The role of land compulsory purchase in engineering and transport infrastructure development

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Summary. This paper deals the consideration of the consequences of unjustified decision making on the land development with the application of land compulsory purchase for the engineering and transport infrastructure construction. In the article are considered the approaches to determine the efficiency of land development from the standpoint of needs of population life support and industry complex as well as investment interests.

Key words: social efficiency, economic efficiency, transport and engineering infrastructure, land development, land compulsory purchase.

INTRODUCTION

In the terms of active integration of Ukraine into the world community special importance is given to sustainable development of economic relations. Integration with the Western European countries leads to increasing of trade turnover and passenger transportation volume between the countries. Transit location of Ukraine is one of the most important factors of increasing the role of transport industry in the international economic activity.

Traffic flows plays significant role directly both in social and economic life of the population and in the economy of the country as a whole, as well as regions and the cities. The efficiency of such traffic flows directly depends on the development of engineering and transport infrastructure.

It should be noted that the majority of objects of engineering and transport infrastructure are the linear objects of great length. It is the reason of specific features of their construction and development. At the same time the traffic and engineering loading within settlements and outside their boundaries have fundamental differences. It is caused by the structural organization and functional differences of these areas [14,20].

The specific features of the construction of engineering and transport structures within settlements lay in necessity of their implementation into the existing urban planning structure of settlements which is characterized by complex anthropogenic conditions. It makes difficult to choose their locations [13].

The large number of restrictions in existing built environment requires searching of alternative variants of decisions which are legally permitted as well as socially and economically efficient within established limits.

Situation is somewhat different outside borders of settlements. There are no restrictions caused by the existing built environment and at first glance it seems that the infrastructure elements can be placed anywhere. But in this case there are limitations arising from the other reasons such as land quality, dispersion of settlements and nature resources etc.

Consequently speaking about the construction of new engineering structures should be stressed approach based on multiple-path analysis. Moreover the kind of land use and property rights should be assessed also. For example, a new road may be the shortest, but pass through the private lands with high prices or lands with special value. So, it is necessary to correctly model a decision which will determine the feasibility and efficiency of engineering and transport infrastructure construction.

PURPOSE OF WORK

The purpose of the paper is a justification of the necessity of complex overview mainstreaming of consequences of land compulsory purchase in transport and engineering infrastructure construction.

THE MAIN MATERIAL

Modern approaches to determine the efficiency of land development (*E gen*) should be based on sustainable development, taking into account two main components. First is directed to population life support and economy efficiency ($El.\sup.$).The second being capital investments efficiency (Ein.) [8, 16].

Thus, the overall efficiency of land use can be expressed by the relation:

$$Egen = f(El.\sup.; Ein) \to \max . \quad (1)$$

From the standpoint of population life support and economy the land use efficiency is characterized by social and economic components with included implementation costs:

$$El.\sup. = f(Esoc, Eec; COSTS), \quad (2)$$

where:

Esoc – social efficiency,

Eec – economic efficiency,

COSTS – land development costs.

Social efficiency reflects the immaterial production spheres, which are aimed to improve the population living conditions such as housing, health, medical and cultural services, etc. It can be evaluated for the whole country as well as for regions or cities [15].

Economic component of land use efficiency is directly related to local gross product and local budget revenues. Total income of local budgets consists of taxes, non-tax and other revenues on the irrevocable basis. Tax revenues, duties and other mandatory payments and their rates are legally provided [9, 18].

Non-tax revenues are from property and commercial income, administrative charges and payments, noncommercial sale income, fines and financial sanctions revenues, etc. [1, 12].

Economic efficiency from land use can be evaluated as a ratio of the sum of local budget revenues from land ownership and land tenure (INC) to the sum of overall land development costs (COSTS):

$$Eec = \frac{\sum_{i=1}^{n} INC_i}{\sum_{k=1}^{m} COSTS_k}. \quad (3)$$

The article focuses on the study of the potential budget revenues on the basis of modeling the consequences of transport structures and utilities construction. Special emphasis is given to the problem of land use with different types of land rights.

The peculiarity of land resources as an object of management and development is the fact that they can not be additionally renewed unlike other natural resources [17]. This is the basis for the management decision-making. Some changes should be made for transformation process. For example, to change the land owner it is necessary to transfer the property rights. When changing land use, if we increase the residential area, the area of some other purposes should consequently decrease.

Any land use is characterized not only by legal and physical characteristics but also by kind of activity which conducted on it. The article deals with the following main kinds of the local budget revenues from:

- transfer of land ownership or land use;
- land ownership and land use charges;
- economic activity taxes;
- revenues from fines and financial sanctions for the improper land use [5,18].

Therefore, the sum of total incomes INC_i at the optimum land use will be as follows:

$$\sum_{i=1}^{n} INC = \sum_{i=1}^{c} INCtax.tran_i + \\ + \sum_{i=1}^{a} INCSown.use_i + \\ + \sum_{i=1}^{z} INCprof.ec.act._i + \sum_{i=1}^{e} INCfines_i \quad (4)$$

where:

INCtax.tran – tax income when transferring land ownership or land use,

c – the number of land plots on which rights are transferred,

INCown, use – land ownership or land use incomes,

a – the number of tax payable land plots;

INCprof.ec.act. – income from taxes on the profit from economic activities,

z – the number of businesses liable to pay a tax profit to the local budget,

INCfines – revenues from fines for violation of the legislation or negative consequences of land use,

e – the number of land plots owners of which pay fines or other charges for violation of the legislation or the negative consequences of land use.

Income from the transfer of land title basically consists of the sale of ownership or use right. Income depends on the type of ownership [3].

When transferring private property rights, basic income consists of revenues paid at registration of contract of rent or sale. The income contains the state duty and tax on income received from the sale of real estate [3, 7, 18].

When transferring state or municipal property rights, basic income is generated on the auction sale. The purchase basis being market value dependable on market conditions and on demand on land plots of certain urban value.

Income from land ownership and land use contains the taxes on land and land use payment. The taxes are determined by the property costs. And property's cost depends on its location and type of use [4].

Income from taxes on economic activities is considered in connection with their increase due to the optimal use of the land plot in the existing urban planning environment.

For example, the owners of retail real estate located in places of daytime population concentration have the potential possibility to obtain more income than the owners of plots with complicated transport access. As a result, the optimal location of the land plot in accordance with its function can assist of profits increase and consequently increasing revenues to the local budget.

In case of violations, the legislation sets scheme of prosecution and bringing to responsibility by system of paying the fines. Implementation of really effective methods of punishment, sanctions and fines for violation of the legislation will encourage compliance with law and as consequence the inflow in local budget. It can provide additional profitable opportunities in urban infrastructure development. In both cases, the results are both for the operation and development of the whole city and also for every resident.

Let's consider the costs component in the formula (2).

Land development costs of settlements include construction costs of necessary residential and industrial objects purpose, namely: objects of social infrastructure, objects of residential real estate, public service objects, objects of industry, objects of engineering and transport infrastructure, etc.

Therefore, the sum of total implementation costs of land development could be expressed the following way:

$$\sum_{k=1}^{m} COSTS_k = \sum_{i=1}^{z} COSTSres_z + \sum_{i=1}^{l} COSTSsoc_l + \sum_{i=1}^{c} COSTSser_c + \sum_{i=1}^{u} COSTSind_p + \sum_{i=1}^{s} COSTS\,\mathrm{inf}_s \quad (5)$$

where:

COSTSres – costs of construction of residential real estate objects (houses, cottages, hotels etc.),

z – the number of the residential real estate objects,

COSTSsoc – costs of construction of social infrastructure objects (schools, hospitals, stadiums etc.)

l – the number of the social infrastructure objects,

COSTSser – costs of construction of public service objects ,

c – the number of public service objects;

COSTSind – costs of industrial construction,

u – the amount of the industrial objects,

$COSTS\,\mathrm{inf}.$ – costs of engineering and transport infrastructure construction,

s – the number of the engineering and transport infrastructure objects.

The objects of engineering and transport infrastructure should be considered in 2 directions:

- as a significant component of land development,
- as the planning object.

It's very difficult to exaggerate the importance of the construction of abovementioned objects. Actually, construction object that is not equipped with modern engineering facilities don't meet the standards and requirements of the market.

Transport accessibility of objects provides communication with employees, suppliers and customers. So, actually any structure which is not connected to utility networks is 'dead'. A lack of transport connections leads to social and economic isolation of the structure.

Different objects require various engineering and transport service. For example, for residential real estate it is necessary to provide them with water supply, sewerage systems, heating etc. for domestic use. While industrial objects require more powerful engineering systems, which are determined by production technology.

Firstly, the specific feature of engineering and transport infrastructure objects as part of the planning structure is that they pass through cities, regions and even countries.

The engineering and transport infrastructure objects are very versatile. Many of them have different kind of negative effect on environment (road, airport, port). But there are some objects that need to be protected from anthropogenic impacts (water supply objects). In both cases, it requires additional area to arrange buffer zones [2,19].

Unlike detached object, engineering and transport infrastructure construction needs land compulsory purchase because of great length and large areas which they cover. Compulsory purchase can be applied to forest lands, agriculture land as well as in built-up areas [6].

Within settlements compulsory purchase is often due to the lack of free areas for city development. Outside the settlements majority of lands are in long term rent and in private ownership.

When city development is planned on the land of private property, for construction of engineering and transport infrastructure the land can be voluntary sold and by use compulsory purchased. Land plots are in private property and land purchase is effected with the consent of its owner or through a court proceeding in accordance with the market value [6, 11]. In the case of a court proceeding local community has to compensate for damages, including lost profits, damages from the temporary occupation of land plots, land degradation; damages due to lost revenues and also when existing use became worse or impossible [11].

Therefore we think it is necessary to consider total amount of construction costs for the engineering and transport infrastructure accounting the necessity of purchase land plots from land owners and users.

The sum of total construction costs for engineering and transport infrastructure objects could be expressed as follows:

$$\sum_{i=1}^{s} COSTS\inf_{s} = \sum_{i=1}^{r} COSTScom.pur._{r} + \\ + \sum_{i=1}^{x} COSTSpr.des._{x} + \\ \sum_{i=1}^{p} COSTScomp.dam._{p} + \\ + \sum_{i=1}^{t} COSTSconst._{t}, \quad (6)$$

where:

COSTScom.pur.– costs for compulsory purchase of land (when necessary),

r – the number of land plots that are subject of full or partial purchase,

COSTSpr.des – costs of purchase of the rights to development and project design costs,

x – the number of objects which need the permission and project design development,

COSTScomp.dam. – the costs of compensation for damages to land plot's owners,

p – the number of landowners and land users who should be paid compensation for the loss of lost revenues,

COSTSconst. – construction costs,

t – the number of objects for construction .

In the case of compulsory purchase of land for public needs total costs for land development are financed from the local budgets.

The costs of project design and construction costs depend on the scale of the object and market pricing conditions.

Let's focus our attention on the first two components of above formula that affect on the reduction of the local budget. As mentioned above the shortest way is not always the best. At first glance it seems that the fewer land plots are to be purchased, the less will be the sum of total costs and as a result the less money spent from the local budget. But it is only at first glance.

Multiversion choice of route for the construction of future communication must take into account all the components of their future performance efficiency. Moreover increasing of the road length can make it possible to provide more objects in different kind of services, A similar situation can happen in the case of compensation payment.

Moreover the presence of road or engineering structures increases the potential attractiveness of these lands and their market value. In addition, it is necessary to mention about potential and possible improvement of the proximately engineering service to residents of remote villages. At the same time, it can have a positive impact on economic efficiency of industrial objects.

Local budget is filled both with real estate tax and land tax. Today in Ukraine there is no real estate, only land tax [18]. In turn, as soon as a real estate tax is being introduced, it will depend on the market value, as it is in majority European countries. The development of transport and engineering infrastructure objects will encourage local revenues by increasing the market value of the land.

The analysis of the consequences of unjustified construction of transportation and engineering network and as a result land compulsory purchase and land quality deterioration need special consideration.

Sometimes land compulsory purchase costs and compensation costs are equal or significantly higher than the common investment costs and have no visible economic and social effect. Present scheme neglects factors mentioned above.

According to the legally approved city planning documentation, the provision of necessary in areas is effected. Other words, design decision is coordinated without all necessary compensation costs. In any case, there are always serial alternative variations.

The costs for compulsory purchase should always be taken into consideration when estimating comprising these variants.

City planning documentation is the basis for the land compulsory purchase. The present land use in legal boundaries is necessary to take into account for reasonable decision-making when urban planning [6, 10].

When such aspects are missed, it is necessary to make changes of city planning documentation. Currently legislation identified two sources of financing city planning documentation: local budgets and investment funds. In most cases, these works are carried out by municipalities. It leads to local budget outflow.

Any chance to adopt unreasonable decisions can bring to new corruption schemes.

Taking into account all incomes and expenses formula (3) takes the following form:

$$Eec = \frac{\sum_{i=1}^{c} INCtax\ .tran_i + \sum_{i=1}^{a} INCSown\ .use_i}{\sum_{i=1}^{r} COSTScom\ .pur._r + \sum_{i=1}^{x} COSTSpr\ .des._x} \longrightarrow \frac{\sum_{i=1}^{z} INCprof\ .ec.act._i + \sum_{i=1}^{e} INCfines_i}{\sum_{i=1}^{p} COSTScomp\ .dam._p + \sum_{i=1}^{t} COSTSconst._t} \longrightarrow .$$

For commercial investment of any business entity the quality of land plot is assessed in terms of its transport accessibility and availability of all necessary engineering services for the planned activity.

Transport and engineering infrastructure development has direct effect not only on population living standard and economic growth, but also on investment climate.

CONCLUSIONS

The follow conclusions can be made:

1. Complex approach to land compulsory purchase method should be applied for effective decision-making.

2. If the comprehensive analysis and assessment of the impact of compulsory purchase is not applied, the outcomes can be as follows:

- overall costs for land development can be groundlessly increased;
- total investment attractiveness of land as a result of the construction is not commensurable with negative environmental impacts;
- the necessity to make changes to urban plans which are funded by the local budget can be appeared;
- the complication of bureaucratic coordination schemes encourages the creation and apply corruption schemes.

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РОЛЬ ПРИНУДИТЕЛЬНОГО ИЗЪЯТИЯ ЗЕМЕЛЬ ПРИ СТРОИТЕЛЬСТВЕ ОБЪЕКТОВ ИНЖЕНЕРНОЙ И ТРАНСПОРТНОЙ ИНФРАСТРУКТУРЫ

Аннотация. В статье обоснована необходимость учета последствий от необоснованного принятия решений при развитии территорий с применением принудительного изъятия земельных участков для строительства объектов инженерно-транспортной инфраструктуры. Рассмотрены подходы к определению эффективности развития территорий с точки зрения обеспечения жизнедеятельности населения и нужд экономического комплекса, а также инвестиционных интересов.

Ключевые слова: социальная эффективность, экономическая эффективность, объекты инженерно-транспортной инфраструктуры, развитие территорий, принудительное изъятие.