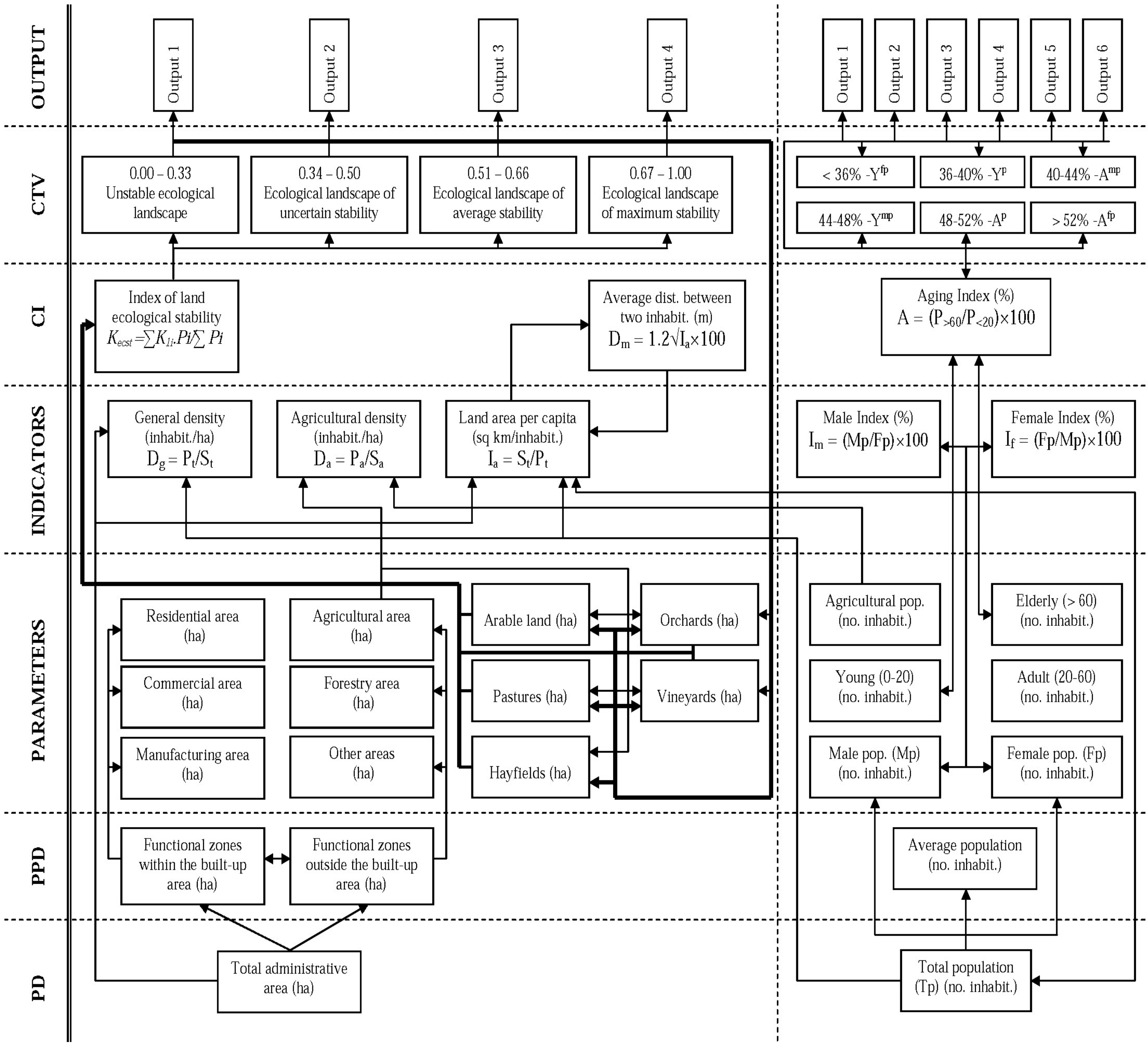

Fig. 2. The logical scheme of simulation of the internal dynamics of settlement system *(where: Y^{fp} – young female population; Y^{mp} – young male population; A^{fp} – Aged female population; A^{mp} – aged male population).*

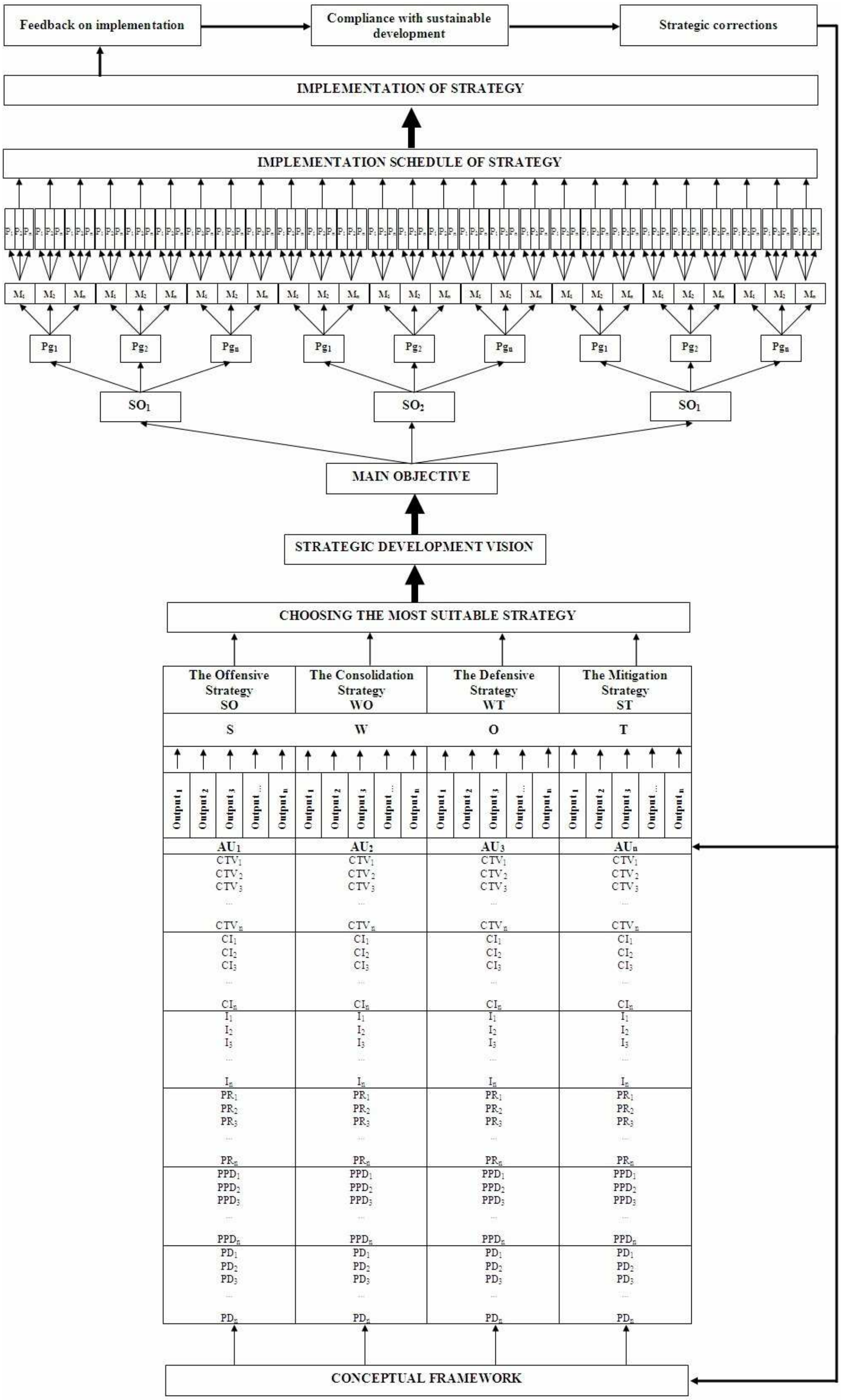

Fig. 3. Logical scheme of the implementation of development strategy *(where: PD – primary data; PPD – preliminarily processed data; PR – parameters; I – indicators; CI – composite indicators (indices); CTV – threshold values; AU – assessment units; SO – strategic objectives; P_g – programmes; M – measures; P - projects).*

The development and implementation of such an electronic system would generate great benefits both on short and long term mainly represented by:

a). Maximum efficiency of the multi-criteria analytical approach;

b). New and acknowledged prerequisites for developing correct multi-criteria analyses to achieve highly accurate information;

c). A relatively complete knowledge of the state and dynamics of geosystem in real time;

d). The possibility to simulate different scenarios of internal dynamics;

e). The possibility to identify vulnerable structural elements of the settlement geosystem;

f). A chance to become an efficient tool of good governance.

Such a logical scheme is provisional so that it can always be adjusted by adding new parameters and indicators while increasing the organizational complexity of the settlement geosystem. For example, we developed a small part of such a scheme which is composed of only a few parameters, indicators, composite indicators and threshold values (see Fig. 2).

At this time, it is almost hard to predict the complete structure of such a scheme. Their vastness can be anticipated only if we consider the number and type of assessment units (AU) that should be taken into account:

- territorial assessment unit (TAU);
- natural framework assessment unit (NFAU);
- demographic assessment unit (DAU);
- social assessment unit (SAU);
- economic assessment unit (EAU);
- technical assessment unit infrastructure (TIAU);
- real estate assessment unit (REAU);
- urban and architectural assessment unit (UAAU);
- habitation environment assessment unit (HEAU);
- natural and anthropogenic hazards assessment unit (NAHAU);
- transportation assessment unit (TrAU);
- public services assessment unit (PSAU);
- administrative assessment unit (AAU);
- macro-territorial framework assessment unit (MFAU);
- sustainable development assessment unit (SDAU).

Each of these assessment units contains a significant number of structural elements according to the informational pyramid, which can thus paint a true picture of a settlement and facilitate the perception of functionality and dynamics of such a geosystem.

For illustration, we present the list of parameters identified in the territorial assessment unit to be considered in the multi-criteria analysis (see Appendix 1).

The territorial assessment unit (TAU) is represented by the land on which the settlement is located and the land around it. This is the physical support of the settlement whilst their development depends on the metrics and type of economic land use. The territory and the complementary land of the settlement result from the process of administrative-territorial organization and the quality of the economic valorisation and management up to the present day. The territory incorporates all of the components of the physical-geographical framework (geology, morphology, hydrology, climate, soil, biodiversity, resources, and natural hazards) and therefore can be considered as the basic resource in settlement development.

After completing the design and structure of this logical scheme, it should be connected to the scheme of development strategy so that these two tools would become a single operational tool (see Fig. 3). Then, the informational outputs derived from the logical scheme of simulation of the internal dynamics of the system will be directly included in the SWOT analysis, which will further determine the most suitable strategy type consistent with the results of multi-criteria analysis. Hence, the quality of the development strategy greatly depends on the outputs presented in the logical scheme.

If connected, the two logical schemes result in a new operational structure, which helps optimizing the entire process of designing the development strategy.

To follow up the results of the implementation of strategy we need to develop an implementation tracking module consisting of: 1) evaluation of feedbacks, 2) measuring results in compliance with the requirements of sustainable development, and 3) correction of results (registered values that are below the requirements of sustainable development). This last evaluation component will further release feedbacks to the base of the logical scheme that would highlight any required adjustments, both at the conceptual level and at the level of assessment units (AU). These feedbacks will help identify the parameters that register values outside normal conditions and therefore specifically indicate which of the geosystem's components are vulnerable and must be optimized. Thus, once again the logical scheme proves valuable in the monitoring of the strategy implementation and territorial development process. Monitoring and evaluation should not be made only punctual and at the end of the process, but throughout the entire process of strategic development [20]. The use of such logical scheme would meet the broad objective of displaying an integrative view on the status and dynamics of settlement system and would reveal the performance level of the strategy.

4. CONCLUSION

We live in an age of postmodernism, in which challenges of the present and expectations of the emerging future are higher than ever. This state of facts triggers paradigm shifts in the organization of our society, implicitly requiring intelligent human habitat development. This new paradigm of intelligent development means developing new tools of knowledge and planning decision-making. Planning must be inclusive and should provide full knowledge on the managed and operated structures. Only this way can we ensure that the decisions we make are consistent and not conflictive in relation with the territorial realities. The development of such a decision-making tool in human habitat development planning, based on logical scheme can open new paths to achieve the desire all territorial planners have - smart and sustainable planning.

This study is a first step of a long-term research project which aims to develop an integrative and complete logical scheme to be employed in strategic and intelligent human habitat development planning.

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Appendix 1. Territorial Assessment Unit. The list of territorial-related parameters.

Crt. no.	Assessment Unit	Measurement Unit	Indicative
1	**TERRITORIAL UNIT**		**TU**
1.1	TERRITORIAL PARAMETERS		TP
1.1.1	**Administrative area**	**ha**	**AA**
1.1.2	**Intraurban area**	**ha**	**IA**
1.1.2.1	Agricultural land	ha	Al
1.1.2.2	Land covered with buildings and yards of residential use	ha	BYres
1.1.2.3	Land covered with buildings used for public services and facilities	ha	Bps
1.1.2.4	Land covered with designated buildings and warehouses for industrial use	ha	BWind
1.1.2.5	Land covered with buildings designated for agri-zootechnical use	ha	Baz
1.1.2.6	Land designated for road transportation infrastructure (intraurban public roads and related constructions)	ha	RoTI
1.1.2.7	Land covered with public and private parking lots	ha	PPP
1.1.2.8	Land designated for rail transportation infrastructure (public railroads and related constructions, industrial railroads)	ha	RaTI
1.1.2.9	Land designated for air transportation infrastructure (airport, runway and related constructions)	ha	ATI
1.1.2.10	Land designated for water transportation infrastructure (harbour and related constructions)	ha	WTI
1.1.2.11	Land covered with designated green areas (parks, squares, etc.)	ha	DGa
1.1.2.12	Land designated for open space green areas	ha	OGa
1.1.2.13	Land covered with green areas designated for protective purposes	ha	PGa
1.1.2.14	Land designated for public technical infrastructure and related facilities (gas, electricity, water and wastewater, waste deposits, etc.)	ha	PTI
1.1.2.15	Land designated for public infrastructure (cemeteries, warehouses, etc.)	ha	PI
1.1.2.16	Land designated for special use (military, protected areas, nature reserves, nature monuments, etc.)	ha	SU
1.1.2.17	Land covered with watercourses, lakes, ponds and swamps	ha	Wl
1.1.2.18	Land covered with forests	ha	Fl
1.1.2.19	Unproductive land (degraded by any types of pollution, affected by risks)	ha	Ul
1.1.2.20	Safeguarded land	ha	Sl
1.1.3	**Extraurban area**	**ha**	**EA**
1.1.3.1	***Agricultural land***	***ha***	***Al***
1.1.3.1.1	*Arable land*	*ha*	*Arl*
1.1.3.1.1.1	Arable land	ha	Arl
1.1.3.1.1.2	Land designated for perennial forage crops	ha	PFC
1.1.3.1.1.3	Temporarily uncultivated/unsown land	ha	TU
1.1.3.1.1.4	Land covered with equipped greenhouses and hotbeds	ha	GH
1.1.3.1.1.5	Land covered with paddy fields	ha	PF
1.1.3.1.1.5	Degraded arable land (by erosion, acidity)	ha	DArl
1.1.3.1.2	*Land covered with pastures*	*ha*	*Pl*
1.1.3.1.2.1	Land covered with clean pastures	ha	CP
1.1.3.1.2.2	Land covered with grasslands with trees	ha	GT
1.1.3.1.2.3	Land covered with wooded pastures	ha	WP
1.1.3.1.2.4	Land covered with pastures with shrubberies and brambles	ha	PSB
1.1.3.1.2.5	Land covered with degraded pastures	ha	DP
1.1.3.1.3	*Land covered with hayfields*	*ha*	*Hl*
1.1.3.1.3.1	Land covered with clean hayfields	ha	CH
1.1.3.1.3.2	Land covered with wooded meadows	ha	WM
1.1.3.1.3.3	Land covered with meadows with shrubberies and brambles	ha	HSB
1.1.3.1.3.4	Land covered with degraded hayfields	ha	DH
1.1.3.1.4	*Land covered with vineyards*	*ha*	*Vl*
1.1.3.1.4.1	Land covered with indigenous and grafted vineyards	ha	IGV
1.1.3.1.4.2	Land covered with hybrid vineyards	ha	HV
1.1.3.1.4.3	Land covered with hops	ha	Hl
1.1.3.1.4.4	Land covered with vine nurseries	ha	VN

1.1.3.1.4.5	Land covered with degraded vineyards (aged)	ha	DV
1.1.3.1.5	*Land covered with orchards*	*ha*	*Ol*
1.1.3.1.5.1	Land covered with classical (common) orchards	ha	CO
1.1.3.1.5.2	Land covered with intensive and superintensive orchards	ha	ISiO
1.1.3.1.5.3	Land covered with bush fruit trees plantations	ha	BftO
1.1.3.1.5.4	Land covered with mulberry trees plantations	ha	MtO
1.1.3.1.5.5	Land covered with fruit tree nurseries	ha	ON
1.1.3.1.5.6	Land covered with degraded orchards (aged)	ha	DO
1.1.3.2	***Forestry Land***	***ha***	***Fl***
1.1.3.2.1	Forest-covered land (surface > 0.25 ha)	ha	Fcl
1.1.3.2.2	Wood-designated land	ha	Wl
1.1.3.2.3	Land covered with forest nurseries	ha	FN
1.1.3.2.4	Land covered with forest infrastructure (roads, cabins)	ha	FI
1.1.3.2.5	Land covered with protective forest plantations	ha	PFP
1.1.3.2.6	Land covered with forests for landscape preservation and forest tree genetic reproduction	ha	Flp
1.1.3.2.7	Land covered with forests under economic exploitation	ha	Fec
1.1.3.2.8	Land covered with forests designated for the regeneration of wildlife population (for hunting)	ha	Freg
1.1.3.2.9	Land covered with degraded forests	ha	DF
1.1.3.3	***Land covered with water***	***ha***	***Wl***
1.1.3.3.1	Land covered with streams	ha	S
1.1.3.3.2	Land covered with stagnant water bodies	ha	SW
1.1.3.3.3	Land covered by the territorial sea	ha	TS
1.1.3.3.4	Land covered by the inland sea	ha	IS
1.1.3.4	***Land covered with transport and communication infrastructure***	***ha***	***TCIl***
1.1.3.4.1	Land covered with national road infrastructure	ha	NRI
1.1.3.4.2	Land covered with zonal road infrastructure	ha	ZRI
1.1.3.4.3	Land covered with local road infrastructure	ha	LRI
1.1.3.4.4	Land covered with railroad infrastructure	ha	RrI
1.1.3.4.5	Land covered with overhead power lines	ha	OPL
1.1.3.4.1	Land covered with other infrastructures	ha	OthI
1.1.3.5	***Land covered with buildings and yards***	***ha***	***BYl***
1.1.3.5.1	Land covered with buildings and yards designated for industrial use	ha	BYind
1.1.3.5.2	Land covered with buildings and yards designated for agricultural use	ha	BYagr
1.1.3.5.3	Land covered with buildings and yards designated for tourism and leisure use	ha	BYTou
1.1.3.5.4	Land covered with buildings and yards designated for mining use	ha	BYmin
1.1.3.5.5	Land covered with buildings and yards designated for special use	ha	BYsp
1.1.3.6	***Degraded and unproductive land***	***ha***	***DUl***
1.1.3.6.1	Desert land and sand dunes	ha	DSD
1.1.3.6.2	Land covered with rocks, boulders and gravels	ha	RBG
1.1.3.6.3	Land covered with ravines, gullies and torrents	ha	RGT
1.1.3.6.4	Land covered with salty crusts	ha	SC
1.1.3.6.5	Land covered with bogs and fens	ha	BF
1.1.3.6.6	Land covered with pits and quarries	ha	PQ
1.1.3.6.7	Land covered with mine waste	ha	MW
1.1.3.6.8	Land covered with landfills	ha	Lf
1.1.3.6.9	Land affected by physical and chemical pollution	ha	PCP