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The Economic Model of Synchronizing the Processes of Integrated and Sustainable Development of Urban Areas

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Abstract— **The –synchronization" concept as a subject of research is commonly defined in academic circles as the reduction of certain processes to their simultaneous execution (or at a regular interval). In the author's opinion underpinned by this article, to remove the existing misalignment in the process of integrated development of a multipurpose urban environment, the synchronization concept is to be understood in broader terms with regard for the physical dimension of objects relative to which the processes under review occur. This methodological approach allowed the author to suggest a coupled three-tier model correlating the urban environment development hierarchy (urban block – neighborhood – community) with three different development technologies implemented by different stakeholders of the investment-construction activity, defined by the author. The model proposed by the author allowed to accurately structure the problem of bringing into step the moves made by stakeholders of the investment-construction process in the form of interrelated subtasks described in the work. The resultant methodology (model) can be used as a universal economic-mathematical tool for analyzing the existing and under development alternatives of government involvement in the development of a multipurpose urban environment.**

Keywords— synchronization, integrated real estate development, public support of the construction industry, developer partnership, investment support matrix.

1. INTRODUCTION

Classic economic theories associate the concept of synchronization solely with the timing dynamics of processes under study. Yet in real life the dynamics of integrated real estate development processes prove related not only to the function of time, but also to the spatial development of territories and their quality improvement – multilayer formation of a comfortable urban environment. Therefore, in the author's opinion, synchronization in this context shall be construed in a broader than usual meaning – as coordination of complex processes and coupling of territorial development levels. Under this approach it seems justified to consider development and interaction between builders, developers and public authorities as synchronization of execution of various interrelated development projects (processes) with measures of public support for the construction industry in forming a contemporary multifunctional urban environment.

2. RELEVANCE, MAGNITUDE AND SCRUTINY OF THE PROBLEM

The approach described above, rather widespread among foreign urbanists [1], [2], [3], recently penetrated both the Russian economic theory [4], [5], [6], [7] and urban development practice at its different levels. Thus the national project "Forming a Comfortable Urban Environment" [8] proclaims as one of the key targets creating a pervasive system ("top-down" and "bottom-up") of involvement in the process of integrated regeneration of a specific urban area along with the synchronization of actions taken by the government, business and residents. According to the developers of these documents, the system should be as follows: federal funds provided in accordance with the said program help with the delivery of large regional projects; in its turn, regional support from municipalities helps implementing relevant municipal integrated rejuvenation projects; on the municipal level these steps involve developers and even local communities in the delivery of urban regeneration projects, including by encouraging the projects initiated by citizens (or small business).

3. TASK SETTING, MATERIALS AND METHODS

Real estate development is a rather specific totality of activities undertaken by urban development subjects, their content and specifics determined to a large extent by the size of objects developed. To figure out the priority of development among such activities, a logical link between subjects and their objects is needed. The present work focuses on objects the size of up to an urban community. The indicators for these and smaller objects are determined, as per the Town Planning Code of Russia (TPC of Russia, [9]), by regional town-planning standards (regional TPS) called to establish the totality of an estimated minimally admissible level of provision with objects of regional importance and a maximally admissible level of their territorial accessibility.

Moscow Government Resolution #801-PP, dated 23.12.2014, "On approval of the provisions regarding the content, preparation procedure, approval and change in the standards of town-planning design in the city of Moscow" [10] sets the structure of Moscow's town-planning standards (TPS), which must include 8 groups: TPS for residential areas,

TPS for retail outlets and services, TPS in education, TPS in fitness and sports, etc. Yet, as of the end of H1 2018, only transport TPS were actually passed.

The highest public interest in this context is roused by future TPS of residential areas, their draft being officially presented to the academic and architectural community in mid-2017. Proposed in the project is the prediction model of residential areas, including an urban community, neighborhood and the urban block as a new town-planning unit – residential buildings with essential services on the lower floors and a courtyard – a private landscaped territory with quiet relaxation grounds that can be basically accessed by residents of this specific urban block, but which is closed for transit public.

The author proposes to correlate a consistent increase in the dimensions of objects described in the TPS for application of economic and other interests cherished by subjects of the town-planning activities defining three types (varieties) of objects, with three types of design technologies that would correspond to them (as well as with various judicial institutes and instruments in relation to these types of objects).

First-type object: urban block or house – a sole land parcel prepared and formed from among the state or municipal lands for its further allocation to legal entities or individuals for investment purposes, landowners later also becoming developers. Such is the legal doctrine applied to such lands.

Second-type object: a neighborhood – localized territory (in the form of a large land parcel divided into urban blocks) which is a field of activity for major developers or, more often, a group of publicly or privately affiliated legal entities – developers. For such major or "composite" subjects the author suggests the term builder-developer.

Third-type object: an urban community – a totality of neighborhoods or localized territories (second-type objects) as well as strips of land (linear objects) outside these territories for their provision with utilities. A partnership between developers and public authorities of a corresponding level, formal or not so much so, is used in relation to third-type objects (for more detail about the institutionalization of such associations see the author's work [11]). Such multi-subject entities should later be named "developer partnership".

The author proposes to match the above-listed three object types with three various technologies and three types of subjects (or three combinations of various subjects and three types of engagement between them).

1) developers – entities that own sole land parcels and, in accordance with urban development plans for the land parcels (as well as technical specifications for their hookup to utilities, which are part of such plans), prepare design documents and carry out construction works within the precincts of such sole plots (urban blocks);

2) *builders* – entities which, acting within the legal mandates for greenfield or brownfield development:

- have acquired the rights, assigned to them by public authorities in accordance with an established procedure, to conduct activities in relation to a large land parcel – a territory with set boundaries – and actually pursue them;

- have assumed the responsibility of greenfield or brownfield development of the allocated land, creating engineering and social infrastructure thereon, as well as the release of built-up territories from the rights of third parties in accordance with the law;

- may carry out construction or reconstruction within the precincts of sole land parcels upon the completion of area planning and the fulfillment of other duties;

3) *developer partnerships* – a combination of subjects, conducting activities in relation to third-type objects (urban communities), on partnership terms. A specific pattern of engagement between various subjects – private developers and public authorities – inevitably applies to such entities.

The formalization of the technologies described above may look as follows (Fig. 1):

1. The developer delivers a project of the first level (П1), i.e. builds a first-level object (О1) – a house or an urban block. First-level infrastructure (И1) is needed for the object to function properly; this infrastructure includes at least several parts: first-level landscaping (Б1), first-level networks (С1). In their turn, first-level networks comprise an internal network (СВ1) and networks of contact (СК1) with external infrastructure. In other words, a first-level project as a whole represents an unclosed multitude of the following elements:

$$\notin 1 = (\in 1, \Im 1, \nabla \Re 1, \nabla \supseteq 1) \quad (1)$$

To be commissioned, a first-level object must be hooked up to external infrastructure and a project of a higher level.

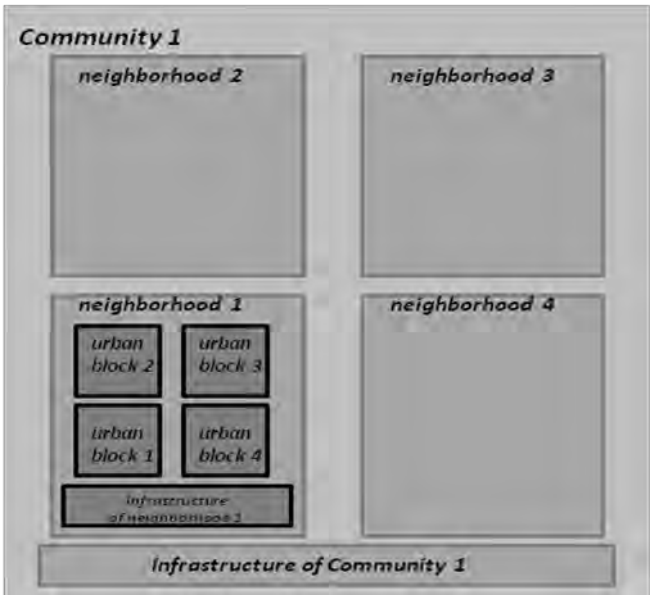

Fig. 1. Three-level model "urban block – neighborhood – urban community"

2. The builder-developer delivers projects of the second level (P2): builds a neighborhood that will comprise several (n) urban blocks – first-level objects augmented by several (m) second-level objects (О2), i.e. social infrastructure required at the neighborhood's level: shops, school, post-office and

suchlike, along with second-level infrastructure and essential transport infrastructure (T2):

$$\notin 2 = (U_{i=1}^{n} 01_i \,;\, U_{i=1}^{m} 02_j \text{, B2, XB2, XK2, T2}) \qquad (2)$$

Before commissioning, a second-level object must be connected to an external environment (infrastructure) and a higher-level project.

3. Projects of the third level (urban communities) will comprise second-level projects (neighborhoods) and for their delivery developer partnerships with municipal authorities involved will be needed.

The development of communities generally comprises processes (elements) shown in Table 1.

Table 1. Elementary processes forming the process of urban community development

Identifier	Processes (elements)
1.	Preparation of urban development documents
1.1.	Boundary-setting and cadastral registration
1.2.	Preparation and adoption of a site plan
1.3.	Public hearings (if needed)
1.4.	Changing the type of permitted use (if needed)
2.	Regulation and entrenchment of legal relationship between developer partnership members
2.1.	Establishment of land ownership rights of all partnership members (servitudes inclusive)
2.2.	Signing (prolongation, amending) of land lease agreements or land redemption (privatization)
.2.3.	Settlement of partnership members' obligations
2.4.	Determining the distribution of ownership (and other) rights, following the urban community development results
3.	Geotechnical investigation and front end engineering design
4.	Site preparation
4.1.	Relocation of utility lines from the developed land
4.2.	Demolition of non-retentive structures and remediation of the territory
5.	Design and construction of income-generating real estate of various designations
.5.1.	Residential buildings
5.2.	Real estate of administrative and business designation
5.3.	Retail property
5.4.	Industrial and warehousing property
5.5.	Other income-generating property
6.	Development of social infrastructure
6.1.	Schools and preschool institutions
6.2.	Healthcare facilities
6.3.	Sports facilities
6.4.	Security and law enforcement facilities
6.5.	Cultural institutions
7.	Construction of engineering and transport infrastructure
7.1.	Construction (refurbishment) of the street and road grid
7.2.	Development of off-street transport: subway, railways, monorail and other transport
7.3.	Primary engineering structures
7.4.	Water, heat, gas and power supply lines
7.5.	Fiber optic networks, mobile communication and Internet infrastructure
8.	Landscaping and planting of greenery
9.	Maintenance of buildings, territory and infrastructure
10.	Concomitant processes (elements)

It should be noted that in each particular project of integrated urban community development the need for any of the above-mentioned components may either lack completely, or certain elements can be installed earlier; the very list could be more detailed if need be (in particular, as regards the processes reflected in Э.3, Э.8 – Э.10).

4. Results and conclusions

Thus, in the author's opinion, the task of synchronizing the integrated multipurpose development of an urban community should be structured as the addressing of three interrelated subtasks.

Subtask 1: suggesting and implementation of the urban community development schedule with regard for time synchronization of interrelated processes at the level of an urban community (i.e. in fact a schedule of sequential or parallel execution of the above-listed "elementary" processes). The given subtask does not seem difficult to crack, as the method of network-based modeling, underlying the network (arrow) diagrams of construction projects [12], [13], [14], has long and successfully been used in both domestic and foreign practice.

Subtask 2 represents the above-stated problem of synchronizing the processes/projects of various size (level): on the one hand ("bottom-up"), implementing an integrated development plan for a specific urban community must be bolstered by way of synchronization in time and space between the activities of developers building individual urban blocks as well as of builders, developing neighborhoods, and the local authorities; on the other hand ("top-down"), the development of an urban community under review must also be synchronized with the development of a respective city district, construction of the power generating capacity, public transport networks, etc. In the author's opinion, the solution of the given subtask should almost exclusively be sought in the area of legal and economic institutionalization of relationships between the participants of developer partnerships (from the level of a particular developer to the level of regional executive authorities).

In the author's opinion, the activities for integrated sustainable development of territories (ISDT or KURT) regulated by Federal law #373-FZ, dated 03.07.2016, "On entering amendments to the Town-Planning Code of the Russian Federation, certain statutory instruments of the Russian Federation, as regards the improved regulation of preparation, approval and finalization of site planning documents and providing for integrated and sustainable territorial development as well as recognizing certain provisions in statutory instruments of the Russian Federation as null and void" [15] represent the mechanism capable of ensuring the practical synchronization of the efforts made by developer partnership participants. In the author's opinion, this statutory instrument can and must be used by builders-developers as the principal mechanism of engagement with executive authorities on integrated development projects (being similar to public-private partnerships, in a way). If earlier almost all encumbrances (including social and infrastructural) were solely shouldered by developers (builders-developers), then within the KURT framework municipal authorities must (at least in theory) get involved, assuming certain financial and other responsibilities. For all that, the definition of "KURT activities" is some sort of an umbrella covering nearly all types of investment-construction activities on the level under review in the present work, including further development of built-up territory (DBT, articles 46.1–46.3 of the TPC of Russia); integrated development of a territory or urban area, including for the construction of budget-class housing (IDT, articles 46.4–46.8 of the TPC of Russia); integrated development of a territory at the initiative of land title holders or at the initiative of a local governance body (IDT, articles 46.9, 46.10 and 46.11 of the TPC of Russia). In other words, it can be stated that IDT and DBT are just realization mechanisms of the KURT practically institutionalizing the synchronization of activities by members of developer partnerships.

Subtask 3 – distributing the commitments between investment support stakeholders to take charge of specific elements (processes) in the integrated development of an urban community. Despite a decent number of works highlighting the interaction between the private and public links in investment-construction projects based on PPP principles (see [16], [17], [18], for example), as well as various models of forming investment management mechanisms in integrated development projects [19], [20], in the author's opinion, this topic remains undisclosed to a large extent. The author proposes to use a matrix reflecting the distribution of investment commitments by the stakeholders (Figure 2) as a model formalizing the given task.

Members of the developer partnership / **Elements (processes) in urban community development**	**Nongovernment actors**			**Government actors**		
	Builder 1 (D_1)	…	Builder-developer A (D_a)	Authority 1 (U_1)	…	Grid operator B (U_b)
1 Preparation of urban planning documents 1.1. …	$D_{1.1}^{D1}$	…	$D_{1.1}^{Da}$	$U_{1.1}^{U1}$	…	$U_{1.1}^{Ub}$
1.2. …	$D_{1.2}^{D1}$	…	$D_{1.2}^{Da}$	$U_{1.2}^{U1}$	…	$U_{1.2}^{Ub}$
2. ….	…	…	…	…	…	…
…	…	…	…	…	…	…
10. …	…	…	…	…	…	…
Here: means nongovernment members of a developer partnership: builders or builder-developers; stands for government (quasi-government) members of a developer partnership: public authorities of various levels, grid and transport companies; denotes investment commitments by members of a developer partnership, expressed as their shares.						

Fig. 2. Investment support matrix for integrated development of an urban community

In today's practice the involvement of public authorities (as well as quasi-state power-generating, grid and transport companies) in the investment support of projects is determined by relevant government programs. Such programs sometimes referred to as national (regional, municipal) "projects" or "priority projects" more often represent just declarations; for their practical implementation the passing of respective budgets and other legal acts (laws, resolutions, etc.) is first required at the level of legislators and then at the level of executive authorities – specific moves for distribution of investment resources envisaged in respective budgets, which is simulated by filling out the boxes in the matrix described above.

The proposed three-level model of synchronizing the processes of integrated multipurpose urban environment development, in the author's opinion, is rather relevant as it reflects economic and other relationships between the stakeholders of urban development activity and could be used to expose "weaknesses" and reasons for desynchronization (misalignment) points, also as an instrument of element-by-element analysis of the investment component in new government programs of supporting the construction industry in the Russian Federation.

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