The Method of Rapid Analysis to Determine the Version of the Modern Use of Historic Manor Complexes

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Abstract. The article is focused on the problem of preserving the ownerless historic manor complexes (HMC) and their restoration on the basis of commercial use in conditions of public-private partnership. Basing on the theoretical R & D done in the recent years and on their study of the experience gained in the best practices of capitalizing the architectural heritage, the authors identified possible options for the use of estate complexes and formalized a minimum list of the key HMC indicators affecting the further choices. Proceeding from the prescriptive literature, they determined the values and the importance degree of key indicators for each use option. Further on, using the method of multivariate analysis of variance, the authors adjusted the process to juxtapose the values of the key indicators of the estates with the specified conditions for each option and automated that process by means of software support. The result of the work appears in form of the analysis matrix, which automatically performs the multifactor analysis of the estate complex and helps to select the most rational use of the given HMC. The proposed method of express analysis makes it possible to determine the most effective options for the modern use of each particular estate, depending on its indices. This will reduce the risks of potential investors, attract the inflow of investments into the restoration and thus contribute to the revitalization of the estates by integrating them into the Key words: manor, historic manor complex, architectural monument, restoration, commercial use, use cases, express analysis.

1. Introduction

It is for over 100 years already that the condition of historical manor complexes (HMC) has been and is causing grave concerns [1]. In the last 30 years, this problem has grown to the truly catastrophic dimensions; according to the source analysis data [2], in just one Moscow Region 57% of the estates may be considered as lost (over there, only a church and / or some elements of the park have survived), while among the relatively survived HMC are forlorn and appear in the unsatisfactory condition.

It should be emphasized that historical manors and manor complexes are a part of the material basis for the cultural identity of the nation [3-4], and preservation thereof is an imperative for sustainable development of the settlements architecture and the society [5-11].

The detailed analysis of the current agenda and methodology for the work with cultural heritage objects (CHO) can be found in the list of references [12]. The major condition for preservation of OCHs and hence the historical manors, too, is to include them in the contemporary life by accommodating these objects for new functions. This paradigm was accepted by the academic
community in the 20th century [13], and is being supported until now by the Russian [14-17] and foreign [18-20] restoration communities.

In the RF now, the government funds are only sufficient for restoration and further maintenance of especially valuable and significant manor complexes [21], which are used mostly as state museums. Appeared in the last decade, the opportunity to attract private capital can help to revitalize and adapt for the new functions at least some of the multiple forlorn provincial estates in the RF territory.

The first cases of the manors restored at the expense of non-government assets are described in detail in the book [22], and with all the uniqueness of each particular case, we may draw one general conclusion: in the market-economy conditions, for sustainable existence of any object, it must be operated at least by the self-support principle – i.e., the expenses for its maintenance must be covered by the revenues from its functioning. Operation of any building regarded as an architectural monument is especially expensive, and only the commercial use of manors gives a hope for self-repayment of such complexes. In this connection, a correct choice of the modern new function for an ordinary HMC would guarantee its further successful existence and hence reduce the probability of future desolation.

The following case study is a corrected and extended version of the earlier presented methodology [23].

2. Materials and methods
It is advised to extend the list of the currently known HMC-use options by including therein the real-estate facilities that are not used for such purposes so far [24] (Table 1). Such approach requires to provide some classifications.

| Dwelling Function | Public Function | Commercial Function |
|-------------------|-----------------|---------------------|
| ✓ real-estate with the urban dwelling function; ✓ real-estate with the countryside dwelling function. | Therapeutic & recreation function: ✓ medical institution; ✓ nursing home; ✓ sanatorium; ✓ sports complex. Educational and pedagogical function: ✓ kindergarten / infant nursery; ✓ school; ✓ vocational college / higher-education institution; ✓ circle (studio)/section/art school/ music school/ driving school. Special function: ✓ theater/concert hall/cinema theater; ✓ exhibition center | ✓ office; ✓ shop; ✓ business / shopping center; ✓ cafe/cafeteria; ✓ restaurant; ✓ accommodation facility (hotel, guest-house, hostel, apartments); ✓ garages to be rented; ✓ warehouses; ✓ manufacturing enterprises. |

Certainly, it is most preferable to do so that the manors would revive their initial historical dwelling function of a “patrimonial nest”. This function is shown in the list of Options as the real-estate with the urban or countryside dwelling function. At the same time, it is possible to accommodate several families in HMC, which in the given case would play a role of “revenue-earning” houses, which, too, have been traditional for Russia.

The purely museum function of HMC is not considered in the given list, because – despite the appearance of private museums in the RF – this Option of use remains quite doubtful in terms of its pay-back [25]. At the same time, placement of information on the history of any given HMC and presentation of its survived artifacts in one of its premises would make it possible to open a mini-museum with any selected Option of using the given HMC (whether as a café, sanatorium, or a
business center). Thus, the historical heritage would be withdrawn from the “dead-still” museum-making process and included in the modern cultural space.

Such institutions as an orphan child home, or administrative units (police, court, or government bodies), railway station, port, or library are not included in the list being considered. The reason is that this article is only focused on the potential projects that in future would generate funds for maintenance of the manors through private investments.

As shown by the experience, hospitals, out-patient clinics, or schools are not appropriate options to use a historical building, because functioning of such institutions can cause a negative impact on safe preservation of the historical object interiors [18]. However, in those cases, when the manor building does not have the lavish interior decoration, or is featured by the low-rate preservation, it would be even better to use it for some “aggressive” function, which would help to bring the given building back to life, rather than to lose the manor forever.

In case of unsatisfactory condition of remote manors, which can be adapted as infrastructure facilities for settlements, the conditionally apt Option may be the use of such HMC as a sports complex, garage for lease, warehouse or a small manufacturing enterprise. In this case, the historical manor building would accommodate the administration of the respective unit, while it would be possible (with the tactful dialogue of the historical and new architecture) to construct new buildings for the sports or production functions, provided that it is allowed by the protective status of the territory. Such choice of the Option will be justified, because the revenues from functioning of the facilities will provide for restoration and further maintenance of the survived manor buildings.

For the provisional estimate of the perspective and risks of investments in some or another new function, the methods of searching the Option should consider the big number of the HMC feature indices, and at the same time in the swift “maneuver” manner react introduction of new requirements and restrictions. This is very difficult to do with manual sort-out of the possible use Options. The currently known methodologies for selection of HMC use Options are all marked by the tough initial frames, which take into account the huge number of factors, ranging from the condition of the mansion through to the gas-supply of the object [26]. This circumstance makes it extremely difficult to search a new cost-effective function and hence the possible investments.

Available and broadly used today in many fields of science and technology, there are methods to select the most optimal solution of various complex tasks on the base of using the multiple factor analysis by means of computer software. This work presents the development of express analysis that can simplify the initial phase of selecting the HMC use Option. To this end, it is offered first to formalize the minimal list of the HMC key indices, which cause influence on choosing the further use Option (Table 2).

Certainly, the safe preservation ratio of the building and its protective status play an important role, but consideration of the object with regard to these indices cannot be automated. Therefore, such analysis shall be postponed as the following step in the HMC analysis, which is not presented in this article.

Basing on the regulatory literature¹, we identified the basic requirements set for the object (HMC) provided that it will be adapted for each modern-use Option: the diapason of the admissible values of quantitative indices and the compulsory / non-compulsory presence of qualitative ones.

| Table 2. Key Indices of HMC. |
|-----------------------------|
| **Quantitative indices of HMC** | **Qualitative indices of HMC** |
| Location: | Space: |
| ✓ distance from big and major cities’ (km); | ✓ presence of a garden & park zone; |
| ✓ minimal usable space of the building (m²); | ✓ presence of forests; |

¹ Town-Planning Code of the Russian Federation, Government Standards of Russia, The Moscow region Law, Order by the Russia Ministry of Economic Development, CR, Territorial Construction Norms, Construction Norms and Regulations etc.
In order to identify the importance of some or another index depending on the use Option, the importance ratio has been loaded, and the system of scores from 0 to 3 is being applied, where: 0 means “the feature not to be taken account”, 1 – “less important”, 2 – “medium important”, and 3 – “important”. All indices, the presence of which is compulsory for the Option, are unconditionally important, and therefore their importance ratio would be equal to three. If an index is not compulsory for the Option, its ratio would range between 0 and 2, depending on the Option, but if a quantitative index is not considered categorically, its score will be equal to nothing else but 0.

3. Results of the study
The afore-described data are confined in Table 3 (see below). To make it more clear, the table is presented in form of a model.

| HMC Key Indices | Conditions and Importance | Use Option 1 |
|------------------|---------------------------|--------------|
| Quantitative Index | diapason of admissible values | [a1; b1] |
|                  | importance ratio          | N1           |
|                  | 0 – non-compulsory;       |              |
| Qualitative Index | 1- compulsory importance ratio | 1           |
|                  |                           | N2           |

The sum of the importance-ratio scores for all use Options is different and serves an indirect evidence of the requirements being set for the object (manor) depending on the selected Option and of the use of the manor resources in future. For example, the minimal sum of scores is attributed to the option of “exhibition center / gallery”, and the maximal one – to the option of “boarding house”.

Now, there is an opportunity to juxtapose the values of the key indices for a specific manor with the required conditions of Table 3 for each option of use and thus to define the list of the apt use options. The analysis matrix, designed by means of the MS Excel software (Table 4) is offered to facilitate the process of juxtaposition. In order to explain the structure of the matrix, it, too, is presented here in form of a model.

| Key Indices of the HMC | Values of HMC Key Indices (xₐ) | Use Option 1 |
|------------------------|---------------------------------|--------------|
| Quantitative Index     | X₁                               | f(x₁)=N₁, if X₁=[a₁; b₁] |
|                        |                                 | f(x₁)=0, if X₁≠[a₁; b₁] |
| Qualitative Index      | X₂                               | f(x₂)=N₂, if X₂ = “present” |
|                        |                                 | f(x₂)=0, if X₂ = “absent” |
| RESULT                 |                                  | f(result)=N₁+N₂, if X₁=[a₁; b₁] and X₂ = “present” |
|                        |                                  | f(result)=“DISCLAIMER”, if X₁≠[a₁; b₁] and X₂ = “absent” |

2 SP 42.13330.2011. Gradostroitelstvo. Planirovka i zastroika gorodskikh i selskikh poseleniy [Code of Regulations (hereinafter, CR) 42.13330.2011. Town Planning, Planning and Development of Urban and Rural Settlements].
The data of the manors being analyzed shall be recorded in the yellow-color column “Values of HMC Key Indices (xα). The formula conditions are presented in the boxes of columns for each use option on the basis of data from Table 3.

General view of the formula:
\[
\begin{align*}
    f(x_α) &= N_α, \text{if } x_α = [a_α; b_α] \\
    f(x_α) &= 0, \text{if } x_α ≠ [a_α; b_α]
\end{align*}
\]

where:
- \(f(x_α)\) – function of the box;
- \(x_α\) – value of the manor key index;
- \(N_α\) – importance ratio;
- \([a_α; b_α]\) – interval of admissible values of the HMC key index;
- \(α\) – sequential number.

These formulas serve the tool for in-matrix automatic juxtaposition of the loaded HMC key-index value with the range of admissible values as presented in Table 3. If the loaded value satisfies the set range, then the respective importance ratio from Table 3 shall be presented in the box, and if it does not fit within the range, the ratio shall be neglected, and the value appearing in the box shall be zero.

The final formula, loaded in the “RESULT” line of each Option box, includes all necessary conditions from Table 3. If these conditions are satisfied, the scores shall be summed up, and if at least one compulsory condition is not satisfied, the word appearing in the respective box shall be “DISCLAIMER”.

As for the manor indices, the following combination shall be loaded into the formula: it is sufficient that the given indices of the manor would satisfy at least one of the two conditions – either No. 1: “Distance from big or major cities”, or No. 2: “Distance from the nearest residential settlement” + “Population size of the nearest residential settlement”. So, if the manor is located, for instance, in Moscow, the indices No. 2 should not be loaded, and therefore the value of these indices shall be loaded as “-“ and “0” respectively.

As a result, the matrix shall automatically perform the multi-factor analysis of the manor by the key indices, and automatically write “DISCLAIMER” or present the sum of the scores in the “RESULT” box. Basing on the number of scores, it would be possible to draw the recommended rating of the use Options. While any Option from the rating may be used, the manor features would be activated in the Option with maximal sum of the scores. It should be noted that several use Options from the list of the apt ones may be applied in one and the same manor, and thus there can be interesting combinations opening good chances for creation of multi-functional centers.

The matrix makes it possible to perform analysis by 3 more scenarios – i.e., to find out if there is a possibility to increase the usable space or the land-plot space, or the usable space and the land-plot space at the same time.

For the sake of clearness, the matrices have been recorded exactly as they appear in this paragraph, while they look different in the software language, in particular, the diapason of key indices’ values and the importance ratio are not loaded into the formula, while the reference is made to the respective boxes of Table 3. So, the herein offered methodology is “open” for corrections: if necessary, the set conditions may be changed, while the matrix will not require any modifications.

4. Conclusions and discussion

The matrix operation can be only demonstrated (Tables 3 and 4) when the key indices’ values of a specific HMC are loaded: in the given case, we loaded the indices of such HMC as “Manor of the 18th – 19th centuries“ (Russia, Moscow, Vorontsovo Pole street).

The matrix operation resulted in the rating of the most apt options for the modern use of the analyzed manor: 1st place – kindergarten / infant nursery; 2nd place – office, restaurant, medical institution; 3rd place – theater / concert hall / cinema theater, etc. These recommendations coincided with the current function (since 201the, after the accomplishment of restoration works, the manor was adapted as the headquarters Russian Society of History headquarters, which include the office,
conference room, and exhibition hall). The successful revitalization of the given manor has been confirmed by its good functioning until now.

1. The analysis matrix, designed in MS Excel software, automatically performs the multi-factor analysis of the considered facility by means of juxtaposing its key indices with the regulatory requirements of the use Options. The result of the analysis is presented as the rating of the most practicable use Options for the HMC.

2. As the software does not require any special knowledge and skills, it can be applied by a very broad circle of concerned persons.

3. The developed methodology is an “open” program, which in any given case makes it possible to regard the individual specifics of the HMC by means of loading additional indices as well to consider the new possible options (with due regard of the regulatory conditions for functioning thereof).

4. The offered methodology also helps to perform the express-analysis for selection of the possible Options for the modern use of HMC and thus to reduce the risks of investments.

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Appendix A

Table A1. The required values of the HMC key indices and their importance ratios.

| Key Indices of the HMC | Conditions and Importance | Commercial | Educational | Public | Spacial |
|------------------------|----------------------------|------------|-------------|--------|---------|
|                        | Distance from big and major cities (km) | 60          | 0.5         | 0.5    | 0.5    | 0.5    | 1      | 0      | 0.3   | 1.5   | 3      | 1.5    | 1       | 0.5    |
|                        | Distance from the nearest residential settlement (km) | 3           | 0           | 3      | 3      | 3      | 3      | 0      | 3     | 3     | 3      | 3      | 3       |
|                        | Population size of the nearest residential settlement (number of persons) | 1000        | 1000        | 1000   | 1000   | 5000   | 5000   | 1000   | 5000  | 5000  | 1000   | 1000   | 0       |
|                        | Attitude toward the building (m²) | 70          | 70          | 60     | 16     | 250    | 31     | 612    | 30    | 51    | 70,32  | 15400  | 227     | 133     | 5520   | 100    | 135   | 100   |
|                        | Attitude toward the land plot (m²) | 60          | 400         | 66,25  | 0      | 200    | 0      | 132,5  | 3,6   | 35,6  | 3400   | 40080  | 1125    | 2050    | 505,5  | 0      |

* Symbolic legend:

- - the index is not regarded, any value is possible.

- - the index is not regarded, any value is **not** possible.

| Qualitative indices | Options for the modern use | Presence of a garden & park zone | Presence of forests | Presence of water-pools or fishing | Presence of mountains / hills (potential skiing, mountaineering, shipping etc.) |
|---------------------|---------------------------|----------------------|-------------------|----------------------------------|-------------------------------------------------|
|                     |                           | 0                    | 1                 | 0                               | 0                                               |
|                     |                           | 1                    | 3                 | 2                               | 2                                               |
|                     |                           | 2                    | 1                 | 0                               | 0                                               |
|                     |                           | 3                    | 0                 | 0                               | 0                                               |
|                     |                           | 1                    | 0                 | 0                               | 0                                               |
|                     |                           | 2                    | 1                 | 0                               | 0                                               |
|                     |                           | 3                    | 1                 | 1                               | 0                                               |
|                     |                           | 2                    | 2                 | 2                               | 2                                               |
|                     |                           | 3                    | 2                 | 2                               | 2                                               |
|                     |                           | 1                    | 2                 | 2                               | 2                                               |
|                     |                           | 2                    | 2                 | 2                               | 2                                               |
|                     |                           | 3                    | 2                 | 2                               | 2                                               |

The sum of the importance scores: 18 17 23 21 15 21 23 14 18 24 16 22 23 18 16 16 11
### Table A2. Demonstration of the analysis matrix operation for HMC multi-factor analysis.

| Key features of the IMC | Option for the modern use | Public Function |
|-------------------------|---------------------------|-----------------|
|                         |                           | Therapeutic & Recreation function | Educational and pedagogical function | Special function |
|                         |                           | School | Kindergarten/Infant nursery | Public building |
|                         |                           | Hospital/Higher education institution | School library | Children's center |
|                         |                           | Police station | Community service center | Old-age home |
|                         |                           | Social service | Child care center | Community gym |
|                         |                           | Leisure activities | Youth service center | Community center |

#### Values of IMC Key Indices:

| Feature | Values |
|---------|--------|
| Distance from big and major cities (km) | 0 |
| Distance from the nearest residential settlement (km) | 0 |
| Population size of the nearest residential settlement (number of persons) | 1490 |
| Land area of the building (m²) | 1490 |
| Land area of the land plot (m²) | 7420 |

#### Commercial Function Options for the modern use:

| Option | Present | Absent |
|--------|---------|--------|
| Presence of a garden & park zone | Present | Absent |
| Presence of a forest | Absent |
| Presence of an open space for recreation and washing | Absent |
| Presence of an open space for swimming and fishing | Absent |

#### Public Function:

| Function | Name & address of HMC |
|----------|-----------------------|
| Therapeutic & Recreation function | "Manor of the 18th – 19th centuries" (Russia, Moscow, Vorontsovo Pole street) |
| Educational and pedagogical function | |
| Special function | |

#### Location Space:

| Feature | Value |
|---------|-------|
| Minimal usable space of the building (m²) | 1490 |
| Minimal usable space of the land plot (m²) | 7420 |

#### DISCLAIMER

- DISCLAIMER 1: DISCLAIMER 2: DISCLAIMER 3: DISCLAIMER 4: DISCLAIMER 5: DISCLAIMER 6: DISCLAIMER 7: DISCLAIMER 8: DISCLAIMER 9: DISCLAIMER 10: DISCLAIMER 11: DISCLAIMER 12: DISCLAIMER

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**Table A2.** Demonstration of the analysis matrix operation for HMC multi-factor analysis.