

FUTURE COMES WHEN THE PRESENT TURNS INTO THE PAST: FROM GRAVITATIONAL TO NETWORK SPATIAL STRUCTURES

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БУДУЩЕЕ ПРИХОДИТ, КОГДА НАСТОЯЩЕЕ СТАНОВИТСЯ ПРОШЛЫМ:
ОТ ГРАВИТАЦИОННЫХ ПРОСТРАНСТВЕННЫХ СТРУКТУР К СЕТЕВЫМ

Abstract

Success of spatial planning and urban growth management depends on our knowledge about cities and systems of settlements. Dominating in the relevant domestic theory views are continue to be almost unchanged since eighties of the 20th Century and can be described with the *gravitational model*. General overview of spatial development processes provides opportunity to identify at least two patterns of spatial organisation associated with the subsequent stages of settlement systems' structural development. Structural organisation at the earliest stage can be described with *linear-nodal model*. Lately this pattern of spatial organisation had been substituted by *gravitational structures*. Establishment of such structures were predefined by establishment of centralised mechanisms of territorial management. Within every stage of structural development three phases are identified: origin and development (1), sustainability (2) and destruction (3). The first phase of origin and development overlaps the last phase of the previous stage. The contemporary period is characterised as the last phase of gravitational structural organisation and transition to the new pattern of spatial organisation on the basis of *network model*.

Реферат

Эффективность пространственного планирования и управления градостроительным развитием зависит от нашего знания о городах и системах расселения. Доминирующие в соответствующей отечественной теории взгляды остаются практически неизменными с восьмидесятых годов двадцатого века и могут быть описаны гравитационной моделью. Общий обзор процессов пространственного развития дает возможность выявить как минимум два образца пространственной организации систем расселения, характерных для соответствующих этапов развития. Структурная организация на наиболее раннем этапе может быть описана линейно-узловой моделью. Позднее на смену такой форме пространственной организации пришли гравитационные структуры. Формирование таких структур предопределялось становлением централизованных механизмов территориального управления. В рамках каждого этапа развития структуры систем расселения выделены три фазы: зарождение и становление (1), устойчивое существование (2) и разрушение (3). Первая фаза зарождения и развития накладывается на последнюю фазу разрушения в рамках предшествующего этапа. Современный период характеризуется как последняя фаза существования гравитационной структурной организации и перехода к новой пространственной организации на основе сетевой модели.

Key words: spatial planning; system of settlement; spatial settlement structure

Ключевые слова: пространственное планирование; система расселения; пространственная структура расселения

THE PROBLEM

Undoubtedly problems related to urban growth management are nearly the most discussing in the professional circles of architects and urban planners.

So far, sometimes flaring up and sometimes dying down, disputes and attempts to provide theoretical comprehension of processes and phenomena related

to urbanisation, search and introduction of successful planning tools and management mechanisms have not resulted in unambiguously positive achievements yet. It is possible to continue quite extensive list of negative consequences caused by hardly controlled processes of urbanisation and urban growth. These are generation of incredibly intensive flows of passengers, goods, resources and energy; destruction of valuable natural, semi-natural, rural environments and cultural landscapes; social and economic segregation. From the other hand the one key advantage traditionally is associated with the growth of big cities. It is the high concentration of resources, diversity of opportunities and favourable conditions promoting rapid social and economic development – the “science and technical progress” as it used to be determined a couple decades ago. Nevertheless this advantage seems quite controversial as far as it is achieving mostly due to exhaustion of resources, limiting both opportunities and competitive development perspectives for other settlements.

One can argue against such pessimistic view. Why processes of urbanisation and urban growth are “hardly controlled” or even uncontrolled? Is it possible to deny the victorious experience of development and implementation of numerous master plans and similar urban planning documents in the past? Meanwhile it is worth to admit, the thorough scrutinizing reveals that all achievements associated with “successful” urban planning and management are looking as anodyne self-deception. It is specially the case regarding the fact that narcissism and architectural centrism are quite common phenomena in our professional community. We suppose that an architect knows how to design the shape of the city to accommodate its' growth and future needs. However such knowledge is usually based on simple superficial empiric observations how other cities have grown in the similar conditions. [1] Thus if we plan what usually happens adding certain share of professional ambitions and happy thoughts, doesn't it mean that we are dealing with illusion of planning? Doesn't it look quite similar with the planning of the next morning or the next spring after the winter with the following celebration of achievement that morning has come or spring has began as it have been planned?

Theory allows practice to take convenient position. Cities and systems of settlements are considered simultaneously as objects of spontaneous development and as objects of targeted planning and management. It has rationale as far as in the particular case we are dealing with very complex objects and processes having higher degree of uncertainty. At the same time it enables practitioners avoiding critic in the case of failures. There always is possibility to interpret all negative

consequences of development as results of spontaneous processes, and, on the other hand, all gains and achievements of such development can be treated as results of successful urban planning and management practice.

Meanwhile there are two points that has rarely been discussed in the professional spheres. First, if in the case of cities and systems of settlements we are dealing mostly with spontaneous processes we must admit that overwhelming majority of decisions on actions summarising development process are taken unconsciously, irrelatively of actual impacts on human environment. Second, if we are talking about good theory and successful practice, we must see evidences of growing professional responsibility for outputs actually delivering by practitioners. The last would result in growing influence over political decisions and essentially in growing representation of practitioners in the sphere of public policy. [2] However such dynamic has not been observed in the national practice yet. Domestic theorists even avoid the usage of notion “planning” as far as it assumes wider responsibility for the actually delivering results and has prominent political dimension. [3] Contrary to the western urban planning and management theory and practice that has left the purely architectural subject field and considers planning as political process [e.g. 4, 5 and 6], domestic theorists instead of notion “planning” exploit different notion ‘планировка’ (i.e. formal shaping of a city or urban structure) having no corresponding translation in English. [7] It is supposing that the task of professionals is to draw nice shape of the city, but it is not their fault when this shape will not have been achieved in future. This can always be explained by obstinacy of spontaneous processes.

1. THE SITUATION

To make planning and management more effective we need to know about characteristics and behaviour of the object as much as possible. So what do we know about cities and systems of settlements? On the surface in the domestic theory there is the possibility to reveal substantial layer of concepts describing objects we are interested in from the position of gravitational model. In essence this model explains processes of forming and functioning of systems of settlements as multilevel centralised and subordinated constructions, establishing internal structure as relation of unitary central dominant element and its' surrounding subordinated elements. In other words the biggest settlement-centre creates zone of influence. This zone specifies limits of concrete territorial system consisting of subordinated settlements.

In compliance with the theoretical concept the gravitational model assumes that central dominant settlement in contrast to others accumulates surplus of resources and functions, as it is declaring, for the welfare of all settlements within the territorial system. The city-centre becomes the source of managerial impacts establishing sustainable centripetal flow of resources, stimulating own accelerated development and territorial growth. In the process of such growth the city-centre generates specific structure consisting of so called "central integrated" and "peripheral" zones with "transitional" zone in between. Domestic theorists consider such spatial organisation as absolute and inalienable feature of cities that have achieved the certain size. [8]

Why the gravitational model seems the most constructive and even the only possible alternative in the domestic theory? There are quite obvious reasons for that. The processes describing by the model ideally correspond to the hierarchal centralised state management systems, including those responsible for the spatial planning. At the same time all classic history of urbanism covers the period of origin and development of hierarchal centralised state management structures only. [9] Gravitational model has successfully worked throughout the long period of human history and problems associated with uncontrollable development are relatively new. That is why in the domestic theory and practice such explanation of spatial organisation and interrelations of settlements supported by authorised opinions has not been the subject for critic and revision yet.

2. HISTORIC PERSPECTIVE

How were systems of settlements at the earlier stages of human civilisation development organised? What was the spatial structure of such systems? How

did such structure facilitate functional processes of vital human activities, migration, genetic, economic and cultural exchange? If we have a look into the past much deeper than it has been done in the classic sources devoted to the history of urbanism we will certainly find traces of different organisational and spatial structures. There are evidences that at the early stages of human civilisation development at least another alternative spatial organisation existed, different to that describing by the gravitational model.

The most obvious patterns of earlier structures can be described with linear-nodal model. Because of extremal passivity, traces of such ancient spatial organisation continue its existence in very old trade routes as well as some of them has got new functional content in contemporary transcontinental communicational corridors. It is very likely that gravitational structures started development on the basis of former linear-nodal structures. The question is what phenomena followed such transformation? The answer will require new interpretation of historic events associated with destruction and breaks of linear structures as evidences of crisis and transition to the new form of spatial organisation.

In that way there are obvious indications that with regards to systems of settlements the gravitational model is not only one possible form of spatial organisation. If it is not the only one and not the first one, so the most likely it is not the last one. Pattern of spatial structure distinguishes the stage of spatial development, and in essence the process of spatial development itself with regards to systems of settlements could be described as transition from one pattern of structural organisation to another. It is possible to suppose that every stage consist of three phases at least. The first one is the phase of origin and development, the next is the phase of relative sustainability and the last phase is

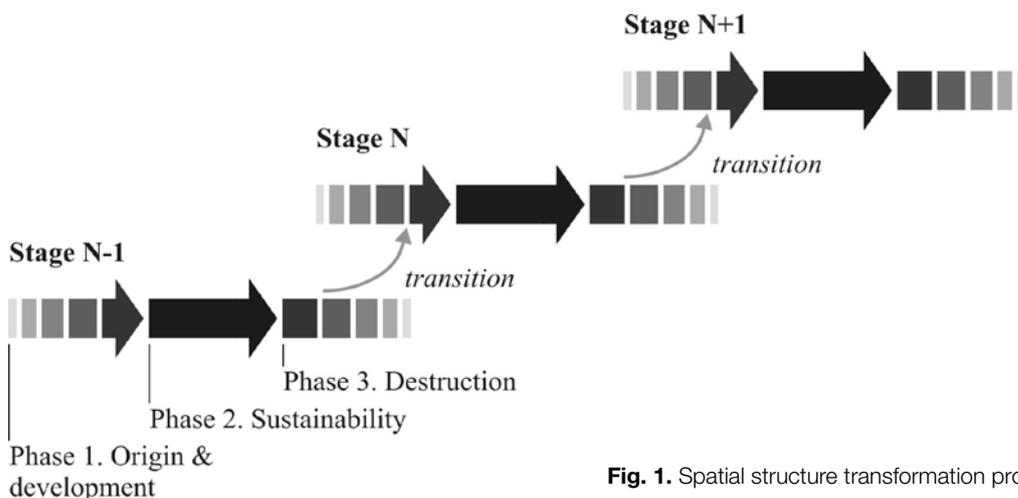


Fig. 1. Spatial structure transformation process.

the phase of destruction and transition. In this connection every initial phase within one stage overlaps the last phase within the previous stage (figure 1).

3. THE CONCEPT

The problem of finding effective solutions to urban growth management, overcoming negative consequences of spontaneous urbanisation and approaches to constructive spatial planning can be defined with three key questions:

- Are contemporary negative processes and phenomena indicators of specific phase of evolution within specific stage and its transition to the new structural organisation?
- If contemporary status of systems of settlements is the specific phase in evolution of spatial structures has appeared and dominating at the respective stage, what is the next stage of spatial organisation?
- What managerial impacts are more appropriate at the contemporary phase and stage of structural development?

Proposing theoretic concept gives key for alternative interpretation of contemporary processes related to the urban growth during the last century. In contrast to the traditional views assuming that growth of large cities as creative process, it is interpreted here as destruction or autodecomposition.

4. PLANNING THE FUTURE OR RETAINING THE PAST?

The concept of gravitational model presumes that dominant city-centre has competitive advantages in development of environmental and functional diversity. It is multiplying such advantages by means of managerial influence at the flows and allocation of resources. Ones appeared during the specific period of time gravitational structures enter into the phase of sustainability. The sustainability often is not obvious as far as it is covered by competition between different territorial systems and centres. The competition results in complication of structure and hierarchal and multi-level organisation.

At last hierarchal multilevel constructions have built up and achieve the maximum level of intensity (figure 2). Every settlement has taken specific place. All resources available are mobilised. Sustainable existence of centralised gravitational structures is supported by internal processes. As the result the concentration of competitive advantages in the central cities, positioning on the top of hierarchal constructions, achieves its

maximum. The mechanism of speeded up generation of new functions and environments has launched. This requires increasingly more resources in terms of volume and diversity. Initial competitive advantages allow satisfaction of internal development needs and intensification of external influence by means of pauperization of other elements of the system.

Nevertheless concentration of influence, resources, functions and environments comes to its highest level. There is the basis to assume that such concentration has the 'non-return point' when the process of autodecomposition starts. Namely decomposition or destruction is appropriate term for unmanageable processes of urban growth! It is destruction of city itself as well as decomposition of system of settlements and transition to the subsequent spatial structure.

Expulsion of big monofunctional complexes lacking of vital capacity with limited environmental diversity

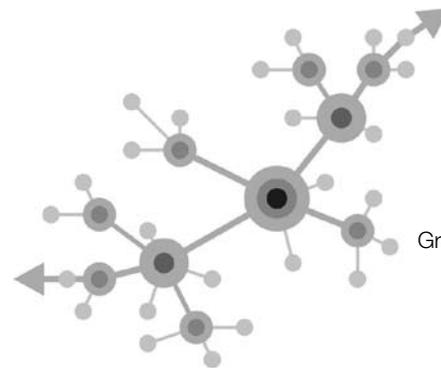


Fig. 2.
Gravitational model:
sustainability

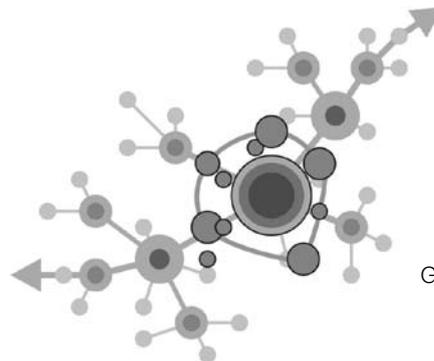


Fig. 3.
Gravitational model:
destruction

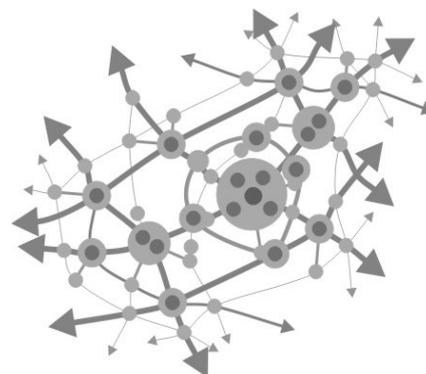


Fig. 4.
Network model

to the periphery of the dominant city-centre indicates transition from sustainability to instable status. This means that specific spatial structure of the city-centre, consisting of mentioned above “central integrated”, “transitional” and “peripheral” zones, is indication that stable phase of development is over and the system of settlements with the city-centre is coming to the phase of destruction and transition. In succeeding time the process of expulsion becomes more prominent and supplementing with expulsion of monofunctional complexes industrial zones, dwelling districts, shopping areas and etc.) out of the city borders and development of new settlements as satellites with limited functional and spatial diversity, promoting economic and social segregation.

Development of the city-centre has similarities with eruption when the process results in extermination of the nearest and then more distant settlements, historical, cultural, rural and natural environments (figure 3). To provide vitality of the system the need for transportation of people and resources rises steeply. Development of infrastructure increases the processes of destruction of valuable natural, semi-natural, rural and traditional urban environments resulting in degradation of spatial diversity and, finally, in functional and spatial entropy.

Thus contemporary domestic theory and practice of urban planning is remaining on positions and in captivity of stereotypes of 70-th – 80-th of the XX century. At that time comprehension of results achieved after the Second World War with domination of hard centralised system of state power consolidated the gravitational model of spatial organisation as the only option for spatial planning. Hard centralised systems of settlements had become the basis for totalitarian spatial planning and progressive dynamic of spatial development resulted in physical growth was considered as the only successful scenario. Annoying misbehaviour of some settlements that “did not want to grow” and even stagnation had not sadden the happy picture of unitary universal order and victorious growth.

Since then domestic theory and practice do not brave enough to argue with authoritative opinions of eighties and simply contemplate the usual course of events. The fact that national system of settlements does not represent the vanguard of development allows generation of convincing solutions for the time being by means of wise observation what has happen with those who are ahead without efforts to give any alternative interpretation of contemporary processes. Unfortunately the forecast can be unfavourable. Such approach to planning is the way to crisis that has already started. The most unpleasant circumstance is

that the crisis apogee will happen when vanguard run out of it successful and renovated.

5. THE FUTURE HAS ALREADY COME

As it was mentioned above, spatial structures of systems of settlements are extremely inertial. Moreover, such sustainability of physical structures in time justifies sustainability of theoretical concepts and its dominance in professional mentality without more or less prominent alternative. Nevertheless the future has come! There is no need to address traditionally to such come-at-able and understandable for our professional mentality experience from the East to see it. Is it possible to give theoretical interpretation what is happening in the systems of settlements in the West?

There are some indicators that allow doing this. Such indicators are in the plane of stereotypes of professional and mass mentality. Here we can observe prominent shift in evaluation of the spaces or environments from accent at the physical location as gradation “centre–outskirts– periphery”, towards appreciation of wider choice of qualitative environments and opportunities available or easily achievable in the specific location. It is important that in principle such a freedom of choice could be provided irrespectively to the traditional centres or nodes of gravitational structures. In spite the fact that central zone of capital city is highly evaluating exactly because of condensed opportunities and wider choice, in the domestic professional mentality the value of this zone is still associating with the physical location.

In the West after crisis and entropy accompanying destruction of centralised systems of settlements it is possible to detect signs of new structural organisation. This new organisation involves opportunities of decentralised spatial development as well as new technologies and planning approaches. There are evidences that spatial structures of systems of settlements are entering into new stage of development. Instead of destructing gravitational structures the new network structures are establishing (figure 4). Contemporary phase could be described at the same time as phase of transition from gravitational to network spatial structures.

What are the features of the network model and what novelty it brings in comparison with gravitational model? First of all the network model eliminates hard localisation of competitive advantages exclusively in the city-centre and stimulates springing up development opportunities in every node of system. Managerial efforts of spatial planning are oriented towards the following objectives:

- to develop and support competitive diversity of qualitative environments to live and to work in, equally accessible to all members of local communities irrespectively to its physical location,
- to provide competitive diversity of locally accessible job opportunities,
- to increase attractiveness and support sustainability of traditional jobs involving intellectual and creative capacities,
- to stimulate development of competitive choice of services and opportunities for communication and exchange as inside as outside of the local communities,
- to ensure development of opportunities and accessible forms for self-perfection, education and professional training.

Network model of spatial organisation has got wide application in the sphere of protection of natural biological and landscape diversity. The idea of spatial and structural organisation on the basis of relation “centre–satellites” has not been applicable to this sphere initially. Planning supporting development of ecological networks is based on identification of core areas and transitional components, so called ‘corridors’, at different scale levels from transcontinental to local. At the same scale level all core areas and corridors are of equal functional value with regards to support of favourable conditions for biological and landscape diversity protection and regeneration. [10]

Very likely that network structures of settlements will build up hierarchal constructions according to the scale level of organisation as well. Providing absolute freedom for individual mobility, such organisation will allow gradual reduction and minimising volumes of passenger and resource flows. Making and development of network structures will be accompanied by transformation of mass, and first of all, professional mentality with regards to realisation of:

- imperishable value of environmental and functional diversity as important resource, on the one hand, and need for preservation and development of such resource as obligatory condition for development, on the other hand;
- need to provide equal and competitively sufficient access of local communities to resources and technologies, including resources of environmental and functional diversity regardless to its physical localisation;
- opportunities of new technologies of management, communication, production and services for providing competitive development conditions for every element of the system of settlements;

- importance of harmonious coexistence of parallel network structures, namely settlement networks and ecological networks.

These positions are not new and in different combinations came into use in advanced planning practices since early 70-th.

Accordingly to proposed theoretical concept effective spatial planning overcoming and mitigating negative effects of spontaneous spatial development requires deliberate transition from gravitational spatial structures to the network structures. As regards to productivity and efficiency the unitary gravitational concept is getting less relevant to contemporary realities and in less demand in advanced planning practices. We are leaving in dynamic world and the phenomenon that we could explain yesterday evolves and becomes inexplicable on the basis of previously established views. It is time to admit that domestic practice and the theory advocating it is turned into the past and it is prime time to take up the future.

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