



## Innovative Methodology and Management Tools of Commercial Real Estate

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**ABSTRACT:** There are a number of current scientific, methodological and applied problems related to the management of operational activities of construction companies. This article is devoted to the development and application of innovative universal methodology for the management of commercial real estate (CRE). This methodology is substantiated a new and productive system of regulation of enterprises participating in the construction and investment process. This approach is suitable for management tools of any type of CRE and integrates into a single system the factors of influence, bases, methods and procedures. Operational technology of multicriteria analysis of management decisions on the operational activities of enterprises is applied to the lifecycle of servicing and the environment of stakeholders CRE as a temporary enterprise based on the implementation of qualimetric approach. The methodology and tools together create a methodological and scientific basis for regulating the operational activities of a servicing company or real estate management company (REMC), which administers investment and construction projects (individual objects and commercial buildings) and as a new type of developer in a single cycle of servicing regulates the interaction of institutional participants and stakeholder enterprises (performers), ensuring compliance with the economic, budgetary and administrative characteristics of the surveying cycle as an object of construction and profitable operation, investment and commodity-property complex.

**Keywords:** management tools, commercial real estate, construction development, surveying, surveying company, real estate management company, methodology for management of commercial real estate.

**Abbreviations:** REMC, real estate management company; CRE, commercial real estate.

### I. INTRODUCTION

The formation and development of segments of the real estate market in Ukraine has led to the need to use modern operational management systems of construction companies, one of which is surveying. Analysis of world experience shows that only the application of a professional approach to real estate management, which directly includes the finished products of construction companies (buildings, structures and other industrial and civil facilities) can significantly increase the efficiency of management in the interests of property owners, users and the state as a whole. As part of real estate management, there is a separation of functions between the owner and the management company-surveyor: the owner transfers to REMC to manage CRE, but retains the functions of strategic decision-making and quality control; all functions of operational management are performed by the enterprise-surveyor. The main advantages of the REMC are: comprehensive approach, reduction of operating costs, comprehensive knowledge of the market and a high level of professional training of specialized specialists, long-term cooperation with retail operators. The advantages also include the fact that the

real estate management company provides much higher profits from the used space. This is due to the fact that the company receives income from interest on the owner's profits and in its interests to maximize total income.

The current situation in the construction and investment complex of the country and, in particular, in the subsector of investment and construction of commercial housing (the sub sector remains primarily profitable for developers and risky for home buyers) outlines a set of pressing theoretical, methodological, scientific and applied problems. There is a need to improve the application mechanisms for managing the processes of the cycle "initiation-justification-investment-preparation-construction-operation" of the project and distribution of results" for projects of construction and sale of housing. This section should be succinct, with no subheadings.

Scientists have made a significant contribution to the study of theoretical and methodological principles of development in works [1-3].

Articles [4, 5] are devoted to determining the nature of the impact of production, technological and socio-economic factors on the dynamics of strategic change.

In studies [6-8] identified patterns of cyclical flow of institutional and economic transformation of the

enterprise in terms of adaptation to the economic environment changes.

The solution of problems of improvement of structural and process construction of the enterprise in studies [9, 10] is mainly based on principles of introduction of the design and competence approach concerning use of the newest information and communication and intellectual tools of management.

The articles [11-13] are devoted to solving the problems of legislative regulation of servicing activities of enterprises in Ukraine.

Applied problems of determining the cost of development surveying services and minimizing the risks of real estate construction and operation projects are described in detail in works [14, 15].

Some works [16-19] are devoted to the problems of working out recommendations for evaluating the effectiveness of construction and investment projects as projects implemented with the participation of a surveying company, a professional real estate manager at the stages of its life cycle.

Possibilities of application of foreign experience in operational activity of the enterprises-stakeholders of construction in modern economic conditions are analyzed in articles [20, 21].

The importance and relevance of solving the questions led to the choice of topic and objectives of this study.

## II. TOOLS AND METHODOLOGY

The authors of this study have developed and propose a universal methodology and management tools of CRE. This methodology is suitable for management of any type of CRE and integrates into a single system the factors of influence, bases, methods and procedures.

Fig. 1 shows the components of the methodology for the effective management of the REMC, which are considered as a system sequence of interrelated factors of formation and use that influence the choice of basis, methods and procedures of economic analysis.

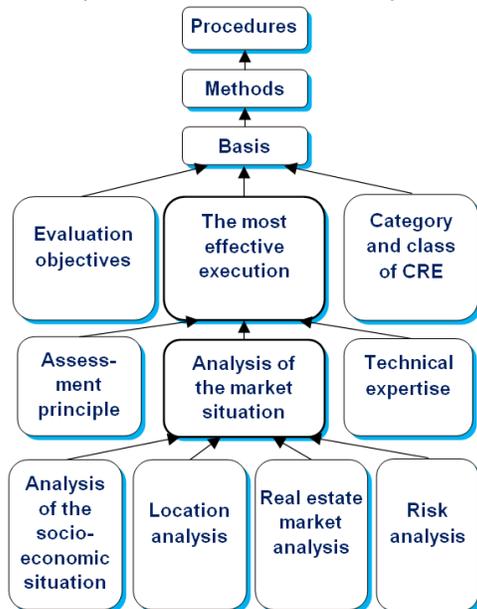


Fig. 1. Components of the methodology for management of the REMC.

The basis of the methodology for management of the CRE defines a method or set of methods that are interconnected by an appropriate algorithm and by which a quantitative result can be obtained.

The decision-making function is an ongoing task in the management process of the CRE.

Fig. 2 presents the decision-making process according to the proposed methodology, which consists of a sequence of stages and aims to determine the most effective use of CRE.

In the decision-making process, alternative uses of CRE are formed and the advantage of each of them is assessed. To achieve this goal, the evaluation of alternatives is carried out according to the degree of achievement of the most important goals, which consists of two procedures.

1. Assessment of the projected impact of alternatives on the achievement of quantitative and qualitative goals in terms of both unambiguous and ambiguous expectations of the future situation, taking into account external conditions.

2. Modeling the consequences of the implementation of alternatives, based on objective analysis and subjective understanding of value, and effective solutions with possible changes in the goals, measures and constraints.

The result of the decision-making task is the choice of an alternative that requires the implementation and determination of its effectiveness through an integrated assessment of the quality of decisions.

A generalized characteristic of decision making is the effectiveness of such a decision. Such a characteristic of efficiency, for example, can be considered an integrated indicator of economic reliability, the level of profitability and so on. This characteristic includes the result of the decision, which determines the degree of achievement of goals related to the cost of achieving them. The solution is more effective, the greater the degree of achievement of goals and lower costs for their implementation.

The decision-making task for REMC in the management system of CRE should be described as follows:

$$\langle Z_j, T, Q | Z, A, B, N, K, F, O, R, E^R \rangle, \quad (1)$$

where: to the left of the vertical line are the symbols that describe the known elements of the task and to the right are unknown:

$Z_j$  is formation and description of the problem;  $T$  is time to make a decision;  $Q$  is identifying the necessary resources for decision making;  $Z = (Z_1, \dots, Z_n)$  is search and selection of alternative situations, determine the overall problem situation;  $A = A_1 + A_2 + A_3$  is the first level of the hierarchy of goals ( $A_1$  is valuable,  $A_2$  is consumer,  $A_3$  is social goals);  $B = (B_1, \dots, B_n)$  is plural restrictions;  $N = (N_1, \dots, N_n)$  is the second level of the hierarchy, evaluation of alternative solutions by the degree of achievement of their most important goals (financial support, location, technical capability, physical capability, political factors, etc.);  $F$  is the function of the preference of the decision-maker;  $K$  is criterion for choosing the best solution;  $O$  is optimal (best) solution;  $R$  is implementation of the selected option;  $E^R$  is determination of results (effect) of realization.

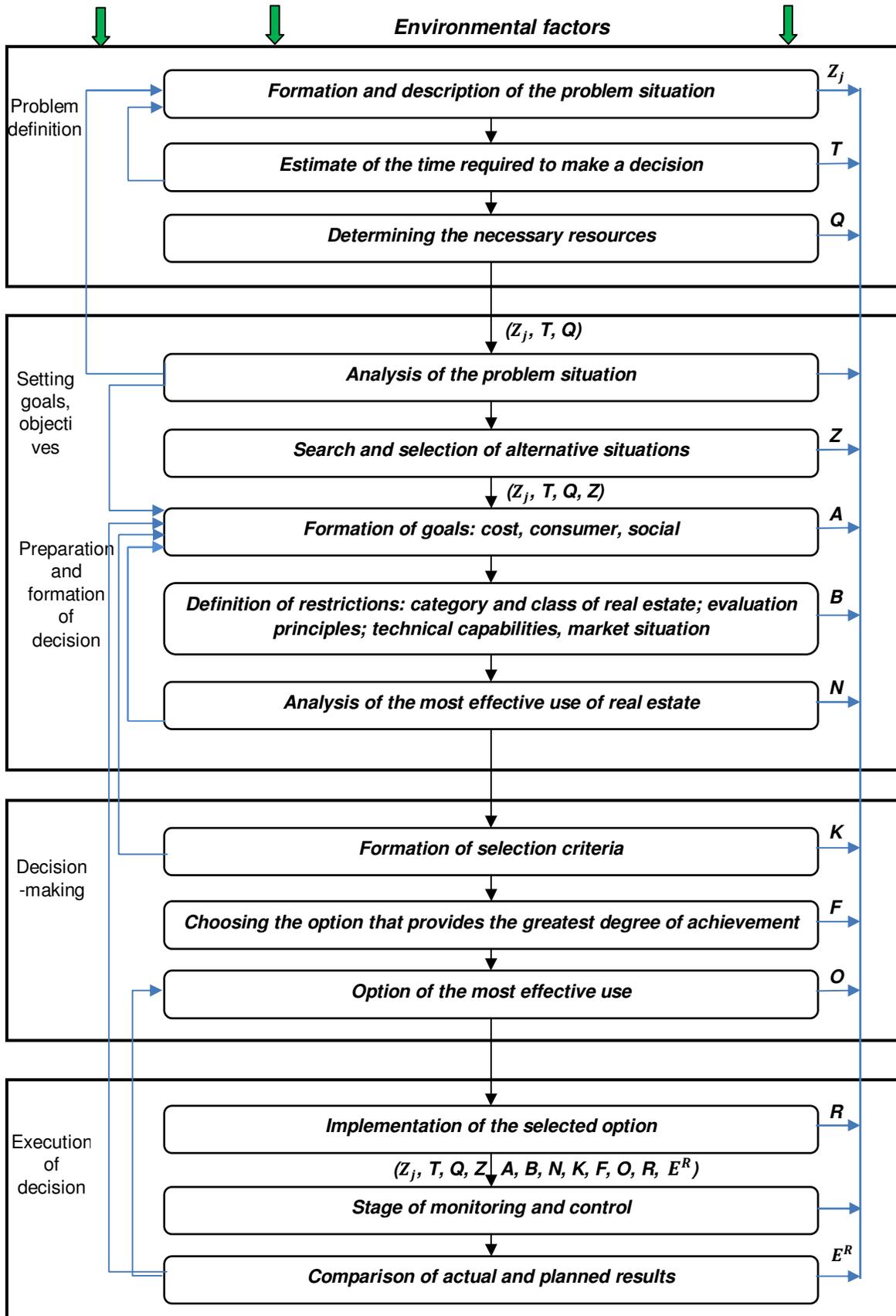


Fig. 2. The decision-making process for the effective use of CRE.

Decisions made under conditions of certainty are based on the future existence of a particular situation, taking into account environmental factors. Moreover, the effect of one or another alternative solution can be determined by the unambiguous level of achievement of one main goal. The optimal solution in this case will be an alternative that leads to maximizing the level of achievement of the extreme of the set goal in compliance with the established restrictions. If the decisions made are not based on one specific situation in the external environment, but on several possible situations, then the decision-making takes place in conditions of risk or a certain uncertainty of the external environment.

In the general case, the problem of choosing a solution under uncertainty can be formulated as follows.

Let's have a vector  $S = (S_1, S_2, \dots, S_n)$ , describing  $n$  states of the environment and the vector  $X = (X_1, X_2, \dots, X_m)$ , describing  $m$  valid solutions. The task of optimization is to find such a vector  $X = (0, 0, \dots, 0, X_i, 0, \dots, 0)$ , which would provide the optimum of some function  $W(X, S)$  by the criterion K:

$$W = \text{opt}_K W(X, S) \quad (2)$$

Function  $W(X, S)$  called the utility function (efficiency). The value of the optimum function  $W(X, S)$  is revealed based on the statement of a specific problem. If the task of optimization, for example, is to make a profit, then the values of the function tend to maximize, if the cost - to minimize.

The input data of the task is usually presented in the form of a matrix  $m \times n$ , each element of which is defined as follows:

$$W_{ij} = F(x, s); i = \overline{1, m}, j = \overline{1, n} \quad (3)$$

where  $F$  is a rule determined by the statement of a particular problem.

It is necessary to distinguish between a risk situation and a situation of uncertainty when making decisions in conditions of incomplete information. A situation of risk is considered if there is statistical information about similar decisions made earlier, or if the situation under study has been repeated many times. In this case, the frequency of occurrence of individual conditions makes it possible to estimate the probability of their occurrence in the future.

Decision-making in conditions of uncertainty means that the decision is fundamentally new and there are no relevant statistics. In this case, the state is attributed to some subjective probabilities, which allows you to replace the situation of uncertainty with a quasi-situation of risk.

When making decisions in conditions of risk, it is assumed that statistics are available to assess the likelihood of a situation, as well as that past experience can be used to assess the future. This estimate can be refined with the help of experts in case of problems with extrapolation of statistics.

Determining in any available way the probability of each situation, we obtain the vector  $P$

$$P = \{p_j\}, j = \overline{1, n} \quad (4)$$

Knowing these probabilities for each solution  $X = \{x_i\}, i = \overline{1, m}$ , we can find the mathematical expectation  $W(x, s, p)$  and determine  $X_i^*$  from its maximum value, for which we have  $\text{opt } W(x, s)$ :

$$W = \max_i \sum_{j=1}^n w_{ij} \cdot p_j, i = \overline{1, m}; j = \overline{1, n} \quad (5)$$

The principles underlying the Laplace criterion are known as the principles of insufficient grounds. It is believed that if the probabilities of possible states are unknown, then there is no sufficient reason to believe that they have an uneven distribution. Then the appearance of any possible state is equally probable and the decision must be made, which in these conditions gives the maximum effect:

$$W = \max_i (\frac{1}{n}, \sum_{j=1}^n w_{ij}), i = \overline{1, m}; j = \overline{1, n} \quad (6)$$

The application of this criterion is appropriate only in cases where there is no information about the occurrence of a condition.

Wald's criterion involves the choice of a cautious, pessimistic strategy in the economic situation. Each action is associated with a certain guaranteed result. For each solution  $X_i$  is chosen the least of  $W_{ij}$ , then the decision is made that gives a maximum of  $W$ :

$$W = \max_i (\min_j w_{ij}), i = \overline{1, m}; j = \overline{1, n}. \quad (7)$$

The choice of action with a focus on the least favourable condition according to Wald's criterion is a kind of reinsurance. On the other hand, it would be reckless to choose a behaviour that only with a certain probability guarantees the most beneficial consequences. More logical behaviour is one that occupies a certain intermediate position. The essence of this compromise is the basis of Hurwitz's criterion:

$$W = \max_i (\alpha \cdot \max_j w_{ij} + (1 - \alpha) \cdot \min_j w_{ij}), \quad (8)$$

$$i = \overline{1, m}; j = \overline{1, n}.$$

The parameter  $\alpha$ , usually called the coefficient of optimism, can take values in the range (0; 1). When  $\alpha = 0$  (complete pessimism), the criterion under consideration becomes Wald's criterion.

The essence of Savage's criterion is to determine the minimum risk. When choosing a solution according to this criterion, the following procedure is taken:

1) In the problem of choosing the solution of the matrix of the utility function (efficiency) is put in line with the new matrix of lost opportunities. The elements of this matrix represent the losses from erroneous actions, and the erroneousness of this decision is determined after the action has already been committed.

The elements of this matrix are calculated by the formula:

$$b_{ij} = w_{ij} - \max_i w_{ij} \quad (9)$$

Eqn. (9) shows the benefit lost as a result of making the  $i$ -th decision in the  $j$ -th state.

2) According to the matrix  $B$ , a solution is chosen according to Wald's criterion, which depicts the smallest value of the maximum lost opportunity. The choice of criteria is made by the decision maker.

A key point in the decision-making process is the procedure for identifying and justifying the alternative use of the CRE, which is an effective approach to methodology and management tools of the CRE.

### III. RESULTS AND DISCUSSION

Approbation of the proposed methodology for the management of CRE was conducted for a Ukrainian commercial real estate object.

Table 1 presents most problematic organizational business processes in REMC. Table 2 presents the process transformation performance evaluation in REMC. Table 3 presents assessment of the efficiency of using CRE.

**Table 1: The most problematic organizational business processes in REMC.**

S.No.	Business process description	Average importance score (0-5 points)
1.	Preparation of initial permits	4,8
2.	Land allocation	4,5
3.	Search for investors	4,1
4.	Getting loans	3,8
5.	Object Acceptance	3,5
6.	Work with providers	3,1

**Table 2: Effects of process transformation in REMC.**

S.No.	The essence of the changes in business processes	% cases
1.	<b>Redesign of individual subprocesses:</b>	<b>57, 5</b>
	1. work with private investors	28, 7
	2. work with providers	14, 3
	3. formation of budget documentation	7, 3
	4. control of work performed	7, 2
2.	<b>Process simplification</b>	<b>14, 5</b>
3.	<b>Improvement based on personification of responsibility</b>	<b>7, 5</b>
4.	<b>Reengineering according to the some goals and criteria:</b>	<b>20, 5</b>
	1. criteria of efficacy	5, 5
	2. fundamentality	5, 3
	3. breadth of coverage	5, 0
	4. effectiveness	4, 7
<b>Total</b>		<b>100</b>

**Table 3: Assessment of the efficiency of using CRE.**

S.No.	Conversion quality criterion	Average mark (from 0 to 5)
1.	Process cost reduction	0,8
2.	Reduced process time	1,2
3.	Process quality improvement	2,5
4.	Increase customer satisfaction	2,8

**Table 4: Evaluation of the effectiveness of the implementation of the methodology for participants in the use of CRE.**

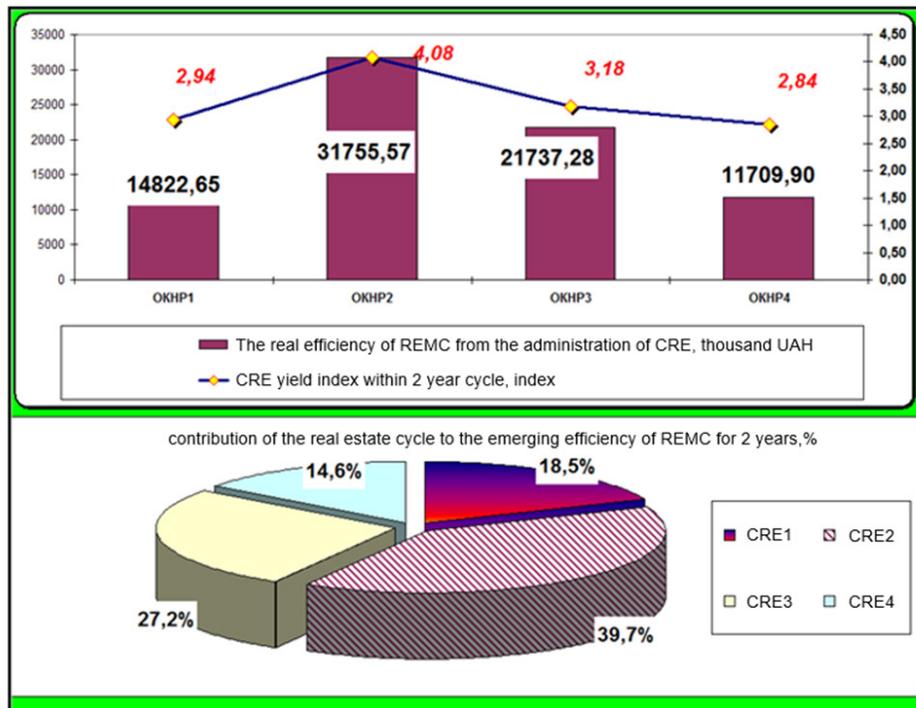
Participant in the use of CRE	Type of the effectiveness	Efficiency mark
Customer	Reducing the time for preparation of initial permits	3,2 times
	Save time	12,2 million UAH
	Savings associated with reduced risk of unforeseen costs	0,85 million UAH
	Reduction in transportation costs	0,15 million UAH
	Reducing the cost of preparation of initial permits	1,1 million UAH
Supplier	Growth in output from an increase in the number of large customers	15%
	Lower average cost of the delivery	12%
Contractor	Reducing the risk of project changes and underutilization of capacities	8%
Investor	Reduced risk of loss of funds	10%
Municipality	The effect of reducing the likelihood of a violation of building codes	5%
	Lower control costs	

On the basis of the given data in Tables 1-3 calculations according to the offered methodology are carried out. Table 4 shows the evaluation of the effectiveness of the implementation of the methodology for participants in the use of CRE.

The value of the results for science is determined by the fundamental novelty of the methodology and tools introduced in the study to regulate the operational activities of the stakeholder enterprise in the construction and real estate markets. Unlike other studies [3-5, 13-16, 22], the results of this work provide analytical and parametric justification of business

processes for managing the activities of stakeholders, who with the help of a real estate management company implement investment and construction projects in a single cycle "investment-preparation-construction-operation".

The significance of the results for practice is that the heads of development companies are provided with a clearly formalized BLM-adaptive toolkit for organizing, operating and adjusting the operating system KUN, which allows the servicing company together with their subordinate companies to successfully implement growth strategy within the servicing cycle.



**Fig. 3.** Evaluation of four alternatives to the use of CRE.

The surveying company is provided with relevant tools for streamlining economic parameters, resource-calendar program, business process budget and characteristics of surveying cycles.

Fig. 3 presents the results of these calculations and provides four alternatives for one CRE. According to the above calculations, the alternative CRE2 is an option for efficient use.

#### IV. CONCLUSION

This study is devoted to the development and application of a universal methodology for the management of CRE. This methodology is substantiated a new and productive system of regulation of enterprises participating in the construction and investment process. Operational technology of multicriteria analysis of management decisions on the operational activities of enterprises is applied to the cycle of servicing and the environment of stakeholders REMC as a temporary enterprise based on the implementation of qualimetric approach.

The methodology and tools together create a methodological and scientific basis for regulating the operational activities of a servicing company or REMC, which administers investment and construction projects (individual objects and commercial buildings) and as a new type of developer in a single cycle of servicing regulates the interaction of institutional participants and stakeholder enterprises, ensuring compliance with the economic, budgetary and administrative characteristics of the surveying cycle as an object of construction and profitable operation, investment and commodity-property complex.

#### V. FUTURE SCOPE

The future scope of this research is to refine a universal methodology for administering the management of

commercial housing project in the format of a single temporary stakeholder enterprise such as surveying company or REMC.

**Conflict of Interest.** No conflict of interest declared.

#### REFERENCES

- [1]. Elbardan, H., Othman, A. and Kholeif, R., (2017) Enterprise Resource Planning, Corporate Governance and Internal Auditing. *An Institutional Perspective, Cham: Palgrave Macmillan*, 446 p.
- [2]. Ryzhakova, G., Ryzhakov, D., Petrukha, S., Ishchenko, T. and Honcharenko, T., (2019). The innovative technology for modeling management business process of the enterprise, in *International Journal of Recent Technology and Engineering (IJRTE)*, 8(4), 4024-4033.
- [3]. Elbardan, H., Othman, A. and Kholeif, R., (2017) Enterprise Resource Planning, Corporate Governance and Internal Auditing. *An Institutional Perspective, Cham: Palgrave Macmillan*, 446 p. doi: <http://doi.org/10.1007/978-3-319-54990-3>
- [4]. Kortmann, S., (2012). The Relationship between Organizational Structure and Organizational Ambidexterity. *A Comparison between Manufacturing and Service Firm, Springer Gabler*, 183 p. doi: <http://doi.org/10.1007/978-3-8349-3630-1>
- [5]. Janssen, T., (2016) Enterprise Engineering. Sustained Improvement of Organizations. *Cham: Springer*, 148 p. doi: <http://doi.org/10.1007/978-3-319-24172-2>
- [6]. Marchuk, T., Ryzhakov, D., Ryzhakova, G. and Stetsenko, S., (2017). Identification of the basic elements of the innovation-analytical platform for energy efficiency in project financing. *Investment Management and Financial Innovations*, 14(4), 12-20.
- [7]. Miller, R., Strombom, D., Iammarino, M. and Black, B., (2009). The commercial real estate revolution: nine

transforming keys to lowering costs, cutting waste, and driving change in a broken industry, *John Wiley & Sons*.

[8]. Mihaylenko, V., Honcharenko, T., Chupryna, K., Andrashko, Yu. and Budnik, S., (2019). Modeling of Spatial Data on the Construction Site Based on Multidimensional Information Objects. *International Journal of Engineering and Advanced Technology (IJEAT)*, 8(6), 3934-3940.

[9]. Terentyev, O., Tsiutsiura, S., Honcharenko, T. and Lyashchenko, T., (2019). Multidimensional Space Structure for Adaptable Data Model. *International Journal of Recent Technology and Engineering (IJRTE)*, 8(3), 7753-7758.

[10]. Kuchansky, A., Andrashko, Y., Biloshchytskyi, A., Danchenko, O., Ilarionov, O., Vatskel, I. and Honcharenko, T., (2018). The method for evaluation of educational environment subjects' performance based on the calculation of volumes of M-simplexes. *Eastern-European Journal of Enterprise Technologies*, 2(4-92): 15-25.

[11]. Riabchun, Y., Honcharenko, T., Honta, V., Chupryna, K., and Fedusenko, O., (2019). Methods and means of evaluation and development for prospective students' spatial awareness. *International Journal of Innovative Technology and Exploring Engineering*, 8(11), 4050-4058.

[12]. Chupryna, Y., Ryzhakov, D. and Malykhina, O., (2018). The identification of alternatives and changes in scenarios for the development of regional build clusters. *International Journal of Engineering & Technology, UAE: Science Publishing Corporation*, 10(3.2), 484-486.

[13]. Appel, S., Kleber, P., Frischbier, S. Freudenreich, T. and Buchmann, A., (2014). Modeling and execution of event stream processing. *Business processes. Information Systems*, 46, 140-156.

[14]. Bertolini, M., Bevilacqua, M., Ciarapica, F.E. and Giacchetta, G., (2011). Business process reengineering in healthcare management: a case study. *Business Process Management Journal*, 17(1):42-66.

[15]. Dezdar, Sh. and Ainin, S., (2011). Examining ERP implementation success from a project environment perspective, *Business Process Management Journal*, 17(6): 919-939.

[16]. Singh, G., Gupta, R. and Agarwal, N., (2020). Economic Re-Engineering: Covid-19. *International Journal on Emerging Technologies*, 11(4): 01–05.

[17]. Chhetri, B., (2020). Agile Project Management for Knowledge-Based Projects in IT Sector. *International Journal on Emerging Technologies*, 11(3): 1049–1053.

[18]. Ryzhakov, D., Dikiy, O., Druzhynin, M., Petrenko, H. and Savchuk T., (2020). Innovative tools for management the lifecycle of strategic objectives of the enterprise-stakeholder in construction. *International Journal on Emerging Trends in Engineering Research*, 8(8): 4526-4532.

[19]. Honcharenko, T., Chupryna, Y., Ivakhnenko, I., Zinchenco, M. and Tsyfra T., (2020). Reengineering of the construction companies based on BIM-technology. *International Journal on Emerging Trends in Engineering Research*, 8(8): 4166-4172, <https://doi.org/10.30534/ijeter/2020/22882020>

[21]. Fedorenko, V., Rizhakova, G. (2018). Theoretical and methodological ambush of innovation and investment in Ukraine. Monograph., LTD "DKS Center", Kiev, 442 p.

[22]. Arzhaev, F. I., Bikmetova, Z. M., Iamalova, E. N., Ignatieva, O. N. and Samigullina, A. F., (2020). Asian Financial Development: The Rise of a New Financial System. *International Journal on Emerging Technologies*, 11(5): 252–260.

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