OPTIMIZING THE MANAGEMENT MODELS IN DEVELOPING HOUSING ESTATES

BY

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Abstract. Residential construction projects are currently in high expansion, both nationally and internationally, due to individuals fundamental need to have access to accommodation, as well as to the liberalization of loan facility, both for the buyer and the investor.

In a competitive market, where the demand and offer hold a large share, it is mandatory that for investments in residential complexes, sub-branch of construction industry, to implement a vast controll-management system and to ellaborate performant optimization execution supervision programmes, so as to meet investor's objectives and beneficiary's requirements.

Keywords: optimization; management models; housing estates; investment, project management.

1. Introduction

Socio-economic transformation at national and international level, along with the need to adapt to European market requirements, impose the changing and modernization of construction management.

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This is one of the main reasons imposing the need to develop and implement instruments, techniques and methodologies to make the construction activity more facile and efficient.

Specialists in this field have to be able to analyze a wide spectrum of probabilities, that may occur during designing and execution of a construction project, as well as to have decision-making ability to opt for optimal solutions for solving all potential issues that may occur (Munteanu & Şerbănoiu, 2010).

Currently, it is fundamental for every individual or family to have access to accommodation, and understandably to the quality and comfort it provides. Starting from this point, any individual is able to exercise all the other fundamental rights and obligations of everyday life (Dan, 2003).

The statistics provided by National Statistical Institute, for 2017, indicates an increase of residential construction projects with 13.3 %, compared to 2016, as shown in Fig. 1.
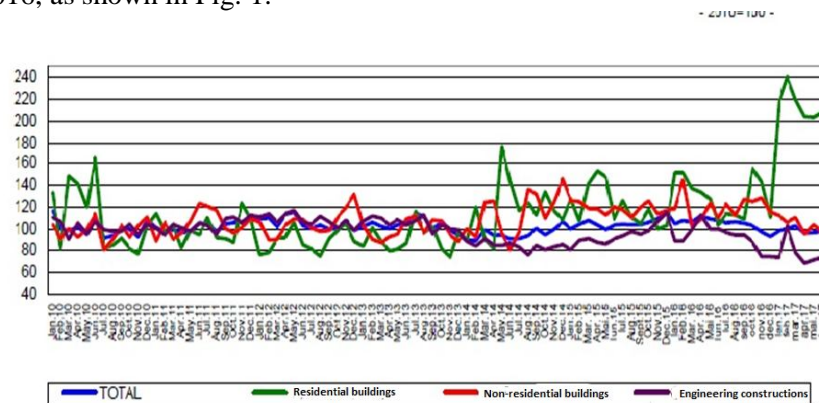

Fig. 1 – Evolution of residential constructions.

The investments in residential constructions are mainly founded on the number of estate market demands and the large number of such ongoing projects comes as a consequence of liberalization of loan facility, whatever their form (for example, ,,First Home" governmental programme).

Loan facility stimulates both   the purchasing power of beneficiaries, and the growth power of the investors, therefore directing the consumption to estate purchase (Iftode O.C., 2016).

NP-057-02 Normative, "Normative for designing residential construc-tions" classifies housing developments as individual housing complexes and collective housing complexes. In the context of investments, individual housing complexes are characterized by large development area, located in the suburban areas, with limited access to the utility network, adjacent costs to provide all

necessary resources, high comfort regarding usable area and the possibility to parcellate. In the same context, collective housing complexes are characterized by limited development area (vertical development), easy access to utility network located within of urban areas, low costs to provide all necessary resources, renting possibility.

Taking into consideration the fact that the development of residential constructions is conditioned by profitable investment correlated with meeting highest requirements of normative in force and the price-quality condition (as far as the beneficiary is concerned), not to disregard that house-building activity might be unpredictable, with many internal and external influential factors, then an optimization project must be taken into account.

2. Factors in the Construction Process

Talking about the investments for a construction project, and more specifically for residential constructions, we assume that for this project to be carried out in optimal conditions, three entities are involved: the contractor (investor), the constructor and the beneficiary.

The success of such a project lays into carefully planning, organizing and controlling it, from the design to the end, with the purpose of meeting the beneficiary requirements in terms of agreed execution time, functional and financial feasibility without overlooking quality standards, costs and the agreed time frames.

All factors, direct and indirect, involved into developing a construction project, are schematically represented in Fig. 2, surprising their interdependency under the incidence of delivering a finite product (the objective) according to the standards imposed in the design stage (technical project).
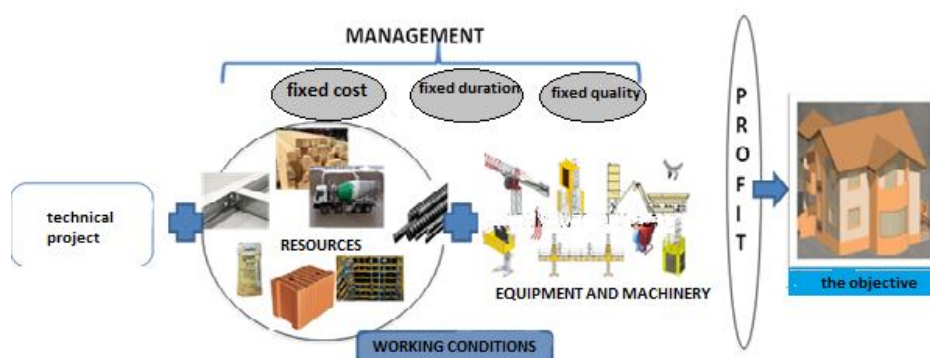

Fig. 2 – Factors involved in the construction process.

3. Construction Wok Particularities

In its broad meaning, construction, as implementation area, as well as an area requiring permanent modernization of managerial models used in organizing, planning and running the execution of a plan, differentiates itself from other industrial branches through a quantum of specific features (Munteanu, 2010).

First and foremost, construction work is directly influenced by environmental factors, leading to unpredictable working conditions, difficuly to forecast, therefore imposing additional solutions to be able to respect the agreed time frame with the available resources.

The unicity of construction projects completes the series of restrictions, as follows: assuring a contestant material supply, available workforce and equipment, quality standards compliance, urban management plans and detailed plans, price variations and, sustainable development.

In the construction field, the final product is directly bound by the location through foundation system, therefore establishing a fixed position throughout the entire life cycle of the construction.

The interdependency of the main factors involved in the deployment of a construction process, condition the project management to implement a detailed control-management strategy.

4. Criteria for Choosing the Optimal Configuration for Residential Construction Development

According to NODEX, "optimal" means the most appropriate, suitable, assuring the highest efficiency, able to correspond to best interests.

Technically speaking, when we talk about an optimization process, we refer to the algorithm or concept with the most performant result for any project manager, giving them the opportunity to achieve the objective pursued.

Practically, the optimization can be defined as the science to determine "the best solution" for certain constraints, issues that may occur and the fundaments of certain criteria for the identified issues.

The optimization criteria or the efficiency criteria represents the basis of establishing the objective functions for the optimization pattern in construction projects. the basis of any optimization criteria has the following features:

Performance or the most advantageous result of a system, machinery, equipment, etc. (DEX);

Labor productivity or the ratio between the resulted quantity and the labor effort (DEX);

a) the rate or ratio between the fold-effort and the final result;

b) restrictions or constraints occurring along project's development path and which require an alternative set of decisions in order to respect de agreed time frame;

c) efficiency or satisfying the initial expectations;

d) the objective or the agreed purpose in the required technical conditions, meeting the beneficiary's highest expectations and with convenient result for the investor.

Specific for construction design and execution is identifying the best solution for minimum material, financial and time effort, with maximized results. This process is best known in practice as optimization issues formulation. This issue formulation always requires the identification of an equilibrium between designing a pattern complex enough to best describe the issue and finding out the best solution for it (Trandafir, 2004).

In the light of the three entities governing the construction process, as far as the optimization issues are concerned, we can formulate the following hypothesis: the investor is interested in making an advantageous profit complying at the same time with the quality standard imposed by the techinac project and the end-dates imposed by the time schedule of every construction stage. The constructor will resonably handle the labor force and equipment so as to satisfy the requirements of both the investor and the beneficiary, and to maximize his profit. The beneficiary is interested in purchasing a technic and price competitive product and a short lead time.

5. Decision Matrix: Constraints. Possibilities. Decisions

Issues optimization formulation is tightly connected with potential constraints that might occur, from construction design to objective's end-date.

According to resource sizing for the construction design stage of a housing complex, the following parameters are required:

a) maximum allowable cost (investment value);

b) maximum lead time;

c) quality standards (satisfying all requirements).

Orderly implementation and realistic estimation of these parameters, means the implementation of a rigorous optimization programme, where quality, sustainability and profit guarantee the efficiency of that programme. At the same time, according to the main purpose, every manager is free to set its own course, customized, able to allow him to reach his objectives.

Any decision process, irrespective of the main purpose, is based on the following elements:

i) the decision maker (group of individuals) responsible for finding out satisfactory alternatives for reaching the objective;

ii) the wording of identified decision issue, most of the times translated into selecting an organization method, a technology or required materials;

iii) all possible ways to solve the issue;

iv) all decision criteria chose by the decision maker or all points of view taken into account by the decision maker when choosing an alternative;

v) set of conditions that presupposes that every solution has a corresponding consequence from a range of probabilities;

vi) all consequences and their characteristics following the evaluation of each possibility, tightly connected to each evaluated criteria and with each imposed condition.

vii) the objectives or purposes set by the decision maker, as part of the decision process, representing the proposed consequences and   taken on the decision maker, in order to set the decision criteria.

6. Optimization of Management Models

In respect of cost optimization and agreed execution time frame for building a residential complex, we will refer to the advantages and disadvantages of currently used models, as described in published literature:

a) s**uccessive method**, characterized by reduced labor force, reduced material consumption/day (materials, human resources, equipment) easy supervision of construction activities, long execution time span;

b) **parallel (simultaneous) method**, characterized by short execution time span, large resource consumption/day (materials, human resources, equipment), considerable labor force, difficult supervision of construction activities;

c) c**hain method**, assures a continuity in the working flow, from one sector to another, and at the same time, the synchronization of the team ending a construction stage on a given sector and the one starting with the next stage.

In respect of the criteria we need to optimize, to reach the established objective, in developing housing complexes, and choosing the optimal management model and execution plan, the following steps should be followed:

a) deciding on the technologic workflow, influencing the construction processes;

b) spatial structuring of process execution to establish the number of working sites;

c) the calculation of organizational parameters (execution time span, required labor force, number of equipment);

d) graphs elaboration according to the above.

7. Conclusions

Formulation of optimization issues in the described context leads approaching the criteria to comply with maximum admitted execution time span (reducing the time span and adhering to the maximum admitted cost (or cost reducing)).

I respect of reducing execution time span, if we analyze the parallel method, we will see that it generates high costs through the large number of labor force and equipment required for the construction process. It also involves a large working site and thus a large material and resources daily consumption. To optimize this method, you need to deliver in time all required materials and equipment, in time working site preparation, close supervision of the teams involved in the execution process, so as to reach to a profitable cost/productivity ratio.

Using chain, method in respect of reducing execution time span requires a large number of labor force and equipment which may generate higher costs, but the required materials and equipment are easy to predict in comparison with work productivity.

In respect of compliance with maximum cost or cost reduction, using the successive method implies reduced costs for labor force and other resources for the construction process, but because of long execution time span, it may generate indirect costs (salaries, travel expenses, etc.). In terms of optimization, in order to reduce the overall cost, reducing the overall execution time span is needed, with the purpose of reducing or eliminating indirect costs.

In this context, the purpose of optimization is the identification of the right management method to meet the requirement that a construction process has optimal overall execution time span with an overall cost less or equal to the maximum admitted cost.

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OPTIMIZAREA MODELELOR MANAGERIALE ÎN DEZVOLTAREA
ANSAMBLURILOR DE LOCUINŢE

(Rezumat)

Dezvoltarea ansamblurilor de locuinţe rezidenţiale cunosc în prezent o puternică expansiune la nivel naţional şi internaţional, prin prisma nevoii fundamentale a individului de a avea acces la o locuinţă dar şi datorită liberalizării sistemelor de creditare, atât pentru cumpărător cât şi pentru investitor.

Într-o piaţă concurenţială, unde cererea şi oferta înregistrează cote înalte, se impune ca pentru investiţiile în ansamblurile de locuinţe rezidenţiale, ramură a industriei construcţiilor, să fie aplicat un amplu sistem de management-control şi să se elaboreze programe performante de optimizare a conducerii lucrărilor de construcţii, astfel încât să fie indeplinite atât obiectivele investitorului dar şi exigenţele utilizatorului.