

Ministry of Education and Science of Ukraine
Kyiv National University of Construction and Architecture

Wei Yingjie

to the attestation graduation work
to obtain a master's degree
on the subject:

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

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

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- **The relevance of the topic** ‘Renovation technologies as a prerequisite for the introduction of innovative measures in the management system of construction enterprises’ is due to the need to update the technological and management infrastructure of the construction industry, which will help to increase its efficiency and competitiveness. The use of renovation technologies in construction not only reduces costs and increases the speed of work, but also ensures the resilience of enterprises to economic and technical changes. Since the construction industry is an important sector of the economy, the integration of innovative technologies into the management processes of enterprises can significantly improve the quality of projects, reduce their costs and improve the use of resources, which is important for the sustainable development of the national economy.

- **The aim of the master's research is to** identify innovative tools for managing organisations and develop theoretical foundations of management in the context of renovation technologies of construction on their basis.

- **The main objectives of the study:**
 - 1) to study the current state of the problem under study;
 - 2) to clarify the conceptual and terminological apparatus of the study;
 - 3) to identify the main factors influencing the management of innovative organisations in construction;
 - 4) to develop and theoretically substantiate the principles of management of innovative construction organisations;
 - 5) to outline the prerequisites for the introduction of renovation technologies into the technology park environment;
 - 6) to develop methodological recommendations on innovative tools for the management of organisations in the context of renovation technologies in construction.

- **Object of research:** innovative management tools for construction organisations.

- **Subject of the study:** practical application of innovative management tools for organisations in the context of renovation construction technologies.

- **Innovations in construction:** Modern construction requires the introduction of technologies and methods aimed at improving efficiency, environmental friendliness and quality. However, the construction industry remains one of the least digitized (only 13% of global GDP), which reduces its innovation potential.
- **The role of the state in regulating innovation:** In Ukraine, the state actively supports the innovative development of the construction industry by funding research and stimulating the activities of enterprises. This includes support for technology parks, which contribute to job creation and regional economic development.
- **Innovative materials and technologies:** The use of environmentally friendly materials, recycling, and innovative architectural solutions are priorities in construction to help reduce costs and improve the environment.
- **Technology parks and their impact on the economy:** They create sustainable infrastructure, optimize budget expenditures, and contribute to the development of the local labor market, which improves the investment climate and ensures the socio-economic stability of the regions.

Historical development of the term **“innovation”**: The term was first coined by Joseph Schumpeter, who defined innovation as a process of irreversible changes in production that involves new combinations of factors. Other classics (H. Hartman, B. Santo, etc.) consider innovation as a process that contributes to the improvement of life through the development of ideas and technologies.

- Technology parks facilitate the commercialization of scientific knowledge by turning it into innovative products, which is important in the context of increasing global competition. They support the development and implementation of advanced technologies in various sectors, including the construction industry.
- The laws of 1999 and 2005 provided benefits for technology parks (tax exemptions and other financial incentives), which were intended to create favorable conditions for the development of innovative projects. However, with the change of political course after 2004, this support has significantly decreased, which has had a negative impact on the country's innovation potential.
- Technology parks can become centers for the production of innovative products that meet international standards and are in demand on international markets. However, for the full development of technology parks, it is necessary to restore government support programs that would attract investment and stimulate the innovation environment in the country.

Greenfield technology park - built on undeveloped land.

Advantages: complete freedom of planning, modern standards, environmentally friendly territory.

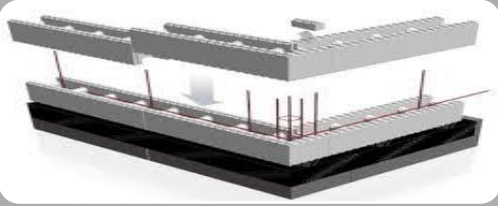
Disadvantages: high infrastructure costs, lengthy approval procedure, possible hidden restrictions of the site.

Brownfield technology park - uses existing industrial facilities.

Advantages: ready-made infrastructure, savings on communications, the ability to launch quickly.

Disadvantages: restrictions on redevelopment, outdated infrastructure, legal risks.

Key aspects of the transition of construction companies to innovative technologies:



Modern materials and structures

- The introduction of the latest building materials (e.g., Thermodom technology using thermoblocks for energy-efficient walls), which increases thermal insulation and reduces heating costs.



Innovative construction methods:

- Building Information Modeling (BIM) is a technology that integrates all stages of construction (planning, design, execution, and operation) into a single three-dimensional model, improving communication and decision-making accuracy.
- Prefabrication: production of building elements in factories for quick assembly on site, which significantly reduces construction time.
- Internet of Things (IoT): Facilitates the management of construction processes and the supply of materials, and enables real-time monitoring of the facility's condition.



High-tech equipment:

- 3D printing allows you to quickly create building elements with precision and less resource consumption.
- 3D laser scanning and drones for analysis and control of the construction site, improving the accuracy and efficiency of processes.
- Modern 4D, 5D and 6D models: Taking into account time, energy, and financial parameters for a complete project assessment at the planning stage.



Virtual and augmented reality:

Allows clients and engineers to evaluate a project in real conditions before construction begins.

Technology parks provide a complete infrastructure for the development of innovative startups and enterprises. They include innovation and technology, consulting, training, information and marketing centers, as well as laboratories for research and development.



Greensburg Business Incubator (USA): Founded in 2009 as a space for startups and small businesses. The building has a high level of energy efficiency (LEED Platinum certificate) and provides space for new businesses at reduced rental rates.



Unit City (Ukraine): An innovation park in Kyiv based on a former factory, opened in 2017. Contains educational centers, business campuses, technology laboratories, and other innovative spaces that promote startups and research initiatives.



Bandung Technology Park (Indonesia): It cooperates with the Telkom Institute and the Ministry of Industry. The main goal is to support innovation, research and development of the telecommunications sector, as well as entrepreneurship education.



Ukmerges Parmones Parkas (Lithuania): A Norwegian industrial park in Lithuania with a focus on industrial development and cooperation. The companies in the park share infrastructure and resources, which promotes cost savings and cooperation between enterprises.

A key factor in the dynamic development of a technology park is its support from the state. The state can provide support to technology parks in the following areas

- investments in the construction of buildings, structures, infrastructure, and equipment;

providing access to regional and national scientific and technical grants;

development of special privileges and privileges in the field of land relations and lease, taxation, crediting, import-export of high-tech products;

joint development of research projects with leading research institutes;

assistance in organizing the exchange of best practices.

Proposals for the effective functioning of technology parks in Ukraine:

Improve the legal framework: Introduce tax and customs incentives for residents of technology parks (tax exemptions for 5-10 years, equipment import privileges), using the European model of incentives and public-private partnerships to attract investment.

State preferential financing: The state should support technology parks by providing preferential loans for equipment, reimbursement of electricity costs, and partial compensation for investments.

Integrated innovation infrastructure: Create eco-friendly cities within technoparks with developed infrastructure such as industrial facilities, business accelerators, export hubs, and coworking spaces to support innovation.

Regional specialization: Identify priority industries for each region by conducting surveys and analyzing data (human resources, transportation, markets) to develop technology parks in accordance with regional needs.

Market monitoring: Continuously monitor changes in labor and sales markets to avoid imbalances in demand for services and goods.

The role of local authorities: Local authorities should actively promote the investment attractiveness of the region by aligning technology park development projects with regional priorities and market needs to ensure economic growth.

Implementation of a comprehensive system for evaluating the effectiveness of innovation activities of construction industry enterprises on the example of LLC “Haus.me”

The study is aimed at developing a system for evaluating the effectiveness of innovative activities of construction enterprises on the example of Haus.me LLC, which is engaged in the production of innovative autonomous houses. The main purpose of the work is to create an indicator that will allow the company to assess the originality of its innovative developments.

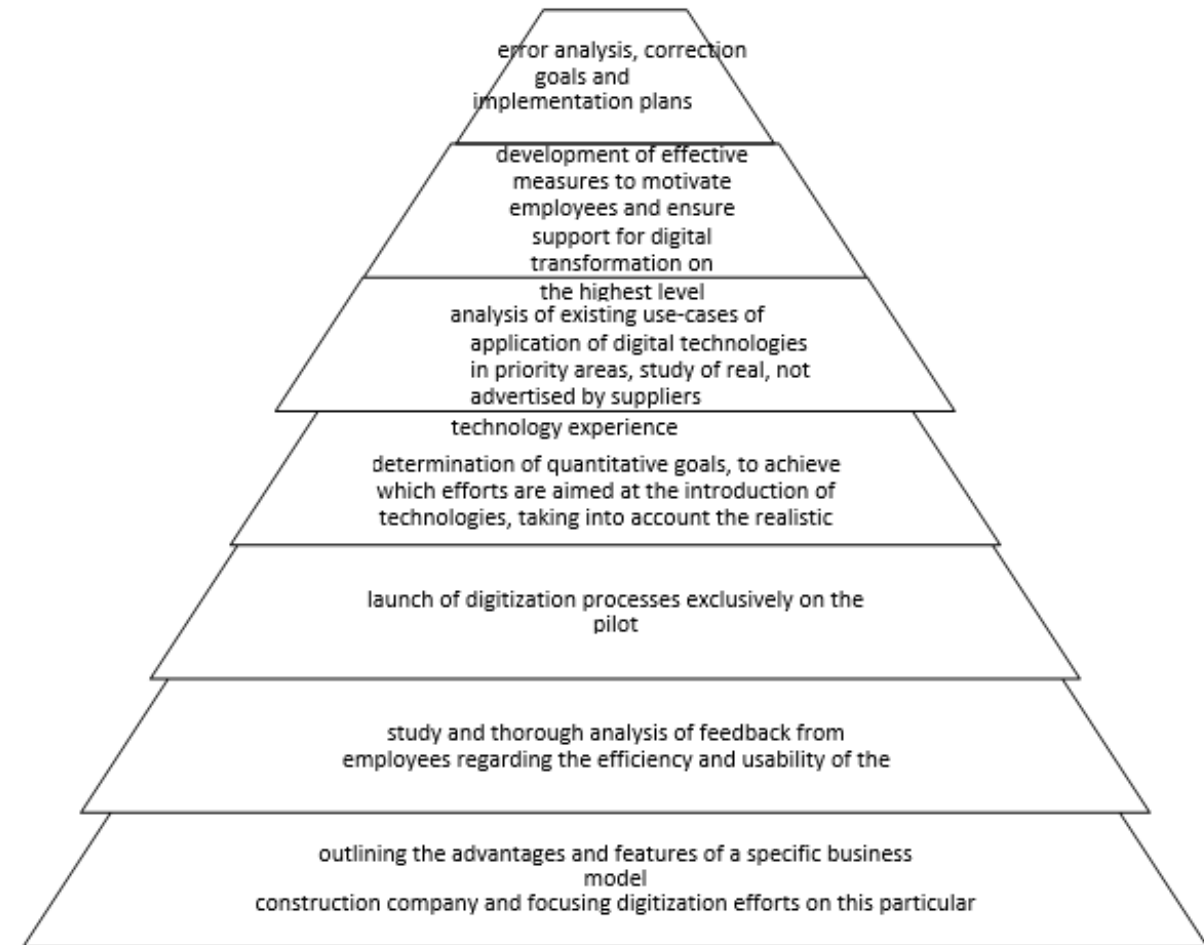
1. Innovative product of Haus.me LLC: The company develops autonomous houses that run on solar energy, have a water supply and air conditioning system, and operate without connection to external networks. The houses are partially manufactured using a 3D printer.
2. Product originality index: To assess the originality of innovations, a formula has been developed that takes into account the technical, functional, environmental and highly specific characteristics of the product. This index allows to determine the degree of originality of the product and its ability to enter the market as innovative.
3. Assessment method: The evaluation is conducted by assigning weight to various product characteristics through expert judgment. Technical characteristics are given the highest weight, followed by functional, highly specific and environmental characteristics.
4. Results of the efficiency assessment: The developed system allows to evaluate the effectiveness of the company's innovation activities. For Haus.me LLC, the system has shown that its innovation activities are effective and sufficiently original in the market.

An analysis of Ukrainian legislation in this area has revealed its main shortcomings:

- there are no clearly defined legal norms on the protection of trade secrets and know-how;
- the legal regime for the protection and use of intellectual property created in connection with the performance of an employment contract, created at the expense of the state budget, or under a contract is not defined;
- there are no legislatively enshrined preventive measures aimed at preventing offenses in the field of intellectual property;
- there is no legal regulation of the valuation of intellectual property and its accounting;
- the procedures for technology transfer and the institution of legal liability for intellectual property infringements need to be improved.

- As a result of Russian aggression, housing and infrastructure have been severely damaged and need to be restored quickly. The problems of construction companies have a direct impact on economic recovery.
- The construction market in Ukraine has been growing since 2016, particularly in residential construction. However, sustainable development requires an annual increase in the volume of work by 25-30%.
- The integration of digital technologies helps to reduce costs, increase efficiency and reduce errors. However, digitalization is developing slowly in Ukraine, and many companies have not yet achieved significant results.
- Creating optimal conditions for the development of innovative projects is possible through the development of technology parks, research centers, and innovation exchanges. These structures facilitate the integration of science, education, and production.
- Laws on intellectual property and construction regulations need to be improved, in particular to facilitate the use of innovative and energy-efficient technologies.

Recommendations for promotion in the field of digitization



- In today's environment, the problems of training industrial park managers as innovative specialists in the industry are becoming increasingly important.
- To optimize the training of managers to work in industrial parks, methods such as rank analysis, in particular the Kendall correlation coefficient, are used to assess the importance of various performance factors. According to the results, the most important factors are the personal characteristics of specialists and the organization of experience exchange events that increase the efficiency of industrial parks.
- Another important topic is the development of the necessary skills in managers, including the philosophy of critical thinking, the ability to predict consequences and act in conditions of uncertainty, as well as customer focus and effective team management. Universities and technology parks should adapt their curricula to the needs of the modern labor market to prepare managers capable of innovating and managing change in a rapidly changing environment.

A key element of the effective functioning of a technology park is a qualified manager, and therefore the main skills that a candidate should possess have been identified and analyzed. Based on the analysis, the training program **“Industrial Park Management Manager”** was developed.

Implementation of trainings in an industrial park is an important step in improving the overall performance and quality of staff work. The development of specialized trainings, such as “Industrial Park Management Manager”, takes into account not only the general aspects, but also the specific requirements related to the peculiarities of work in the park. This allows employees not only to adapt to new conditions, but also to develop professional skills, in particular in interacting with clients and achieving personal and organizational goals.

Trainings increase the effectiveness of managers, which in turn improves the quality of the park's operations, reduces possible losses and promotes a sense of responsibility among employees. In addition, such programs help to engage staff in self-development, which is an important factor for the long-term stability and success of the park.

The development of industrial parks provides for the creation of new jobs in the region;

The development of new production facilities will increase the interest of investors and help attract new investments;

Industrial parks are an effective tool for increasing the investment attractiveness of the region

State support for industrial parks will allow the development of high-tech, competitive production.

Industrial parks allow for the development of interregional and international relations in the industrial sector;

Support for small and medium-sized businesses in the region will reduce the level of import dependence;

Development of the region's industry will increase tax revenues to the budget;

Industrial parks can be an important driver of Ukraine's post-war recovery, as they contribute to economic growth, investment, job creation, and regional development. Industrial parks are divided into greenfields (new sites) and brownfields (reconstructed production areas), which defines different business models and opportunities for investors.

In Ukraine, industrial parks have a legal framework that provides benefits for participants, including compensation of interest rates on loans, preferential customs conditions and tax preferences. However, there is currently a problem of insufficient support and development of such parks, which limits their effectiveness. An important problem is the uneven incentives provided to different regions, which can lead to an imbalance in business development across the country.

Stimulating the development of industrial parks is an important tool for economic recovery, attracting new investments, and strengthening Ukraine's competitiveness in the international market. However, additional measures are needed to ensure the effective use of these preferences, particularly in times of war.

Thank you for your attention!