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Computer Sciences and Information Technologies (CSIT)



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Lviv, Ukraine

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Матеріали
XIV-ої Міжнародної науково-технічної конференції

КОМП'ЮТЕРНІ НАУКИ ТА
ІНФОРМАЦІЙНІ ТЕХНОЛОГІЇ
CSIT 2019



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Львів, Україна

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PREFACE

Welcome to XIVth International Scientific and Technical Conference **Computer Sciences and Information Technologies CSIT 2019**, which is organized by IEEE Ukraine Section, IEEE West Ukraine AP/ED/MTT/CPMT/SSC Societies Joint Chapter, Lviv Polytechnic National University, Institute of Computer Science and Information Technologies, supported by Technical University of Lodz Poland, Institute of Information Technologies, patronized by Ministry of Education and Science of Ukraine.

The international conference **Computer Sciences and Information Technologies**, established in 2004, is annually organized with the principal aim to discuss modern trends in computer sciences, information technologies, applied linguistics, and others related areas. To achieve this goal, various aspects of computer science will be presented in such major topics:

- Artificial Intelligence
- Cyber-Physical Systems
- Software Engineering
- Applied Linguistics
- Intelligent Management Technologies
- Mathematical Modeling
- Big Data and Data Science
- ICT in Higher Education
- Data and Knowledge Engineering
- Project Management

CSIT 2019 Program Committee evaluated over 250 submitted papers from China, Czech Republic, France, India, Ireland, Japan, Kazakhstan, Poland, Serbia, Turkey, Slovakia, Spain, and Ukraine to crystallize a high-level technical program of oral presentations. To continue previous successful practice, CSIT 2019 hosts three international scientific workshops: *International Workshop on Inductive Modelling IWIM-2019*, *International Workshop on Project Management IWPM 2019*, and *International Workshop on Information modeling, Data and knowledge engineering IWIMDKKE 2019*, all supported by IEEE.

The sincerest, boundless gratitude of organizers is sent to members of International Program Committee, who supported CSIT 2019 conference by participating in it, their comprehensive reviews allowed the conference to participate in the promotion of science and technological excellence. It should be proudly mentioned, that some papers are common for several institutions, and even countries, involved in the conference. Such examples of international cooperation, that we have noticed in papers, submitted this year, has inspired CSIT 2019 International Program Committee and Organizing Committee to encourage the cooperation.

Conference CSIT 2019 and satellite Workshops will be held in Lviv which is the largest city in Western Ukraine and the seventh largest city in the country overall. The historical heart of Lviv city is famous for its old buildings. The city center is on the UNESCO World Heritage List.

Lviv is one of the most important cultural centers of Ukraine, famous for art, literature, music and theatre. It hosts more than 100 festivals annually, has 60 museums and 10 theatres. With regard to its urban fabric and architecture, Lviv is an outstanding example of the fusion of the architectural and artistic traditions of Central and Eastern Europe with those of Italy and Germany. The CSIT 2019 conference will be held in early autumn, and Lviv will be at its best: the city is famous for its welcoming and hospitality, its beautiful parks, diverse cuisine, fascinating history and charismatic architecture. Please, be sure of our warmest gratitude for you interest and participation in the conference.

We are looking forward to welcoming you in Lviv and at CSIT 2019!

Sincerely yours,



Mykola Medykovskyy
Director of Institute of Computer Sciences and
Information Technologies of Lviv Polytechnic
National University, Ukraine
CSIT 2019 Executive Chair

Lviv 2019

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Models of safety management in development projects

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Abstract — A complete scientific research on safety management in development projects in Ukraine is closely linked to the development of real estate, in particular, with the legislative initiatives adapted to the Ukrainian market model for safe development of real estate. This raises considerable interest from the moment of application the system mechanisms of development projects at the planning stage. Existing economic and social realities of safety management in Ukraine will bring the real estate market to a qualitatively new level and ensure its further logical development. Despite the effective implementation of some advancement mechanisms of development projects in Ukraine, the overwhelming majority of issues related to the implementation of modernization measures remain insufficiently studied. The existing practice of development has a number of unresolved problems, however, at the same time, a number of scientific studies presented in the national management science. The purpose of our research is to analyze the existing in the world practice models of safety management in development projects and to identify the possibility of their application in the conditions of Ukrainian economic and legal reality - adaptation in accordance with the requirements of the Ukrainian real estate market.

Keywords — *critical parameters; development projects; safety management; phases of the project.*

I. INTRODUCTION

Formulation of the problem. Formation of territorial development concept of Ukraine makes it possible to increase the degree of its economic and financial independence and turn the perimeter of development into a "growth engine" of the region. The regulation of public relations in the field of civil security is related to the creation and management of the real estate market in Ukraine, and to provide fundamental paradigms: comprehensive legality and high level system reliability. The high level of formalization and optimization of relations in the real estate sector can provide the necessary protection of the subjective rights of participants in the reports on the assignment of real estate and the subsequent possession,

use and their disposal. In obedience to data [11] of the State Statistics Service of Ukraine, the construction of infrastructure projects is increasing. Between 2016 and 2018, their number has increased approximately twice (see Figure 1).

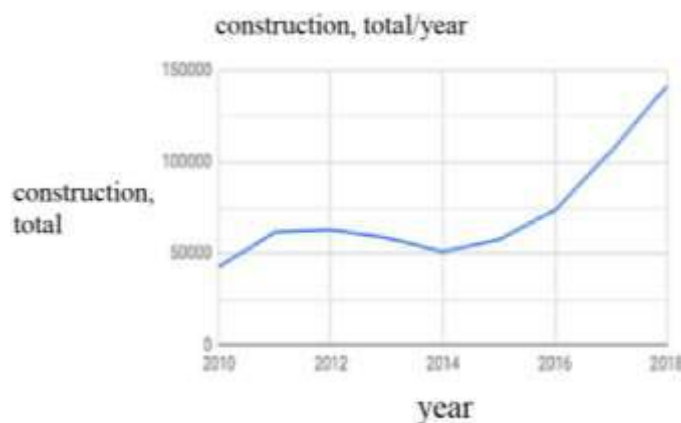


Fig. 1. General statistics of construction projects realization in Ukraine for 2010 - 2018 years

The current trends in the creation of large development projects have peculiarities of implementation, taking into account the constant presence of lots of people, and therefore the question of the safe functioning of such objects comes to the fore. As regards the comparison of the volume of construction products produced by engineering structures and construction projects, it should be noted that there is no significant advantage in any of the directions of development projects (see Figure 2). The number of such projects [11] from year to year is approximately the same, and therefore the amount of investments varies in the same framework: for example, in 2018, the volume of construction work in buildings amounted to 66791.6 million UAH, and in the creation of projects engineering buildings 74421.5 million UAH.

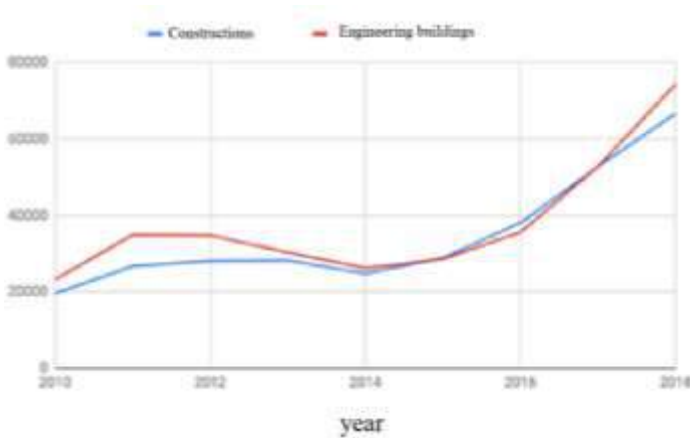


Fig. 2 - Volume of realized construction projects by types

By comparing the dynamics of construction projects for residential and non-residential buildings in 2013-2018 (see Figure 3), we can note [11] that each product of a development project must contain a technical implementation taking into account the philosophy of the objects' life safety. Incorrect definition of the safety parameters of a building with a mass stay of people will tirelessly lead to loss of reliability of structure functioning, which simultaneously will be accompanied by deterioration of economic and social indicators.

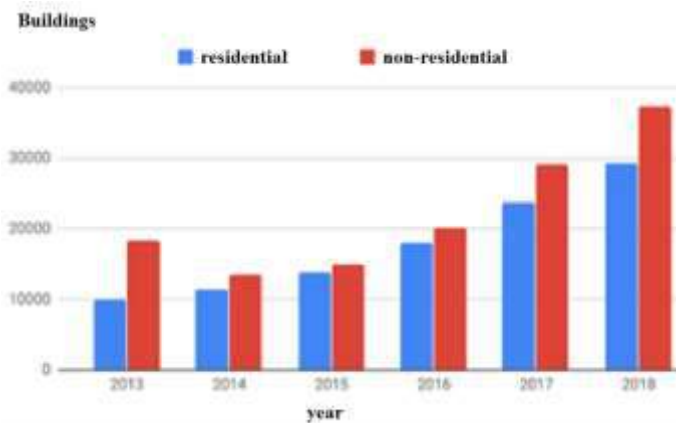


Fig. 3. Dynamics of residential and non-residential buildings construction projects

The development of the investment attractiveness of Ukraine and, consequently, the increase in the scale of construction of objects with massive presence of people when proper introduction of safety systems presents a real danger to the person, so today is an issue of research and modeling of exploitation parameters of the development projects products at all stages of the project implementation.

II. ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS.

Development projects are complex organizational-technical process that requires the application of fundamental rules for managing projects, programs and project portfolios, using of systemology approach to management of such projects,

undertaking of project components in-depth analysis and the influence to its introduction at various phases of the project's life cycle (including at the planning stage). Introduction of complex organizational-technical projects, programs and project portfolios, assessment of safety indicators, their implementation, the search for their components and modeling of safe functioning parameters were conducted by Ukrainian and foreign scientists, inclusive of S. D. Bushuiev, V. D. Gogunskiy, I. A. Babaiev, V. A. Rach, Yu. P. Rak, S. K. Chernov, O. B. Danchenko and others.

For example, in his scientific works [16-18] Professor S. K. Chernov explores finding and defining the parameters of the effectiveness of projects and programs using the uncertainty assessment system.

In the works [12-13], the scientific school of Professor Rach V.A. explores the processes of introducing an investment flow in the management of development projects.

Professor S.D. Bushuiev in fundamental research papers [1, 3-6, 21] on the management of development projects considered integrated approaches to the modeling of project implementation, programs and portfolios of projects and their adaptation to international standards of project management [15], in particular to the International standard on project management PMBoK [14].

Babaiyev I.A. in the scientific work [2] investigated the indicators of the successful introduction of projects and programs on the basis of genetic analysis.

Yu. P. Rak scientific school [19-20] studied the direction and conducted research in the field of life safety, taking into account the parameters of the safe functioning of objects with massive presence of people, critical infrastructure objects and their protection from the negative impact of crisis situations.

V. D. Gogunskiy in his research [7, 8] carry out the studies the human factor impact on the introduction of project programs and a comprehensive risk assessment.

Associate professor Danchenko O. B. [9, 10] her scientific papers devote to the development of classification risk characteristics and modeling of project management process deviations.

However, the scientific results obtained in the scientific and technical field, is difficult to adapt to the solution of problems related to the development of safety models in development projects.

Therefore, today the task of solving the scientific-applied task of creating safety management models in development projects at all phases of the life cycle remains relevant.

The purpose of the article is to analyze the existing in the world practise models of safety management in development projects and to identify the possibility of their application in the conditions of Ukrainian economic and legal reality - adaptation in accordance with the requirements of the Ukrainian real estate market.

Research methods. The basis of theoretical and methodological studies are general scientific principles and the

fundamental principles of project management and programs methodology. The research was based on the use of systematic analysis methods - to study the thematic area of exploitation the products of infrastructure development project of existing models and the development of new.

III. RESULTS OF RESEARCH

Safety management in development projects is proposed to be considered as a series of activities limited by time and financial resources aimed at achieving the goals and results of the effective functioning of the construction infrastructure. Principles of implementation the development projects are defined as partnership, co-financing, concentration, planning, coordination, and in the first place - safety. Among the principles of implementation the development projects - evolution, integrity, objectivity, social orientation, proportionality and balance. We have carried out the classification of development projects (see Table 1), which are based on their quantitative, qualitative and functional characteristics, and provide a basis for substantiating the measures of effective use of resources and improvement of safety management in development projects.

As to the safety requirements for a product of a development project, we can note the following (see Figure 4):

- requirements for operation: it is necessary to develop rules for its safe operation; requirements for occupational safety; etc;
- requirements of normative documents: according to normative norms and rules of Ukraine, in particular SBN (State building norms), SSTU (State Standart of Ukraine), BN&R (Building norms and rules);
- Specific safety requirements for a product product: ensuring the reliable operation of all life support systems for a project product, taking into account all possible project risks.

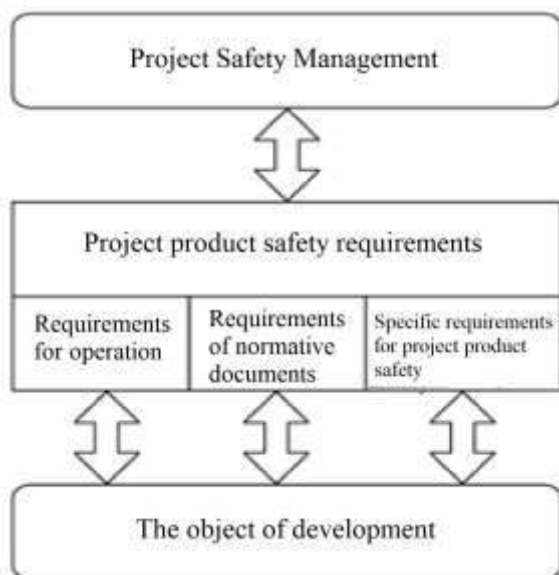


Fig. 4. Model-scheme of development project safety management

TABLE 1 CLASSIFICATION OF DEVELOPMENT PROJECTS

Types of development projects	
Signs	
Qualitative	
By structure and composition	symmetric
	integrated
	simple
By the level of alternatives	alternative to cost
	complementary
	mutually exclusive
	independent
In terms of complexity	complex
	simple
Functional	
By field of activity	combined
	technical
	strategic
	practical
	ecological
	research
	Promotional
	social
	innovative
	By the nature of the events
infrastructure	
mixed	
Quantitative	
By duration of events	short term
	mid-term
	long term
By the number of covered projects	monoproject
	multiproject
	megaproject
	metaprojects
By scale	microprojects
	macro projects

Development project management is a system of skills, tools and methods of project activity, aimed at achieving the goals and results that are implemented in construction projects. Methodological basis of safety management in development projects - PMI / PMBOK project management standards. We believe that it is expedient to apply an integrated approach not only to the management of standard project parameters (time, money, resources, volume, quality of measures) but also to security levels (see Figure 5), which will make it possible to optimize their use and improve management efficiency changes in development projects.

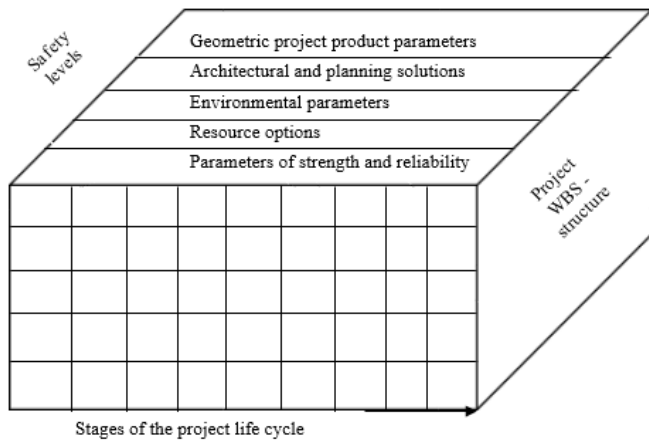


Fig. 5. Model of safety decomposition of the development project

IV. CONCLUSIONS AND PROSPECTS OF FURTHER RESEARCHES

A scientific study of safety-oriented management in development projects in Ukraine is closely linked to legislative initiatives on the real estate market. The results of scientific research made a possibility to form such scientific results:

- to the direction of next scientific-research can be attributed parameters study of development projects products safe functioning at all phases of the project life cycle;
- planning and implementation of development projects requires the application of security-oriented management provisions.

With regard to the directions of further research, we can refer to the conceptualization of development projects, the improvement of models, methods and management mechanisms for them.

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