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THE TRENDS OF MODELING THE WAYS OF FORMATION, DISTRIBUTION AND EXPLOITATION OF MEGAPOLIS LANDS USING GEO-INFORMATION SYSTEMS

The areas of need for ways of modeling the formation, distribution and use of land metropolis using GIS are identified. The article is to define the areas of modeling ways of formation, distribution and use of land metropolis using GIS. In the study, the following objectives are set: to develop an algorithm process data base (Data System) creation for pecuniary valuation of land settlements with the use of GIS; to offer process model taking into account the influence of one factor modules using geographic information systems; to identify components of geo providing expert money evaluation of land metropolis; to describe the general procedure for expert money assessment of land and property by using geographic information system software; to develop an algorithm methods for expert evaluation of land. Identified tools built algorithms used for modeling the ways of formation, distribution and use of land metropolis using GIS. Directions ways of modeling the formation, distribution and use of land metropolis using GIS.

Key words: land metropolis, GIS, modeling, algorithm, simulation directions.

Костянтин Мамонов, Володимир Шипулін, Ернест Штерндок. НАПРЯМИ МОДЕЛЮВАННЯ ШЛЯХІВ ФОРМУВАННЯ, РОЗПОДІЛУ ТА ВИКОРИСТАННЯ ЗЕМЕЛЬ МЕГАПОЛІСУ ІЗ ЗАСТОСУВАННЯМ ГЕОІНФОРМАЦІЙНИХ СИСТЕМ

Визначена необхідність здійснення напрямів моделювання шляхів формування, розподілу та використання земель мегаполісу із застосуванням геоінформаційних систем. Метою статті є визначення напрямів моделювання шляхів формування, розподілу та використання земель мегаполісу із застосуванням геоінформаційних систем. Визначені інструменти, побудовані алгоритми, що застосовуються для моделювання шляхів формування, розподілу та використання земель мегаполісу із застосуванням геоінформаційних систем.

Ключові слова: землі мегаполісу, геоінформаційні системи, моделювання, алгоритм, напрями моделювання.

Константин Мамонов, Владимир Шипулин, Эрнест Штерндок. НАПРАВЛЕНИЯ МОДЕЛИРОВАНИЯ ПУТЕЙ ФОРМИРОВАНИЯ, РАСПРЕДЕЛЕНИЯ И ИСПОЛЬЗОВАНИЯ ЗЕМЕЛЬ МЕГАПОЛИСА С ИСПОЛЬЗОВАНИЕМ ГЕОИНФОРМАЦИОННЫХ СИСТЕМ

Определена необходимость осуществления направлений моделирования путей формирования, распределения и использования земель мегаполиса с применением геоинформационных систем. Целью статьи является определение направлений моделирования путей формирования, распределения и использования земель мегаполиса с применением геоинформационных систем. Определены инструменты, построены алгоритмы, применяемые для моделирования путей формирования, распределения и использования земель мегаполиса с применением геоинформационных систем.

Ключевые слова: земли мегаполиса, геоинформационные системы, моделирование, алгоритм, направления моделирования.

Problem statement. The development of urban territories depends on the trends and peculiarities of formation, distribution and exploitation of the land. In this context one should underline a low level of the territories development, delay of the rates of construction, a high proportion of a number of settlements, where the normative financial estimation has not been made. For solving the problem the application of the trends of modeling the ways of formation, distribution and exploitation of megapolis lands using geo-information systems (GIS) has been proposed. Theoretical propositions and practical recommendations on the use of geo-information systems are presented in the works of A. Liashchenko [1], A. Mitchell [2], Y. Palekha [3], O. Stepenko [4] and others.

The aim and tasks of the article. The aim of the article is to determine the trends of modeling the ways of formation, distribution and exploitation of megapolis lands using geo-information systems.

The following tasks are being solved:
To work out an algorithm of the process of creating the information base (data base) for the financial estimation of the land of the settlements using geo-information systems;
– To propose the models for the process of considering one factor impact using the moduli of geo-information systems;
– To determine the components of geo-information supply of the expert financial estimation of megapolis lands;
– To characterize a total ordering of the expert financial estimation of the land parcels and the real estate using the systems of geo-information supply;
– To work out an algorithm of the methods for the expert financial estimation of the land parcels.

Main material. On the basis of the existing normative base the financial estimation of the settlements land is divided into the following stages:

1. Creating the information base (data system) for the financial estimation of the settlements land:
- Collecting and processing the geo-space data;

- Determining the basic value;
- Economic and planning zoning;
- Determining the system and zones of the local factors impact;

2. The financial estimation of separate land parcels.

The algorithm of the financial estimation of the settlements land using geo-information systems has been worked out by the authors. It develops the processes of the mass estimation of land using modeling (fig. 1) and applying (fig. 2) the models of the factors impact on the land estimation.
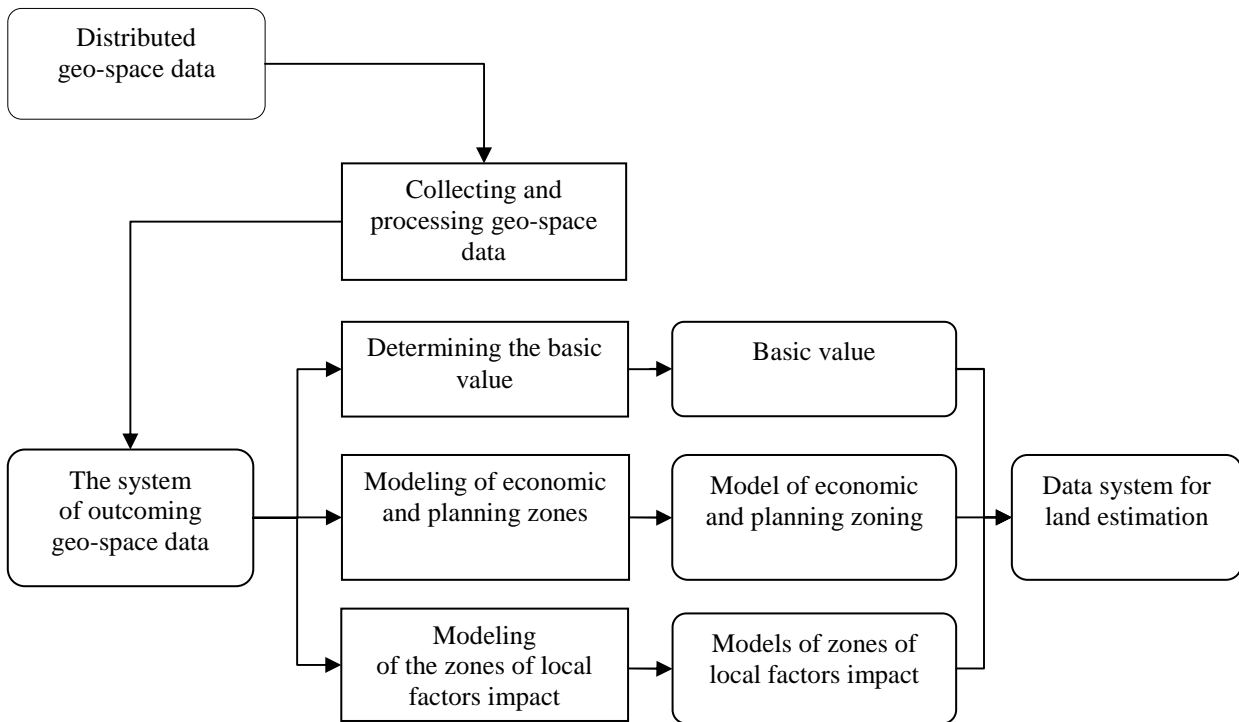

Fig. 1 The algorithm of the process of creating information base (data system) for financial estimation of settlements land using GIS
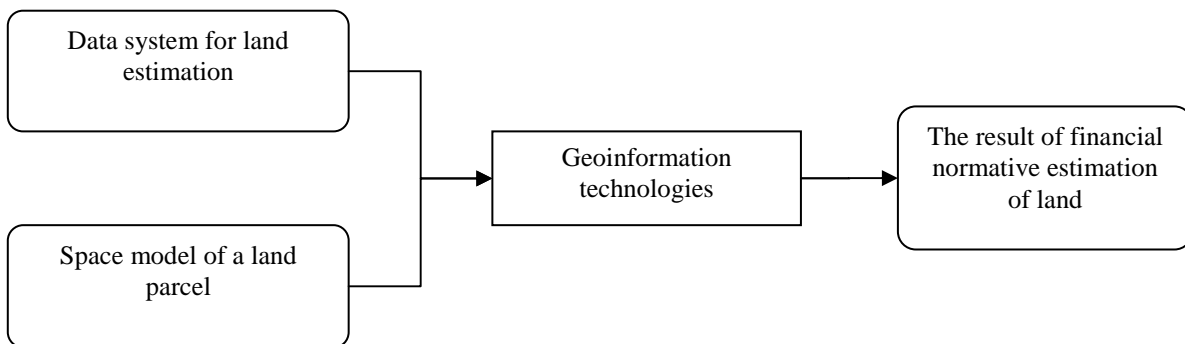

Fig. 2 The algorithm of the process of financial estimation of land parcel using GIS

Geo-information systems for estimating space factors, influencing the formation, distribution and exploitation of megapolis lands apply the corresponding models, which are to be first determined for certain conditions of the estimation. The model of the process of considering the factors impact when making the financial estimation of a certain land parcel using the modulus ArcGIS ModelBuilder is presented for the concrete realization (fig. 3-4).

Mention should be made that the system of geo-information supply of the expert financial estimation [5]

consists of the following components:
1. The software of the geo-information system;
2. The geo-data base of the geo-information supply;
3. The legislative framework of making the estimation;
4. The estimation technology;
5. A set of instruments;
6. An estimator.

Geo-data base of the geo-information system supply contains the information on:

- the results of carried out estimation, including their space aspects and the main price formation characteristics;
- analog objects, including their space aspects and the main price formation characteristics, for example, land parcels without the development, flats, house

and grounds, non-residential premises and so on;
- the normative financial estimation of the land parcels;
- the market rates of rental lease;
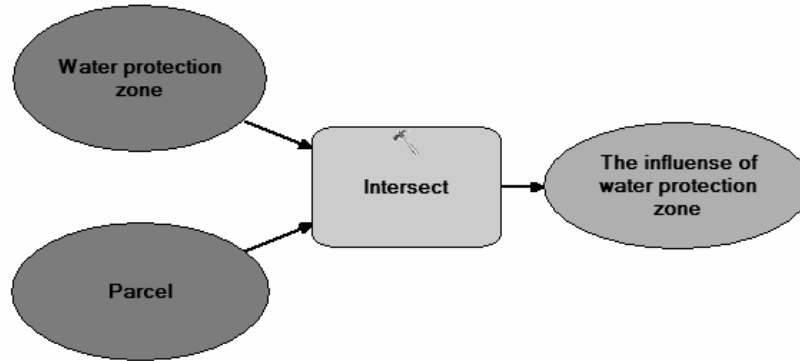- the territory studied.

Fig. 3. The model of the process of considering one factor impact using the modulus ModelBuilder
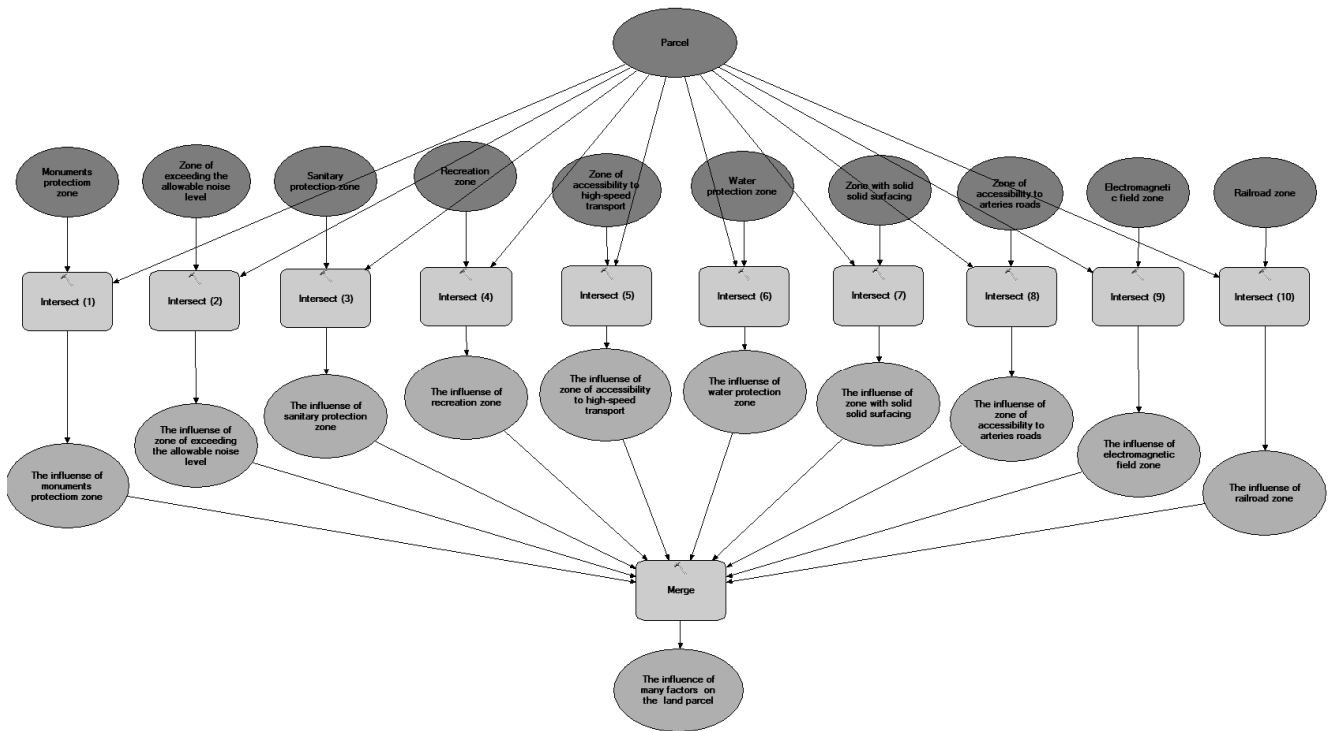

Fig. 4. The model of the process of considering many factors impact when making financial estimation of a separate land parcel using the modulus ModelBuilder

A total ordering of the expert financial estimation of the land parcels and real estate using the systems of geo-information supply corresponds to the algorithm, stated in the Law of Ukraine "On the estimation of property, property rights and professional estimation activities", the block diagram of which is presented in fig. 5 [6].

As one can see in the scheme the determination of the possibility of using geo-information systems and choosing the necessary methodic approaches, methods and estimation procedures and their application using the systems of geo-information supply do not essentially

change the legally determined algorithm of estimation, it complements it.

For each method of the expert financial estimation of real estate the system of geo-information supply stipulates the use of the corresponding technology of the estimation. The block diagram of the algorithm of choosing estimation methods depending on the characteristics of the estimated object and the information availability is presented in fig. 6.

Conclusions. The system of the information supply of the expert financial estimation of land and objects of

real estate allows to determine space factors using certain methodic approaches and it will increase the reliability and efficiency of the land parcels estimation using all methods.

Geo-information supply allows to present land parcels not only by point models, but also by uninterrupted fields called surfaces. The value surface of the land parcels is modelled on the basis of their point layer.
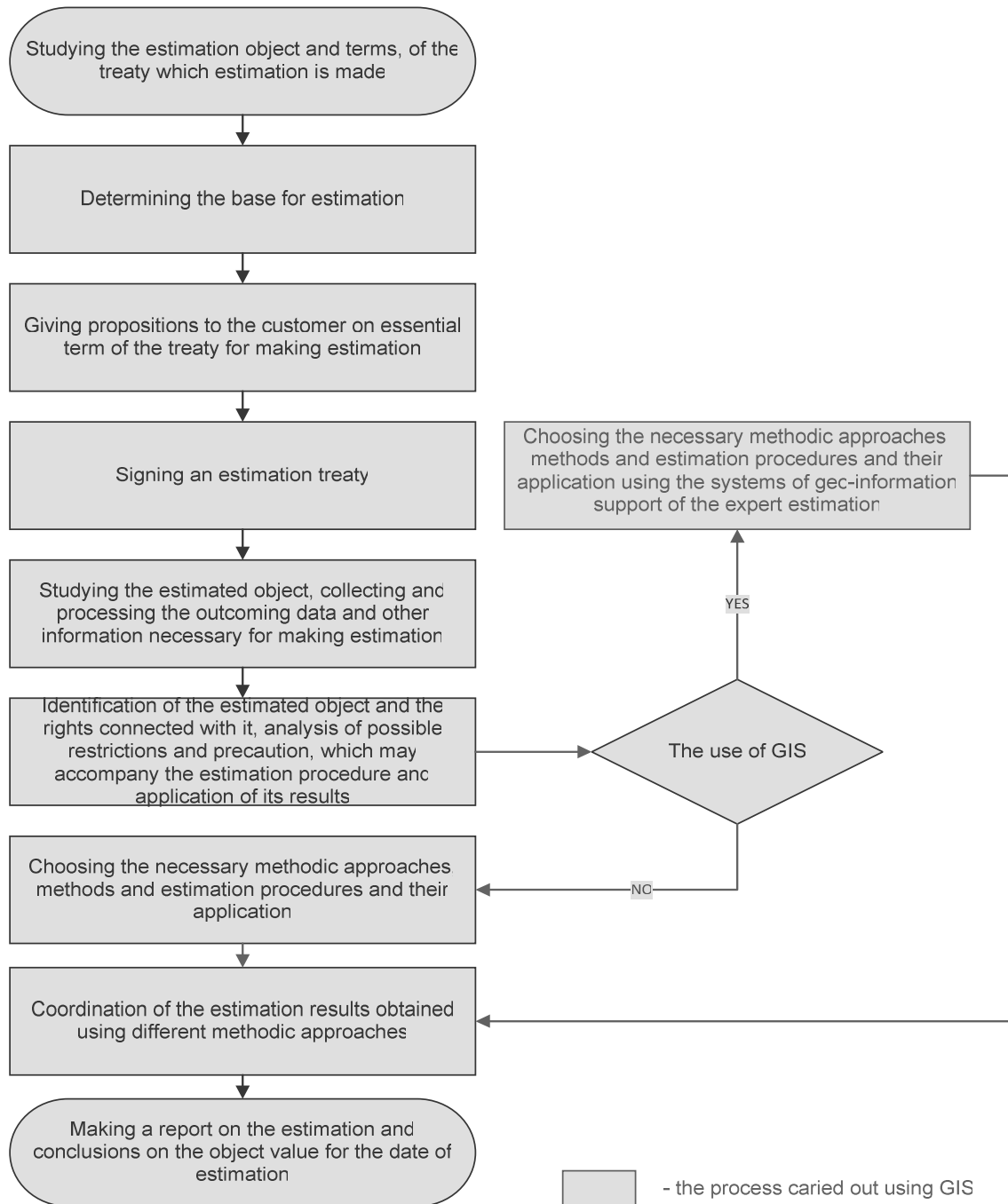

Fig. 5. A total ordering of the expert financial estimation of land parcels and real estate using geo-information systems
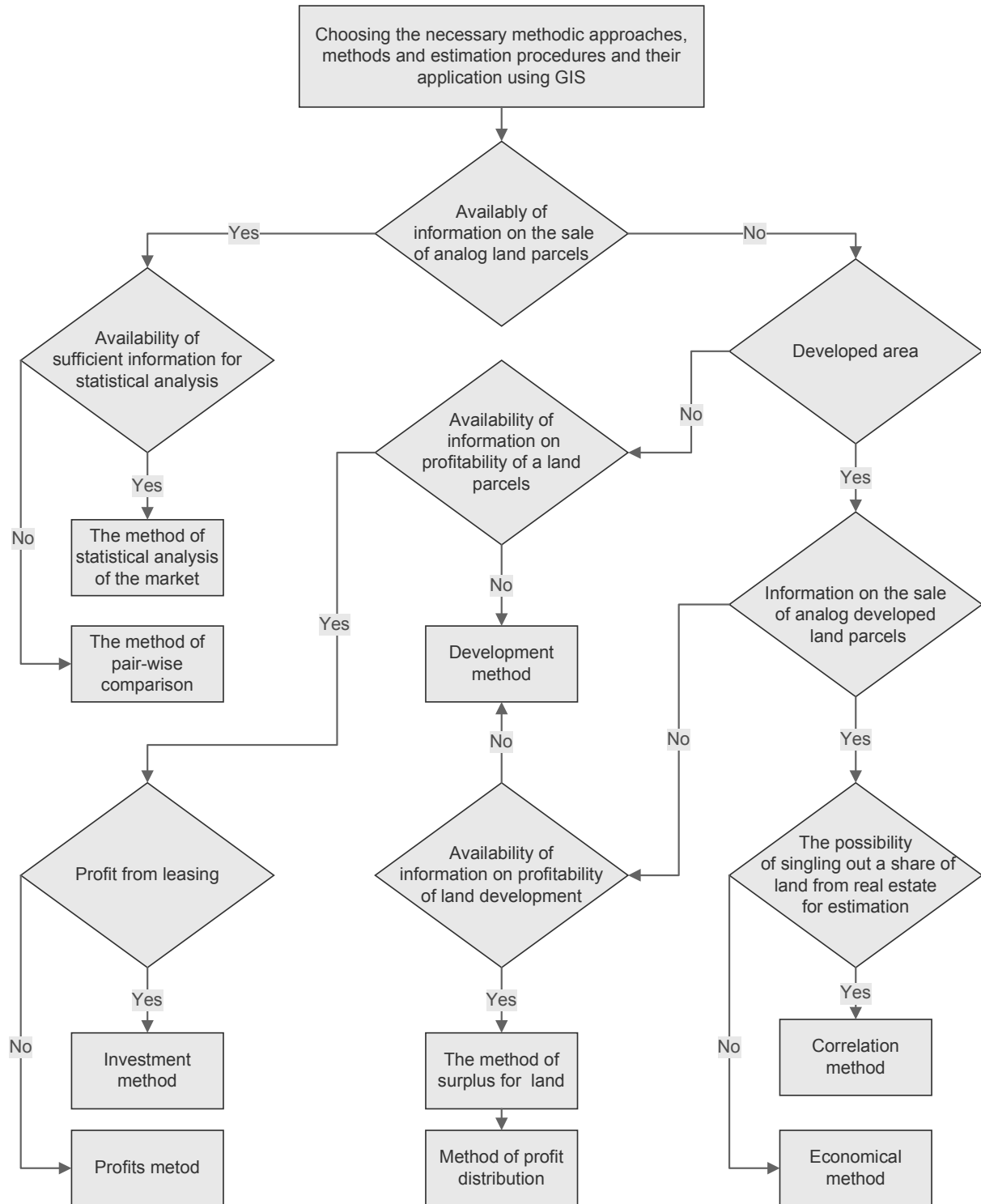
Fig. 6. The algorithm of choosing methods of the expert estimation of land parcels

On the results of the investigation the trends of modelling the ways of formation, distribution and exploitation of megapolis lands using geo-information systems have been proposed:

– the formation of the information-analytic, normative-legislative, space basis for modelling the ways of formation, distribution and exploitation of megapolis lands;
– determining geo-information set of instruments for modelling the ways of formation, distribution and exploitation of megapolis lands;

– building and realization of the algorithm of the formation and use of the geo-data base the formation, distribution and exploitation of megapolis lands;
– determining the level of space factors impact on the formation, distribution and exploitation of megapolis lands;
– building geo-information models representing the space factors impact on the formation, distribution and exploitation of megapolis lands;
– making decisions on the formation, distribution and exploitation of megapolis lands.

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