

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE  
KYIV NATIONAL UNIVERSITY OF BUILDING AND ARCHITECTURE**

**Faculty of Construction**

**Chairman's management in construction**

*educational  
qualifying  
level*

**Master's degree**

*Discipline*

**07 "Management and  
administration"**

*Specialty*

**073 "Management"**

*Educational  
program*

**Management of organizations and administration**

**EXPLANATORY NOTE  
FOR THE GRADUATE THESIS  
TO OBTAIN THE MASTER'S DEGREE**

on the subject:

**Renovation technologies as prerequisites for the introduction of innovative measures  
into the management system of construction enterprises.**

**Kyiv 2024**

**KYIV NATIONAL UNIVERSITY OF CONSTRUCTION AND  
ARCHITECTURE**

**Faculty of Construction**

**Chair management in construction**

***I APPROVE***

Head of the department

\_\_\_\_\_ Doctor of Economics, Prof. Ryzhakova G.M.

" \_\_\_\_ " \_\_\_\_\_ in 2024

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FOR THE GRADUATE THESIS  
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**" Renovation technologies as prerequisites for the introduction of innovative  
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**Executed**

**student Wei Yingjie of the Man-23 group**

**Field of knowledge 07 "Management and  
administration"**

**Specialty 073 "Management" Educational  
management of organizations and  
administration program**

**Head: Doctor of Economics, Professor  
Shpakov A.V.**

**Reviewer \_\_\_\_\_**

**Kyiv 2024**

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ARCHITECTURE**

**Faculty of Construction**

**Chair management in construction**

**Educational and qualification level "Master"**

**Specialty 073 "Management"**

**"I APPROVE"**

**Dean of the Faculty of Science, Professor  
Ivanchenko G.M**

«    » \_\_\_\_\_ **in 2024**

**TASK**

**for the attestation graduation work of student**

**Wei Yingjie**

**The topic of the work: " Renovation technologies as prerequisites for the introduction of  
innovative measures into the management system of construction enterprises "**

Head attestation graduation works of Doctor of Economics, Professor Shpakov A.V. approved by  
the KNUBA order from " \_\_\_\_\_ " \_\_\_\_\_ 2024 No \_\_\_\_\_

**2. Deadline for submission of work by the student** \_\_\_\_\_

**3. Initial data for work:**

*literary sources: Internet resources; practical developments of domestic and foreign scientists;  
general scientific and special research methods of technology park apparatus of developed  
countries.*

**4. The content of the settlement and explanatory note - a list of issues that need to be  
worked out - (consisting of 3 sections):**

*Section 1 – analysis specialized literature in topics research, research update;*

section 2 – development of methodological research measures in the field of management construction company;

section 3 – implementation of the research results in the company's activities construction industry.

5. **List of graphic material:** 15-20 sheets of A4 format (slides) showing the content of research in all sections of the explanatory note to the final certification work.

#### 6. Consultants of thesis sections

Section	Surname, initials and position of the consultant	Signature, date	
		issued the task	Task accepted
<i>Sections 1:</i> Theoretical foundations of the formation of an innovative system of construction in the Ukrainian and European environment	<b>Ph.D., associate professor M.V. Horbach</b>		
<i>Section 2</i> Practical aspects of the application of innovative management tools of construction enterprises in the post-war period	<b>Ph.D., Professor V.O. Pokolenko</b>		
<i>Section 3</i> Activation of technological parks in the context of construction renovation technologies	<b>Doctor of Economics, Professor Chuprina Yu.A.</b>		

#### 7. CALENDAR PLAN

No. z/p	The name of the stages of the attestation final work (AVR)	Execution period AVR stages	Note ka
	The student's choice of the AVR topic, submission of an application to the department and coordination with the academic supervisor	01.09-07.09	
1	Systematization of materials and preparation of the weekend data for AVR	07.09-14.09	
2	Approval of the content (plan) of the AVR, drafting individual task	14.09-23.09	
3	Preparation of the introduction and the 1st section of AVR	24.09-12.10	

4	Preparation of the II section of AVR	12.10-9.11	
5	Preparation of Section III of the AVR, conclusions and list used sources	9.11-29.11	
6	Submission of the completed AVR by the student to the scientific to the manager	30.11.-1.12	
7	Completion of qualifying master's degrees works of checking for the presence of textual borrowings	02.12. - 05.12.	
8	The department's decision to admit AVR to defense in AEK	06.12	
9	Immediate approval with the AVR presentation manager and defense reports. Final design and review of the work	07.12-08.12	
10	Preliminary defense of AVR at the department and its approval the head of the department	09.12-10.12	
11	Presentation AVR in AEK	11.12-12.12	
12	Defense of AVR in AEK and assignment to graduates qualifications	15.12-20.12	

8. Issue date of assignment " \_\_\_\_ " \_\_\_\_\_ 2024.

Student \_\_\_\_\_ / \_\_\_\_\_ **Wei Yingjie** \_\_\_\_\_ /

Head of work \_\_\_\_\_ / **Shpakov A.V.** /

Head of the Department of Management in Construction \_\_\_\_\_ / **Ryzhakova H.M.** /

<b>RESUME</b> (summary)			
to the student's final attestation work:			
ZVO	<b>Kyiv national university of building and architecture</b>		
Topic	<b>Renovation technologies as prerequisites for the introduction of innovative measures into the management system of construction enterprises</b>		
Educational level	<i>MASTER according to the educational and professional training program</i>		
Faculty	<i>Constructional</i>		
Chair	<i>Management in construction</i>		
Specialty	<i>Management</i>		
Educational program	<i>Management of organizations and administration,</i>		<i>Man-23</i>
Head	Head: Doctor of Economics, Professor Shpakov A.V.		
Scope of work:	explanatory note, p.	sections	Visual and graphic part (sheets A4 format)
	<i>148</i>	<i>3</i>	<i>slides</i>
Chapter 1 "Theoretical Basics formation innovative systems construction in Ukrainian and European environment"	The first chapter examines the content of the innovative construction system, investigates innovative economic structures in the context of renovation construction technologies. The section explains the meaning of the term "technopark", describes in detail the classification, advantages and disadvantages of the technopark environment as a factor in the innovative development of the construction industry. The areas of implementation of innovative technologies in the development strategies of construction enterprises are considered.		
Section 2. "Practical Aspects application Innovative tools management construction enterprises in"	IN to the second section are being investigated practical aspects design of world-class technoparks. Detailed analysis functioning foreign technoparks gives be able to highlight a number of advantages and disadvantages that will help in planning own activity Analyzed experience creation and development of technoparks in Ukraine was revealed a number of problems and ways to solve them are proposed. In the section the method of comprehensive evaluation of efficiency was introduced innovative activity on examples construction		

post-war period"	an enterprise engaged in the production of an innovative product.
Section 3. "Activation of technological parks in the context of construction renovation technologies"	In the third section, separate aspects of the financial and economic analysis of the activities of domestic construction enterprises are considered. The legal conditions for the development of innovative construction projects have been analyzed. The problems of training managers in the management of technology parks were identified and a training program was developed. The measures to stimulate the development of technology parks as a driver of the formation of business cities in the post-war reconstruction of Ukraine are disclosed
Conclusions on work:	IN conclusions summarize essence technological park, emphasize on importance technopark environment in Ukraine. They are described important aspects effective functioning of domestic technoparks: in particular, legitimate state participation and assistance in activities, changes in legislation, solving urgent problems at the regional level. Result the study showed that the activation of technological activities parks is possible thanks to the improvement of the legal conditions of development and commercialization innovative projects construction in a favorable business environment, as well as the training of managers in the management of technoparks, as innovative specialists of the industry.
Keywords: technology park, innovative activity, innovation, innovative product, construction renovation technologies.	

**Compiler:** \_\_\_\_\_/\_\_\_\_\_/

**Head:** \_\_\_\_\_/Doctor of Economics, Professor Shpakov A.V./

" \_\_\_\_ " \_\_\_\_\_ 2024

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## **Introduction**

**Relevance of the topic.** Industrial zones, free economic zones and industrial parks are one of the factors for attracting investments and stimulating the country's economy. Science, technology, business, as well as technological parks are defined as a technological, global and economic place for the development of interaction aimed at promoting market penetration and providing specialized services at a high level. Technology parks are created to reduce large economic losses. The development of parks has a positive effect on the attraction of business representatives, because from the point of view of investors, the advantage of industrial parks is that they are formed faster than consulting, research service centers for business, have access to a wider range of services for entrepreneurship, have the ability to quickly achieve the effect of scale, and involves the dissemination of information and competences in specific areas of various sectors and management, training and marketing.

The problematic link in the development of innovative activity in Ukraine is not money, not the regulatory framework, which also slows things down, but the presence of structures capable of turning ideas into scientific and technical developments and ensuring the introduction of the latter into production.

It is worth considering the innovative structure in the scale of the engine of innovative development. It provides horizontal and vertical connections between subjects of innovative activity. In particular, the main elements of the infrastructure are: innovation and technology centers, business incubators, technology parks, science parks and technopolises. The experience of developed countries shows that such innovative structures create favorable conditions for the effective activity and development of small innovative enterprises that implement original scientific and technical ideas by providing them with temporary use of production areas, material and technical bases, information networks,

provision of devices and equipment and provision of advisory assistance on a wide range of scientific and technological, economic and legal issues [1].

The experience of developed countries gives a clear understanding that the most effective process for accelerating the transfer of technologies on the market is technoparks, technopolises and similar territorial innovation structures. The construction of these elements contributes to the emergence of new production processes, the development of small and medium-sized businesses, the strengthening of the scientific and technological base at the regional and national levels. The science park becomes the center of the national innovation system, and under such conditions, the demand of business entities for innovative developments appears.

One of the main tasks of economic policy in Ukraine is to increase the innovative component of the gross domestic product, the science intensity of which is only 0.9% (as of 2019), while in EU countries it is 2.01% of GDP, in Sweden it is 3.62% , Finland - 3.96% of GDP. The share of Ukraine in the world market of science-intensive products, which is estimated at 2.5-3 trillion. dollars, equal to 0.05-0.1%, which is hundreds of times lower compared to the USA (36%), Japan (30%), Germany (17%). So far, the country has not created general favorable conditions for the implementation of innovative activities. Only about 10% of industrial enterprises are engaged in the development and implementation of innovations, which is below the threshold value (25%) and the similar indicator of developed countries (60-80%). Production of high-tech sectors of the economy is only 2.8% of the total volume of industrial exports. One of the consequences of the lack of effective mechanisms for economic stimulation of innovative activity is that 83% of investments in the country are directed to enterprises of the third technological order, 10% to the fourth and only 7% to the fifth (2019). The difficulty of increasing the effectiveness of the national economy is explained by the need to involve public and economic institutions in the integration of science, education and business opportunities, achieving their integrity to ensure effective transfer

scientific results, bringing scientific and technical products to their commercial use [2].

Many works are devoted to the theoretical and practical aspects of the emergence, formation, development and functioning of various types of innovative structures, including technoparks. In particular, I. Ukhanova highlighted the development and functioning of technology parks [50], O. Doroshko determined the essence and purpose of technology parks [39], A. Bondarchuk studied the activities of foreign innovation structures [51], I. Antipov analyzed the impact of technology parks on the national economy [40].

**The purpose of the master's research is:** identification of innovative management tools of organizations and development of theoretical foundations of management based on them in the context of construction renovation technologies.

**The main tasks of the study:**

- 1) to study the current state of the researched problem;
- 2) to find out the conceptual and terminological apparatus of the research;
- 3) identify the main factors affecting the management of innovative organizations in construction;
- 4) to develop and theoretically substantiate the principles of management of innovative construction organizations;
- 5) outline the prerequisites of renovation technologies in the technology park environment;
- 6) to develop methodical recommendations for innovative management tools of organizations in the context of construction renovation technologies.

**Object of research:** innovative management tools of construction organizations.

**Subject of research:** practical application of innovative organizational management tools in the context of renovation of construction technologies.

## **Research methods:**

### *theoretical methods:*

- analysis of foreign and domestic experience in the management of technoparks;
- study of the literature on the organization of innovation centers;
- analysis of graphic and photographic materials;
- method of deduction;
- method of analogies: processing and comparison of information based on already existing experience on this topic.

### *empirical methods:*

- survey;
- observation method.

**Practical significance of the obtained results.** Recommendations have been developed regarding the importance of creating a technopark environment and implementing appropriate management methods in the context of renovation construction technologies. Based on the materials of the thesis, a presentation was held at the conference and the theses of Ivakhnenko, I.S., and Lazarenko, Yu.A., Rationale for the selection of the target market segment for the introduction of innovative products by domestic construction enterprises, were published // Marketing strategies, entrepreneurship and trade: current state, development directions: Materials III International science and practice Internet Conf. (Kyiv, October 27, 2022): theses of reports / resp. ed. P. V. Zakharchenko. Kyiv, 2022. 478 p. (appendix D), as well as theses for the International scientific and practical conference of young scientists "Build-Master-Class-2022" Yuliya Lazarenko Development of proposals for the functioning of domestic technoparks as a testing ground for breakthrough innovations in construction (appendix D).

**Structure and scope of the study:**the master's thesis consists of an introduction, three chapters, a conclusion, a list of used sources and appendices.

# **CHAPTER 1. THEORETICAL BASIS OF THE FORMATION OF THE INNOVATIVE SYSTEM OF CONSTRUCTION IN THE UKRAINIAN AND EUROPEAN ENVIRONMENT**

## **Innovative construction system and innovative economic structures in the context of renovation construction technologies**

Development trends of the world economy vividly demonstrate that the only way to ensure the country's competitiveness in the international arena is the formation of a knowledge-based economy. In the conditions of globalization, the importance of the innovative component of the socio-economic development of the country is constantly increasing, innovations are becoming an important source of economic growth, increasing the level and quality of life of the population. Changing the economy to an innovative model of development involves the creation of effective mechanisms of interaction between all subjects of the innovation process, because the level of its efficiency depends not only on the efficiency of individual independent economic agents (production enterprises, scientific organizations, higher primary institutions, state institutions), but also on how they interact with each other, as well as with public institutions [3].

Since the 1950s, European countries have been actively forming innovative systems of leading industries, which ensures the development of the national economy and creates the necessary conditions and resources for the transformation of new knowledge into innovation.

The term "innovation" was first introduced into the scientific lexicon by the classical scientist J. Schumpeter. He claimed that "innovation is a historical phenomenon that causes an irreversible change in the production of goods. If, instead of changing the value of the factors, we change the production function, then we will have an innovation. That is, we can define innovation simply as the establishment of a new production function. Innovation means the emergence of a new combination, that is, a transition from an old production function to a new one" [4].

The fundamental foundations of scientific economic teachings on innovation were also laid out in the works of other classics. Their views on the definition of the concept

"innovation" are presented in Annex A.

Analyzing the interpretations of leading classical scholars, we can conclude that their positions differ. Such scientists as H. Hartman, B. Santo, B. Twiss, P. White, G. Riggs [10, p. 23; 11, p. 117; 12, p. 37; 13, p. 72; 14, p. 7; 15, p. 171]

consider innovation broadly as a complex process that takes place in the economic and social spheres and consists in the development and use of ideas, inventions, etc., with the aim of improving people's lives and meeting their needs more fully. The process can cover the entire range of activities of the enterprise from research and development to marketing. This group of authors presents innovation as a developed and implemented idea that carries novelty or improvement. J. Schumpeter, M. Huchek, P. Drucker, and V. Hippel take opposite positions [9, p. 87; 17, p. 63; 18, p. 24; 19, p. 19; 20, p. 168]. They

consider innovation as certain changes that occur in order to create and improve technology, production, organization or any other macro- or microeconomic sphere. From this position, innovation is presented as the transition of the structure of any phenomenon to a new state. This approach is more narrow, because from the point of view of the goal of creating an innovation, change is not always the end result, but only a means of achieving it.

Definitions of the concept of innovation, given by the classics, today cannot fully reveal its essence, since the dynamism of the development and transformation of economic processes requires a constant search for new approaches to this problem.

This situation makes it necessary to consider modern approaches to the definition of this concept, which are presented in Appendix B.

Among modern researchers, followers of a broad understanding of

innovation are Yu.V. Yakovets, A.A. Harin, T.O. Franchuk, L.L. Antonyuk, A.M. Lieutenant, V.S. Savchuk [21, p. 9; 22, p. 34; 23, p. 142; 24, p. 14; 25, p. 116]. They represent innovation as something new: the introduction of new elements, everything that has come into use for the first time.

Followers of a narrow approach are A.M. Sumets, V.S. Tubalov, I.I. Vinichenko, T.S. Medvedkin and many others [26, p. 28; 27, p. 7; 28, p. 15; 29, p. 9; 30, p. 7; 31, p. 7; 32, p. 113; 33, p. 75], however, there is no unified interpretation in the points of view of these scientists. Thus, scientists N.P. Zavlin and A.V. Vasyliiev [34, p. 28; 35, p. 7] are followers of the approach that represents innovation as a change. According to the vision of these researchers, innovation is any change in structure or functions, transformation of existing practices into new ones. Scientists S.M. Ilyashenko, I.I. Vinichenko, T.S. Medvedkin, O.V. Mechanic [28, p. 15; 29, p. 9; 30, p. 7; 31, p. 7] consider innovation as the end result of activity in the form of specific goods, technologies, processes, etc. However, it should be noted that the result can be both a new product and an improved one. In works [32, p. 113; 33, p. 75] innovation is considered limited. It acts as an element of innovative activity or the process of its creation. So, according to scientists, innovation is an approach to design, production, etc., or the use of the result of intellectual activity.

Analyzing the data of the tables in Appendix A and Appendix B, we can come to the conclusion that both supporters of the classical approach and contemporaries have a wide range of interpretations of the concept of innovation, and therefore I agree with the words of Chornaya M.V. and fully agree with her interpretation of this concept that innovation - adapted to the modern needs of the external environment (capable of further "life" and functioning) the final result of scientific developments for the creation of fundamentally new products, methods, means, processes, projects, systems, etc. in any field of enterprise activity, the implementation and commercialization of which ensure it has excess profit and a monopoly position during a certain period of time [5].

At the current stage, the need to transition the economy to an innovative

path of development is an important factor in accelerating economic growth state, technological and socio-economic development, ensuring competitiveness on the world market. The basis of the innovative path of economic development is the process of finding, preparing, creating, implementing and commercializing innovations, that is, ensuring the transformation of an idea into an innovation [6].

The issue of the formation of an innovation system is especially relevant at enterprises in the construction industry, the result of which innovation activity is significantly spread over time. Therefore, the priority task is: evaluating the effectiveness of innovative activity, which is compatible with modern economic conditions.

The innovative construction system is formed on the basis of the content and structure of the innovation process, in particular, fundamental research, innovative development, introduction of technical and technological innovations in production, development of new types of products.

The innovation process is the process of transforming scientific knowledge into an innovation, which can be represented as a sequential chain of events, during which the innovation matures from an idea to a specific product, technology or service and spreads during practical use. This process does not stop even after the introduction of news into production, because as it spreads, it improves, becomes more efficient, acquires previously unknown consumer properties [7].

The innovative construction system is an interactive network of public and private sector institutions that create, adapt, import, modify and distribute new technologies [8].

In the sphere of economic activity, in terms of innovation, the construction system remains quite conservative - according to McKinsey research, despite the fact that construction accounts for about 13% of world GDP, it remains the least digitized branch of the economy [16].

Effective functioning of the innovative construction system is impossible without state regulation, appropriate use of market and administrative levers of influence, realistic concepts, strategies and programs for the near and distant future. Creation of favorable organizational, economic and socio-economic conditions, thanks to the normative legal base and determination of the model of its development for the future - the main goal of the current state regulation of innovative activity in construction.

In Ukraine, unlike some European countries, it is the state, and not the corporate sector, that supports and stimulates the development of innovative activities in construction, financially ensures the conduct of complex fundamental and applied scientific research. Their results find practical use in various branches of the domestic economy - during 2018-2020, the number of enterprises implementing technological and non-technological innovations in the country grew annually [35].

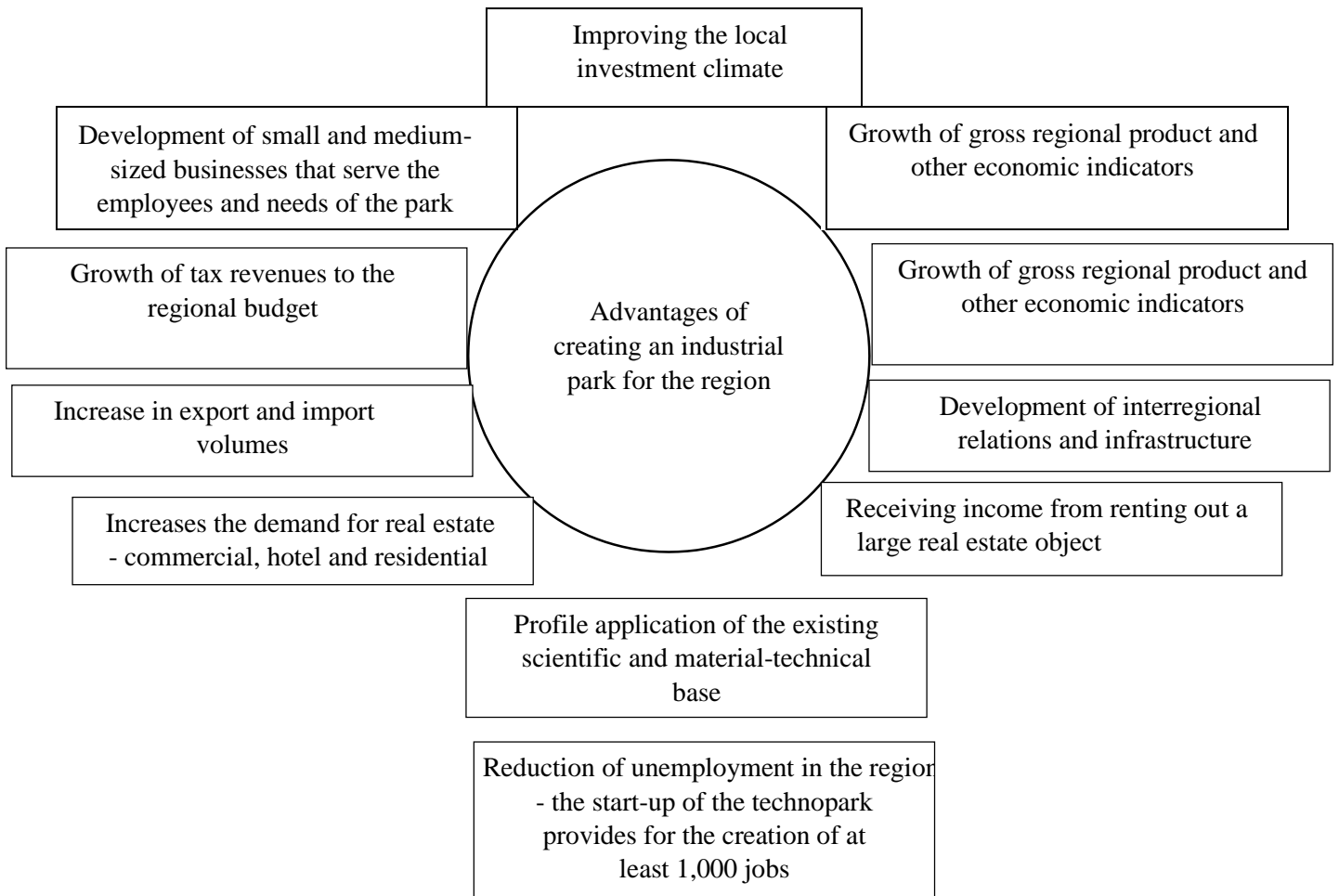
The policy aimed at the innovative development of the construction sector covers such important tasks as the formation of a competitive environment through the mechanisms of influence existing in the state (primarily, the system of antimonopoly regulation, preservation of copyrights, monetary and credit regulation), including measures of effective integration of the main subjects of innovative process. The latter are currently quite actively used by most European countries [35].

Today, innovative construction activities and related research and development are demanding state support. The more the state will be interested in stimulating the innovative activity of construction enterprises, the more chances it will have to reach a new qualitative level of development of the economy of the national economy. It is necessary to fundamentally change production and increase its efficiency in order to enter the world economy, significantly

to strengthen their positions in foreign markets, to become among the leaders of world exports [36, p. 446].

The country needs an innovative breakthrough, focusing on the creation of production clusters that will make it possible to produce construction products with new consumer qualities, respectively, more competitive. Such a sequence of actions will lead to an increase in the export of Ukrainian products to world markets, as a result, an increase in economic indicators [37, c. 15].

Technology parks make it possible to form a sufficiently strong stock of infrastructural capacities, concentrated on the local territory, as well as to build effective technological chains. They create a large number of jobs, including working professions, and also stimulate the development of the consumer market and the market for the provision of social and household services, helping to solve the problems of employment and development of mono cities.



**Figure 1.1. Key benefits for the economy from the creation of an industrial park in the region**

State regulation of innovative activity in the construction of Ukraine is closely related to technological modernization, represented in modern ideas not only by new construction technologies, but also by areas such as software, in the structure of which VIM technologies (information modeling in construction) and management are distinguished projects; equipment and the digital production that represents it; construction modeling processes and prefabrication [16].

The development of the construction system depends on the economic and social stability of the country. The state should direct its policy to increase the welfare of the population, reduce the budget deficit, and stabilize the monetary system

flow, reduction of inflation, restoration of economic growth, strengthening of the national currency. In turn, the innovative construction system should involve a diverse range of innovations:

- use of nature-preserving building materials;
- secondary processing of construction waste;
- implementation of the latest architectural and planning solutions.

Technological parks are extremely relevant for the regional economy, as they represent a business that earns money by improving the investment climate, which means that it allows optimizing budget expenditures on infrastructure and relieving the state of extraneous functions.

## **The creation of technology parks as a factor in the innovative development of the construction industry in the context of renovation processes in Ukraine**

The scientific and technical potential of society in the conditions of the current functioning of the market economy is an important factor in the activity of the overall system. The rules of the world market are becoming more and more strict. Currently, it is not enough for countries, international corporations, and small and medium-sized enterprises to simply possess a powerful scientific and technical potential. It is worth having and applying the ability to transform scientific knowledge and ideas into commercial products.

The experience of industrialized countries shows that scientific parks (research parks, technological parks (technoparks), technopolises, etc.) are an effective tool for solving these tasks.

First of all, it should be emphasized that the process of creating technological parks during the transition to an innovative type of economy in highly developed countries of the world took place in the conditions of globalization of the world economy, increased international competition, and the use of the latest technologies in the production of competitive products. Therefore, as the main goal of such a form of organization of the scientific and production process, as a technology park, the provision of rapid implementation of scientific developments, which become innovations, was singled out [38].

Technology parks are the driving force behind the formation and further effective development of the innovative activity of the country.

A technological park is a commercial or non-commercial enterprise established in a certain organizational and legal form (limited liability company, joint-stock company, association, fund, institution), has the status of a legal entity and contributes to the formation of an innovative environment. This is facilitated by a number of factors, such as: material and technical, economic, innovative and social base for the activity of small innovative enterprises

was directed to the generation of new ideas and the implementation of an innovative product. In order to develop entrepreneurship in the scientific and technical sphere, technoparks are given tax and other benefits. Technoparks function on the basis of venture capital and aim to create fundamentally new technologies and samples of industrial products, contributing to the commercialization of the achievements of the technological revolution [39].

Technoparks function within so-called umbrella structures. These structures, which, according to some data, also include business incubators, innovation centers, and engineering centers [40], are designed to serve budding entrepreneurs, scientists, developers, and engineers in order to ensure rapid and direct implementation of developments and business plans. The specifics of the technopark are scientific, design and technological developments related to high technologies.

Technoparks can be considered from several points of view. First, the technopark is a special type of free economic zone, on the territory of which the development of science-intensive products is intensively developed, new personnel are formed, technical-implementing zones. This understanding of the technology park meets the requirements of the processes taking place in the world economy [39].

Secondly, science provides an incentive for the development of business, mainly small, which allows us to talk about technology parks as a form of support for small entrepreneurship, as the main factor in the development of a competitive environment in Ukraine [39].

Thirdly, it is in technoparks that science receives financial and other additional opportunities for conducting fundamental and applied research. And this means that science is becoming more independent from state influence. In this regard, technoparks are an attractive form of support for domestic science [39].

Technoparks have quite flexible activities thanks to the legal environment, perfect material base, and this in turn allows to create the latest technologies, train highly qualified personnel,

conduct applied research at the modern level, create opportunities for industrial development of the developed technologies.

Technoparks are an excellent environment for the birth of innovations in the form of ideas, products that will be in demand on the world market. Implementation of the achievements of science and technology in real life, which involves an innovative development model, will lead to the modernization of the economy, which consists in replacing some elements of the production system with other, more modern ones. Thus, science as a generator of new knowledge should be recognized as a national development priority and the main factor in reforming the economy. This becomes possible only under the conditions of a consistent state scientific and technical policy, which is based on the provision of innovation security of the country, the definition and implementation of strategic priorities of scientific and technical development, and the creation of favorable investment conditions for enterprises actively implementing innovations through state regulatory measures [39] .

Types of technology parks. Their differences. Advantages and disadvantages.



Technopark of the "Greenfield"  
type(GREENFIELD)



Technoparktype "Brownfield"  
(BROWNFIELD)

## Rice. 1.2. Types of technology parks

Greenfield-type technology park (GREENFIELD) is a technology park created on a previously undeveloped plot of land. As a rule, such a site is not provided with engineering and transport infrastructure at the time of project implementation. Undeveloped land plots are leased or sold to residents for the purpose of construction.

A technology park of the "Greenfield" type is suitable for those industrialists for whom it is important:

- ✓ cleanliness of land, water and air - it is possible to check these indicators with the help of a preliminary professional examination;
- ✓ modern planning according to its own unique project and innovative capacities - when it comes to high-tech production lines, it is easier to build from scratch than to renovate old sites;
- ✓ compliance of the project with international standards is an important factor for European manufacturers who want to unify all production of their companies or make them in accordance with international standards "ECO".

Advantages of a technology park of the "Greenfield" type:

- absence "historical risks" - legal, environmental, arbitrary construction;
- flexibility in defining and designing the technical parameters of the future project;
- freedom at choice land areas and bigger number offers on the market.

Disadvantages of a technology park of the "Greenfield" type:

- underdeveloped infrastructure;
- are possible hidden features land areas (geology, reservoirs, plantations);
- urban planning land restrictions;
- large financial costs and, as a rule, a long procedure for preparing and approving documents "from scratch".

A technology park of the "Brownfield" type (BROWNFIELD) is a technology park created on the basis of previously existing enterprises or production facilities. Usually, such objects are equipped with engineering and

transport infrastructure and have already undergone repair or reconstruction. A technology park of the "Brownfield" type involves the purchase or lease by residents of existing production, warehouse and administrative buildings and infrastructure structures, which have already been reconstructed or overhauled.

A technology park of the "Brownfield" type is suitable for those industrialists for whom significant savings on laying communications, creating access roads and construction of production buildings are important.

Advantages of a technology park of the "Brownfield" type:

- availability of engineering infrastructure, access roads and capacities necessary for project activity;
  - a ready-made, functioning object, which makes it possible to start work immediately after buying or renting a plot of land;
  - a ready-made decision on urban planning and land "issues";
  - as a rule, the location is close to large settlements.
- Disadvantages of a technology park of the "Brownfield" type:

- limited possibility of bringing the project into compliance with the desired parameters;
- insufficient or outdated engineering and transport infrastructure with a high cost of maintenance or reconstruction, which may exceed the cost of building the project on the "greenfield" site;
- as a rule, there are fewer offers on the market;
- the risk of being near residential buildings or others "forbidden" objects;
- most buildings were built in Soviet times, the exterior of which looks less attractive than new buildings;
- the need to additionally carry out a detailed legal review of all previous agreements related to the land plot.

For Ukraine, the creation of technology parks is currently an important factor, because it accelerates the process of achieving the programs of the Cabinet of Ministers of Ukraine. This truth is realized at all levels of state administration, by entrepreneurs and scientists.

Technoparks were created to support technological scientific

developments that could be financed and promoted on the market. The idea behind their creation was that they would be centers that would lead our science and production to the path of a new science-intensive economy of Ukraine.

For some, it will be a revelation that there are officially 16 technology parks in Ukraine. Dates of registration - in zeros. Three technoparks are located in the occupied territory of Donetsk. The rest are little-known entities. Unless Kyiv Polytechnic Institute, Institute of Electric Welding, Institute of Single Crystals.

The construction of technology parks in Ukraine dates back to 1999, during the development of the legal framework. In 1999, the Law of Ukraine "On the Special Regime of Innovative Activities of Technological Parks" was adopted, according to which eight technological parks operated [41]. On January 1, 2005, the Law of Ukraine "On Amendments to Certain Laws of Ukraine Regarding the Special Regime of Investment and Innovation Activity of Technology Parks" entered into force, according to which seven more joined the nine technology parks, the creation of which began in 1997-1999 [42].

In accordance with this Law, 16 technoparks were created. However, not all of them were able to organize their activities in the past period (Table 1.1). The above indicators of the activity of technology parks are recorded in the departmental register statistical reporting of the Ministry of Education and Science of Ukraine. Monitoring of these indicators was carried out annually both by the Ministry itself and by the Ministry of Finance of Ukraine, tax and customs authorities that monitor the progress of each project.

Table 1.1.

## Technological parks of Ukraine in 2000-2012

№	Technopark	Date of registration	Volume of implemented innovative products, million hryvnias.
1	"Semiconductor technologies and materials, optoelectronics and sensor technology" (Kyiv)	June 2001	495,2
2	"Institute of electric welding named after E.O. Paton" (Kyiv)	July 2000	8535,4
3	"Institute of Single Crystals" (Kharkov)	July 2000	3456
4	"Vuglemash" (Donetsk)	November 2001	146,3
5	"Institute of Technical Thermal Physics" (Kyiv)	September 2002	5
6	"Kyiv Polytechnic" (Kyiv)	June 2003	30
7	"Intelligent Information Technologies" (Kyiv)	December 2003	—
8	"Ukrinfotech" (Kyiv)	November 2002	14
9	"Agrotechnopark" (Kyiv)	October 2007	—
10	"Eco-Ukraine" (Donetsk)	—	—
11	"Scientific and educational devices" (Sumy)	—	—
12	"Textiles" (m. Kherson)	December 2007	—
13	"Resources of Donbass" (Donetsk)	—	—
14	"Ukrainian microbiological center of synthesis and the latest of Technologies" (UMBISCHENT) (Odesa)	—	—
15	"Yavoriv" (Lviv region)	August 2007	1
16	"Engineering Technologies" (Dnipropetrovsk)	November 2008	—
Together			12681,9

The concept of technoparks at that time was: creation of favorable conditions for the implementation of innovative projects, as well as attracting investments and the latest technologies to the country.

In Ukraine, in 2000-2001, the law provided for the construction of the first three such institutions: "E.O. Paton Institute of Electric Welding" in Kyiv, "Institute of Single Crystals" in Kharkiv, and "Semiconductor Technologies and Materials, Optoelectronics and Sensor Technology" in Kyiv. The creation of these structures was based on the powerful research and production team of the National Academy of Sciences. Employees were expected to develop and introduction of science-intensive devices and materials for health care, biotechnology, electronics development, radiation instrumentation, nuclear technology and breakthroughs in other fields.

The main thing in the work of technoparks is to focus on the creation and release of a finished high-tech product directly in Ukraine. At the same time, the product is export-oriented in order to conquer the markets of Western countries and ensure the full "development-innovation-production" cycle. The state, in turn, in every way stimulates the activity of technology parks: exemption from payment of VAT, income tax and other benefits. This was clearly spelled out in

the 1999 law of Ukraine. At the same time, the 1999 law was not about "parks in general", but about specific subjects of economic activity. It was assumed that the payments would not simply be transferred "without address" to the budget revenue, but would be accumulated in special accounts of technoparks. These funds could be used exclusively for the purposes specified by law. This would allow technoparks to subsequently create a reliable source of financing and refinancing of innovative and investment projects aimed at implementing the latest technologies.

The Orange Revolution of 2004-2005 and the change in the political situation in the country changed a lot. Then politicians "postponed" the issue of the creation of technoparks in the far drawer and took up, in their opinion, more important problems, such as the party struggle, the gas issue and Russia, and the adoption of new laws.

Why, at the beginning of the 21st century, technological parks could be considered a factor in the innovative development of the construction industry in the context of renovation processes in Ukraine, and now there is complete silence around them, why are they little known to the general public? It's simple, currently the state does not consider it necessary to support their activities with loans, benefits, state programs. One concession – residents of technoparks can be subsidized for imports into the country imported equipment and materials, analogues of which are not produced in Ukraine. But in general, it does not affect the situation - there is no investment flow.

So far, everything has been done in the legislation to complicate the development of technology parks: starting from the fact that each new park needs to be amended to register a complex examination. Therefore, in my work, I strive to return to the process of construction of technoparks the role of a leader of innovative development of the construction industry.

## **Transition of construction enterprises to the latest innovative technologies construction**

In the 21st century, no one is surprised when the next invention enters the market, because innovations are actively involved in all spheres of life of the population, including the construction sector, in particular, in the design, construction and construction of housing.

The scale of housing construction, the building materials used, the quality of the housing, the environmental safety of its residents, and the operating costs of its maintenance depend on which new technologies are implemented and how quickly it is implemented. That is why all housing construction strategies must be developed, adjusted and implemented taking into account the features of such technologies and the specifics of their implementation [43].

Therefore, the introduction of innovative technologies in the construction industry of Ukraine is quite relevant at the moment. Such technologies are being implemented, but at an extremely slow pace. It is worth considering housing construction in Ukraine as an area where innovative technologies can be fully applied. It is appropriate to substantiate the implementation of innovative technologies in the following directions in the sections of national and regional strategies for the development of housing construction (Fig. 1).



**Rice. 1.3. Directions of implementation of innovative technologies in housing development strategies**

Source [43]

For example, in the direction of "building materials and technologies", it is appropriate to note that during the 90s, the "Kyiv project" developed a new generation of residential buildings of the monolithic frame system, which allows for the construction of 28-40-story housing with improved layout of apartments. For the past seven years, all projects of residential buildings have been developed with application "warm walls" and equipment with heat, gas, water metering devices [44].

A number of Ukrainian construction enterprises are mastering new technologies aimed at reducing the cost of housing construction. For example,

"Kyivmiskbud" is mastering new technologies for the construction of monolithic frame buildings, the inner walls of which are made of reinforced concrete, and the outer walls are made of brick. According to experts' calculations, this technology makes it possible to reduce the cost of bricks, which have become significantly more expensive recently. Besides,

"Kyivmiskbud" intends to abandon the purchase of cheap Chinese-made fittings and sanitary ware, as these materials cannot withstand operational loads [45].

The given examples prove that it is extremely important to develop and implement new domestic technologies for construction [46].

Unfortunately, innovations in the direction of "building materials and technologies" are implemented extremely slowly. As a result, the needs for construction materials are now met by domestic production by approximately 70%, the rest has to be purchased abroad. In addition, the introduction of modern technologies significantly outpaces the development of appropriate building materials, which leads to the need to buy them abroad and to a significant increase in construction costs [47].

The direction of "architecture and urban planning" is especially important, because within its limits it is possible and necessary to highlight not only architectural and artistic solutions for the development of cities, the use of underground space and the spaces of disturbed territories, the ecological foundations of the formation of a residential environment, landscape architecture,

but it is also extremely important to outline approaches and measures aimed at curtailing the processes of ghettoization and expanding the processes of oasisization [43].

The reduction of ghettoization processes will be facilitated by the decision of the Ministry of Regional Development and Construction of Ukraine, according to which the structures of this Ministry, together with DNDPVI "NDIProektrekonstruktsiyya" for the implementation of the Law of Ukraine "On the comprehensive reconstruction of quarters (micro-districts) of the outdated housing stock", provide scientific and technical support and regulatory support for state policies regarding reconstruction of residential buildings with replacement of outdated housing, improvement of thermal protection and quality of existing social facilities during the implementation of complex reconstruction of residential buildings with replacement of outdated housing. The reconstruction of such neighborhoods will result in the improvement of the quality of housing and the environment, which will contribute to the development of oasisization processes, and therefore will allow reducing social tension in society [43].

Considering the next direction "construction machinery and equipment", it is important to use innovative construction machines in construction, to study in detail information about the peculiarities of operation of construction machinery and their technical condition.

The direction "roads and structures" includes innovative materials for road surfaces, modern approaches to design, calculations, the search for the latest constructive solutions for bridges, road overpasses, innovative technologies for erecting structures on roads.

As part of the direction "engineering networks and equipment" necessarily include innovations in the design of water drainage systems, heating systems, and air ventilation; the latest technologies for cleaning and disposal of sewage sludge; new technologies in the treatment of waste water and flue gases; design of efficient thermal installations; technical diagnostics and forecasting of the technical condition of engineering networks; increasing the reliability of engineering networks.

There are a number of companies in Ukraine that effectively apply the latest innovative construction technologies, setting an excellent example for competitors on the market. Of course, the first stages of launching innovative technologies in the activity are financially costly, but in the future it pays off and leads to significant economic benefits.

The fact that Ukrainian builders have such new construction technologies that allow them to build 2-4-apartment houses in three months, and high-rise buildings in 8-12 months [48] should be regarded as positive.

As experts note, in our time, technology is an extremely promising technology for the rapid construction of energy-efficient buildings

"Thermodim", which is based on the use of blocks of fixed formwork made of expanded polystyrene (thermoblocks). This technology is similar to the method of monolithic construction, where also at the construction site, the concrete-containing mixture is poured into a special form (formwork), which gives the desired shape to monolithic concrete or reinforced concrete structures. But, in technology

"Thermodim" formwork is not removed, it remains part of the wall and performs the functions of heat, sound, waterproofing, etc. The main advantage of using such formwork is that the built wall is a multi-layer protective structure with the necessary heat transfer resistance, which is built in one technological cycle. That is, the wall provides a reduction in the cost of heating and cooling the building during its operation, which in the conditions of the increase in the price of coolants becomes one of the most important factors that influence the developer's choice of one or another construction technology [49].

"Thermodim" technology can help builders to significantly shorten the construction period, because at the same time works on laying electrical wiring, ventilation, sewer pipes can be performed with the work of laying thermoblocks (before filling them with concrete), which are laid in such a way that they are reliably protected with the help of monolithic concrete and due to this may have a longer period of their trouble-free operation. At the same time, construction costs

are reduced by 20-35%, compared to the construction of a brick house.

Amazing developments of modern scientists fascinate and impress with their novelty and significance. The construction sector is getting better every day and is effectively increasing the use of technological opportunities. What is new in the world of construction technologies [74]:

#### 1. Building Information Modeling (BIM)

In 2018, the most large and innovative developers are starting to implement the building information modeling (BIM) system. It is based on a three-dimensional information model, on the basis of which the work of investors, customers, designers, contractors, architects and operating organizations is organized. That is, everyone who can participate in the implementation of the construction project. In the process of information modeling, there is a collective creation and use of information about the construction, which forms the basis for all decisions during the life cycle of the object (from planning to construction and operation). What does this system give in practice? Those who have implemented it confirm a reduction in the number of errors and project changes due to improved communication between all parties of the work process, increased accuracy of forecasts and control. BIM has extraordinary power - this system raises architects to the highest level of skill, allowing them to think three-dimensionally. The principle of operation of the system can be compared to a cloud storage or a global network, where all information on construction, design, etc. is collected. It is collected in real time and loaded into the virtual one.



After that, all information can be viewed wherever there is an Internet connection and make adjustments, automate routine operations, focusing on creativity. The incredible capabilities of BIM software and its constant development make it possible to evaluate a three-dimensional model of a project. Thanks to the integration of all construction processes in BIM-models, construction can be performed not only efficiently, but also taking into account the architecture of sustainable development. You can fully study all the pros and cons of the project, strengthen all the weak points, make timely changes, calculate and reduce energy consumption and CO2 emissions due to the use of special materials.

## 2. Prefabrication

The assembly of ready-made elements-modules is becoming more and more popular due to its speed and economy. Building blocks and structures are prepared in the workshop, and simply assembled at the site. This helps to reduce costs and speed up the construction process. In wooden residential construction, ready-made residential blocks for high-rise buildings consist of Cross Laminated Timber (X-LAM) panels. They are characterized by high strength, which is why they are used in the construction of high-rise buildings. It was using this technology that the tallest modern wooden house was built. Technologies are already being implemented from the manufacture of more complex MEP

(Mechanical, electrical, and plumbing) elements.



3. Internet of things (Internet of things, IoT).



Internet of things, IoT applications are created to facilitate and simplify the work of engineers and designers. In the process of designing the object, a specialist can receive information about all new materials and can implement them in construction. All necessary materials and components are delivered directly to the construction site.

#### 4. 3D printing

Technology that allows you to create the necessary building elements with incredible speed and accuracy. In BIM programs, this technology is used very intensively and does not give up its positions. Of course, 3D printing technologies are in high demand, so whole houses are now being printed on construction sites.



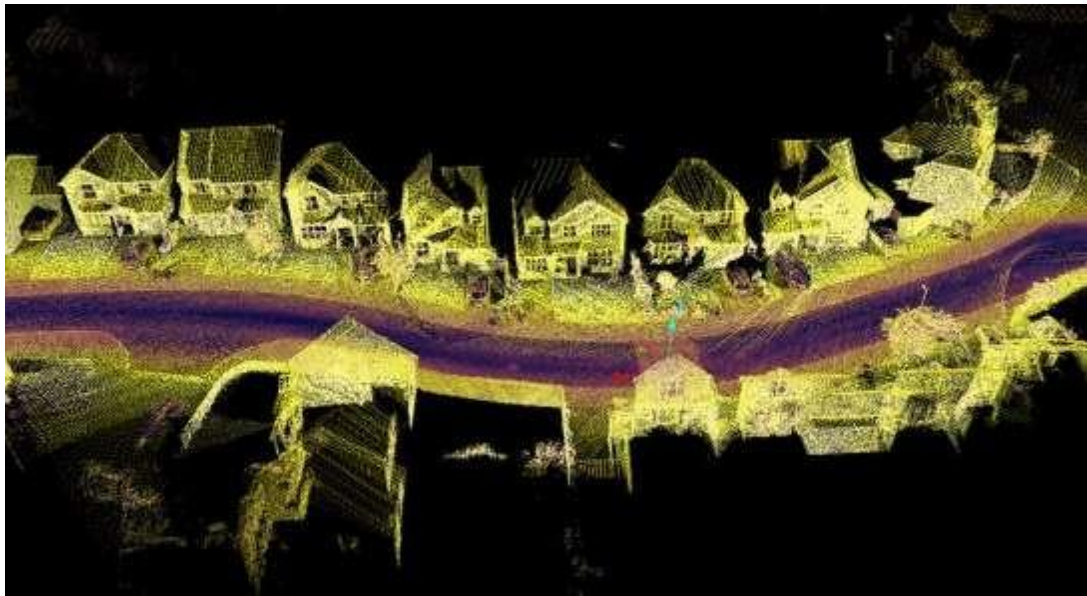
#### 5. Laser 3D scanners and drones

With the help of laser 3D scanning, it will be possible to examine the model on the construction site and make the necessary changes. Drones will also be used, they will collect information from objects in real time and transfer it to a computer for verification and processing. This will make it possible to clearly control the process.



## 6. 4D, 5D and 6D scans

Using 4D scanning allows you to set construction time intervals. It is possible to estimate how much time will be spent on the implementation of any of the engineering solutions. 5D and 6D modeling makes it possible to evaluate not only the appearance, but also the thermal insulation, acoustic and other characteristics of the project. Already at the modeling stage, it is possible to calculate the cost and energy efficiency of the project.



## 7. Virtual and augmented reality

With the help of special glasses, the client can view the presentation model in the office. And the function of augmented reality enables the client and the engineer in glasses connected to the computer to evaluate the full-scale model on the landscape. And immediately assess the need for all changes made in the development process and their effectiveness at the facility.



Practically every day new ideas and proposals appear on the world market to ensure maximum comfort and safety of modern housing. Scientists from different parts of the planet are working on creating new strong and safe building materials, developing incredible, sometimes cosmic architectural ideas. And all this is implemented [74].

## **CONCLUSIONS TO CHAPTER 1**

So, with the help of structural and content analysis, it was found and clarified that the change of the economy to an innovative model significantly affects the formation of the innovative system of the country's leading industries, and this is a key factor in accelerating the economic growth of the state, technological and socio-economic development, and, most importantly, ensuring competitiveness in the market.

It has been found that the organization of innovation centers (technology parks) is currently relevant for the production of innovative products and modernization of the economy. The legislative framework of Ukraine and the domestic experience of creating technology parks are analyzed.

The functioning of the technology park specializing in the production of construction products was presented. After all, the introduction of innovative technologies in the construction industry of Ukraine is quite relevant at the moment.

The areas of implementation of innovative technologies were analyzed, such as: building materials and technologies; architecture and urban planning; construction machinery and equipment; highways and road structures; engineering networks and equipment; ecology and safety in construction. And the achievements of scientists-developers developing the construction industry are also highlighted.

## **CHAPTER 2. PRACTICAL ASPECTS OF APPLICATION OF INNOVATIVE MANAGEMENT TOOLS CONSTRUCTION ENTERPRISES IN THE POST-WAR PERIOD**

### **Design features of world-class technoparks for the creation of coworking innovations in construction**

In the modern world economy, technological parks are becoming more and more the norm than the exception, they are gaining popularity in most countries of the world.

The term "technopark" appeared for the first time in 1951. An innovative facility in the USA (the state of California, the town of Palo Alto), where one of the most famous and largest American universities - Stanford University, is located - was called a technology park. After the Second World War, professor of electrical engineering Frezeriv Termai returned here from Harvard, who became the dean of the engineering faculty, and then the vice president of the institution. It was he who had the idea of using part of the university land to create a compact industrial zone, where it would be possible to attract companies of the electronic and aerospace industries that developed rapidly after 1945, primarily due to military orders from the federal government [50].

Organizations of the "technopark" type remained a specific American phenomenon for a long time. In the 70s, they began to appear in Western Europe, and in the last decade, the "park wave" covered almost all the developed countries of the world and many developing countries (India, Malaysia, Thailand, etc.), as well as countries with transitive economy. Currently, the total number of various parks is in the thousands. International associations of these organizations also function.

Currently, technoparks are not a novelty, the creation of the first technopark was recorded more than half a century ago, but scientists never formed generally accepted definition of this concept, there is also no single structure and classification of technological parks for all countries. The International Association of Technoparks emphasizes the equivalence of concepts such as "technological

park", "technopolis", "technological area", "research park" and "Science Park". In Great Britain, the term is commonly used "science park", in the USA - "research park", in Ukraine - "technology park" [76].

Antipov I.V. gives the following definition of a technology park: "Technology park is a scientific and industrial territorial complex, the main task of which is to create the most favorable environment for the development of small and medium-sized science-intensive innovative firms. As a rule, the main structural unit of the technopark is a specialized center. The following centers are represented in the structure of technoparks: innovative and technological; educational; consulting; informative; marketing; legal; financial; economic; industrial zone" [40].

In early 2002, the International Association of Technology Parks proposed the following definition: "A technology park is an organization managed by specialists whose main goal is to increase the well-being of the local community through the promotion of innovative culture, as well as the competition of innovative business and scientific organizations. To achieve these goals, the technopark stimulates and manages flows of knowledge and technologies between universities, research institutes, companies, and markets. It facilitates the creation and growth of innovative companies through incubation processes and spin-off processes."

In Ukraine, the concept of "technopark" appeared in 1999, when the President of Ukraine signed an order on the creation of relevant structures, and the Verkhovna Rada adopted a law regulating their activities. The law defines that the technology park is a "legal entity or their association, the main one the purpose of which is the implementation of innovative and investment projects, the production implementation of knowledge-intensive developments, high technologies and products competitive on world markets". The creation of technoparks appeared as a continuation of the further innovative development of the regions and the country as a whole [41].

Today, more than 500 technology park structures operate in developed countries, and this number has a constant tendency to increase. Undoubtedly, the majority of technoparks were created and operate in the USA, Western European countries, Japan, and China. According to some estimates, more than 160

technology parks operate in the USA (which is about 30% of the total number of such structures worldwide), in Germany there are more than 60 structures of this type, in China

- about 50, in Great Britain - more than 40, in France - 30, in Japan - 20, in Singapore - 10. Technological parks, as special structures focused on the development of technologies in the country and the creation of knowledge-intensive products, concentrate significant scientific potential, which makes them a certain catalyst for the development of the economy and a factor that should contribute to the development of the country's knowledge-intensive industrial sector and form the prerequisites for the transition of the country's national economy to a new technological structure [50].

Technopark is a large scientific center, the construction of which is carried out on a specialized territory, equipped with first-class engineering, research, production, information and social infrastructure. The following centers are represented in the structure of technoparks: innovative and technological; educational; consulting; informative; marketing; legal; financial; economic; industrial zone [40].

**Business incubator in Grisburg.** The City of Greensburg and the USDA Development Team partnered to create a Business Incubator (Figure 2.1) to provide small businesses with startup space to expand for a limited period of time at attractive rental rates until they can relocate or build a larger space. The business incubator is located in the city of Greensburg in the United States of America, the year of construction is 2009, the total area is 864 m<sup>2</sup> [51].

The building, located along the main street, accommodates five shops on the first floor and nine office spaces on the second floor, and also has a storm shelter. BNIM worked with the design team to ensure sustainable development and help create an optimally functioning building that achieves 57% energy efficiency through: building location, building materials and use of renewable energy sources.

Features of the LEED Platinum Certified Business Incubator include: natural daylight, rainwater harvesting, ground source heat pumps, photovoltaic panels for power generation and ICF wall construction.



**Rice. 2.1. Greensburg Business Incubator. Greensburg, United States of America.**

The main idea of the Business Incubator is to be useful to startups by providing them with workplaces in offices on the basis of rent. At the same time, for a fixed rent, which is naturally lower than renting a full-fledged office or even using an apartment as such.

Teams can come to the business incubator at the earliest stage - for example, when the project has one and a half founders (himself and his great desire) and an idea, without a business architecture and even a product prototype.

**Innovation Park Unit City.** The Unit City innovation park was created on April 6, 2017 (Fig. 2.2), which is located on the territory of the former motorcycle factory on Dorohozhitskaya Street. Its total area is 25 hectares, but at the moment only five objects are open (this is about 2% of the future town) [51].

The business campus with a sports complex and a cafe is located on 4,000 m<sup>2</sup>. Another 3,000 m<sup>2</sup> was occupied by the UNIT.Factory free programming school and the Bionic University educational project. The FabLab prototyping laboratory was also recently opened. In the future, they plan to build another business campus and a co-working space. A little later, residential buildings, medical centers, schools, kindergartens, parks and recreation areas will grow here [51].

Here, every inventor has an excellent environment for creativity, development and efficient work because the Unit City innovation park is filled with business campuses, technology laboratories, accelerators, educational centers, interaction spaces, social and cultural spaces that are filled with like-minded people

and companies.

A city within a city has been built with the most innovative infrastructure, which will include educational, business, cultural, sports and entertainment facilities. A concentration of technical initiatives and programs for cooperation between entrepreneurs, experts, startups, corporate innovation institutions, accelerators, educational initiatives and even research centers has been created in order to increase business opportunities, stimulate synergistic effects and spread common knowledge [51].



**Rice. 2.2. Innovation Park Unit City. Kyiv, Ukraine.**

Innovative parks have become a modern phenomenon, as evidenced by a number of universal characteristics:

- the core of the innovation park, its center and the beginning of any process (genesis of an idea, product, business) is a higher educational institution, its presence on the territory plays a key role;
- the presence of a small business incubator allows scientists to significantly save money at the initial stage of idea implementation, because all qualified assistance and assessment of prospects for business operation is provided on the spot;
- the presence of venture capital funds or other sources of financing is quite beneficial;
- and, of course, we do not forget that each innovation park is filled with all the economic benefits that make it easy to set up a business process for

corporations, as well as for newbies in product development, including opportunities to purchase or lease land, build or lease buildings, lease equipment, establish cooperation with by the university, receiving local tax benefits or other financial incentives, providing the necessary financial and communication services.

In addition to the ideal conditions listed above for the successful functioning of innovation parks, the state, local authorities, and the administration of the relevant university should provide their support.

**Bandung Technology Park.** The main idea is to interpret the Bandung Technopark (Fig. 2.3) as a symbol of technology and nature coming together in harmony. Nature is represented by a "valley" inspired by the location of Bandung as it is surrounded by two mountains. ICT represents the main process of information technology, known as "information transfer". When ICT and nature come together in this project, they form the "Valley that transmits information" - a valley where all knowledge and skills related to information and technology are transferred from and to every person [51].

Bandung Technology Park, which was created in cooperation between the Telkom Institute of Technology and the Ministry of Industry of the Republic of Indonesia. The creation of the Bandung Technology Park begins with the establishment of the UPT Telematics and Telecommunications Center as a forum for innovation for faculty, students and the general public, as well as a business incubator as a place where people can learn how to do business.

The main goals of the technology park:

- conducting scientific research, developing technologies and commercializing their results;
- creation of small-scale and serial production;
- granting office and production premises, objects engineering, transport, residential and social infrastructure;
- integration of the national economy into the world economy.



### **Rice. 2.3. Bandung Technology Park. Bandung, Indonesia**

Technoparks of the new generation contain an important aspect: coordination of technical and business decision-making processes and their implementation, which allows to shorten the time from concept to market as much as possible.

**Ukmerges Parmones Parkas Industrial Park** is a Norwegian industrial park in Lithuania, located in Ukmerga (Fig. 2.4), a medium-sized city in central Lithuania, 75 km from the capital Vilnius. Having good infrastructure for all major cities of the country with a well-developed industrial potential in the city, it is an optimal location for tenants.

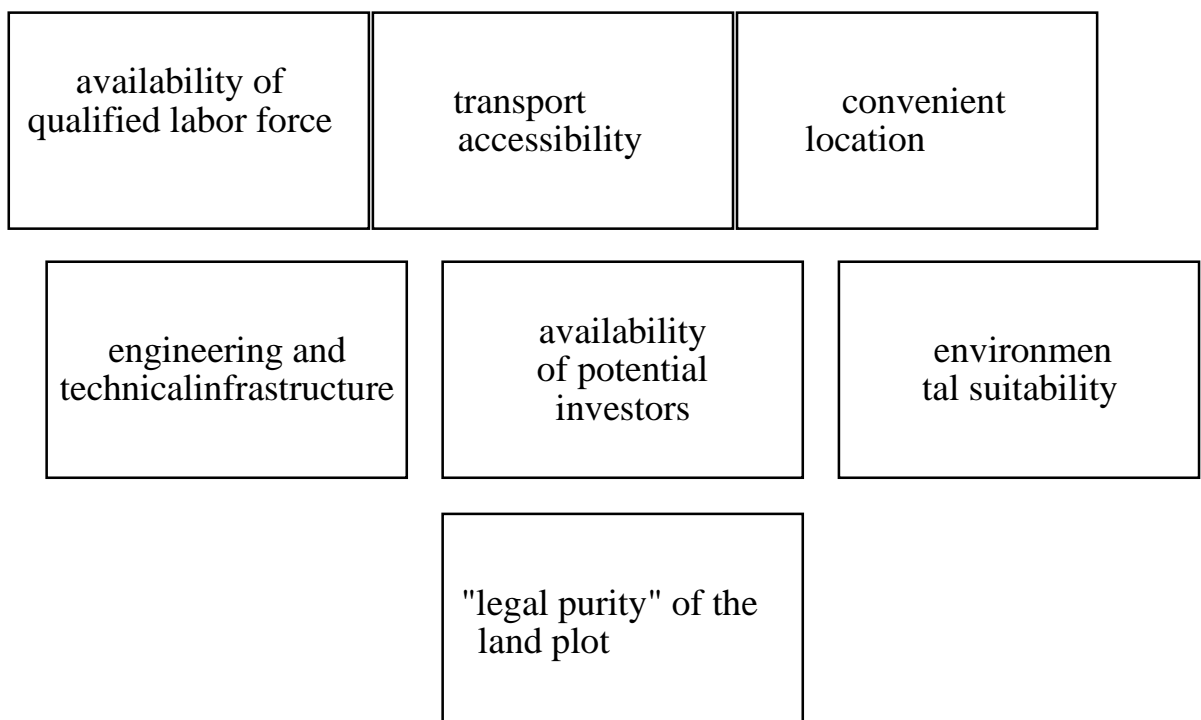
The industrial park with a total area of 22,000 m<sup>2</sup> is an economically and technologically developed center where 7 enterprises operate. Companies that have expanded their activities within this territory can share IT infrastructure services, security, concierge services, conference halls, heating systems, etc.

Another big advantage is the opportunity to create synergies, collaborate in the service sector and thus be both a customer and a supplier for the other.



**Rice. 2.4. Ukmerges Parmones Parkas Industrial Park. Ukmerge, Lithuania.**

The main function of the industrial park is that they serve as a guide and a tool for the implementation of sustainable economic development of the region and its cooperative relations through the use of modern technologies and modern business tools, to ensure wide availability and effective use of all the variety of modern technologies, expert knowledge, necessary for the development of the regional economy, improvement of the state administration system [75].



**Rice. 2.5. Signs of industrial parks**

An industrial park has mandatory features:

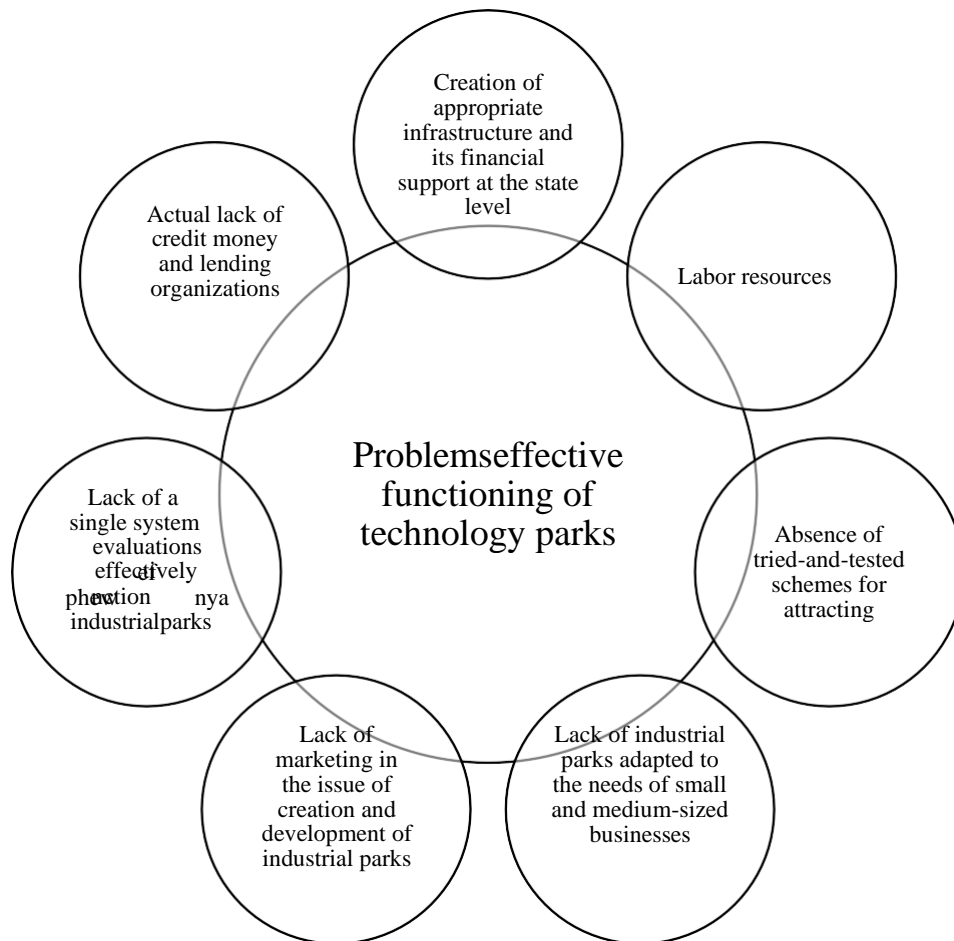
- availability and qualifications of the workforce;
- transport accessibility: highways, high-quality internal roads, airports, ports, proximity to the border (is an additional advantage);
- convenient location (urban or suburban area, entrance, railway line);
- availability (proximity) of energy supply networks, engineering and technical infrastructure;
- the presence of potential investors, primarily anchor investors;
- willingness of local authorities to provide benefits and preferences to investors (local);
- the attitude of the population towards investors and employment in production;
- access to raw materials and its cost (with taking into account potential specialization);
- conformity requirements valid legislation (size, targeted designation of the land plot);
- "legal purity" of the land plot (impossibility of appeals and litigation);
- one owner (a desirable factor to avoid potential disputes among owners);
- ecological suitability (unpolluted territory);
- lack of need for significant adaptation works (leveling, removal of black earth layer, cleaning from pollution).

## **Development of proposals for the functioning of domestic technology parks as a training ground for breakthrough innovations in construction**

In conditions of rapid growth of competitiveness, Ukraine should increase the integration of products into the world market. The world market is becoming more and more demanding every day, and it will be difficult for participating states without demonstrating innovative potential to function there. Considering the fact that one of the effective mechanisms for the development, application and dissemination of new technologies are technoparks, their development should be considered as one of the necessary prerequisites for restoring socio-economic stability, increasing the country's economic and scientific prestige in the world, and the gradual transition to the industrial and post-industrial stage of development [50].

The need and prospects for the development of technoparks have been discussed many times by Ukrainian authorities at various levels, so today it is especially important to identify the main problems that arise in the process of functioning and development of technoparks on the territory of Ukraine.

Having analyzed the experience of creating and developing technology parks in Ukraine, a number of problems were identified.



**Rice. 2.6. Issues of effective functioning of domestic technoparks**

Problem #1. Creation of appropriate infrastructure and its financial support at the state level.

It is necessary to foresee the financing of the creation of the technology park infrastructure in advance. The costs of its creation are quite high and not every technology park initiator can finance the construction of infrastructure facilities at technology parks. It is also necessary to take into account in advance the compliance of the infrastructure with the future individual requirements of all potential residents of technology parks, which also involves additional costs for conducting a preliminary analysis of the site.

Problem #2. Labor resources.

Unfortunately, there is a catastrophic lack of qualified workers in Ukraine:

- there is not enough people needed to organize not only production, but also service within the industrial park;
- there is a lack of technical specialists who "understand" the current level of technology and have undergone modern retraining;
- there is a lack of qualified managers, both in management companies and among residents and initiators.

Problem No. 3. Lack of industrial parks adapted to the needs of small and medium-sized businesses.

The issue of organizing and investing in the creation of industrial parks created for the needs of small and medium-sized businesses is acute. SMEs do not have the opportunity to buy land plots and build industrial enterprises from "scratch". But the demand for modern industrial spaces provided by the services of management companies is high in almost all regions of Ukraine.

Problem #4. Absence of tried-and-tested schemes for attracting residents.

Insufficiently developed schemes for attracting residents and investors to industrial parks. The market lacks typical schemes for attracting residents, both large "anchor" investors and small residents who are not ready to buy out entire plots of land or industrial buildings.

Problem No. 5. Lack of marketing in the issue of creation and development of industrial parks.

Management of industrial parks in the process of formation and development of territories should use appropriate marketing concepts and tools. Information exchange, development of positioning and specialization of the industrial park, creation of the most complete portfolio and website. These points are one of the main factors of promotion in the market, both at the national and international level.

Problem No. 6. Actual lack of credit money and lending organizations. Loan funds with low interest rates are necessary for the organization of any production. Lending and leasing for industrial enterprises and industrial parks is a problem that must be solved in the near future. In recent years, large production enterprises in Ukraine have been created mainly by Western companies that have

access to international cheap credit resources. There is a crisis in the domestic market today. The active participation of authorities is necessary to establish mutually beneficial credit terms and cooperation of residents of industrial parks and representatives of credit organizations.

Problem No. 7. Absence of a single system for assessing the efficiency of the functioning of industrial parks.

It is necessary to develop a comprehensive system for assessing the efficiency of the functioning of industrial parks in order to identify problems and develop management solutions for the creation of future stimulating support measures. Each region, together with national regulatory authorities, should define its key and priority industries. At the same time, the competitive advantages of one or another region should be modeled taking into account the development of the national and international market.

A clearly defined system of measures and the mechanism of state regulation of innovative processes makes it possible to significantly influence the development of science-intensive activities, economic and social stability. The analysis of foreign experience showed that the most effective measures to stimulate innovative activity are: implementation of government programs aimed at innovative entrepreneurship, creation of a favorable innovation environment, provision of loans, benefits, risk insurance for investors, partial compensation of investment costs to firms operating in the scientific field.

I agree with the words of I. O. Ukhanova that the construction of the technology park is aimed at accelerating the processes of adaptation of the participating enterprises to the market economy, the formation of centers of innovative activity and entrepreneurship in the regions, the acceleration of the restructuring of industries [50].

Now Ukraine is going through the most terrible times - the conditions of war. Victory and reconstruction of the most affected regions are not far off. Regional authorities and administrations can put forward the initiative to build technology parks as a testing ground for breakthrough innovations in construction, since the technology park can make a significant contribution to the economy of the region and the country as a whole, due to:

- stimulation of economic growth;
- diversification of the local economy;
- development of small and medium-sized enterprises;
- increase in state budget revenues.

At the initial stage of the implementation of innovative activities, local authorities should clearly formulate a program for the creation of an innovative system, by prescribing provisions and functionality, through the construction of technology parks. The program should contain: methods of examination and competitive selection of innovative proposals, regulations for the interaction of residents and technology parks, a methodology for evaluating the commercialization of R&D results and products of the technology park, a mechanism for planning and managing innovative projects.

The key factor in the dynamic development of the technology park is its support from the state. The support of technoparks can be provided by the state in the following directions [50]:

- investments in the construction of buildings, structures, infrastructure, equipment;
- ensuring access to regional and national scientific and technical grants;
- development of special benefits and privileges in the field of land relations and lease, taxation, lending, import-export of science-intensive products;
- joint development of research projects with leading research institutes;
- assistance in organizing the exchange of best practices.

The experience of developed countries shows that technoparks benefit from quite significant state support. Thus, the contribution of central and local bodies to the development of park infrastructure and the construction of buildings in Germany and Belgium reaches up to 100% of investments, in Japan - up to 90%, in France - up to 70% and above, and innovative companies are given tax discounts (central, local), soft loans and direct subsidies. In China, the creation of technoparks is carried out within the framework of the state program "Torch". Of the 100 technology parks, half were created at the regional level, the other half at the national level. Financing innovative activities only from the state budget is

ineffective. Therefore, the state finances up to 90% of the cost of innovative projects [50].

In Great Britain, the state provides small innovative companies operating within technology parks with government grants and loans. Government grants are provided in the following areas: investments in fixed capital (make up from 10% to 50% of costs, provided on condition of creation or preservation of permanent jobs, long-term positive impact on the economy); implementation of real estate projects; goods and services related to the environment; innovation and R&D (includes specialized mentoring support). Government loans are provided through both debt and investment instruments. Their size ranges from 5 thousand to 1 million pounds. In addition, resident enterprises pay only rent, they are provided free of charge with knowledge concentrated in the university, on the basis of which the technology park was formed, legal, financial, accounting and other consultations, marketing research, assistance in obtaining grants and loans, attraction of investors and potential consumers of innovations [50].

In Japan, a significant amount of investment in technology parks in the creation of all the necessary infrastructure, the purchase of equipment belongs to the state. Besides within the framework of the current program "Technopolis" in the territories of these structures, various measures of credit and tax incentives are provided: in the first year, resident companies are allowed to write off 30% of the cost of equipment, 15% of the cost of buildings and structures, the state pays a third of the costs for joint scientific research [50].

The experience of the development of technoparks in the USA shows that their participants occupy the necessary state space for free for the first year and receive legal and financial advice. In the country, about half of R&D expenses are covered by the state. A targeted policy of the state and regional authorities is implemented to support innovative processes that allow them to occupy the first positions in the global technology market [50].

As studies of foreign activities show, at each stage of the development of technoparks there is an appropriate system of measures to support their effective activities. There is a proven multi-stage algorithm.

Regarding proposals for the effective functioning of domestic technology

parks, the following is proposed:

➤ first of all, review and improve the legal framework in the field of industrial parks. It is recommended to take the European model of development as a basis. In particular, this concerns [50]: the establishment of effective tax and customs incentives for residents of technology parks (exemption from income tax for the first 5 years, for the next 5 years - the rate is half the basic rate (today 9%); exemption from import VAT , import duty on equipment and equipment for economic activity within the territory of the EP (restriction on its alienation within 5 years); exemption for 3 years from real estate tax, land tax and rent for the use of state/communal land property on which the technology park was created); implementation of effective policies for the development of private equity, possible as a result of the implementation of measures to improve the investment climate; development of models for using the public-private partnership mechanism with the aim of attracting non-state investment resources for the development of technology parks [52];

➤ the state, as a guarantor of the smooth functioning of technology parks, should provide preferential financing at the expense of state funds. A number of incentives are offered for the development of technological projects, including cheaper loans for the purchase of production equipment, compensation for interest payments on loans, covering the costs of connection and connection to power grids, as well as partial compensation for the investments of industrial park participants in the creation of production facilities;

➤ establishment of a clear chain in the system from the idea to the realization of the product and its sale. Technopark should become an ecological city with a developed infrastructure, which includes industrial and logistics facilities, investment centers, startup business accelerators, export hubs, co-working spaces, training, consulting, and research "brain" centers. Chain "development - innovation - production";

➤ determine the most suitable priority industries or clusters for each region. This is possible only after conducting a survey of the business community of the regions and a large-scale collection of statistical data from a wide range (personnel, transport, energy balance, sources of raw materials, sales markets,

etc.);

➤ in real time, it is necessary to constantly monitor the dynamics of changes in labor markets and sales markets, so as not to create a surplus or shortage of certain product groups, types of services in the regions;

➤ local authorities also occupy not the last place in the effective functioning of technoparks, because they can influence the creation of an investment-attractive region and high-quality support for investors, only the presence of techno-industrial parks will not bring the expected results. The creation of development projects must be coordinated with the priorities of regional and local development, while they must meet market needs in the long term. The "homework" for local authorities is to increase the production of goods with high added value, and in the future to increase their share in Ukraine's exports.

In the global race for competitiveness, one should act rationally and comprehensively, keeping in focus national interests and the priority of community development. The time has come to launch Ukrainian development projects at full capacity. Technoparks in the regions of Ukraine are a relevant and effective tool for the development of the domestic economy, and now is the time to use it actively and productively [53].

## **Implementation of a complex system for evaluating the effectiveness of innovative activity of enterprises in the construction industry on the example of LLC "Haus.me"**

For the experimental implementation of a complex system for evaluating the effectiveness of innovative activity, I analyzed the activity of a construction company engaged in the release of an innovative product to the market of "Haus.me" LLC. An analysis of a number of construction companies that operate in the direction of innovation development showed that "Haus.me" LLC is the most innovatively active enterprise, and its innovative activity demonstrates the highest result.

How, after buying a house, do not pay for electricity and water at all? The PassivDom startup team thought about this question. They developed a 3D-printed model of a house that can exist completely autonomously: powered by solar panels on the roof and a ton of filtered water. The product was named haus.me. This is a real mobile home. It can be easily and quickly located or moved. This self-contained house does not require a foundation, just a level surface of the ground or any flat surface. The house does not need to be connected to electricity, water or sewage, the architects focused on the solar network, implemented the idea of generating water from air condensate and autonomous sewage.

The house is partially printed on a 3D printer, it is only the walls and the frame. After printing, the "skeleton" of the house is sheathed with panels, decorated, furnished, equipped with equipment and household appliances. The team's goal is to sell homes that are fully ready for occupancy.

The company has its own production workshop, where one house is printed with the help of six KUKA industrial robots. It takes about 8 hours to make a frame for one house.

Initially, when the team was thinking about materials for the frame, they considered metal, but a material with high strength and low thermal conductivity was needed, because the plan was to create an energy-efficient house. So they settled on composite material. Three printers simultaneously print the walls of the house layer by layer. Thermal insulation materials are used for production - vacuum panels, foamed polyurethane, foamed glass and fiberglass, as well as binding materials such as epoxy resins. None of the competitors has yet applied the technology of strengthening polyurethanes and insulation with the help of carbon fiber or fiberglass skeleton.

The house runs on solar energy. Inside, solar panels power ventilation, air conditioning, lights, and household appliances. There is enough energy for heating, lighting and household appliances even in winter. The house also has an autonomous water supply system. These are tanks with potable and technical water in a capacity of up to 1 ton. Due to the fact that the water is filtered after use, a significant amount of it can be used again.

The house is heated (and cooled) using an industrial heat pump. Sediment with a SOR coefficient is used to equip buildings. This device, when heating the air, consumes 500 watts and emits 35 kW of heat. The temperature in the house is controlled using NEST thermostats, and the house also has an air quality control system (determines the level of CO<sub>2</sub> in the room).

The house is built of strong materials. The outer surface consists of carbon fiber, strong polymers and 6 panels of protected glass, and the inside uses comfortable natural wood. For their part, the developers provide warranty and regular maintenance of all items and systems in the house.

The enterprise faces a clear task: to determine the degree of originality of the product it produces. The results can be both positive (high involvement in innovative activity, which allows effective

to balance on the national market), and negative (inefficient innovation activity and the involvement of additional means of managing the processes of innovation activity, which will lead to additional costs).

Therefore, there is a need to develop an indicator on the basis of which the enterprise will be able to independently determine the degree of originality of the developed product.

To solve this problem, Chorna M.V. in her research, she developed a formula that can be applied to the company I analyzed [5]:

$$I_o = \sum_{i=1}^{i=n} w_i \times X_i, \quad (2.1)$$

Where  $I_o$  is the index of originality of development;

$w_i$  – is the weight of the  $i$ -th characteristic of the developed product;

$X_i$  – characteristic of the developed product, fundamentally different from the existing ones;

$n$  - is the number of fundamentally new characteristics of the developed product.

The proposed indicator reflects the degree of originality of all characteristics of the innovative product, taking into account their importance in the overall structure [5].

The main problem of the interpretation of its components is the practical impossibility of comparing fundamentally new characteristics due to their absence on the market, therefore it is considered possible to determine this indicator in terms of the possible similarity of the innovative product with products already existing on the market at the time of evaluation [5].

The scientific literature provides a wide range of parameters of this type of construction products [54–56], which according to their content can be divided into the following groups of characteristics: technical (reliability and strength of construction structures), functional (space organization, aesthetics, comfort, etc.), environmental (sound comfort, temperature-humidity regime, etc.) and narrowly

specific (socio-cultural significance, earthquake protection, fire resistance, etc.) depending on the nature of construction products.

The selected characteristics are proposed to be used as basic features of an innovative product fundamentally different from those existing on the market when determining the degree of originality of construction products. [5].

Due to the heterogeneity of the selected characteristics in terms of their essence and practical significance, the main task is the formation of a single indicator of the originality of innovative products. For the practical realization of the set goal, the method of giving advantages was applied [57], which consists in the assessment by experts of each parameter of construction products and giving it a certain weight.

According to the results of the survey using this method (Appendix B), the group of technical parameters (0.38) is the most prioritized, functional parameters are in second place (0.32), narrowly specific parameters are in third place (0.19), the last in importance are environmental parameters ( 0.11). This formula was developed by Doctor of Economic Sciences M. V. Thus, the degree of originality of the developed product can be determined as follows:

$$I_o = 0,38 \times T + 0,32 \times \Phi + 0,19 \times C + 0,11 \times E \quad (2.2)$$

where  $I_o$  – is the index of originality of development;

$T$  – the presence of technical characteristics of the developed product, fundamentally different from those existing on the market (if present, it is taken as 1);

$\Phi$  – the presence of functional characteristics of the developed product, fundamentally different from those existing on the market (if present, it is taken as 1);

C – presence of narrowly specific characteristics of the developed product, fundamentally different from those existing on the market (if present, it is taken as 1);

E – the presence of ecological characteristics of the developed product, which are fundamentally different from those existing on the market (if present, it is taken as 1).

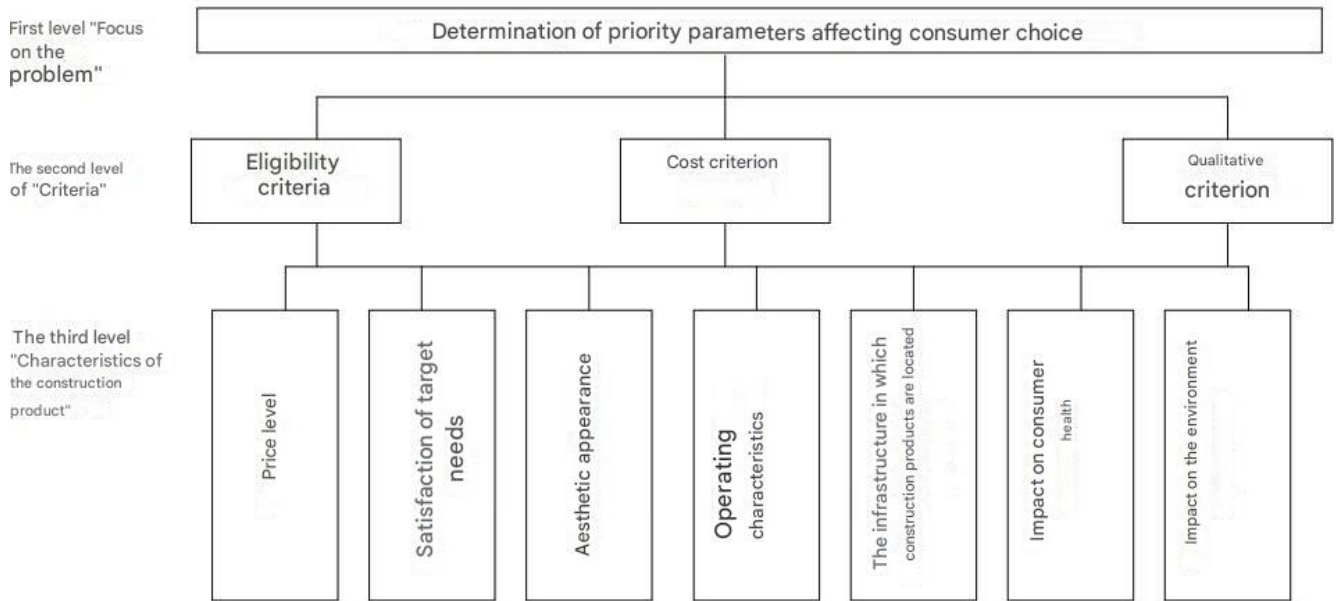
Thus, this indicator can take values from 0 to 1. The value of this index, close to 1, indicates a high possibility of entering the market of the innovation itself, the opposite will reflect the development of the innovation by the enterprise [5].

To establish the expediency of the evaluation, first of all, the degree of originality of the innovation is determined (formula 2.2):

$$I_o = 1 \times 0,38 + 0 \times 0,32 + 0 \times 0,19 + 0 \times 0,11 = 0,38 \quad (2.3)$$

As a conclusion, the innovation, the production of which is engaged in the production of "Haus.me" LLC as the main activity, is a fundamentally new construction technology and is carried out exclusively by this company. Important positions were involved in the assessment: enterprise, consumer, staff, investor, the influence of innovative technology on which is the greatest.

The formation of the evaluation criterion base was carried out according to the principle of adaptive flexibility, that is, based on the identification of innovation (Fig. 2.1) [5].



**Rice. 2.5. Decomposition of the researched problem – evaluation of the priority of product characteristics affecting the consumer choice**

Source [5]

System evaluations efficiency construction innovative at home will consist of the following indicators (Table 2.1).

Table 2.1

The system for evaluating the effectiveness of the production of an innovative product of the LLC

«Haus.me»

Criterion	Indicator	Formula
	<b>Enterprise</b>	
Economic efficiency	profitability index of innovative activity	$I_r^{UL} = 1 - \frac{R_{n-1}^{det}}{R_n^{in}}$
	modified Tobin coefficient	$q^{Tobin} = 1 - \frac{\Pi_{det}}{\Pi_{in}} = 1 - \frac{P_{det} \times Q_{det}^{prod}}{(P_{in} \times Q_{in}^{prod}) + (P_{in} \times Q_{in})}$
	modified the Lerner coefficient	$He = \frac{\Delta P_{in} - \Delta B_{in}}{will_{in}}$
	construction process optimization index	$I_{con} = 1 - \frac{T_{in}}{T_{\phi}}$
Scientific and technical efficiency	index of the intensity of patent-licensing activity	$I_{i, n-1} = \frac{Q_{in}}{Q_{prod}}$
	technology progressivity index	$I_{nprod} = \frac{Q_{in} + Q_{ydocsk} + Q_{znan}}{Q_{in}}$
	labor productivity index	$I = DPP \frac{1}{...}$
Social efficiency	index of satisfaction with working conditions	$11 - \text{Chil Chil} \frac{...}{...}$
	index of innovative activity of personnel	$I_{in} = 1 - \frac{u_{n-1}^{det}}{u_n^{in}}$
	<b>Staff</b>	
Social efficiency	modified index worker absenteeism time during implementation innovative activity	$I_{abs} = \frac{\sum_{i=1}^n Tp_{i, det} - Tp_{i, in}}{City_n}$
	qualification index employees	$IKG = 1 - \frac{r_{det}}{r_{in}}$
	wage index, which is calculated for detachment system	$I_{in}^{wip} = 1 - \frac{B_{n-1}^{det} \times Tp_{det}}{B_{n-1}^{in} \times Tp_{in}}$
	<b>Investor</b>	
Economic efficiency	expectancy index profit from investment;	$I_{in} = 1 - \frac{NPV_{det}}{NPV_{in} \times k_r}$
	contraction index payback period investments	$I_{in} = 1 - \frac{DPP_{in}}{DPP_{det}}$

The initial data for the calculation are presented in the table, on the basis of which the results of the evaluation of the effectiveness of innovative activity were obtained (table 2.2).

Table 2.2

Initial data for calculating the efficiency of innovative activity, Com  
«Haus.me»

Indicator 1	Values 2
Profitability of the construction enterprise in the period before the introduction of the innovation, %	137,42
Profitability of innovative activity after the introduction of the innovation, %	468,5
The volume of innovative products sold at an increased price on the market (full coverage of the maximum possible demand on the market with innovative products), mln.	1402
The volume of ordinary construction products sold at the average price, million hryvnias.	516
Price increase for innovative construction products, %;	125
Increase in costs for innovative activities, %	55,21
Term of construction of innovative products, months	18
The actual term of construction without using the results of innovative activities, months	36
Number of intellectual property rights documents received, units	4
The total number of innovative developments, from	7
The volume of fundamentally new (innovative products), million hryvnias.	1402
The volume of improved products in-house for the development and implementation of innovation, mln. games.	249,34
The volume of borrowed innovative products for the development and implementation of innovation, games.	-
Total volume of production, million hryvnias.	1918
The rate of change in labor productivity after implementation of innovative activities in comparison with the period before implementation innovations, in the form of a decimal fraction	0,36
Index of originality, in the actual sense	0,38
The share of employees who are not satisfied with working conditions after the implementation of innovative activities in the n-th period (dismissed at their own will), %	1,28
The share of workers dissatisfied with working conditions in the period before the implementation of the innovation	2,15

Continuation of Table 2.2

activities (dismissed at their own will), %	
The share of employees from the total number who are the initiators of innovative ideas, <b>rationalizing proposals for the implementation of innovative activities in the n-1st period, %;</b>	<b>24,3</b>
The share of employees from the total number who are the initiators of innovative ideas, <b>rationalizing proposals during and after the implementation of innovative activities in the n-th period, %</b>	<b>38,5</b>
<b>Workers' time spent on all construction operations prior to the introduction of the innovation, thousands of man-hours.</b>	<b>21</b>
The coefficient of risk of not receiving profit from investment	<b>0,7</b>
Net reduced income from innovative activity, calculated according to the level of innovative risk determined by the scale, thousand UAH.	<b>5947,71</b>
Net reduced income from ordinary activities, calculated according to the average level of risk, thousand UAH.	<b>369,48</b>
Discounted period of payback of investments <b>in innovative activity, years</b>	<b>1,8</b>
Discounted period of payback of investments <b>in ordinary activities, years</b>	<b>3,7</b>

Table 2.3

## Results of evaluation of the efficiency of innovative activities of "Haus.me" LLC

Direction	Criterion	Indicator	Value	
1	2	3	4	
Enterprise	Economic efficiency	profitability index of innovative activity	0,79	
		modified Tobin coefficient	0,63	
		modified Lerner coefficient	0,56	
	Index of economic efficiency of innovative activity			0,28
	Scientifically-technical efficiency	construction process optimization index	0,50	
		index of the intensity of patent-licensing activity	0,57	
		technology progressivity index	0,86	
	Index of scientific and technical activity of innovative efficiency			0,25
	Social efficiency	labor productivity index	0,96	
		index of satisfaction with working conditions	0,40	
index of innovative activity of personnel		0,37		
Index of social effectiveness of innovative activity			0,14	
Index of efficiency of innovative activity from the point of view of the enterprise			0,07	
Staff	Social efficiency	modified index of absenteeism during the implementation of innovative activities	0,10	
		employee qualification index	0,17	
		wage index, which is calculated according to the piecework system	0,03	
Index of efficiency of innovative activity from the position of personnel			0,001	
Investor	Economic efficiency	index of expected return on investment	0,94	
		index of reduction of investment payback period	0,51	
Index of efficiency of innovative activity from the position of an investor			0,48	

Table 2.4

Interpretation of the results of the evaluation of the efficiency of innovative activity of "Haus.me" LLC

Integral index	Meaning	Innovative activity is effective	Innovative activity is ineffective
Enterprise			
Index of economic efficiency of innovative activity	0,28	[0,13;1]	]0;0,13[
Index of scientific and technical efficiency of innovative activity	0,25	[0,13;1]	]0;0,13[
Index of social effectiveness of innovative activity	0,14	]0;1]	[0]
Index of efficiency of innovative activity from the point of view of the enterprise	0,01	[0,01;1]	]0;0,1[
Staff			
Index of efficiency of innovative activity from the position of personnel	0,001	]0;1]	[0]
Investor			
Index of efficiency of innovative activity from the position of an investor	0,48	[0,25;1]	]0;0,25[

The interpretation of the integral indicators of "Haus.me" LLC demonstrates that innovative activity is sufficiently effective in all parameters.

Thus, the experimental implementation of the developed system for evaluating the effectiveness of innovative activity of construction enterprises confirmed its effectiveness and practical significance.

Developed by Chornaya M.V. the evaluation mechanism allows construction enterprises to effectively organize innovative activities and respond in a timely manner to changes in the internal and external environment.

## **CONCLUSIONS TO SECTION 2**

The main definitions of the technology park concept were analyzed. The main definition of the technopark is highlighted. Technopark is a unique, autonomously functioning, dynamic system that responds to external and internal tasks and conditions.

The experience of functioning of technoparks was analyzed using the example of: Greensburg business incubator, Unit City innovation park, Bandung technopark, Ukmerges Parmones Parkas industrial park.

A number of problems in the activity system of technology parks of Ukraine have been identified. From this, a number of proposals were developed that will help significantly improve the activities of domestic technology parks.

The implementation of a complex system for evaluating the effectiveness of the construction industry enterprise "Haus.me" LLC, which is engaged in the production of an innovative product, was carried out.

## **CHAPTER 3. ACTIVATION OF THE ACTIVITIES OF TECHNOLOGY PARKS IN THE CONTEXT OF RENOVATION TECHNOLOGIES CONSTRUCTION**

### **Improvement of legal conditions for the development and commercialization of innovative construction projects in a favorable business environment**

In today's complex conditions of the development of our country, which are accompanied by the destructive influence of the open aggression of the Russian Federation, the issues related to the state of operation, problems and prospects of development of the construction industry of Ukraine are gaining importance. Such a statement is based on the fact that the speed and quality of the restoration of the destroyed infrastructure and housing stock of Ukrainian settlements depends on the state, development trends and prospects of construction enterprises.

As a result of Russian aggression in Ukraine, 116 thousand residential buildings were destroyed or damaged, in which about 3.5 million citizens lived.

"As of June 1, 3.5 million Ukrainians have damaged or destroyed homes. We are talking about 116 thousand objects with a total area of 14 million square meters. m", - noted in the Department of Housing Policy and Improvement of the Ministry of Community and Territorial Development [58].

In the context of this study, first of all, it is advisable to consider certain aspects of the financial and economic analysis of the activities of domestic construction enterprises, which were reflected in the compiled rating of construction companies of Ukraine.

The reliability rating of developers is compiled to study the risks of construction companies fulfilling their obligations to investors - real estate buyers, so that an interested person can check who exactly can be trusted with their own funds.

The 24 largest developers working in Ukraine were included in this rating. A mandatory condition for participation was the presence of innovative projects.

After all, the main purpose of the rating is to assess risks for investors [59]. The weight of each methodology factor is determined based on its impact on reliability. The overall rating score is calculated from the weighted average score for each factor and the weight of the corresponding factor.

Thus, the "financial reporting" factor is determined by such indicators as compliance with reality and accounts payable, which is calculated as an assessment of the ratio of assets to revenue and has a weight of 0.1.

The availability factor of completed and active facilities is determined by the ratio of completed facilities over the past 5 years to facilities under construction and has a weight of 0.2.

Such a factor as "Support and risks of owners" covers all categories of owners: the state, foreign corporate structure, utility companies, non-resident natural person, residents of Ukraine; ratings of foreign parent structures; the risks of the origin of shareholders and also has a weight of 0.2.

The "Permit documentation" factor takes into account the following indicators: Documents for the land, Availability of permits for construction work, Correspondence of permit descriptions with what the developer plans to build, Correspondence of floor area, Correspondence to the risk class, Presence of urban planning norms and restrictions, Number of registered changes in the construction permit works, Project execution term and has a weight of 0.2.

The factor "Court disputes" has a weight of 0.05 and is characterized by such indicators as the presence and intensity of court disputes with investors and contractors and the presence and content of court disputes with state bodies.

The factor "Financing scheme" also has a weight of 0.05 and covers the scheme of attracting funds and the scheme of financing construction.

Such a factor as "Delay" is characterized by the average delay in terms of delivery of objects and the % of delivered objects with a delay. In total, this factor has a weight of 0.1.

The "Transparency" factor is determined by how transparently the company's activities are conducted and has a weight of 0.1.

Each factor is assigned a score from 1 to 4 before considering its importance. The scores depend on the range in which the value of the indicator falls. The calculated rating is summarized in table 3.1.

Table 3.1

**Reliability rating of builders [8]**

Company	Rating	Financial reporting	The owner owns the risk	Permissive documentation	Sudove risk and	The delay	Transparency
Stolitsa Group	3.5	C	A	A	A	B	B
Kowalska real estate	3.0	D	B	B	B	A	B
KSM group	2.5	B	C	A	B	B	D
Perfect Group	2.0	D	D	A	B	B	C
Kyivbuddevelopment	1.5	D	C	C	A	D	C

*\*5 stars - the maximum level of reliability; 4 stars – a moderately high level of reliability; 3 stars – satisfactory level of reliability; 2 stars – low level of reliability; 1 star - catastrophic level of reliability.*

*\*\*A – positive influence of the factor on the reliability of the developer; B – a satisfactory influence factor on the reliability of the developer; C – moderately negative impact of the factor on the reliability of the developer; D - the negative impact of the factor on the reliability of the developer.*

So, as can be seen from the presented rating, none of the companies scored the maximum score.

Along with this, in the context of this study, it is necessary to analyze the general trends in the development of the construction industry in Ukraine.

The construction industry of our country has become one of the indicators of the Ukrainian economy overcoming crisis phenomena. The index of construction products, which was at the mark of less than one hundred percent in the period 2012-

2015, since 2016 began to confidently signal the annual growth of construction products. Thus, according to the data of the State Statistics Service of Ukraine, in 2016 the specified index was 117.4%, in 2017 – 126.3%, in 2018 – 108.5%. In 2019, the development of the Ukrainian construction market continued. According to the results of the first half of 2019, 32.4% more construction work was completed in our country than in the same period last year. By

In 9 months of 2021, the Ukrainian construction market grew by 3.2%, and the building materials market grew by 14.9% compared to the same period in 2020. The general trend is the growth of the construction industry market of Ukraine and the trend of accelerating growth. The volume of completed construction works for January — September 2021 amounted to UAH 149 billion, which is 3.2% more than in 2020 [60].

The leader in terms of development rates in the industry was residential construction, which added 18.4% to last year's result. Commercial construction showed a drop of 2% and an increase in infrastructure construction by 1.3% [61].

According to indicators of the volume of completed construction works, infrastructure projects are leading: road construction, replacement of overpasses, airports. Development drivers are increasing the pace of project implementation

"Great Construction", the launch of the state program on mortgage lending, as well as the beginning of the reformed operation of DIAM (former GASI). Small-scale "Great Restoration" programs and energy modernization projects also played their role [61].

At high rates of market development, there is a trend towards an increase in the price of building materials. In particular, the unprecedented increase in the price of gas on the European market can hit many businesses, in particular, manufacturers of innovative construction products.

The positive dynamics of the economy, observed in recent years, intensified construction activity and contributed to the development of the industry.

At the same time, to overcome the economic crisis through construction, Ukraine

annual growth of the volume of construction works at the level of 25-30% for about 10 years in a row is necessary.

However, the potential for construction development in Ukraine is huge. In accordance with modern energy conservation standards, only 5-7% of residential and non-residential buildings have been built or reconstructed, the rest of the entire volume of buildings must be repaired and reconstructed everywhere, and the same "Khrushchev" to demolish.

Every year, it is necessary to build 1 square meter of housing per inhabitant, although only the Kyiv region can boast of such indicators. In Ukraine, a total of 0.24 square meters per inhabitant is being built (that is, the all-Ukrainian figure should be increased by 4 times). As for industrial regions, where added value and GDP are created, the volume of residential construction is small and amounts to 0.06-0.11 sq.m per one inhabitant, therefore there is a need for a growth of 10 times or more [61].

At the same time, digitization is considered the main lever capable of ensuring the development of the Ukrainian construction industry.

This observation is based on the fact that digitalization in construction companies allows to reduce design costs and speed up the project implementation period. The main trend among foreign companies is real-time construction management based on cloud solutions for collaboration, which allows more effective control of all operations and thus reduces the number of unnecessary errors and costs. There are digital tools for effective real estate and operational management. At the same time, different solutions and suppliers can be found on the market for each direction.

If we generalize the existing cases in the world practice, then first of all, the effect related to the increase in operational efficiency is noticeable. Thus, the use of digital technologies allows you to reduce labor costs, better manage procurement and construction equipment, and increase speed of project implementation, reduce the number of errors.

The use of big data and digital marketing tools also shows high efficiency in terms of creating customized offers, improving sales force and increasing brand

awareness.

Digital technologies also help in creating new businesses and sources of income. For example, in foreign practice there are digital platforms for the joint use of construction equipment. One of the latest trends is the investment of construction companies in technology startups, which subsequently make new technologies one of the sources of income.

In the Ukrainian construction industry, with the exception of some companies, digitalization has not yet shown the effect that can be observed in foreign counterparts. The most advanced area is the digitization of the product and client functions. At the same time, the level of digitization of the main process and corporate functions is quite low.

In addition, when talking about solutions in the construction sector, the key issue is still the implementation of the reform that has been ongoing in the market. Among the priority tasks is the well-established operation of the system for issuing all documents necessary for construction activities. With the help of an electronic portal that minimizes the human factor, the process of obtaining documents should be equal for all market players. However, today the system continues to work in test mode.

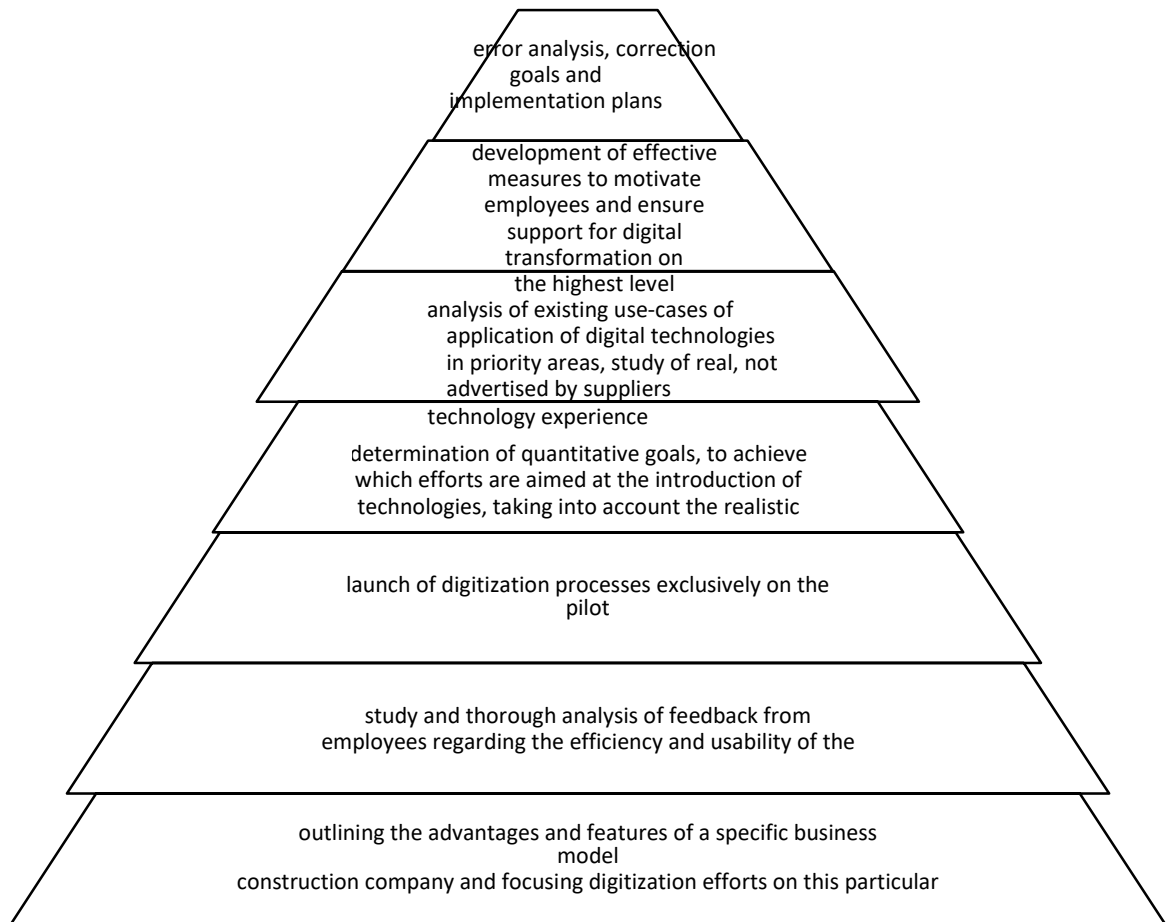
In addition, the anti-raider law and the law on cancellation of share contribution are intended to improve the general development trends of the construction industry in Ukraine. In particular, the latest document, which entered into force last year, canceled the mandatory payment of 2-4% of the construction cost for residential and commercial real estate, respectively [62].

In addition, it is possible to emphasize the law on the improvement of regulation, which helps to reduce the level of regulation in the construction industry. As well as orientation to new norms, the so-called Eurocodes during construction of objects. It's going about higher standards for building materials. Thus, the number of projects in which innovative and energy-efficient technologies will be used may increase on the market.

Environmental materials are increasingly being used in construction around the world. The global green building market is expected to grow to \$610 billion by 2027 (11% annual growth). Today it is estimated at 239 billion dollars [63].

Digitalization processes are the key basis of the outlined processes. At the same time, the development of digitalization in the construction industry of Ukraine is restrained by the following factors: underestimation of a number of promising technologies, resistance of management, learning from mistakes and ignoring best experience, loss of time in search of the "best" solution, too large one-time coverage of the digitalization project, lack of a motivated internal team for implementation of changes and monitoring systems.

Summarizing the existing practice, the following recommendations can be highlighted that can help Ukrainian construction enterprises to advance in the field of digitalization (Fig. 3.1):



### **Rice. 3.1. Recommendations for promotion in the field of digitization**

In this way, the prospects for the development of construction companies with the help of digitalization processes are substantiated by studying the state of application of digital technologies in the construction industry and studying the general trends in the development of construction enterprises.

All innovative activity develops using, first of all, the following three resources: human, production and financial, and the first is decisive. As is known, the basis of innovations characterizing science-intensive products are the results of scientific and scientific-technical activities, which under certain conditions receive a special legal regime of protection - the regime of protection of an object of intellectual property. In case of violation of this legal regime, protection mechanisms are activated.

An analysis of the legislation of Ukraine in the specified area revealed its main shortcomings:

- there are no clearly defined legal norms regarding the protection of commercial secrets, know-how;
- the legal regime of protection and use of intellectual property objects, created in connection with the performance of the employment contract, created at the expense of the state budget, according to the contract, is not defined;
- there are no preventive measures established at the legislative level aimed at preventing offenses in the field of intellectual property;
- there is no legal regulation of the assessment of the value of intellectual property objects and their accounting;
- technology transfer procedures and the institution of legal responsibility for offenses in the field of intellectual property need to be improved.

It is clear that it is impossible and inexpedient to solve all the existing problems of legal regulation of intellectual property rights in the Project. But the commercialization of the results of innovative activity is undoubtedly connected with the need to improve the methods of protection and legal forms of commercialization of intellectual property objects and the creation of a legal basis for the assessment of intellectual property objects, their accounting as specific intangible objects on the balance sheet of the relevant business entities. It would be expedient to fix the basics of solving these problems in the relevant projects. The effective functioning of the innovation system requires the presence of an appropriate innovation infrastructure within which the subjects of the innovation process interact. Today, significant changes are taking place in the organization of the most innovative structures. The main directions of their development are the transition from narrowly specialized organizational structures to structures covering the entire innovation cycle, from departmental structures to non-departmental, secondary entities, which are technopolises, science towns, technology parks, innovation transfer centers. These structures represent a territorial form of integration of science, education and production. They create an optimal environment for the exchange of ideas, transfer of information, provide preferential access to capital, attracting investors and venture capital funds.

At the same time, there is already a need for new types of innovative

structures - innovative exchanges, consulting, engineering and marketing firms, innovative firms. In this regard, it would be worthwhile for the authors of the Project, relying on the prognostic function of legal science, to provide such norms that would contribute to the creation of the specified structures, without limiting the subjects of innovative activity only to already existing organizational and legal forms. The issue of the relationship between scientific organizations and scientists regarding the disposition of objects of scientific creativity remains unresolved to the end. The legal nature of the latter may be different, which requires a corresponding legal decision (created under a contract, in order to perform an official task and performed functions, as well as created not in connection with the main labor activity). In order to solve this issue, it is necessary to determine the mode of protection and protection of objects of scientific creativity. It is about the fact that such objects may not contain objects of patent protection and then they will be protected only by copyright, which, as is known, protects only the form. Today, it is important to protect scientific information, which contains objects of scientific creativity and which, by and large, has practically no effective protection system. The implementation of the specified proposals will contribute to increasing the role of fundamental science in the innovation process of Ukraine, to the legislative consolidation of effective (real) guarantees of the implementation of the constitutional right of citizens to scientific creativity, thanks to which it would be possible to revive the former prestige and attractiveness of the work of scientists, which would contribute to the influx of talented young people into science .

In addition, Art. 54 of the Constitution of Ukraine in the part of the state's duty to promote the development of science will be provided with appropriate legal guarantees. The legal form of commercialization of innovations based on objects of intellectual property are contracts on the disposition of property rights to objects of intellectual property (first of all, to inventions and useful models), which can significantly affect the innovative

"climate" in the state.

The process of creating a legislative framework in the field of innovative activity due to the lack of unified conceptual approaches to the creation of the NIS itself was carried out unsystematically and fragmented for a long time. This largely

explains the insufficient effectiveness of the legal regulation of innovative activity, which is significantly negatively affected by the practice of suspending the current norms contained in the current legislation. One of the shortcomings of the existing legal regulation of the specified sphere of social relations is the lack of a clearly defined conceptual apparatus and principles of legal regulation of innovative activity.

An important task is the formation of a regulatory and legal framework to ensure equal entry of Ukraine into the scientific and technological space of European countries and the world.

The legal framework should be formed in accordance with the trends observed in the world. Ukraine has joined most of the existing agreements and conventions in the field of protection of intellectual property, know-how, etc.

In order to position Ukraine as a country with high innovative development, it is necessary to attract foreign investors to the development of the domestic sphere of innovation and conduct an active policy of international cooperation. Analyzing the existing investment programs and Ukraine's ability to join them, we can conclude that international programs of the European Union and the CIS countries are a priority.

Mechanisms and specific proposals for participation in them have been developed in sufficient detail. There is a project of the Concept of cooperation in the innovation sphere of the CIS countries, which was prepared with the active participation of Ukraine. Regarding cooperation with the EU, the task is to initiate new programs on the conditions that existed and exist in the EU for the countries of Central and Eastern Europe.

This will allow not only to attract more significant funds for the implementation of research and development works and innovative projects, but also to expand the spectrum of cooperation between Ukrainian and foreign organizations.

Therefore, we can conclude that in order to activate the development of innovative infrastructure in Ukraine, it is necessary to:

Effective state-legal regulation of innovative activity, which includes, first of all, improvement of the methodology of carrying out the examination of innovative projects, is a serious leverage of the state's influence on innovation processes.

In the conditions of an underdeveloped market in Ukraine, curtailment of economic incentives aimed at the activation of innovative activity, it is necessary to

reach a new level of legal regulation of innovative activity.

Thus, there is an urgent need to "inventory" the entire array of innovative legislation, to bring normative acts into line with each other, as well as to consolidate the most conceptual provisions in the Innovation Code of Ukraine.

The technology park regulatory management tool is necessary to determine the likely benefits, costs and consequences of new or existing regulation and is necessary to ensure the quality of government intervention and provides important information to decision makers to achieve public policy goals.

Methods for making regulatory decisions on technology park policy should take into account national culture, political conditions and administrative style.

When assessing the regulatory impact on technology parks in Ukraine, it is necessary to take into account the main goals of regulatory costs and impacts:

1. Improving understanding of the real effects of government action, including the benefits and costs associated with the regulatory process. This is necessary for the decision-making process, evaluating the effectiveness of the policy and the cost-effectiveness of its instruments by comparing the costs and benefits of different regulatory acts.
2. Integrating technology park policy objectives will enable decision-makers to identify trade-offs and use a coordination tool that can bring together different interests. Market openness and competition should be important elements of the analysis of the regulatory impact on technology parks.
3. Increasing transparency and consultation provides the benefits of decisions and the consequences of actions and is closely linked to public consultation processes.
4. Improving government accountability for decision-making at the ministerial and political levels will contribute to understanding the consequences of policy decisions and their utility for society. Implementation of regulatory impact analysis on technology parks in Ukraine will help the government to make policy more effective and contribute to the country's competitiveness and investment attractiveness.

Regulatory impact analysis provides empirical data that will be informative and accessible to the decision-making process, it is a tool that can be used to

transform stakeholders in understanding the expediency of actions and can help define the role of the modern state.

Using the good practice of OECD countries, the analysis of the regulatory impact on industrial parks should include the following elements: to conduct assessment of the regulatory impact on technological parks is recommended to use a benefit-cost analysis, which determines the benefits that justify the costs, taking into account the distribution of effects in society. This principle is called the "test of benefits and costs", it is the best method of assessing the regulatory impact, as it is aimed at the implementation of public policy that meets the "socially optimal" criterion. Quantitative analysis of benefits and costs usually needs to be supplemented by other available analytical methods.

### **Training of industrial park management managers as innovative industry specialists**

In today's conditions, the problems of training managers for the management of industrial parks as innovative specialists of the industry are becoming important.

The defining feature of the technopark is economic, financial and personnel self-reproducibility. The management of the technology park, after carrying out a scientific examination and economic calculations, concludes a contract with the authors of the innovative idea, provides the developers with the necessary resources and consulting assistance. Conditions are created for bringing an innovative idea to a material product, based on the production of which small and then medium-sized businesses grow. An important point of the contract is the obligation of the authors of the idea, and then the businessmen regarding further cooperation with the technology park, namely: deduction of interest from the profit received from the production of goods that passed through the technology park, consultations for beginners, participation in the organization of other events in the technology park. Thus, when the innovation begins to bring profit, the technology park receives funds - the support of the innovative idea pays off. Part of the funds of the technology park is transferred to the university.

"Graduates" of the technopark do not lose touch with this structure and contribute to its further development [64].

Therefore, the mission of the technopark is to ensure the promotion of innovation from an idea to a product of material production that brings profit, and on this basis - the development of small and medium-sized businesses. Technopark provides resources for the introduction of innovations after researching the prospects of an innovative idea and its scientific justification, ensures the formation of new production, promotes the market entry of the resulting product and, ultimately, receives profit from the introduction of innovations. This process is accompanied by improving the qualifications of personnel, creating a team in a new campaign [64].

Thus, traditionally, the technology park model is aimed at the development of high technologies, the introduction of innovations, and the development of small businesses to the medium level. The semantic meaning of the term "technopark" as a research one is more acceptable in this context [64].

Therefore, the purpose of the technopark is to help the development of a new, progressive idea, substantiate it scientifically, ensure the formation of a new production based on it, promote the market entry of the resulting product and, ultimately, profit from the introduction of innovations. This process is accompanied by improving the qualifications of personnel, creating a team in a new campaign.

Such a remark is based on the fact that without a weighted process of such an assessment and obtaining its results, it is impossible to talk about the effectiveness of the existing mechanisms, and therefore it is not appropriate to develop directions for improvement.

It is advisable to use the method of rank analysis to optimize the training of industrial park management managers as innovative industry specialists. The Kendall tau rank correlation coefficient is a measure of the linear relationship between random variables. Kendall's correlation is rank, that is, to evaluate the strength of the connection, not numerical values are used, but their corresponding ranks.

The coefficient is invariant with respect to any monotonic transformation of the measurement scale.

For this, first of all, it is necessary to distribute the factors of optimization of the energy supply of the technical energy system (Table 3.2):

Table 3.2 Factors influencing the effectiveness of management training of managers

industrial parks as innovative industry specialists [14, 17, 21]

Methods	Experts					Sum of ranks	<i>D</i> (average value)	<i>d</i> <sup>2</sup> (quaratic value)
	1	2	3	4	5			
x1 engagement international experience	4	5	5	8	4	26	-8.1	65,61
x2 digitization the learning process	9	9	7	6	8	39	4.9	24.01
x3 qualification staff	4	4	5	3	6	22	-12.1	146.41
x4 material stimulation	5	5	6	6	5	27	-7.1	50,41
x5 applied aspects of learning	3	5	5	5	4	22	-12.1	146.1
x6 investing in personnel	8	8	10	9	7	42	7.9	62.41
x7 applications innovative teaching methods	6	7	7	5	4	29	-5.1	26.01
x8 conducting events for the exchange of experience	9	9	8	10	8	44	9.9	98.01
x9 financing the learning process	9	9	10	8	8	44	9.9	98.01
x10 personal characteristics of specialists	9	10	9	8	10	46	11.9	141.61
$\Sigma$						341		858.59

In this example, the methods were distributed by importance as follows (Table 3.3).

*Table 3.3*

**Location of factors by importance**

Factor		Sum of ranks
$x_{10}$	personal characteristics of specialists	46
$x_8$	holding events for the exchange of experience	44
$x_9$	financing the learning process	44
$x_6$	investment in personnel	42
$x_2$	digitization of the learning process	39
$x_7$	application of innovative teaching methods	29
$x_4$	material stimulation	27
$x_1$	involvement of international experience	26
$x_3$	personnel qualification	22
$x_5$	applied aspects of education	22

So, as can be seen from Table 3.3, the most significant factors were the personal characteristics of specialists and the holding of events for the exchange of experience.

In turn, according to experts, such factors as applied aspects of training and personnel qualifications have the least effectiveness.

Kendall's concordance coefficient was used to determine the adequacy of the agreement level of experts' opinions. Kendall's coefficient of concordance ( $W$ ) is a measure of multiple rank correlation.  $W$  can take values in the range 0 to +1, where  $W=0$  means no agreement at all in the evaluations or judgments of the experts, and  $W=1$  means full agreement. As the maximum permissible value of the concordance coefficient, we suggest taking  $W=0.4 - 0.6$ : (average agreement of experts' opinions),  $W=0.1 - 0.3$ : (low agreement of experts' opinions),  $W=0.7 - 1$ : (high consistency of experts' opinions).

We will evaluate the average degree of agreement of the opinions of all experts using the concordance coefficient (formula 3.2):

$$W = \frac{12 * S}{m^2 * (n^3 - n)} \quad (3.2)$$

where  $S = 858.59$  (sum of squared values of  $d_2$ ),  $n = 10$  (number of factors),  $m = 5$  (number of experts).

$$w = \frac{12 * 858.59}{25 * (1000 - 10)} = \frac{10303.08}{24750} = 0.416$$

$W = 0.416$  indicates the presence of an average degree of consistency of experts' opinions.

To assess the significance of the concordance coefficient, we use the Pearson agreement criterion (formula 3.3):

$$\chi^2 = \frac{12 * S}{m * n * (n + 1)}$$

$$\chi^2 = \frac{12 * 858,59}{5 * 10 * (10 + 1)} = \frac{10303,08}{550} = 18,73$$

compare  $\chi^2$  with the table value for the number of degrees of freedom  $K = n-1 = 10-1 = 9$  and at the given level of significance  $\alpha = 0.04$

Since the calculated  $\chi^2$  is  $18.73 >$  tabular value  $16.9$  (unified table of Pearson's test), the value of  $W = 0.416$  is not random, and therefore the obtained results make sense and can be used in further research.

So, in the context of this study, the factors influencing the effectiveness of the training of managers for the management of industrial parks as innovative specialists of the industry are substantiated, and with the help of the Kendall correlation analysis method, the factors are separated by significance.

The manager of the industrial park must perform the following main functions:

- to exercise the rights and bear the responsibilities of the customer and the investor in the development of documentation for the planning of the territory of the industrial park, the design and construction of infrastructure facilities, which ensures the functioning of the industrial park at the expense of own and funds raised;
- ensure the attraction of financing for the performance of all works related to the creation and operation of the industrial park;
- acquire property, property and non-property rights, attract the necessary investment resources, other financial and material means, including attracting investments to create and ensure the functioning of the infrastructure of the industrial park;
- conclude an agreement with the resident of the industrial park on the conduct of industrial production and (or) technical implementation activities, providing for the use of the land plot and infrastructure of the industrial park, engineering and technical support;
- perform the functions of a developer in relation to the implementation of industrial park infrastructure development projects, including the construction of transport infrastructure, gas, electricity, heat, water supply, water treatment and drainage, other infrastructure facilities and improvement of collective use on the

territory of the park;

- be responsible for the operation and maintenance of infrastructure facilities located on the territory of the industrial park;
- to assist the residents of the industrial park in placing their own (created) enterprises on the territory of the industrial park, including in the development, examination and approval of the necessary documentation, the selection of contractors and the conclusion of construction contracts;
- provide complex service services for communal provision, cleaning, access to social infrastructure facilities, etc.;
- regularly provide the authorized body, local self-government bodies with information on the progress of the implementation of the investment agreement regarding the creation of an industrial park.

The University of Phoenix (USA) conducted a study of Silicon Valley companies, the purpose of which was to identify the skills most needed by candidates for top positions. As a result of summarizing the obtained data, the scientists came to the conclusion that professional requirements are only in 11th place. And the following 10 skills are most in demand [65]:

1) Philosophy of critical thinking, analysis, argumentation and decision-making

The ability to doubt and the willingness to ask the question: "Is it really so?". Analysis of what is happening and the ability to make decisions in any possible situation.

2) The ability to see trends

Deep understanding of trends, their causes, factors that influence them. The ability to understand signs, to generalize them, to model new directions that have not yet manifested, but are in the process of taking shape. This makes it possible to create tomorrow's competitive advantages today, thereby allowing you to be one step ahead of your competitors.

3) Deep knowledge and vision of the future of the industry, ability to work with information flows

The flow of information is so great today that one of the key skills is the ability to clearly filter data, rejecting unnecessary informational garbage and choosing the most

valuable. Deeply analyze the industry, cross-industry trends and, thus, see the possible directions of transformation and development of each of the sectors.

4) The ability to predict consequences

Understanding what results will lead to certain actions or inaction, every decision is the management of risks, future challenges and opportunities. Ability to predict consequences, both positive and negative, and manage them.

5) The ability to act and make effective decisions in conditions of uncertainty

The ability to focus, concentrate and mobilize all resources in any situation. In conditions of uncertainty, it is necessary to act promptly, quickly find effective solutions, and at the same time understand and manage their consequences and future risks.

6) Constant focus of the entire range of efforts on the needs of the end user of products or services

Consumers and their preferences in the conditions of competition change and become more complicated time and time again, which requires constant feedback and work with customers and their feedback. Customer orientation in all business processes is a guarantee not only of meeting their needs, but also the ability to anticipate and create new needs.

7) Wisdom and resilience as a leader and manager

Today, this is one of the key characteristics of a leader. The ability to find a compromise and be flexible is wisdom; and the ability to defend one's convictions, vision, and follow one's intuition in any situation is resilience. Their combination defines leadership today.

8) Knowledge of the entire range of missions, business strategy and job duties of the head of the company

A clear understanding of the mission and business strategy of the highest position in the company, the vector of its development direction, the vector and specifics of the CEO's management is very important,

even if the candidate is being considered for the position of vice president or head of a department or unit. It is necessary to realize what are the tasks and priorities of work in this position, how the tasks and priorities of such a manager correlate with the tasks and priorities of even higher management.

9) Ability to form teams and objectively manage them

The departure from the construction of organizational structures based on functions is found in most companies today. Building flat organizational structures with a minimal level of hierarchy and based on teams is an approach that has proven to be effective. In this connection, the ability to form teams and manage them is one of the keys for top managers.

10) In-depth knowledge and skills of quantitative and qualitative assessment of own work and the work of subordinate units

The ability to understand the relevance of work, to single out the most important aspects and reject unnecessary ones, to evaluate all types of resources for their implementation. Achieving good results is possible by increasing efficiency in work and minimizing all types of costs for their implementation. And for this, you need to be able to analyze, quantitatively and qualitatively evaluate your work and the work of your subordinates.

In my opinion, having a technical education manager is one of the key conditions for managing industrial centers, technology parks, and technopolises. The second basic condition is the availability of basic knowledge in the field of finance and business management. The second basic condition is the availability of basic knowledge of business and finance.

The head of the technology park must understand that the innovation structure is a complex, multifaceted management process, and therefore skills will have to be improved daily. And therefore, there are individual training and training courses. As a rule, this training consists in visiting various seminars and trainings, where so-called "business games" are held and examples of real situations are analyzed.

For any organization, the high level of qualification of its employees and their ability to communicate and identify customer needs is the key to the company's

success in the market, earning profits and further business development.

Today, large companies and corporations, especially those with foreign capital, have realized the need for training and advanced training of their personnel. One of the effective forms of learning is training, which is defined as a planned process of modifying the attitude, knowledge or behavioral skills of a learner through the acquisition of learning experiences in order to achieve effective performance in one type of activity or in a certain field [59].

Various training programs have different content and purpose: training in the school system (France), training for adaptation to the labor market (Sweden), self-development, training at the workplace, development of collective responsibility and individual responsibility and individual initiative (Japan), preparation for work (Great Britain), improvement of technical skills and communication skills of employees, etc.

In the organizational structure of the industrial park there is a department of personnel training and development.

This department develops and organizes trainings for existing employees of the Park, which are mainly aimed at personal development and improving the quality of customer service.

For example, there is the "Service Star" training aimed at improving teamwork, self-improvement, and personality development.

Specialists participate in it, and it is not specialized in a certain area of the park's work, but is focused on correct communication with the client, approaches to identifying his needs and client retention.

Such trainings are useful and must continue to be conducted, however, given the established facts, there is a need to develop and implement special educational trainings for potential employees, where they would be able to communicate with the client in practice, identify their needs, and gain skills in working with software. This is the kind of job preparation training developed and presented below.

In the simulation of various types of training, several integral components can be distinguished [66]:

1. Explanation (providing new information).
2. Demonstration (showing the possibilities of using knowledge).
3. Imitation of correct actions (practice of real situations and execution of relevant

operations).

#### 4. Consolidation (performance of operations at the workplace after employment).

Today, there are many training companies on the market that are able to develop and conduct corporate trainings, but such training may turn out to be very expensive and not give the expected result, because no matter what the training company is, its own training department will be better able to reveal all the specifics of the work of managers industrial park and focus the training program on the most important aspects.

An important fact of choosing the path of own development of training for managers is also the fact that the park already has a training department, and therefore there is no need to create a new training development department, which requires significant funds, and it is enough to identify responsible persons in the training and personnel development department , who will work on developing a training program and implement manager training for trainees.

This training is a consolidation of the skills and abilities that the intern received at a higher educational institution, during independent work with instructional material and direct internship with a park manager.

Therefore, the following conditions must precede the conduct of the following training "Industrial park management manager": there is a group of persons out of 10-12 people who have a higher economic education and undergo an internship at the park for at least one month, the selected persons are provided with instructional material, the knowledge of which is necessary for the work of a manager, at least two weeks in advance.

After fulfilling the above-mentioned conditions, the training "Industrial park management manager" is held for the formed group of persons according to the following program presented in table 3.4.

Table 3.4

**Training program "Industrial Management Manager parks"**

No	Stages of training	Work methods
1	2	3
1	Introduction to training:	
1.1	General overview of the work of the park, its goals and achieved results	Presentation, mini-lecture, discussion of the general goals of the park, individual goals of its employees and them opportunities
1.2	Getting to know the training participants	Presentation of the trainer, a brief presentation of 3 important facts from his life outside the Park, a similar presentation of the training participants by them personally and the expression of their expectations from the training. A personal greeting all participants with each person present
2	Statement of the problem: What necessary for work manager industrial park?	Mozkova attack: thoughts and offersparticipants to solve the problem
3	Analysis of the components of the problem:	
3.1	How to talk to a client? - friendly atmosphere - colloquy	Discussion of elements
3.2	What instructional material is necessary in the work? - technological cards	Discussion of elements

	<ul style="list-style-type: none"> <li>- instructions</li> <li>- park policy</li> <li>- advice from colleagues, etc.</li> </ul>	
4	Work in specific directions	
4.1	Communication with the client: <ul style="list-style-type: none"> <li>- features of interaction between people of different temperaments</li> <li>- technology of active interaction</li> <li>- role players                      games, revisionplots</li> </ul>	Discussion, brainstorming, mini-lecture, review and further analysis of stories with possible situations that arise during a direct conversation with a client.
4.2	Knowledge instructivematerial: <ul style="list-style-type: none"> <li>- a role-playing game</li> </ul>	Work in pairs, 1 participant is a client, 2 is a manager of industrial park management. A conversation based on the initial data in the "client" card provided by the trainer. Change of roles. Checking the results, discussing errors and features of the park's programs.
4.3	Work in softwaresecurity <ul style="list-style-type: none"> <li>- examples of work in programs on a large screen</li> <li>- independent work of participants in the software</li> </ul>	Mini-lecture with examples of work in software, issuing cards with individual tasks, individual work of participants according to personal computers, checking and discussing tasks.
5	Summing up	
5.1	Definition result solution deliveredproblems	Joint discussion
5.2	Expression thoughts participants,of justification or No their expectations from the training	Individual speeches participants and the coach's final speech.

The introduction to the training is conducted by the trainer. At this stage, he should introduce himself and give an overview of the park. Tell the participants about the scope of the Park's work, its long-term goals, mission and determine the role of the training participants in the Park's system.

Special emphasis should be placed on the capabilities of park employees and

achieving their individual goals. Each participant should feel the importance of his future work for the industrial park and his responsibility, find his place and role in the activities of the park.

In the daily work of a manager, situations often arise when it is necessary to communicate with colleagues in person, by e-mail or by phone. Therefore, communication between employees is very important and should be based on friendly relations and good attitude towards each other. Such a task is solved by the next stage of the training - getting to know each other. For this, it is good to use an informal atmosphere.

The trainer should be the first to introduce himself and state 3 facts from his life outside the Park, then each training participant in turn goes to the middle of the hall, introduces himself and states certain interesting facts from his life. In the future, training participants will be able to easily communicate with each other while working in the park, will feel a friendly relationship with each other, and will help in solving problematic issues.

Also, you can use a handshake as a non-verbal channel of information exchange to get to know each other.

The next stage of the training is the formulation of the problem. The main problem is to determine what is needed to work as an industrial park manager. The purpose of the training is to determine the main provisions that must be followed by the manager and to consolidate the acquired knowledge and skills for effective work by the manager, meeting the needs of the park and own goals.

At this stage, it is necessary to use the method of brainstorming, to identify the main components of the problem for their further analysis and solution. The opinions of the participants are recorded on the board to determine at the end of the training the result of the work and the level of achievement of the set goal.

The main components of the defined problem are: the ability to communicate with clients, knowledge of instructional material, skills and skills in working with software. In the course of the work, other components may be determined,

that should be justified participants of the training and included in further work.

After defining and discussing the main elements of the problem posed at the training, it is necessary to take a short break during which the participants can relax a little, drink coffee or tea, exchange ideas among themselves, and after 15-20 minutes, move on to the next part of the training.

The next stage is the analysis of the components of the problem. Communication with clients is an important component of a manager's work, no matter how much theoretical and practical knowledge he has, but without the ability to communicate with clients, to find a common language, it is impossible to work as a manager.

It is necessary to determine through discussion how the park employee should communicate with the client, which is the most important. The analysis of the instructional material should be based on a brief overview of the main provisions and instructions.

Working in software is a very responsible business, so first of all it is necessary to define and discuss the basic rules of working with a personal computer and software. It is necessary to convey to the listeners the importance of information security in the park, which includes access to a personal computer only by the employee responsible for it, who has official access to work on it, the impossibility of access to the work computer of other persons and other employees of the park, the need to block the system. if the computer is left unattended by a responsible employee. The concept of ethics can also be discussed here.

After the discussion of the components of the problems, they move on to the next stage of the training, which is presented as "Working along defined directions". In this part of the training, the participants should feel themselves as managers of the industrial park and test their knowledge and skills.

In order to consolidate communication skills with clients, it is possible for the trainer to provide the main theses of proper treatment with the client [67]:

1. Mandatory greeting of the first employee of the park with the client.
2. Introduction and questions about how the manager can address the client.
3. Obligatory communication with the client on "You", and with respect.
4. A friendly atmosphere, a smile, the use of terms understandable for the client in the conversation, and if specific terms of the technopark are used, then with a mandatory explanation and interpretation.
5. Using questions in the conversation and consistently identifying the client's needs, giving him the right to choose with a recommendation and explanation of one or another way to satisfy the client's needs.
6. It is obligatory to say goodbye to the client, wish him success and invite him to the park again, provide a business card or the branch's phone number.

Further, in practice, with the help of video stories and examples of correct and incorrect communication, participants are given a real opportunity to independently identify errors in the work of story managers and offer their own ways to solve certain problems, search for the best communication approaches with different clients.

Special emphasis should be placed on working with problem customers who may shout, complain about the park's work, distract and frighten other customers. A special algorithm of actions is also required here. As a rule, it is recommended to communicate with such clients in separate closed rooms or rooms, to speak politely and with respect, to show sympathy and understanding of his problems, to offer ways to solve the existing situation, to settle the conflict.

After determining the effective methods of communication, it is necessary to check and consolidate both this knowledge and the knowledge of the instructional material studied by the participants independently and at the departments during the internship. For this, a special game is held, which is the next stage of training.

The role-playing game involves dividing the participants into pairs at will or any which calculation (for example, on the first and second) and further work of this pair together.

The trainer defines, for example, the first numbers as "managers", and the second as their "clients". Special cards are issued to "clients" on which a certain situation in the park is described in detail, which arises from the manager of the

industrial park. The client turns to the manager and the game begins. The industrial park management manager must determine whether it is possible to conclude a contract with him based on the initial information that the client tells him.

After the game, the industrial parks manager writes down all the main points and decisions he made about his client. Then the roles change, the coach gives out the following cards. Each participant should visit 2-3 times as a manager and 2-3 times as a client. During such a game, participants learn to communicate with customers, identify and satisfy their needs, and make the right decisions.

The developed situational tasks for the role-playing game reflect real situations that may occur during the work of an industrial park manager. Solving them will make it possible to determine the knowledge of the instructional material and give the participants the skills to communicate with customers.

All tasks have characteristic features and specifics of the industrial park's activity, as well as the situation.

After the end of the game, all the notes are collected and after being read by a coach or a participant of a certain situation, they begin to read and discuss the decisions made by the managers of the industrial park.

In the process of discussion, problematic points are identified and theoretical knowledge of the participants is consolidated.

Four situational tasks have been developed for the role-playing game, which can be changed and adjusted with each subsequent training, if possible, the number of situational tasks can be increased for each participant up to 5, for better consolidation of knowledge and acquisition of a wider range of skills and abilities.

The next stage of training is work in software.

In order to best consolidate the learned material, at the beginning of the work, the trainer needs to make a mini-lecture with a display of practical actions in the software on a large screen.

The second part of the module on working with software is conducted by each training participant using a personal computer on which demo versions of the software products of the industrial park are installed.

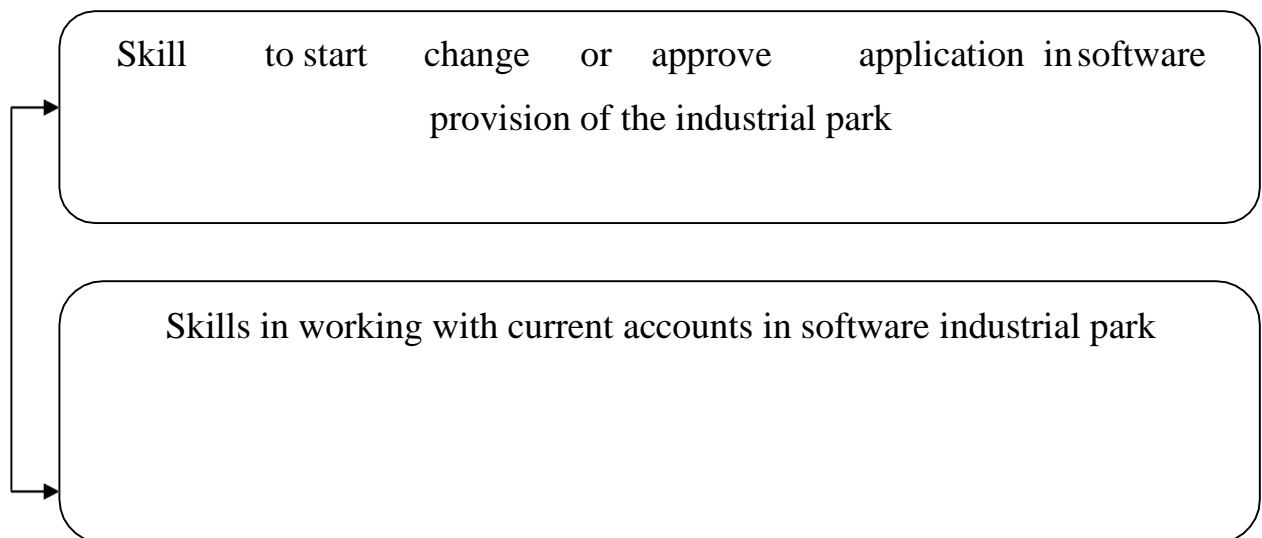
Participants are given cards with tasks that they must complete independently, and the trainer will check the completed work.

The number of cards with tasks should correspond to the number of main software products in which the future managers of the industrial park will work.

Tasks should correspond to real situations at work, reveal the necessary knowledge and develop relevant work skills.

At the end of working on personal computers, the trainer makes notes of the most common mistakes and after finishing working in the software, starts discussing the tasks and emphasizes the shortcomings in the work.

The main operations that a training participant must master in order to successfully pass the training and, accordingly, successfully work in the park at his workplace are presented in Figure 3.1.



### **Rice. 3.1. Software operations mastered training participant**

The final stage of the training is summing up. As at the beginning of the training, the trainer turns to the board on which is written the problem that should be solved by the training and its main components. The trainer sums up by communicating in parallel and clarifying certain moments of joint work together with the participants.

At the end of the training, each participant again goes to the middle of the hall and talks about what knowledge he gained, what he improved, whether his expectations from the training were met.

The final word is given by the coach, who thanks everyone for their attention

and wishes them success in their work.

One of the further directions of development of this training is the use of e-mail, which is available in all departments and for every employee who has a personal computer and access to e-mail.

The essence of the development and improvement of the training consists in sending letters to the managers of the industrial park with a request to indicate in the reply letter real problematic or specific situations that they encounter in their daily work.

Such stories will help trainers and training developers to improve the practical part, make the role play more interesting and practical, and find new problematic aspects in the work of managers.

The introduction of trainings is a popular and quite profitable investment both in business, which will bring more profits in the future, and in the personnel of the organization, which will work more efficiently accordingly, so the development and implementation of such trainings should continue to take place not only for managers of the industrial park, but also for other park staff. Each of such trainings should take into account both mandatory parts and specific parts that affect a specific type of work [68].

The training "Industrial park management manager" was developed based on the real need for training new employees, it will help in the adaptation of interns to their future workplace, teach communication skills with people, i.e. customers, interest employees in self-development and self-improvement, help define and achieve set goals goals

For the park, its effectiveness consists in increasing the efficiency of the industrial park managers and, accordingly, improving the quality of the industrial park's activities, reducing losses, and making industrial park managers aware of their responsibility for their work.

## **Prospects for the creation of industrial parks as a driver of the formation of business cities during the post-war reconstruction of Ukraine**

Industrial parks have become one of the most effective tools of economic growth - they bring eight rubles of investment for every ruble of investment in infrastructure.

According to the traditional Western classification, industrial parks are divided into greenfields, that is, sites created from scratch, and brownfields - organized houses of old production sites through reconstruction. They also differ in their business model: the first are focused on the accommodation of large and medium-sized enterprises with capital-intensive projects and the sale of land plots, the second - on medium, small and micro-enterprises that rent space.

Industrial parks are one of the most effective tools for the economic development of territories and attracting investments, including foreign ones. It is economically very profitable - thanks to the benefits provided, the time of creating productions and bringing them to self-sufficiency is significantly accelerated. The state's interest in the development of industrial parks is reflected in special support measures. With the support of the authorities, direct budgetary investments are provided in the construction of industrial parks and reconstruction of production sites [69].

World experience has developed many methods of combating crisis phenomena aimed at the progress of the state's economic sector. At the current stage of development, there is a significant number of special economic zones that differ only in their functional purpose. These zones include: free economic zones, priority development areas, foreign trade zones, technopolises, industrial parks, etc.

Industrial parks are widespread, first of all, in developing countries. The main goal of their creation and activity is to attract new ones investments, the construction of manufacturing enterprises, an increase in the number of jobs and budget revenues in the form of taxes, fees and other payments [70].

The functioning and other elements of the activity of industrial parks have

been regulated by the legislation of Ukraine since 2012. As of the end of 2021, more than 50 such entities were registered in Ukraine, but out of such a large number, only a few of them actually functioned [71].

Among the experts, there is no unified position on the reason for the failure of projects within the framework of the created industrial parks. Some emphasize that there is no appropriate culture for the development of industrial parks in Ukraine due to their unknownness and incomprehensibility. Others point to insufficient support from the state, primarily financial, which entails an indifferent attitude towards industrial parks in general. That is why the issue of active participation of the state in the process of stimulating the development of industrial parks remains relevant.

The definition of "industrial parks" is contained in the Law of Ukraine "On Industrial Parks" dated June 21, 2012 No. 5018-VI (hereinafter - the Law), but it is large in scope and difficult for ordinary citizens to understand. In simple words, these are special sites (clearly defined and separated land areas), on territory where is carried out industrial and processing economic activity, scientific and technical activity, as well as activity in the field of information and electronic communications. Their feature is that on such territories works special legal regime, determined legislation characterized by various benefits and incentives [72].

The law regulates in detail the procedure for creating industrial parks, which can be conditionally divided into the following stages [72]:

- 1) initiating the creation of an industrial park (the initiator of the creation may be owner and areas in person body state authorities, of local self-government, as well as a private person and lessee of a land plot);
- 2) development and approval of the concept of the industrial park (relies on the initiator of the creation of the industrial park; if the land plot is leased, the lessor must agree on such a concept);
- 3) making a decision on the creation of an industrial park (such a decision is taken by the initiator of the creation of the park for a period of at least 30 years);
- 4) provision by the initiator of the creation of the park to the authorized state body of a copy of the decision on the creation of the industrial park, its concept, as well as a package of documents necessary for registration (for the first two items, the deadline

for submission is 5 working days from the date of the decision on the creation of the industrial park);

5) inclusion of the park in the Register of Industrial Parks on the basis of an application submitted by the initiator of creation (within 45 working days from the moment of receipt of such an application);

6) conclusion of an agreement on the creation and operation of an industrial park between the initiator of the creation and the management company of the industrial park (the term of such an agreement is set within the term for which the industrial park was created).

Separately, we should dwell on the requirements established by the Law, which are presented to the land plot within the boundaries of the industrial park:

- the plot of land must belong to industrial lands;
- it must be suitable for industrial use, taking into account the conditions and restrictions established by the relevant urban planning documentation;
- the area of such a plot (or adjacent plots) should be from 10 to 1000 hectares.

Since the state is directly interested in the success of industrial parks, the following measures to stimulate the establishment and functioning of industrial parks are enshrined in the Law:

- compensation (full or partial) of the interest rate on loans;
- provision of funds on a non-refundable basis, including for ensuring the construction of adjacent infrastructure facilities;
- compensation for the costs of connection and connection to engineering and transport networks;
- the possibility of establishing tax and customs incentives.

Customs preferences were introduced simultaneously with the adoption of the Law without unnecessary delays. In particular, when imported into the customs territory, the following are exempted from customs taxation [73]:

- equipment, devices and components for them, materials that are not produced in Ukraine, are not excisable goods imported by the initiators of creation - business entities, managing companies of industrial parks for the purpose of arranging industrial parks;

- equipment, devices and components for them, which are not produced in Ukraine and are not excise goods, which are imported by participants of industrial parks for carrying out economic activities within the boundaries of industrial parks.

The specified objects are not exempt from taxation only on the basis that they fall under such categories. The list of such objects is approved by the government. Tax-free funds can be used only for the purposes specified by the Law.

Other specific measures to stimulate the development of industrial parks are not foreseen, so the legislator decided to expand the list of such measures.

On June 21, 2021, the Verkhovna Rada of Ukraine adopted in its entirety draft Law of Ukraine "On Amending the Tax Code of Ukraine on Creating Favorable Conditions for Attracting Large-scale Investments in Industrial Production" dated June 22, 2021 No. 5688. The changes include:

1. Income exemption for 10 years. Such a preference is granted to a participant of an industrial park on the basis of an application submitted by him to the supervisory body in an arbitrary form. At the same time, such an application will be considered automatically accepted if the supervisory body does not refuse within ten working days from the day of its acceptance. A mandatory condition is the direction of profit in the development of the activity of the participant of the industrial park within the boundaries of the industrial park. Violation of this condition is the basis for losing the status of an industrial park participant.
2. Exemption from import tax on the added value of operations involving the import of new devices (equipment) by participants of industrial parks into the customs territory of Ukraine exclusively for their own use. Such goods must be manufactured no earlier than three years before the date of their import, must not be used. At the same time, it is prohibited to alienate such goods within 5 years from the date of their importation into the territory of Ukraine, as well as to use them for purposes other than their intended purpose. Violation of such prohibitions entails the emergence of debt for the payment of tax obligations in the amount of unpaid tax, as well as interest.
3. The right of local self-government bodies to establish benefits from the tax paid in the relevant territory, from non-residential real estate objects located on the

territory of the industrial park and owned by participants of the industrial park. Also, local self-government bodies have the right to reduce the land tax rate, the rent for state and communally owned land, and to exempt them from paying land tax altogether.

On the same day, June 21, 2022, the Verkhovna Rada of Ukraine adopted in its entirety the draft Law of Ukraine "On Amendments to the Customs Code of Ukraine on Creating Favorable Conditions for Attracting Large-scale Investments in Industrial Production" dated June 22, 2021 No. 5689.

The draft law provides for exemption from customs duties when the participants of industrial parks import new equipment (devices) into the customs territory of Ukraine exclusively for their own use. Such goods must meet the requirements identical to the above-mentioned law (manufactured no earlier than three years before the date of their importation, were not in use), and also be included in the list of UCT EZD defined by law.

As in the previous case, it is prohibited to alienate such goods within 5 years from the day of their importation into the territory of Ukraine, as well as to use them for purposes other than their intended purpose. Violation of such prohibitions entails the emergence of a debt for the payment of import duties and penalties.

The fundamental difference between the adopted draft law and the current version of the Law is that the changes significantly simplify the procedure for applying such a preference, as clear requirements for goods and their list are established with reference to the UCT of the Economic and Monetary Union. In addition, the Resolution of the Cabinet of Ministers of Ukraine "On approval of the Procedure for the importation into the customs territory of Ukraine by initiators of the creation of industrial (industrial) parks - business entities, companies of such parks for their arrangement and participants of industrial (industrial) parks for carrying out economic activities within the limits of the said equipment parks , devices and components for them, which are not manufactured in Ukraine, materials, which are not excise goods and are exempted from customs taxation" dated June 19, 2013 No. 558, as of today, does not contain appendices with such lists.

The laws adopted by the Verkhovna Rada of Ukraine introduced additional

mechanisms for stimulating the development of industrial parks in order to reduce the tax burden on their participants. In particular, the possibility of exempting participants of industrial parks from income tax, value added tax and import duty (for equipment that imported). In addition, local self-government bodies are empowered to introduce certain tax benefits.

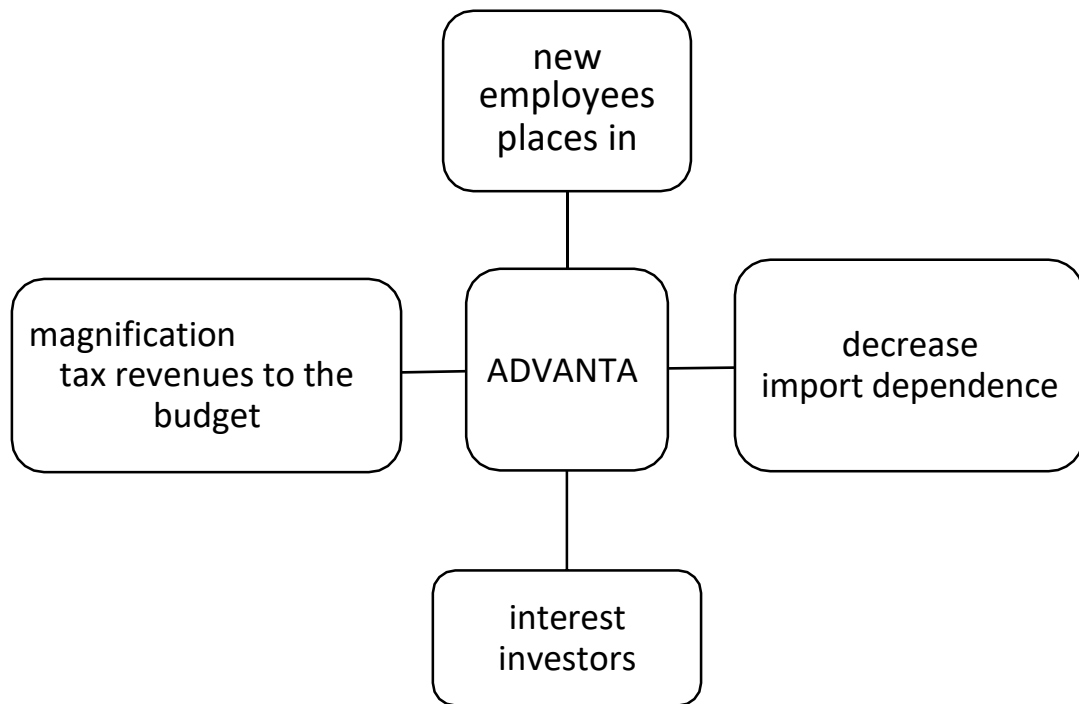
It is obvious that the process of development of industrial parks in Ukraine is in a state of stagnation, therefore it needs decisive changes in regulatory regulation. The state, for its part, is trying to attract business entities to participate in such projects by introducing tax benefits, however, setting a number of restrictions on the use of such preferences, as well as released funds.

On the one hand, such measures will contribute to the inflow of foreign investments into the national economy, although in wartime conditions this sounds rather skeptical. They can also help domestic producers to preserve their production and jobs by moving from dangerous regions.

On the other hand, the proposed measures do not solve the problem globally on the scale of the entire country, but only strengthen the position of some regions (western and central regions of Ukraine). This may be discriminatory against other regions where today it seems dangerous to continue doing business and which need state support to a greater extent [71].

We should also not forget about the following risks of the introduced changes: unequal rules of the game for business provoke corruption phenomena; benefits for certain regions cause burdens for others; in underdeveloped economies, such benefits do not have a significant effect.

Thus, industrial parks are an effective tool for increasing the investment attractiveness of the region (Fig. 3.2):



**Rice. 3.2. Advantages of creating industrial parks in the region**

Thus, industrial parks are an effective tool for increasing the investment attractiveness of the region (Fig. 3.2):

1. The development of industrial parks involves the creation of new jobs in the region;
2. Support of medium and small businesses in the region will reduce the level of import dependence;
3. The development of new industries will increase the interest of investors and contribute to the attraction of new investments;
4. The development of the region's industry will increase tax revenues to the budget;
5. Industrial parks allow to develop interregional and international relations in the industrial sphere;
6. State support industrial parks will allow to develop high-tech, competitive production.

### **CONCLUSIONS TO SECTION 3**

A financial and economic analysis of the activities of domestic construction enterprises was carried out, the general trends in the development of the construction industry in Ukraine were analyzed. The positive dynamics of the economy, which has been observed in recent years, has intensified construction activity and contributed to the development of the industry.

It was found that digitalization is the main lever that can ensure the development of the construction industry in the future.

Recommendations have been developed to improve the legal conditions for the development and commercialization of innovative construction projects in a favorable technopark environment.

A qualified manager is a key element of the effective functioning of the technology park, and therefore the basic skills that the candidate should possess have been determined and analyzed. Based on the analysis, the training program "Industrial park management manager" was developed.

Prospects for the creation of technology parks have been studied and presented, a number of measures that will improve the operating conditions of technology parks in Ukraine are given.

## CONCLUSIONS

The initiation of an idea, the development and release of an innovative product or project should always bring a useful result. It can be economic, manifested in reduced costs of the enterprise for production and increased profit, as well as social, ecological, etc.

The scientific and technical potential of any business needs to be supported and multiplied. The state, as a guarantor of safe and successful functioning on the market, should direct innovative activity in the right direction, namely, create and develop a technology park environment as an element of the innovative infrastructure that ensures the development and production of an innovative product and introduce it into the field of material production for a long-term perspective.

One of the main questions that arises when creating any technology park is whether it is possible to ensure the full-fledged operation of the technology park in the conditions of the current economic system in Ukraine. It should be noted that today it is impossible to provide an effective and efficient system built solely on the experience of developed countries in our conditions, because today there is no appropriate socio-economic environment, developed labor market, capital market, etc. Therefore, in Ukraine, it is necessary to develop, implement and improve its own concept of creating technoparks, which would take into account the modern features of the Ukrainian economy and legislation.

In my research, I took the construction industry as a basis, because at the moment, innovative construction activity and related scientific research and design developments require primary state support. The implementation of innovative technologies in the construction industry of Ukraine is quite relevant.

Studies have shown that the market for innovative construction products is beginning to fill up. Developer scientists are looking for an alternative to harmful building materials, shortening the construction period, mastering BIM-

technologies, build houses on 3D printers. And this means that for innovative progress it is necessary to create a single cluster, a territory where the "development-innovation-production" cycle would be clearly established. Therefore, there is a need to create technology parks with a construction profile.

Studies have shown that there are a number of companies in Ukraine that would expand their activities on the territory of the technology park. For example, the Haus.me LLC company analyzed by me is the most innovatively active enterprise, and its innovative activity demonstrates the highest results. The company uses 95% of the latest construction technologies.

Yes, there are a number of problems that hold back innovative progress, for example. creation of appropriate infrastructure and its financial support at the state level, lack of labor resources, lack of lending funds and lending organizations, etc. But the proposals I have developed to improve the current situation of technology parks will help to establish a functioning system.

But the key aspect of the development and flourishing of the activity of technoparks, the establishment of all connections of activity, the creation of a single cycle of functioning and the release of a unique product is impossible without a manager. The management of the technology park must undergo strict training and competitive selection. The manager of the technopark environment should be versatile, able to control all stages of the product life cycle, attract residents, investors, analyze the market situation, attract marketing tools, collect information about consumers and much more. In my work, I developed a training course for technopark managers, which is an effective training tool.

The main goal of the activity of technology parks is the complex organization of knowledge-intensive production by maximally promoting the creation and introduction of new technologies and stimulating the development of the creative potential of specialists. Concentrating scientific, industrial and financial the resources of technoparks ensure reproduction of the full life cycle of innovations: research - development - implementation - mass industrial production of science-intensive high-tech products competitive on world markets.

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