

Collective Monograph

**TERRITORY OF INNOVATIONS:  
BEST PRACTICES FOR SUSTAINABLE  
DEVELOPMENT AT THE LOCAL LEVEL**  
Part 1.



**TERRITORY OF INNOVATIONS:  
BEST PRACTICES FOR SUSTAINABLE  
DEVELOPMENT AT THE LOCAL  
LEVEL**

**Part 1:  
digest of analytical stage of international scientific  
and educational project**

**Collective Monograph**

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## **TERRITORY OF INNOVATIONS: BEST PRACTICES FOR SUSTAINABLE DEVELOPMENT AT THE LOCAL LEVEL.**

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The digest presents materials of analytical stage of international scientific and educational project and contains the research results on various aspects of innovation tools to promote the goals of sustainable development at the local level. The digest is an organic combination of theoretical and practical author's developments, prepared on the basis of empirical analysis of the EU experience; conceptual bases of formation of innovation policy of regional development in the country as a whole and actual experience of decentralization in regions and its impact on social and economic sphere of regions. Key words: sustainable development goals, innovations, strategy, local communities.

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## INTRODUCTION

The international scientific and educational project “TERRITORY OF INNOVATIONS: BEST PRACTICES FOR SUSTAINABLE DEVELOPMENT AT THE LOCAL LEVEL” was launched by scientists from Ukraine, Estonia and Italy in December 2021. Its main goal is to promote the goals of sustainable development at the local level based on a wide range of innovations.

Taking into account the importance of innovation development, as well as the national peculiarities of the relationship between it and the SDGs, we believe that within the project it is advisable to consider the methodology of innovation policy coherence for sustainable development (IPCSD).

This approach is important in the context of decentralization reform in Ukraine in terms of strengthening the resource base of cities, towns and villages and giving them more rights at the disposal of available resources, boosting economic activity and unlocking the internal potential of communities.

The digest is an organic combination of theoretical and practical author's developments, prepared on the basis of empirical analysis of the EU experience; conceptual bases of formation of innovation policy of regional development in the country as a whole and actual experience of decentralization in regions and its influence on social and economic sphere of regions.

The digest presents materials of analytical stage of international scientific and educational project and contains the research results on various aspects of innovation tools to promote the goals of sustainable development at the local level including local innovation landscapes and regional policy (chapter 1), EU experience of reasonable specialization and its



lessons for Ukraine (chapter 2), Italian Reggio – approach to the creation of the environment in local communities of Ukraine (chapter 3), cluster analysis of innovation implementation in ukrainian regions (chapter 4), innovative ways of ensuring the social security in the labor market in the sustainable development goals achieving context (chapter 5), state regulation of transport infrastructure innovation development (chapter 6), current state and prospects of organic production in Ukraine (chapter 7), conceptual foundations of programming financial support for bridge construction in Ukraine in the context of public-private partnership (chapter 8), innovation as a way to create a competitive advantage of enterprises in the era of sustainable development (chapter 9), modern state of digitalization development of ukrainian territorial communities (chapter 10), characteristics of successful innovative companies in the world (chapter 11).

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**Omelianenko V., Prokopenko O., Tirto T., Omelianenko O.**

## **1 LOCAL INNOVATION LANDSCAPES AND REGIONAL POLICY**

### **1.1 Innovations and sustainable development linkages framework**

Analysis of the current situation in the process of trying to move to the model of sustainable development has shown the need to develop a holistic, scientifically sound action plan, tools, stages of implementation, coordination of collective action and development of effective mechanisms to ensure the implementation of the concept of sustainable development. (2018).

To conceptualize the link between sustainable development and security, particularly within the SDG, and to develop appropriate policies, it is necessary to find the most effective management tools, one of which deals with innovation policy.

According to the National Security Strategy Formulation study, every security strategy at the national level should take into account the factors of technological innovation (human resources, infrastructure, investment, support). Analytical research by J. D. Harmon, J. H. Stevens, L. B. Swim (1991) can be considered a fundamental work that reveals the relationship between national security and innovation with the appropriate financial strategy. Also important are the conclusions of the analytical report of the Committee on Homeland and National Security of the National Science and Technology Council (2016), which provides an opportunity to review the impact of innovation on US national security and identify relevant strategic aspects, including the interaction between institutions.

The importance of SDG 9 is illustrated in Fig. 1.1, which shows the relationship between SDGs.

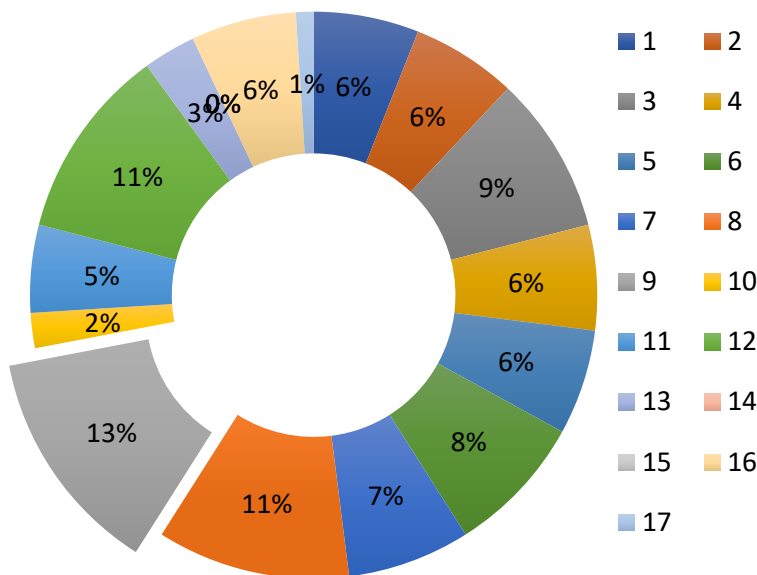


Fig. 1.1. The relative importance of SDGs in explaining differences in countries' well-being

Source: World Happiness Report 2020. Helliwell J. F., Layard R., Sachs J., De Neve Jan-Emmanuel, 2020

SDGs depend on the development and dissemination of innovative technologies. From this point of view, innovation and creativity are not in themselves goals, but means and tools for creating solutions to development problems and, being at the center of the system, affect many SDGs.

In this context, the importance of innovation in the formation of a system of sustainable development within the study of O. Kozakova and I. Fedoseeva (2017) is considered on the basis of the following functions:

- innovations contribute to the implementation of the law of proportionality, according to which the structure of

reproduction most accurately corresponds to the level of existing needs of society;

- innovations provide an opportunity to expand the range of goods and services produced, which contributes to the implementation of the law of increasing needs;

- through the innovations application the production of new products is carried out with lower resource costs;

- innovations as a means of implementing the achievements of human intelligence lead to the intellectualization of activities and increase its knowledge intensity, which contributes to the implementation of the laws of increasing the productivity of social labor and increase production efficiency.

Based on the given approach, for the development of the national system “sustainable development – security” innovation policy as a set of tools to manage the purposeful implementation of innovations that will promote sustainable development should be considered. The need to analyze the innovative dimension of the national system “sustainable development – security” is due to the fact that the narrowing of national security to the military-political aspect in relation to national interests in security and defense is the wrong approach in modern conditions. In this context, innovation security can be a component that connects research in the interests of both national security and its high-quality socio-economic development.

At the level of international organizations, there is a clear understanding of the impact of innovation on sustainable development. In particular, the World Intellectual Property Organization, as one of the UN's specialized agencies, has declared its contribution to the achievement of the SDGs by providing specific services to member states that enable them to use the intellectual property system to stimulate innovation, competitiveness and creativity.

The conclusions of some international resolutions provide an opportunity to confirm the understanding of the role of innovation for sustainable development in public policy. The analysis of these positions, in particular the Resolution of the OSCE Parliamentary Assembly “Strategic Forecasting in Science, Technology and Innovation for Sustainable Development”, provides an opportunity to highlight the main tasks of managing the innovation component in the context of sustainable development:

- use of new technologies, digital economy and science in solving global environmental problems;

- the use of new technologies as a tool for creating new jobs and development opportunities that increase the demand for digital skills and knowledge, which, in turn, creates the need to master digital skills and knowledge so that societies can adapt and benefit from technological change;

- strategic forecasting to ensure that technologies meet the demands and needs of different industries;

- strategic forecasting and evaluation activities should assist policymakers and stakeholders in implementing the 2030 Agenda for Sustainable Development by identifying challenges and opportunities that can be considered from a strategic point of view, and that trends in innovation should be analyzed in the light of broader socio-economic conditions.

The role of the innovation and technology component in sustainable development can be determined on the basis of the IPAT formula known in environmental studies, which states that environmental impact (I) is a product of population (P), per capita consumption rate (A) and used technologies for the production of consumed goods (services) (T). Even if population and consumption increase, the overall impact on the environment and demand can be reduced by using better technology (Homer-Dixon ingenuity factor) (1999).

In the context of achieving the SDGs, we should also

take into account the results of the analysis of innovation policy, considered in the study of Makó C., Illéssy M. (2015), which, as the study showed, also meet the realities and needs of Ukraine:

1) innovation development policy should be based on a broader definition of innovation, recognizing the importance of organizational and social innovation and innovation in public administration, but at present it remains focused mainly on technology; the same applies to the existing innovation model, which mainly reflects the linear way of innovation, exaggerating the importance of research compared to the daily practice of firms;

2) policy should recognize the importance of involving stakeholders in the innovation process and seek to identify a wide range of actors and build effective partnerships around important topics;

3) internal organizational dynamics are poorly considered in innovation policy, partly due to its technological orientation and linear model of innovation;

4) policy is often a top-down approach and the interconnected nature of players and processes at the micro, meso and macro levels is poorly defined.

We emphasize the importance of systemic innovation policy, which involves the development and implementation of a system of priority areas of science and innovation, focused on achieving the SDG in detail by technology or dimensions of sustainable development. In conditions of limited resources, it is necessary to rank innovations by priority. It is proposed to solve this problem by conceptualizing the relationship between sustainable development and security, as a result of which the most problematic components (current, expected) of the national system “sustainable development – security” can be identified by assessing the current situation and forecasting.

The need for a diversified approach to innovation became

clear in the context of the COVID-19 pandemic, when serious challenges arose in the management of a number of areas in the context of sustainable development and security. This is due in part to insufficient investment in health and food security. Experts (International Group of Experts on Sustainable Food Systems, 2020) note that COVID-19 has shown that governments can act most effectively when they provide basic centralized functions alongside the provision of resources and coordination at the regional and local levels.

On the basis of the study (Vylegzhanina, 2016) it is possible to identify the following areas of improvement of innovation policy related to sustainable development.

1. Rethinking the goals and objectives of the innovation system of society as a whole, the role of innovation in the socio-economic development of society, methodological approaches to assessing the effectiveness and efficiency of research based on the SDGs.

2. The task of harmonization of innovation systems and SDG – one of the most pressing in modern conditions. It is the innovation system that is the “energy center” of society, on which its further progress depends. Changes in the socio-cultural values of society, paradigms of its further progress in accordance with the concept of sustainable development must be accompanied by appropriate changes in the priorities of its innovation system, views on its efficiency and effectiveness.

These changes require appropriate reflection in the monitoring system of the innovation system, the purpose of which is to recognize the answers to the following questions:

- the extent to which the existing innovation system is adequate to the SDGs;
- what is the contribution of innovative development over a period of time in solving the problems of sustainable development of society;
- what is the efficiency of the innovation system in terms

of using resources to achieve the SDGs.

3. Improving existing or developing new methods for evaluating the effectiveness of national innovation systems, based on the goals of sustainable development of the country (region). Existing popular standardized methods of evaluating national (regional) innovation systems cannot meet the need for adequate evaluation in terms of sustainable development. They contain only some indicators related to the concept of sustainable development directly and indirectly, but in general do not give an idea of the potential, efficiency and levels of compliance of the innovation system of the SDGs.

4. Overcoming the limitations of the existing system of collecting information on innovation, based on the needs of monitoring innovation activity, which directly contributes to the achievement of the SDG. Technologies for monitoring the development of innovation systems do not take into account social, open and informal innovations and do not assess innovations by the level of their socio-economic significance and contribution to solving significant problems of sustainable development (economy, ecology, society).

Innovative development in modern states is seen as a way to accelerate the growth and transformation of the economy, as well as a way to ensure the systemic competitiveness of the economy. Also, it is the innovation system that allows the country to occupy a certain place in the system of international division of labor and gain weight in the international arena.

Taking into account the constant technological changes, the state innovation and industrial policy is constantly changing. In developed countries, the priority is the development of basic and applied science, public-private partnership in the innovation and technology sectors, creating conditions for the integration of science, education and business. Systematic research is also actively conducted to address the strategic objectives of state and public security and



sustainable development of the country through innovative projects, including at the international level.

Recognizing the limitations in categorizing different approaches to innovation policy and the complications arising from ambiguous use of terms, new innovation approaches are discussed in the study “New innovation approaches to support the implementation of sustainable development goals” (United Nations, 2017) based on such broad strategies:

- mission-oriented innovation involves the implementation of network research programs at the national and international levels, as well as the creation of special organizational structures that can guide innovation to achieve specific SDGs;

- pro-poor and inclusive innovation: expanding the benefits of innovation and building on innovation ideas for the bottom of the needs pyramid through new concepts, low-cost labor and large-scale production;

- grass-roots innovation: expanding the range of subjects of the innovation process to attract grassroots innovation movements; this approach focuses on the practice of innovation in both technology and service delivery;

- social innovation: the transition from technological to social innovation, focusing on organizational innovation and new social practices aimed at improving welfare (for example, in business models, industrial practices and finance and the provision of public services);

- open and joint innovations with digital support: promotion of open digital cooperation; such innovative approaches absorb and recombine many sources and forms of knowledge, especially through the digital support of open collaboration.

As a result of understanding the importance of SDGs, a scientific and practical approach to policy coherence for sustainable development (PCSD) has emerged. OECD experts

define PCSD as “an approach and tool for the systematic integration of economic, social and environmental aspects of sustainable development at all stages of domestic and international policy-making” (OECD, 2019). The main goals of PCSD are as follows:

- promoting synergies in all areas of economic, social and environmental policy;
- determination of compromises and harmonization of domestic policy goals with international goals;
- elimination of the negative consequences of domestic policy for the SDGs.

Taking into account the importance of innovation development, as well as the national peculiarities of the relationship between it and the SDGs, it is advisable to consider the methodology of innovation policy coherence for sustainable development (IPCSD).

In order to implement certain security principles within the public management of innovation development, it is necessary to move from the traditional in Ukrainian practice understanding of innovation exclusively as the promotion of scientific and technological developments or state support for developments or innovative companies. Instead, we propose to consider security through innovation policy, which involves changing the structure of economic sectors and innovation processes, choosing priorities and areas of development that can ensure sustainable development and competitiveness in the future. Only within this approach is it possible to move towards sustainable development security in all its components on the basis of innovative effects.

## **1.2 Local innovation landscapes concept**

The purpose of this part is to analyze the socio-cultural features of the involvement of the community of small towns to the innovation landscape development based on the analysis of world practice and guidelines for policy implementation in Ukraine.

The development of communities on an innovation basis and the construction of appropriate economic activity requires the mobilization of efforts of all social structures, involvement in the learning process of all segments of society, recognition of the unique role of education and science not only for high-tech industries but also for traditional economy and daily life. We believe that the aspect of innovation development plays a dual role and in contrast to the traditional approach, which is often used in the development of territories, when the competitive advantages of traditional nature (for example, for tourists), allows both to improve the quality of life and create conditions community development and relevant territory. The urgency of developing local development strategies is due to the fact that a significant part of the population of Ukraine lives in the so-called depressed regions and has insufficient opportunities for development. In 2019, in 20 regions where 74% of the country's population or 31.4 million people live, the GRP rate per person is lower than the average in Ukraine (Ministry of Development of Communities and Territories of Ukraine, 2020). The crisis of 2020 has shown the urgent need to change the regulatory system in the direction of creating a system of public-state partnership. Therefore, the task of managing the development of the territory is to form and support the mechanism of self-organization of society, which is launched by people, works with the help of people and allows to obtain a concrete result of development of the territory taking into account local interests.

Economic, sociological, political science studies show that communities based on trust and cooperation contribute to the realization of human potential. The fact that social ties and trust play an important role in supporting economic development is increasingly being noted in the economic literature. The factor of social capital is considered by some authors as a necessary term for such aspects of society that, despite the complexity of measurement and inclusion in formal models, are considered the most important determinants of long-term economic success (Temple, 2001).

The realization that “society matters” forces economists to take this factor into account even when constructing theoretical hypotheses. According to Pantem, “Social capital, embodied in the norms and networks of social participation, is a prerequisite for economic prosperity, as well as effective self-government”. In economic theory, term “social capital” is used mainly as a type of capital as a tool to use the economic principles of rational behavior in the analysis of social systems.

From an economic point of view, it is important that social capital as a special resource complements and is able to replace other economic resources and thus leads to a reduction in both production and transaction costs. Social goals are much broader than sustainable economic growth, because, firstly, the development of aggregate rather than economic well-being is important, and secondly, the analysis of policy options must also include long-term effects on economic, environmental and environmental factors and social trends (Galiullin, 2009).

According to the concept of human qualities, the development of society and economy through technological improvement is closely linked to the quality of the workforce. The concept of relevant technologies is closely linked to the concept of human qualities. If the qualities of the endogenous population can affect the acceptability of various forms of industrial development for the territory as a whole, then taking

into account these qualities is an important condition for successful modernization in a particular social and cultural environment. In the study of Hall and Jones (1999), the main factor of efficiency, which forms the main cause of differences in the world level of economic development, is considered to be social infrastructure. Researchers propose to consider this category as a state and institutional policy that shapes the economic environment.

To increase production efficiency, we need a social infrastructure that would increase production activity, capital accumulation and the introduction of technology. Bruno argues that the history of non-urban areas of Quebec (Canada) illustrates the creativity and ingenuity of the inhabitants (thesis “small towns – big ideas”) (Bruno, 2012).

Weber (2002) analyzing the relationship between globalization and rural development, among the many regional economic impacts of globalization on rural areas – outsourcing, tourism development, integration of agricultural markets into world trade, declining local supply of villages and small towns and services, notes that the function of innovation, in particular the development of innovation centers, is a very problematic aspect. As a result, today in Europe the network of small towns includes modern industrial and tourist centers. In the United States, university campuses are scattered throughout the country.

Simon (2005), a well-known German scientist, notes in “Hidden Champions”, that rural areas and small towns have become home to world-class companies, leaders in highly specialized markets: the vast majority of «hidden champions», who are innovation leaders, works in small towns.

The authors (Balaž, Kluvankova-Oravska, Zajac) on the example of EU countries explain the differentiation of countries by institutional, infrastructural and economic conditions of innovation (models of technological

specialization, intensity of investment in innovation, structure of national innovation system, structure of business costs for innovation, openness of national innovation systems) is the peculiarities of development at the regional level. Thus, the formation of regional innovation landscapes is an important task that can create a basis for development in addition to economic and long-term social investment.

Modern regional policy is implemented on the basis of targeting of specific problems and implementing of infrastructure projects. In foreign countries, new approaches are used to stimulate regional development through measures aimed at maximizing regional capacity, promoting entrepreneurship and innovation, supporting educational projects and retraining the local workforce, which allows better use of the potential of depressed regions in connection with the development of more successful regions of the country.

In developed countries, identifying the linkages between the formation (and / or strengthening) of local communities, people's ability to self-organize and quality of life has become an important basis for the spread in the second half of XX century issues of local community development. Thus, the establishment of a double correlation between the level of development of the local community and the ability of society and business to self-organize at the local level, and between the ability of society and business to self-organize at the local level and quality of life formed the basis of a number of successful community revitalization strategies.

Local innovation landscapes are more suitable for the development of complex interactions and capital formation of ties as competitive advantages, because the territories are communities of economic interest and can take advantage of ties and joint activities of economic entities, i.e. the creation of implicit knowledge (cooperation between educational institutions, research institutions, business, staff relocation,

public-private sector interaction, technology diffusion, etc.) in the dimension of networks that depend heavily on coordination management and are necessary for various kinds of innovation.

The importance of small towns is growing in the transition from industrial to post-industrial society, due to the key role of the following factors contributing to the phenomenon of ruralization: simplification of migration, communication and exchange of information over long distances, increasing the number of specialties remote (smart education).

At the beginning of XXI century the development of small towns is gaining new importance, but this problem has been quite relevant for many countries for a long time. For example, in the 40's of the twentieth century in Great Britain, a plan was developed to build “new cities” that would be free of the environmental and social problems of the “old”. This idea has been picked up in many countries. Already in the 1970s, also beginning with the United States, the process of counter-urbanization was clearly manifested in the industrialized countries, which was expressed in the return influx of population from large cities to small towns in the countryside.

Despite this, developed innovation economies are based on local innovations. In the EU in particular, the percentage of science and technology parks operating in small towns exceeds 50%. In Central Europe, this figure is even higher, which is logical, as it is a region with high urban density. However, in Eastern Europe, in particular Ukraine, most science parks are located in large cities, although the density of cities in this area is lower.

The dependence of competitive advantages on the local conditions of a certain territory was analyzed by the apologist of the concept of competitiveness M. Porter, who notes that competitive advantage is created and maintained in close connection with local conditions, i.e. activation of this specific

regional potential should become the basis for development. The growing interest of economists in the concept of small town's development is based on a large number of convincing facts that the most important components of the innovation process (innovation generation, technology transfer, etc.) are geographically localized. M. Porter noted that the stable competitive advantages of firms at the global level are often provided by their strong positions «on the ground»: the concentration of highly specialized industries, personnel, institutional structures, suppliers, etc. in specific regions.

Based on this, local innovation archetype can be defined as a factor that determines the approach to innovation, the inherent innovation strategy and the most typical ways to implement this strategy. According to the approach, the innovation archetype defines:

- organizational format of innovation development, which is the most natural and productive (most often the choice between self-generation, transfer from the scientific sphere, copying or modification of existing technologies);
- sources and methods of searching and collecting information;
- internal mechanisms for innovation;
- priority approaches in finding innovations.

The development of innovation development strategies in relation to local development is carried out largely within the framework of economics. In determining the principles of innovation development should be noted the presence of qualitative changes in various spheres of society through the development, creation and effective use of innovations (economic, social, institutional and environmental) aimed at increasing of social welfare. However, in previous studies authors on the basis of neo-institutional methodology noted that the context of the problems of innovation development should be expanded, especially taking into account the socio-



cultural basis of local innovation archetype.

One of the main aspects of local development is the development of mechanisms for public choice of priorities of the innovation process and their implementation, as well as the creation of tools for broad information support and promotion of innovation ideas to create success stories.

The most effective tool for the development of local communities is the involvement of people in joint activities aimed at achieving the public good or benefit for all participants. In these conditions, the main tasks of local community development practices are capacity building and community empowerment, transformation of local residents from actors into actors, development of participatory democracy and involvement of residents in the development of the territory (enhanced participation).

Today nobody disputes that in modern conditions the lifestyle as a subjective factor determines the state of health by 50-55%. Then, by statistical weight is the impact of the environment (ecological situation), the impact of which on health is estimated at 20–25%. The proportion of genetic, hereditary factors ranges from 15–20%. However, health services and systems accounted for only 8–10% of the impact on public health. This distribution is now accepted by WHO and is widely known as a formula (model) of health as a basic living condition (Akopyan, Bushuev, Golubev, 2002).

One of the possible invariants of the structure of the human quality model is presented in the form of such interacting blocks (Subetto, 2003):

- personal systemic and social quality;
- personal value and worldview quality;
- personal spiritual and moral quality;
- personal psychological and motivational quality;
- personal quality of intellectual development;
- personal quality of human physical development.

These blocks of the inner quality of a person undergo their formation and development under the influence of 3 nested spheres: the sphere of the quality of personal knowledge, the sphere of the quality of the individual's activity, the sphere of the quality of the culture of the individual. Through these spheres two main directions in educational training take place: the quality of general educational training and the quality of professional training, as well as the impact of the quality of education. The dialectic of this interaction is that knowledge affects not only the systemic and social quality and, as a part of it, the quality of professional training, but also all others, including the psychological and motivational block, blocks of intellectual and physical development. Knowledge is instrumentalized, passing into skills, professional competencies, professional qualification readiness for the corresponding professional and qualification activities (Subetto, 2003).

Based on this directions of innovation development at the local level should be distinguished based on the criterion of the leading orientation of the economy of the territory in accordance with its position in the settlement system and the criterion of the presence of specific local conditions.

Accordingly innovation landscape can be considered as a set of interdependent structures, the operation of which is aimed at reproduction and commercialization of accumulated knowledge, and which operate in a certain economic and social context of local innovation archetype.

The problem of innovation development in local innovation archetype dimension has following levels:

- 1) ability to generate new knowledge, which requires a high level of development of basic science;
- 2) ability to transform basic knowledge into applied research and development that can be demonstrated to business;

- 3) demand from business for new technology solutions;
- 4) institutional conditions that encourage the researcher to commercialize research results.

As a result of the functioning of these levels, a certain level of innovation receptivity is formed, which can be defined as the ability of the economy to include in its structure and activities changes caused by the innovation process, which can be both external to economy and development. In this case, the key issue of the analysis is innovation (technological) ability, which is defined by the authors as the ability to effectively use knowledge, and in turn social ability – the country's ability to make technological or organizational progress (Shin, 1996).

Technological and social capabilities are very dynamic, as they can be lost with long-term unclaimed, and accumulate in case of actual need. In the process of technological progress there is an accumulation of technological knowledge, but the real achievements are much more. After all, the essence of technology transfer is training. In addition to general and special knowledge, the ability to acquire new knowledge (training ability) is acquired and increased. Thus, there is an accumulation of advantages: upon reaching a certain level of technological capability, assimilation and improvement of imported technologies is facilitated, which increases technological capability (Balabanova, Grudzinsky, Kudryashov, 2002).

Authors in previous studies have proposed to consider the development resources definition in two dimensions:

- 1) set of economic and social resources, located in some territory (region), given the interchangeability and exchange value of the resources both within a given territory and in the external relations;
- 2) organizational and economic forms and processes of resource using, involved at present time or have potential for involving in development process in future. So author`s

definition of development resources includes resource definition in traditional and market sense as well as management efficiency issues.

Each subsystem of economy (national or local) management should identify and analyze of risks of anticipated threats to resource security, identify variants of responses and implement appropriate control actions. Given analysis and preparatory work should be maintained and updated as conditions are changing. This can be done according six basic groups of development resources:

- 1) natural resources (land, minerals, fuels, climate; their quantity and quality);
- 2) human resources (labour supply and quality);
- 3) physical capital (machines, factories, roads; their quantity and quality);
- 4) technological factors, that connect other resources;
- 5) institutional factors, that include banking system, legal system, good health care etc.;
- 6) relationship capital and cooperation factors, that include process of resource interchangeability through partnerships.

Based on this classification, the problems of socio-economic development of small towns are the low level of development of the urban base, labor market and infrastructure, lack of sources of financial resources. The capacity of a large part of territorial communities and local self-government bodies of small towns to realize their own capabilities and delegated powers is extremely low, which leads to a low level of provision of relevant social and administrative services to the population.

The chosen model of resource and innovation development should determine all the main aspects of innovation policy: the configuration of the supporting infrastructure, the main areas of investment, selection and

support of priority investment projects, training programs and more. The authors note that the model of resource and innovation development can be most effectively implemented at the regional level. Thus, resource-innovation development does not involve reducing the potential of basic raw materials industries, but on the contrary, their development on an innovation basis and completing the structure of the economy through the development of service and related industries capable of providing the resource sector with modern equipment, new technologies and innovation services, processing of resources and extension of technological chains for product processing and development of other high-tech and knowledge-intensive industries that can compete in both domestic and foreign markets (Nagaeva, 2018).

Interaction with business as a practical implementation of innovation archetype should be organized with the help of a map of local values (Belogolovov, 2010), which is a binary resource that can work by combining knowledge about the territory and local resources (“Listen to Earth”) and local community (“Listen to People”).

A 2012 study confirms the findings of the Global Innovation Barometer that companies go beyond the traditional, closed model of innovation, working in a new system. This system allows to develop of cooperation between multiple partners, use the creative resources of medium and small enterprises and individuals and thus create solutions that meet the needs of local markets. Business leaders around the world believe that the most significant innovations in the XXI century will be aimed not just at profit, but at the development of society and meeting universal needs.

The map of local values is compiled in order to increase the economic, social and cultural capitalization of the territory and the local community and should reflect the assessment of the situation in the territory, according to the local population

and administration. It should become the basis of a strategy for self-development based on intersectoral cooperation (coordination of interests with other levels of government and business). To create such a map, it is necessary to formulate priorities (based on the assessment of the existing situation taking into account new threats and opportunities), main directions and indicators of development, which will identify real stakeholders and adequately assess the risks of losses and benefits for them from investment projects.

Based on map of local values Identifying development priorities should take into account:

1. Prevention of risks of loss of values and resources from innovation and investment projects by ensuring a balance of three types of efficiency (budget, commercial and public);

2. Preservation of existing values with increasing their capitalization (social, cultural and economic) and identifying opportunities for the development of their potential on an innovation basis;

3. Restraining the impact of potentially inadequate for the production area with the loss of capitalization of values (for example, the construction of a road or plant without taking into account the interests of local communities).

### **1.3 Local innovation landscapes development cases**

Consider examples of implementation of innovation development strategies.

In Canada, with the adoption of the national innovation program, we can talk about deepening the process of regionalization of science, as one of the main areas of innovation is to develop the scientific and technological potential of individual communities and settlements (community level) (Sokolov, 2005).

The main idea of building trust capital is the principles voiced by Marko Begic, former mayor of Anchorage and senator from Alaska, who noted that when he was mayor, he spent 50% of his time communicating with business representatives. His main advice is that mayors should work with community-based entrepreneurs, learn about their business and build an atmosphere of mutual trust that will allow administrations to interact with the private sector to innovate and make the communities in which businesses are located competitive and growth-oriented (Atkinson, 2012). The main thing is to convince companies in the community to think about product quality or efficiency of production and operational processes and start looking for innovation solutions to these issues with the involvement of local resources.

Representatives of the commercial sector should also take part in the development of local communities. In USA, for example, Community Development Financial Institutions, a new type of private financial institution that specializes in lending locally as part of local community development, have become widespread (Krol, 2011).

In Alberta the Ministry of Innovation and Science was established in 1999, bringing together a number of provincial departments and initiating a number of innovation support programs. It is also important that the field of education in Canada falls within the competence of the provincial government, at the federal level there is not even a Ministry of Education. The innovation program was adopted as part of a broad public discussion of tasks and mechanisms, and its implementation is based on attracting the potential of the general public from all regions. The government of the country, adopting the program of creating an innovation society, assumed that the innovation process should involve all sectors of the economy and society, which in close cooperation and with financial and informational support of the state can

ensure the solution of innovation tasks.

Communities are increasingly becoming sources of new ideas about the directions in which public policy should be developed (Ernst & Young, 2011). For example, the municipality of Boston (USA) has developed a special application for the iPhone, which provided a two-way communication channel for exchanging information with citizens. The implementation of such important projects as Reboot Britain has confirmed that the use of the Internet for crowdsourcing to empower citizens and governments is becoming a reality. In European countries, especially in the United Kingdom, there are also a number of examples of the involvement of citizens in public policy at the local level through projects such as Open City in Birmingham.

Specific examples of the tools for creating innovation landscapes in Canada include the following community initiatives:

- Collective private forest management: provides more efficient management and increased forest productivity. These initiatives are also responsible for reforestation to create new jobs in non-urban forest-dependent settlements;

- Duchenne Reserve: organizes the management of the inhabitants of most of the state lands for recreation, tourism and nature protection with the creation of jobs;

- Agri-environmental agricultural clubs: 50 farmers came together and hired an agronomist to implement best practices for the protection of soils and natural resources. Measures to manage the economic development of small towns include:

- Cais popularises play an important role in the history of non-urbanized regions of Quebec, these credit unions continue to play a major role in the economic development of the non-urbanized sector and the economy of Quebec;

- Local Development Cooperatives: new form of cooperative in which all citizens of one or more settlements



participate in order for collective enterprises to develop activities that improve local socio-economic conditions;

- Local Development Agencies established by the federal development agency (known in other provinces as the Corporation for the Further Development of Human Settlements), in which management is delegated to local stakeholders who provide technical and financial support to newly established small businesses;

- Center for Local Development (CLD): local government creates incentives for and promotes local economic development. Funds are provided by both the central government and local authorities;

- local development funds: together with CLD and municipalities, these local investment funds help finance newly established small businesses.

These facts and examples necessitate an open, permanent, competitive and creative dialogue of business, academia and community in innovation landscapes, which allows the exchange of ideas and technological solutions aimed at more accurately identifying the needs of society to use collective intelligence to create innovation services.

The formation of local innovation landscapes involves the choice of forms of innovation and interaction between government and business on the basis of socio-cultural innovation archetypes. The study, based on the analysis, has found that innovation development at the local level is associated with strengthening the social orientation of innovation and the emergence of local innovation landscapes as an institutional basis of innovation development. Examples of implementation of initiatives can be used in the formation of local innovation landscapes in the united territorial communities of Ukraine were identified. Local innovation archetype as a base of local institutional system (formal and informal elements) is focused on innovative development,

which allows to attract the new participants to innovation networks, including as a result of new social groups involving.

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## **2 EUROPEAN EXPERIENCE OF REASONABLE SPECIALIZATION AND LESSONS FOR UKRAINE**

### **2.1 Conceptualization of smart specialization as a new approach to the formation of regional development strategy**

The issue of development and implementation of smart specialization is becoming increasingly relevant and discussed as a scientific, business community, and at the level of state and world institutions. The concept of smart specialization, proposed in 2009 by experts of the EU group “Knowledge for Growth”, is a response to the global financial and economic crisis and, at the same time, the result of working to address the strategic gap between innovation and productivity in USA and EU. The EU Innovation Agenda identified as one of the tools for smart and sustainable growth at the regional level the Regional Innovation Strategies of Smart Specialization (RIS3), the main idea of which was to make informed choices and fund areas for development innovation and entrepreneurship, creates sustainable competitive advantages for the region (Research and innovation. European Commission – European Commission).

The developers of the concept of intelligent specialization are B. van Arcom and B. Hall, P. David, D. Forey. The work of these authors was the basis for the development of a new conceptual approach to creating sustainable competitive advantages in the region. Researchers focused on identifying such fundamental characteristics of smart specialization that would significantly differentiate the new approach from those that have become widely used in the implementation of innovation development strategies. Already at the beginning of its formation, the concept of smart specialization precluded the a priori definition of regional

specialization based on the priority of industrial activities and industrial potential. It was also emphasized that it is impossible to set specialization priorities based on the recommendations of consulting companies. The main criterion for determining the specialization of the region, scientists define the so-called “entrepreneurial discovery”, ie finding “points of regional potential for the effective use of general purpose technologies to change the production function of specific promising sectors of the regional economy” (Snihova, 2018).

According to the OECD Expert Society, smart specialization is a conceptual basis for the integration of innovation, industrial and regional policies, which in organic unity provide influence on technological and economic specialization of regions, which in turn creates preconditions for their reasonable and sustainable growth and employment in the region. Strategic orientations of smart specialization are defined as the development of the potential of regions with priority on certain areas and technologies, as well as the diversification of the structure of the region's economy through the development of new directions and areas of activity (Foray, 2015). Targeted activities within the framework of smart specialization are provided through the interaction of such key stakeholders as local authorities, civil society, business, science and education.

The methodological foundations of the concept of reasonable specialization are formed at the intersection of the substantive provisions of A. Smith's theory of trade specialization, division of labor, evolutionary and agglomeration economics, neoclassical social economy, industrial development, and others. The concept of smart specialization is characterized as “region-centric” and one that focuses on activating and stimulating state and regional policy in the field of impact investment and innovation (Foray, 2016). The innovative orientation of the concept of smart specialization is determined by its main objectives, which are

formulated as stimulating the development of new activities characterized by a high level of innovation capacity; expanding opportunities for the development of regional economies and the formation of network entities and clusters within a diversified regional space (Foray, 2017).

The results of generalization of the content of the main publications, which reveal the theoretical foundations of the development of the studied concept allowed to identify the main characteristics of reasonable specialization (Foray, 2014):

- accumulates a critical mass of reliable information, on the basis of which the identification of opportunities and strict sound choice of priorities, the implementation of which concentrates a limited resource base;

- timely redistribution of state resources in favor of more viable and relevant projects;

- investment decisions are made in favor of those production assets that are complemented by innovative ideas and projects;

- any region or sector of the economy can be a potential platform for the implementation of promising innovative projects;

- ensuring the stability of competitive advantages is carried out on the basis of effective interaction between science and business, which involves the adaptation of entrepreneurial potential to the current needs of business;

- development of clusters and platforms for inter sectoral cooperation in order to form high-tech business structures;

- public-private partnership is updated and developed, which provides collaborative leadership;

- provides a permanent search for new opportunities and directions of development;

- there are many opportunities for diversification of activities;

- continuous monitoring of the implementation of smart specialization and evaluation of results according to pre-



established criteria.

The implementation of the strategy of smart specialization provides strategic changes at the regional level, which are manifested in such processes as the formation of a knowledge base that serves as a source of recognition, identification and evaluation of business opportunities; intensification and acceleration of processes of technological modernization of existing industries; diversification of activities and filling new market niches through the introduction of radical product and technological innovations.

The European Commission has developed a special algorithm for implementing the strategy of smart specialization, which is formally presented in Fig. 2.1 (McCann, Ortega-Argilés, 2014) and created the S3Platform, which is actually a repository of data and information that characterizes the intellectual specialization of regions and a set of special tools such as:

- Eye@RIS3 – map of priorities of all countries and regions of the European space. This map contains detailed information on economic and scientific spheres, political interests and goals, which are the basis for positioning the location in the relevant coordinate system and forming potential partners;

- ESIF-viewer – is a tool for visualizing investment plans, which is designed for use by governments at the national and regional levels;

- (ESIF) – Energy – operational search tool within the European Structural and Investment Funds programs (ESIF);

- (ESIF) – Digital – tool for evaluating investments in information and communication technologies by countries and regions;

- digital innovation hubs – an interactive tool for finding European organizations involved in the implementation of digital transformation of public life and business.

<b>STAGES</b>	Analysis of the regional context and innovation potential	Setting up an inclusive management environment and structure	Forming a vision of the future of the region	Choice of regional development priorities	Formation of policies, road maps, plans, projects	Integration of monitoring and evaluation mechanisms
<b>TOOLS</b>	Analysis of the synergy of scientific and technological specialization. Analysis of regional economic specialization. GAP and SWOT analysis. Interactive map of competitors	Defining short-term and long-term goals. Environmental analysis, debate, participatory action, pilot projects, Vision identification	Smart Typology of Europe Growth 2020	Visualized map of priorities Eye@RIS3	ESIF-viewer	(ESIF) – Energy (ESIF) – Digital Regional benchmarking. Digital innovation hubs. Competitiveness scoreboard. Self-Assessment Wheel
<b>APPOINTMENT</b>	Identify strategic areas of development, market niches or areas for competitive advantage. Identification of competitors and analysis of competitiveness	Formation of an effective structure of inclusive management of strategy implementation	Combining regional and international experience to identify prospects with the broadest trends	Positioning of the territory, finding of potential partners for cooperation	Visualization of planned investments using European structural and investment funds	Identifying funding potential, benchmarking, assessing the level and dynamics of competitiveness in the European landscape

Fig. 2.1. Algorithm for implementing a strategy of smart specialization (Pylak, Warowny, 2021)

In the context of the implementation of the strategy of smart specialization, the priority areas of focus should be (Advances in the Theory and Practice of Smart Specialization, 2017): clusters, innovation ecosystems, science parks and competence centers, research infrastructure, digital development, traditional and creative industries, culture, financial support instruments, green growth, social innovation, etc.

Generalization of the presented theoretical and methodological and methodological developments in the field of formation and implementation of the strategy of smart specialization allows us to conclude that at the moment there is a process of its conceptualization. It may be too early to talk about the formation of a holistic theory, however, the concept of intelligent specialization is gaining a powerful scientific and theoretical development. It should be noted that at the moment the content of the phenomenon of intelligent specialization is very multifaceted and is considered in various thematic areas. On the one hand, this somewhat undermines the value of smart specialization as a comprehensive, innovative, strategic-oriented approach to effective and efficient regional development. On the other hand, it reveals the complexity and contextual poly variance of the content of the studied concept. Based on the existing theoretical achievements, smart specialization can be defined as a promising methodology for sound selection of priority strategic directions of the region, based on an organic combination of results of sectoral and sectoral analysis of regional space, as well as systems of accumulated knowledge and competencies. economic systems.

## **2.2 European experience in implementing smart specialization and lessons for Ukraine**

The implementation of the strategy of smart specialization in the EU is in the context of solving the problem of “unlocking” the development of regional potential as a basis for smart growth based on complementarity of R&D, innovation, entrepreneurial initiatives and modern information and communication technologies. In accordance with the priorities of the European Strategy 2020, which changed regional and industrial policy on the basis of smart specialization, the main guiding concept was the innovative development of not individual but all sectors, industries in all regions. The content of measures within regional, industrial and innovation policies was not defined as a template, but on the contrary, the emphasis was on the need to take into account historical, geographical, cultural, institutional features of a particular location and create sustainable competitive advantages based on identified and identified unique characteristics of the region.

Focusing on a new methodological approach to the formation of innovative strategies based on smart specialization fundamentally changes the “neutral” logic of intervention in the economy, which was dominant in the EU, to “vertical”. This is manifested in the fact that the implementation of the strategic process on the basis of reasonable specialization involves the inclusion of all local stakeholders in the process of developing such a strategy and its implementation, monitoring and evaluation.

One of the important results of the implementation of the concept of smart specialization in EU countries and regions is that attempts to copy successful regional practices have proved less effective than the “originals”, despite the similarity of the initial conditions of development and institutional-industrial

context (Foray, 2014b). Empirical data suggest that the processes of intelligent specialization should take place through “self-knowledge”, which involves entrepreneurs who are aware and understand that certain products, services, activities with certain changes (modifications) can be produced within the region with relatively more attractive value characteristics. This process becomes a catalyst for business search, which helps regional authorities to audit industrial potential, identify its strengths and weaknesses and develop an appropriate set of measures aimed at implementing both regional and industrial policies.

In this context, the concept of smart specialization has had an impact on the formation of a renewed European industrial policy, as evidenced by the fact that among the basic normative documents that define it is the EU Regulation 1301/2013 of the European Parliament (Guide to Research and Innovation Strategies for Smart Specialisations (RIS 3), 2012). It is in accordance with this Regulation that the smart specialization strategy is defined as a national and / or regional innovation strategy for EU countries. Commission Communication “Investing in Smart, Innovative and Sustainable Industries – An Updated EU Industrial Policy Strategy” (McCann, Oort, Goddard, 2016) it is stated that the strengthening of EU industry should rely on the Smart Specialization Platform. In fact, the concept of smart specialization has become the unifying basis for the development of national innovation, regional and industrial strategies in the EU.

Based on the analysis of the priorities of future specialization, which were posted on the virtual platform Eye @ RIS3database, it was concluded that the application of the smart specialization approach to the formation of strategies is more typical at the national level. Thus, 12 out of 13 countries presented only national strategies and only Poland posted both

national and 14 voivodship strategies (Danilina, 2021).

Based on information from the Smart Specialization And Europe's Growth Agenda website (Foray, 2014) it can be concluded that the experience of implementing regional policy on the basis of the concept of smart specialization is generally characterized as positive. Some results (positive and problematic) of the implementation of the relevant concept are summarized in Table 2.1.

Based on the generalization of the substantive aspects of the concept of smart specialization and the practical features of its implementation, the following useful lessons for Ukraine can be learned:

1) the application of the smart specialization approach for the development of regional innovation strategies aims to create innovation ecosystems, which involves pooling resources of educational and scientific spheres, industrial and infrastructure project sectors, civil society institutions and public authorities at various levels. In such an organizational configuration, development priorities should be chosen based on the definition of local assets and opportunities, with a focus on structural changes in the regional economy and giving it a new quality. At the same time, the innovation hook can be determined not only by technological, but also by service and social innovations. At present, the announced implementation of the concept of smart specialization in Ukraine to determine the priority sectoral areas of smart specialization does not meet its classical guidelines. Justification of the choice of such sectors was based on the work of specialists from relevant ministries (Economic Development and Trade, Infrastructure, Energy and Coal Industry, Agricultural Policy and Food, Health, Education and Science), as well as scientists through an expert survey that does not correspond such principles of reasonable specialization as cross-sectorality and inclusiveness, selectivity, development of all types of goods and services;

Table 2.1. Applied results of the implementation of the concept of smart specialization in EU countries and regions

Location	Characteristic
Slovenia (Hryha, 2019)	The implementation of RIS3 has become a catalyst for the implementation of measures to support research infrastructure in priority areas of “smart specialization”, funding the work of young researchers in joint projects. 9 strategic research and innovation partnerships have been formed in the priority areas of smart specialization and their state support is provided. National scholarships are introduced in accordance with the priorities of smart specialization, educational programs are updated in accordance with the needs of business and priorities. The activities of career development centers are aligned with the priorities of smart specialization through cooperation with partnerships.
Italy (D'Adda, Iacobucci, Perugini, 2021)	The analysis of the consequences of the implementation of RIS3 revealed a lack of connection between selective funding (according to certain priorities) and the intensification of innovation in the regions.
Italy (Toulouse) (Dontsova, 2021)	The development of aeronautics in the Airbus Valley has led to the expansion of entrepreneurial activity in the educational process, as well as a positive impact on the development of research infrastructure in areas such as satellites and GPS technology.
Italy (Florence) (Shevchenko, Kuzmina, Kuzmina, 2021)	The development of aeronautics in the Airbus Valley has led to the expansion of entrepreneurial activity in the educational process, as well as a positive impact on the development of research infrastructure in areas such as satellites and GPS technology.
Australia Italy (South Tyrol) (Benner, 2019)	The implementation of RIS3 proved the importance of ensuring the process of institutional discovery and change.
Latvia (Morgan, 2015)	The positive consequences of RIS3 implementation are the improvement of the quality of R&D management and the creation of regional educational spaces. The problematic point was that the introduction of digital technologies did not lead to automatic continuous data processing. Decision-making still requires multilateral approaches.
Romania (Uyarra, 2019)	In the least developed regions of the EU, there is a low level of involvement of key local stakeholders in the innovation process, which does not allow to fully launch the four-chain spiral of innovation.
Ireland (Ranga, 2018)	The identification of new areas of activity that create sustainable competitive advantages is largely related to the improvement of traditional species. Attempts to develop new directions are slowed down by corporate and political influences, which limit the inclusion of areas of activity with low employment in innovation processes.

2) the smart specialization approach is the basis for the formation of an updated strategy for the development of EU industry, which provides for the “design” of both industrial and regional policy and focus on the development of not individual but all sectors and industries in all regions. Such a statement of the problem should be taken into account in Ukraine when formulating the Strategy for the Development of Ukraine's Industrial Complex until 2025. The draft Strategy includes provisions that do not correspond to the concept of smart specialization in support of cluster initiatives. The contradiction of the provisions is that reasonable specialization involves the creation of new areas and areas of activity, while clusters are aimed at improving the efficiency of the participating enterprises;

3) European experience in the implementation of smart specialization shows the inadmissibility of replicating the successful experience of the regions and involves the search for unique features and characteristics that are the basis for determining the priorities of the region and creating competitive advantages. Therefore, it is very important to properly use the European experience of applying the approach of smart specialization to the formation of regional strategies in Ukraine. Such an experience should not be a tracing paper, but should be critically considered in terms of the context of existence and development; historical, cultural, geographical features; applied methods and tools of implementation, as well as comparison of expected and actual results.

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### **3 INTRODUCTION OF THE ITALIAN REGGIO – APPROACH TO THE CREATION OF THE ENVIRONMENT IN LOCAL COMMUNITIES OF UKRAINE**

#### **3.1 Conceptual Features and the Development Potential of the Reggio Approach**

The relevance of the research topic is due to a number of reasons. In modern Ukrainian society in general and in the pedagogical community, in particular, the attention is focused on the issues related to general human development, childhood as a significant and valuable period of life, educational environment as a factor on which depends the fate of each child and the country, there is a comprehension by social groups and individual citizens of their own specific interests in the sphere of education.

All this is reflected in science and pedagogical practice. Numerous scientific concepts related to the realization of the development potential of the educational environment are in demand by modern institutions of preschool education. The formation of the new educational environment is based on the fundamentally new foundation – multidimensional understanding of life – and is accompanied by the creation and improvement of various new technologies. The experience and the ideas of C. Freinet, M. Montessori, R. Steiner, Loris Malaguzzi, and others are gaining more and more attention of pedagogues.

The main ideas of modern education, supported and disseminated by the UNICEF International Organization, are the ideas of ensuring the rights, freedoms and interests of children, which are presented in the concept of the program

“Child-Friendly Schools”. The study of the experience of child-centered humanistic concepts of preschool education, recognized in the international community and implemented in Ukraine, is relevant.

Benchmarking and adaptation of the best examples of international experience is widespread in the world through the development of national education systems, appropriate for our country as well.

The relevance of the research is due to a set of objectively existing contradictions between:

- 1) the social order of society to perform functions related to the education of socially active individuals capable of transforming the environment, and existing traditional approaches in preschool education, which do not always provide the appropriate level of forming cognitive activity of children;

- 2) the need to create a development environment based on the principles of the Reggio-approach and insufficient development of pedagogical conditions to ensure this process;

- 3) the desire of institutions preschool education to introduce the ideas of Reggio-approach in practice and the lack of developed instructional guidelines for pedagogues working in institutions of preschool education, which belong to local communities.

Taking into account the urgency and lack of development of the issues that can resolve contradictions, we formulated the research problem: under what conditions the educational environment, created on the ideas of Reggio-approach, will be an effective factor in the development of preschool children.

The objective of the research is to theoretically substantiate the possibility of introducing the ideas of Reggio-approach into the practice of institutions of preschool education belonging to local communities of Ukraine.

The Reggio-approach has its history. After the end of the

Second World War, in European countries that survived dictatorial regimes, there was a need to think about a better life for daughters and sons, the desire not to repeat the terrible mistakes of the past. The idea of creating a “new garden” was born in a small village in northern Italy near the town of Reggio Emilia, which later gave the concept its name. The concept was based on the principles of positive humanistic pedagogy. The ideas were developed by psychologist Loris Malaguzzi, who later became the founder of the Reggio-approach (the second name of the approach is Reggio-pedagogy). The proposed concept is called “100 languages of children”. According to C. Edwards, L. Gandini, L. & G. Forman (Edwards, 2012; Gandini, 2012; Forman, 2012), its content assumes that every child has hundreds, even thousands of ways and opportunities to learn, explore the world and express themselves, but 99 languages are taken away by adults.

Reggio-gardens and centers are only those that are located directly in the region of Reggio Emilia. All other gardens and centers of the world are considered Reggio Inspired. The Reggio-approach is used in world practice on a par with the Waldorf School and the kindergartens and schools of Maria Montessori. The Reggio-approach is considered to be one of the most promising; it is also used in municipal kindergartens in Italy, Germany, the Netherlands and other European countries, as well as in private kindergartens in the United States and Canada, and other countries. The experience is comparatively studied by the researchers M. Abdelfattah, F. S. Baker, V. L. Bond, A. Vatalaro, I. Borisova and others (Abdelfattah, 2015; Baker, 2015; Bond, 2015; Vatalaro, 2015; Borisova, 2017), however, there are almost no such institutions in Ukraine, both in the public and private sectors, and in local communities.

The local community is primarily a limited space, which is revealed not so much because of geographical differences

(country, city, village or town, etc.), but because of differences of a symbolic nature – the specifics of culture and activities. Thus, both the place and the community are the factors that determine the formation of the local identity of the individual. Capable and viable local community, which is (may be) a community in Ukraine, is primarily aware of its rights and interests; demonstrates the ability to act in concert and in solidarity to protect and defend them; effectively uses resources and assets for local development. This is how the ideas developed in the Italian region called Reggio Emilia. The study and implementation of such experience in local communities in Ukraine is relevant.

Reggio Emilia continues to attract educators from around the world. Few approaches are so clearly and fundamentally defined, or, according to G. Gardner (Gardner, 2019), nowhere else in the world there is such an organic and symbiotic connection between the progressive philosophy of the school and its practice.

In the educational field of Ukraine there is no single name for the approach, which in the world is called the Reggio Emilia approach (RE). There are several options: Reggio-pedagogy, Reggio-approach, Reggio Emilia approach. B. Gantt (Gantt, 2021) in his work “Perceptions of the Reggio Emilia Approach to Early Childhood Education” writes that “The purpose of this qualitative, exploratory case study was to investigate participant-perceived benefits of RE as a curricular approach.

In our opinion, it should be clearly defined that methodology is, in a broad sense, the application of scientific knowledge to solve practical problems, while technology is an algorithm, a procedure for carrying out any targeted actions. The approach is a methodological orientation of the pedagogue, which encourages the use of a certain characteristic set of interrelated concepts, ideas, notions, techniques,

technologies and methods of pedagogical activity. So Reggio is a pedagogical approach, not a technique or a technology.

In our research, we use the term “Reggio-approach”, the educational activity of which is based on the unlimited belief in children, their abilities and achievements, belief that any activity can be useful and meaningful for children’s development. The main goal in the implementation of the Reggio-approach is to provide the child with as many tools and opportunities that he or she will be able to use throughout the life. The Reggio-approach is based on several key postulates that underlie the philosophy of the approach.

We are going to consider them in more detail.

The child’s perception of the environment begins with a living, direct contemplation of what life itself is. Observation, study, appropriation, assimilation, cognition, comprehension with the mind, feelings is that propaedeutic (introductory) stage of involving the child in values that are learned by involving various forms of organization and types of practical activities, interaction, signs and symbols of society and culture. Depending on the child’s inclinations and abilities, his or her socio-cultural experience, ways of modeling the world, the pedagogue can stimulate their activity, create educational situations that provoke, etc.

It should be noted that the Reggio-approach is based on six rules, which Loris Malaguzzi (WHY Reg) formulated as follows: 1. respect the child and look in the his or her eyes; 2. explain the rules and ask questions; 3. there is no “wrong”, there is “differently”; 4. offer a choice and do not rush; 5. learn in any situation; 6. fantasizing is more important than reading.

Loris Malaguzzi saw the goal of his work as creating a friendly, hard-working, inventive, comfortable, affable school, with the ability to document work, a place of research, knowledge, recognition, reflection, where children, teachers and parents will be happy. We should note that in the tradition

of European education, the word “school” often means kindergarten, which may be at school, but still has the functions of kindergarten. For the Reggio-approach, it is essential to have an enriched environment saturated with natural materials for open use.

In the Reggio-approach, the environment is the third teacher (pedagogue), so it is created and changed according to the child’s requests. Where to put and how to design – is decided with a focus on the child, his or her age and abilities. Thus, K. Kruty (Kruty, 2021), notes that the environment is expanding the centers in stages, according to children’s requests. Also, a new core (center) for activities can be created by a pedagogue and offered for research by children, in the course of activities changing and improving. Children are provided with research tools: an overhead projector, a laptop and a regular projector, a webcam, a microscope with the ability to take photos, a camera.

T. Hall (Hall, 2017) argues that the creation of the “third teacher” is the basis for the design of schools and learning environments. For our research, provocations as a means of inviting a child to play in the environment created by adults are of scientific and practical interest.

### **3.2 Reggio provocations as an invitation to play**

In the context of our research, we consider one of the criteria – the criterion of saturation of the environment with different types of activities. In Reggio-approach every day is an opportunity to create a new project, immerse into interesting experiments, find an unusual provocation in the game activity. For us, the organization of Reggio-provocations as an invitation to play is of practical interest.

Provocation from the Latin word *provocatio* is a



challenge. In the concept of Loris Malaguzzi, the word “provocation” is used in a broad sense as an incentive to action, an invitation to play, as well as opportunities to create, build, discuss what is seen and generate new ideas. Loris Malaguzzi used the metaphor that, in a sense, provocation is the same ball that an adult throws (or returns) to a child, but this is not the only, albeit very creative, way to do it!

According to K. Kruty, adults in the Reggio-approach adhere to the postulate: the child is able to guide and control their own learning and development (and the task of the adult is to support and encourage) (Kruty, 2021). “Reggio-provocation is an original way to stimulate research interest and an invitation to discover in the Reggio-approach. Here the creative potential of the adult unfolds, which accompanies to the environment, creates an occasion for joint activities.

When creating the provocation, a pedagogue inspired by the Reggio-approach should keep in mind that, above all, this is an invitation for the child, not an order to act. Most often, the provocation is a simple but attractive, “catchy” composition that appears in the enriched environment – where the child is sure to notice it, get closer, ask. The provocation from the pedagogue should provoke curiosity, keenness and interest, the desire to take action. One of the conditions is limited assistance to the child, it is not needed to explain what to do with the exhibited materials, it should be watched from afar. The child learns to assess their capabilities, the limits of “knowledge-lack of knowledge”, learns to formulate a request for help, and the adult first asks about their own capabilities, trying not to form a “phenomenon of learned helplessness”.

The development of a child’s curiosity, stimulation of their cognitive motivation, formation of the system of ideas about themselves and the environment – these tasks in the institution of preschool education can not be solved using traditional methods and forms of learning. Active, exploratory

attitude towards the environment, according to K. Kruty, I. Stetsenko, I. Desnova (Kruty, 2020; Stetsenko, 2020; Desnova, 2020) and other scientists, should be developed in early childhood. This position will promote the child's self-realization in children's types of activity.

The authors of the STREAM-education program for preschoolers formulated the principles of organizing activities for the development of research activity of children, which we used in the study to create conditions for provocations, namely: the principle of individual approach to each pupil; the principle of variability and diversity of opportunities provided for children; the principle of reasonable freedom of choice (partner, type of activity, methods, means, etc.); the principle of joint activities of the child and the pedagogue with a gradual decrease in the participation of the latter; the principle of gradual complication of the material by expanding the area of immediate development of the child.

Unfortunately, the content analysis of complex programs that are in the educational field of Ukraine, confirmed the lack of tasks to create provocations in the activities of preschoolers in organized and independent activities. The content of the only alternative program for the formation of culture of engineering thinking for preschool children "STREAM-education, or Paths to the Universe" (scientific supervisor – Prof. K. Kruty) (Kruty, 2020) presents a task for children's experimentation in situations-provocations.

Let us consider the use of provocation on the example of a child's acquaintance with clay. The pedagogue prepares the enriched environment: plastic or wooden stand (we can use a solid mirror for modeling and a mirror in front of the child), a small layer of clay, tools for work; we can put a hand towel and a container of water next to it. It should be noted that clay is rarely offered to children at home, so it may take longer to get acquainted with it than for other materials.

Clay acts as a means – working with clay is perceived as a natural and unconscious desire of a person to reflect from early childhood the image of the mother’s womb and the soft body of the mother. Clay for a child is an opportunity to feel the softness and tenderness of the material that is very similar to skin. One can always read about the benefits of clay and understand that children intuitively choose this material not only for games, but also for their health. Ways to diversify invitations to the game here are the same as with other provocations: open and free access, convenient location.

Conclusion. The rule for the Reggio-pedagogue is not to rush and offer the child something new every day: if the interest in provocation has appeared, we can interact with the clay for several days in a row, better learning the features of this material. The task at this stage for the pedagogue is to enrich the environment: to add relevant materials, for example, for construction (blocks, wire, wooden sticks); to create compositions and free play (flowers, lace, trifles: seashells, corks, bolts, glasses, beads, pebbles); for plots (dishes, animal figures, toy cars); natural materials (bottle caps, feathers, buttons, small stones, toy eyes, dry twigs, leaves, seeds, acorns, chestnuts, stones).

Loose parts are often used for provocations, namely: wooden sticks from coffee shops or ice cream, large beans, pods, pasta of various shapes and colors, small rubber bands for hair or for weaving, wire for beads and rings; tray with semolina or sand; cupcake tins or sorting pans, etc.

The techniques of creating provocations play an important role in the activities of the pedagogue, who forms the cognitive activity of the preschooler.

Of particular importance are those techniques that stimulate internal resources – the processes underlying cognitive activity. First of all, these are the techniques that cause children to expect something new and special from

learning. This technique, which acts as a stimulus to the cognitive activity of children, has its modifications.

In some conditions, when much is already known, this technique takes the form of removal, disclosure of previously known from a new angle, solving a similar problem or task by new means, not in one but in different ways, forcing to reconsider the old ways, to look for other, more economical, rational. In other conditions, the new manifests itself in the form of situations-provocations, which again put children in front of an unexpected decision, contradictions that exacerbate the activity of mind, imagination, memory, as it is necessary to operate on previous knowledge.

Invitation to play, or provocation (*provocatio*), can be different depending on a pedagogue, it all depends on creativity and the desire to prepare interesting material for children. Here are a few more ideas for provocations: *Wimmelbooks*, revealed “in the most interesting place”; glass crystals to “make a rainbow”; spotlight (games with shadows, stained glass mandalas); light table (homemade from a transparent plastic container with a lid and light sources inside); *tantamaresca* theater; materials in the basket (foil, shiny objects of various shapes, reflectors), etc. Particular attention is paid to the study of light and color. It is necessary to actively use the possibilities of light, without obstructing its flow with artificial barriers – blinds, curtains, pelmets, etc. The place near the window to study the interaction of natural light with objects and things, the study of shadows should be free for children. If in ordinary kindergartens preschoolers are introduced to red and one of its shades – pink, then in Reggio-gardens the child will be able to navigate in 26 shades of red.

Thus, provocation as an invitation to play, action, stimulates children’s experimentation, the desire to learn and act with different materials.

The concept of the American scientist U. Bronfenbrenner

(Guy-Evans, 2020) has gained the greatest popularity in the Western European psychological and pedagogical literature. He defines the environment as a complex system that is constantly evolving and covers various, near and far, areas of life.

Thus, K. Kruty (Kruty, 2020) proposes to consider the sensory-enriched educational environment as a set of conditions (in the institution, in the family) that maximum contributes to the personal development of children in meaningful (or leading) for them activities. The author also defines the integral criteria of the enriched educational environment for the institutions of preschool education. Let us call them: the criterion of the enriched environment with sensory stimuli: the sensory richness of the house where the baby grows, of the institution he or she visits, and the territories; harmonization, structuredness of the sensory environment; aesthetic environment; criterion of saturation with different types and kinds of activity: type – game (leading type), prerequisites for training and work; types of activity – communication, cognitive activity, transformative, evaluation-control, creative, etc.; criterion for meeting the needs for physical activity and physical development: healthy lifestyle, the need for activity, sports achievements, etc.; criterion of saturation of the sensory environment with the interaction of pedagogues, children, parents.

The dynamics of progress of development environment is achieved through the interaction of its three structures: pedagogical, methodological, psychological.

The practical implementation of the idea of creating a development environment in the conditions of institution and family involves the construction of such an environment in two directions: subject-environmental and subject-spatial. The child learns a certain sensory standard, which is denoted by a word. In the process of implementing the subject-environmental approach, as a source of sensory experience, it is necessary to

proceed from the ergonomic requirements for the child's activities.

The development environment of the institution of preschool education has three main components, namely: goal-setting, which orients the pedagogue to understand the development environment as a specially organized pedagogical space, analysis of the pedagogue's position, organizing and directing active cognitive activity of preschoolers in the process of joint communication, choice of methods, techniques and tools that allow in the conditions of development environment to model special situations-provocations that stimulate active cognitive activity of the child.

Thus, the pedagogue should provide conditions for the development of children's independence, initiative, creativity. He or she constantly creates situations-provocations that encourage children to actively apply their knowledge and skills, sets them increasingly difficult tasks, supports the desire to overcome difficulties, bring the case to an end, aims to find new, creative solutions.

Participation in solving situations-provocations, in conducting basic experiments, in educational games, in making the simplest mechanisms and models is an obligatory element of children's lifestyle. By own example, the pedagogue encourages children to independently find answers to questions that arise during children's experimentation, draws attention to new, unusual features of the object, provokes guesses, seeks help from children, focuses on experimentation, reasoning, assumptions.

The position of the pedagogue, who shapes the child's cognitive activity by means of the development environment, should be based on compliance with a number of requirements concerning the personal qualities of the educator and the style of his or her interaction with children in the process of active communication.

### **3.3 Principles and methods of creating Reggio-environment in the kindergarten that belongs to the local community**

Here are the main principles and methods used in the Reggio-approach:

- a) creative approach to learning;
- b) the principle of cognition “touch, moving – advance”;
- c) the principle of variable thinking;
- d) interdisciplinary approach to learning;
- e) the principle of equality of children.

According to E. Haziahmetova (Haziahmetova, 2019), the conceptual principles of the organization of the Reggio-environment are:

- a) the principle of using tactile materials;
- b) the principle of informative environment;
- c) the principle of class adaptability;
- d) the principle of accessibility of the environment;
- e) the principle of functional saturation of the environment.

So, to summarize. The conceptual principles of the Reggio-approach are:

1. The educational environment should be useful and instructive. The tactility of the environment is of great importance (natural materials, various textures, surfaces that the child can see, touch, study are offered).

2. All possible means are used for the educational process. Every corner and every surface of the room must be of practical importance. The classroom is a field for the organization of the educational process (the walls are full of shelves, stands for drawings and notes, training corners are installed in each corner, the training center is also organized on the floor).

3. The premises can be transformed according to different tasks and levels of activity: Reggio Emilia schools

teach not only at desks, but also sitting in a circle, standing around a table or sitting on the carpet.

4. Accessibility and a field for independence. All materials for lessons and games should be in the public domain and located so that the child can use one or another learning tool at any time.

5. The environment should arouse interest in learning and motivate, be complex and exciting.

According to the concept of Reggio Emilia, a child should learn the environment by touch and in the movement. This approach means the development of variable thinking. Mary Ann Biermeier (Biermeier, 2017) testifies that in Reggio Emilia's kindergartens and schools, children are taught that there are no dead ends, that solutions can always be found, that there is no single right answer, that there are many different statements. This is facilitated by the interdisciplinary approach, which pedagogues actively apply, integrating not subjects but areas of knowledge.

As part of our research, we developed the model of the development environment of the institution of preschool education, which is a condition for the formation of cognitive activity of the child and covers the structural and content unity of many environments necessary and sufficient for the development of the personality of the preschooler and helps to create situations-provocations in Reggio-approach.

The model of the development environment of the institution of preschool education is proposed in Fig. 3.1.

Thus, some studies in the sphere of the organization of the child's environment consider the requirements that must be met by the environment for the diverse development of the child, namely: the environment must be diverse and complex; consist of various elements necessary for the formation and optimization of all types of activities and comprehensive development of the child; the environment must ensure a free



transition from one activity to another; the environment should be flexible and manageable both by the child and by teachers, be open to creating situations-provocations.

<b>Pedagogical space of the institution of preschool education</b>				
<b>Educational environment</b>		<b>Specifics</b>	<b>Inclusive environment</b>	
<b>Lessons</b>		<i>Creating situations-provocations</i>	Psychologist's office	
<b>Educational travels</b>			Lounge area	
<b>Educational situations</b>			Speech therapist's office	
<b>Interaction with parents, cooperation and partnership</b>			Game room	
<b>Socio-cultural space of the institution of preschool education</b>				
<b>Subject-spatial environment</b>		<i>Creating situations-provocations</i>	<b>Communicative environment</b>	
<b>Subject-game environment</b>	Spatial environment		Sphere of interaction	Levels of interaction
<b>Game materials</b>	Artistic and aesthetic environment		Children	Individual
<b>«Free materials»</b>	Theatrical performance		Pedagogues and parents	Group, collective

Fig. 3.1. The model of the development environment of the institution of preschool education

### 3.4 The system of implementation of Reggio-approach ideas into the practice of institutions of preschool education belonging to local communities of Ukraine

According to K. Kruty, during the development of ways to implement the Reggio-approach into the educational institutions belonging to local communities, we used guidelines for the work of educators (experts) with ECERS scales (K. Kruty, 2021). To calculate the average scores for each of the subscales, scores were added for each indicator, and then divided by their number. The final average score on the whole scale was calculated as the sum of points on all indicators of the scale.

The analysis of the results of the protocols made it possible to derive the average indicators by levels, the state of the development environment in the analyzed groups of older preschool children was almost similar. Thus, in the groups “Bumblebee” and “Little elf” low level of development environment – 53% of protocols, medium level – 38% and 37%, respectively; high levels were recorded in 9% and 10% (shown in Fig. 3.2).

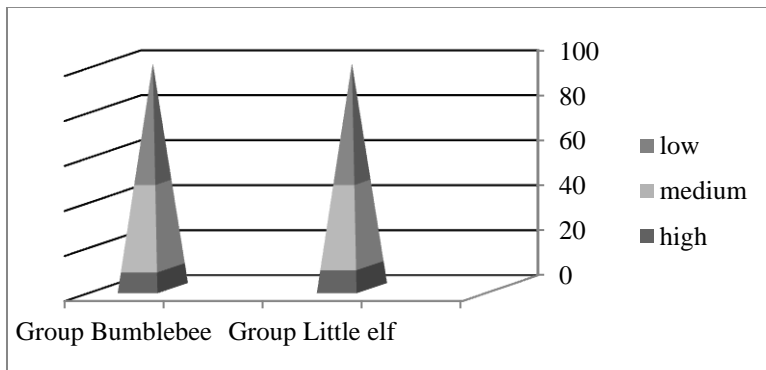


Fig. 3.2. The analysis of the results of the protocols on the state of the development environment in groups of older preschool children

*We chose the level approach* to evaluate the results. This is due to the following provisions:

– *the process of introducing the ideas of Reggio-approach into the practice of institutions of preschool education belonging to local communities of Ukraine is multilevel and includes:* knowledge and understanding of pedagogues about the requirements of the development environment in accordance with the principles of Reggio-approach, providing active, comprehensive, purposeful nature of the future changes, manifestation of motives associated with achieving results, etc.;

– any activity of the preschooler related to the knowledge of the environment, and cognition is a multilevel process;

– the significance of the designed system for implementing the ideas of the Reggio-approach into the practice of institutions of preschool education belonging to local communities of Ukraine is determined by the effectiveness of its implementation;

– the result of the implemented system is the transition from traditional approaches to “zoning” of the environment to a higher (qualitatively different) level of organization of the development environment.

We also conducted a survey of parents of senior preschoolers in order to identify and make them aware of the importance of the research problem. The results of the survey were supplemented by the interviews with parents. Let us focus on the results of the survey and the interviews. Parents were asked to determine the most important qualities of the preschooler’s personality according to the degree of importance. Only 35,4% of parents say that the important quality of the child’s personality is diligence, 68,2% of parents believe that the most important personality traits are honesty, friendliness, independence, responsibility and more.

It was important for us to find out what kind of activity is

the best and most interesting for the child. 76.0% of parents explained that the child is interested in play activities, 24.0% of parents said that the interest of the child is cognitive activity, in other cases the best activity for the child was listening to and reading works of art, productive activities (drawing, modeling, design). 8,2% of parents said that the child is interested in different types of work (household work, manual labor, work in nature). Parents of these preschoolers noted that children independently show interest in work, seek to help adults, ask questions about the content of work performed, feel joy, satisfaction with the process and results of work.

One of the main issues for us is to identify conditions that, in the opinion of parents, contribute to the introduction of the ideas of Reggio-approach in the practice of institutions of preschool education that belong to local communities of Ukraine. We have provided parents with a list of several conditions that can help create the development environment and determine their importance in order of importance. The results of this survey are presented in table 1.

Table 3.1 shows that the priority conditions that contribute to the creation of development environment correspondingly to the ideas of Reggio-approach, according to parents, are: the organization of joint activities of children and adults, presence of tools, necessary equipment, toys. However, conditions such as the example of an adult who is interested in the activity, the cooperation of pedagogues and family, most parents considered as secondary.

Therefore, we believe that such a condition as the cooperation of pedagogues and families in solving the problem of creating conditions for child development is the most effective for implementing the ideas of Reggio-approach into the practice of institutions of preschool education belonging to local communities in Ukraine.

Table 3.1. Ranking of conditions conducive to the creation of the development environment in the conditions of the institution of preschool education

<i>Rank conditions</i>	<i>Parents' assessment of the significance of the conditions</i>
1	Organization of joint activities of children and adults
2	The child has the tools, necessary equipment, toys
3	Creative focus of different activities
4	Example of an adult who is interested in the process of activity
5	Cooperation of pedagogues and families in solving the problem of creating conditions for child development

Based on the results of interviews with parents and the survey, we found out that most parents are aware of the importance of implementing the ideas of Reggio-approach into the practice of institutions of preschool education. At the same time, parents do not always understand the need to organize cooperation between pedagogues and families in solving the problem of implementing the ideas of Reggio-approach into the practice of institutions of preschool education that belong to local communities.

The obtained results of questionnaires, interviews, surveys showed the need to develop a system for implementing the ideas of Reggio-approach into the practice. The system of implementing the ideas of Reggio-approach into the practice of institutions of preschool education that belong to local communities of Ukraine, covered the implementation of theoretically sound pedagogical conditions. In the context of our research, we consider pedagogical conditions as a system of opportunities for the introduction of Reggio-approach into the practice of institutions of preschool education that belong to local communities of Ukraine, namely:

1. Taking into account psychological characteristics and sensitive periods in the development of personality.
2. Amplification (enrichment, expansion) of child

development based on the vitagenic experience of the personality and the creation of situations-provocation as a condition of self-actualization, realization of their “I” in one form or another of activity and communication.

3. Creating the development environment taking into account the principles of the Reggio-approach into the practice of institutions of preschool education that belong to local communities of Ukraine.

Thus, we have identified a group of conditions that determine the effectiveness of creating the development environment for the institution of preschool education.

The whole set of pedagogical conditions is conditionally divided into general and specific. The general ones include personnel, program-methodical, material-technical and sanitary-hygienic conditions of the child’s stay, specific conditions of introduction of Reggio-approach into practice of institutions of preschool education belonging to local communities of Ukraine, determine the component structure of the development environment.

In accordance with the principles of the Reggio-approach, the following component structure of the institution of preschool education development environment was worked out:

- relations between the participants of joint activities (development and support component of the environment);
- appearance, which covers the color scheme, ergonomics and comfort of furniture, etc. (development and tuning component of the environment);
- organization of children’s activity – fullness, effectiveness, play activities, classes, educational trips and educational situations, surprises (development and activating component of the environment).

Here we propose an algorithm for implementing the ideas of the Reggio-approach into the practice of institutions of

preschool education that belong to local communities of Ukraine.

Options for implementing the program:

1. Implementation without changes in the program content (basic): frontal (all age groups of kindergarten); age (groups of one age parallel); group (separate groups of the garden).

2. Introduction with modification of content changes (experimental): frontal; age-old, group.

3. Introduction with professional training and further counseling of the teaching staff.

Stages of implementation of the program

1. Preparatory stage of the implementation of the program – 2 months

Goal: To state the readiness of teachers to introduce an alternative educational program.

Contents of activity: revealing the level of development of sensory, intellectual and creative abilities of children; differentiation of children on the basis of individual, group, age differences; to identify the possibility of actualizing those indicators of cognitive development of children, which is based on the concept of the program.

2. The main stage of the program implementation is the academic year

Goal: To introduce the program as the main pedagogical strategy and innovative technology.

Contents of the activity: organization of the system of psychological and pedagogical activities in accordance with the content requirements of the program.

Result of the activity: activity of the collective on author's methodical support.

Conceptually important: integration of educational activities; experimentation as a basic method of work under an alternative program.

Axis X – horizontal integration – types of children's activities (game, productive, communicative, cognitive, research, transformative, visual, musical, etc.).

Axis Y – vertical integration – educational directions STREAM (science, technology, reading and writing, engineering, art, mathematics).

Axis Z – integration of the educational process: specially organized training in the form of classes; joint activity of an adult with children (educational situations, travel); free independent activity of children.

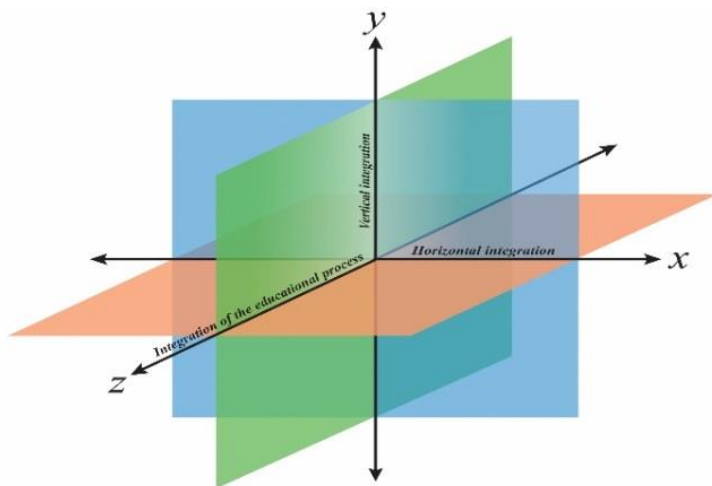


Fig. 3.3. Integration of content, types of activities and directions  
(the author of the idea – Prof. K. Kruty)

Priority forms of presentation of cognitive information of the alternative program: observation, experiments, research; conversation using open questions; games – intellectual and sensory games, game research, didactic and mobile games; creating collections; modeling phenomena and processes; exercise of the association; virtual and real excursions; mini-museums; classes – admiring nature; storytelling; sketches for



music; interactive cognitive fairy tale and history; cognitive presentations with interactive elements.

3. Adaptive stage of implementation of the program – 1 month

Goal: Adaptation of an alternative program to specific operating conditions.

Content of the activity: modification of the program content; the statement of the results of adaptation of the program content.

The result of the activity: the statement of indicators of the dynamics of development of children in accordance with the program requirements.

The most important factor influencing a child's development is the environment. It is important that already at the level of awareness educators and educators-methodologists of the institution of preschool education were focused not so much on the creation of the subject, but on the development environment.

It should be noted that the combination of components of the development environment allows to create conditions for the introduction into the educational field of Ukraine Reggio-approach into the practice of institutions of preschool education that belong to local communities of Ukraine. It should be mentioned that the system of implementing the ideas of the Reggio-approach includes:

- methods: observation, comparison, conversations, assignments, demonstrations, stories, explanations, imitations, exercises, game tasks, pedagogical situations, reflective methods;

- tools: adult personality, fine literature, individual tasks;

- forms of influence: situations-provocations, didactic games, excursions, games-travels, meetings with interesting people, discussions, consultations, parent meetings, seminars, “round table”, council of pedagogues, labour actions,

exhibitions of products of preschool children and parents, complex lessons, educational trips and situations.

The benchmarking of Loris Malaguzzi's educational ideas is relevant not only for communities but also for preschool education. We agree with Peter Moss (Moss, 2016) on the possibility of implementing the Reggio-approach and the need to take into account the pitfalls, namely: there can be no direct transfer of Italian cultural practice into the life of any local community. However, the ideas that developed in the middle of the twentieth century and continue to develop in the Italian region called Reggio Emilia, can be introduced in Ukraine.

In our opinion, the proposed by us system of implementing the ideas of Loris Malaguzzi and Reggio Emilia kindergartens does not suggest following a strict scheme, algorithm or approach that could be copied and applied elsewhere – in a municipality in Italy or in the local community in Ukraine. Like any educational project, it depends on the context. Reggio Emilia kindergarten can be seen as a local cultural project of renewal of education by the local community, certainly open to influence from afar, but the one that develops and preserves unique local identity. The values adopted by these institutions, as well as the pedagogical ideas and methods they implement, can stimulate the thoughts and actions of others, as well as contribute to the joint constructive process of design and development of the local community.

The ideas of Reggio Emilia are very real opportunity to improve the quality of education, expressed not through an attempt to impose national control over the system, but through the local cultural projects of local communities.

Thus, we presented the system, the set of pedagogical conditions and an algorithm for implementing the ideas of Reggio-approach into the practice of institutions of preschool education that belong to local communities of Ukraine.

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## **4 CLUSTER ANALYSIS OF INNOVATION IMPLEMENTATION IN THE UKRAINIAN REGIONS**

### **4.1 Application of cluster analysis for the innovation performance diagnostics in Ukrainian regions**

The rapid development of science and technology, global competition for ideas and means of their implementation have been determining the economic policy agenda of the world's leading economies for many years. The priority is to strengthen entrepreneurial initiative, attract private investment in breakthrough technological areas and intensify high-tech exports. Until recently, innovation was considered as a means of increasing competitiveness, but under the circumstances of the global crisis caused by intensified trade wars, declined productivity and the COVID-19 pandemic, the role of innovation is growing considerably and reaching a new level (Lee and Trimi, 2021). The standard of living of the population and the position of international and regional leadership depends on the successful development of the innovative economic vector of each distinct country and the world in general (Park, 2021; Jit et al., 2021). Therefore, innovation, including research and development, implementation of original ideas and projects, new product manufacture, technological process modernization, organization of sales markets for innovative products, plays a key role in technical, social and economic development of society. The relevance of the chosen research subject relates to the priority of innovative economic development of modern regions of Ukraine in order to accelerate overcoming the consequences of the global crisis and ensure its competitiveness and sustainable development in the long term prospective. The rapid spread of innovation in

global and regional markets enabled this progress.

Recently, the significance of the methodological basis for the formation of new innovative development directions of regions taking into consideration the growing level of impact of the post-crisis environment on regional projects increased dramatically in economic practice (Bailey et al., 2020). All the above-mentioned issues motivated the conduction of this study and the formation of scientific contribution to the development of methodological tools for evaluating the innovation effectiveness in the regions of Ukraine. This research is aimed at developing a methodological approach for diagnosing the effectiveness of innovation in the regions implementing cluster analysis and considering a set of parameters to provide its high level.

Research on the status of the methodology for measuring the innovative development of the national economy and regions of the country has become widespread in modern scientific literature. The basic problems of innovative economic development were characterized and the improvement directions of the system of measurement and evaluation of innovations taking into consideration economic, territorial and geographical features were identified (Du et al., 2019). The comparison of existing methodologies for rating the innovative development of regions was carried out and the consistency of their results was analysed. Directions for improving the evaluation methodology to increase its information and analytical significance were proposed (Magro and Wilson, 2019).

A particular area of research on innovation experiences to date is the economic essence of innovation in terms of country's digitalization. Approaches to estimating the impact of the digital economy on the innovative development of the country and its regions were analysed (Panori et al., 2021). Innovation as an economic category has the dynamic

development, the acceleration of which is influenced by the creation of favourable conditions in the country's digitalization (Yankovskaya et al., 2020). There are also studies proving that the transition to an innovative development type significantly affects various human development problems, creating new perspectives for improving the socio-economic development of the regions (Kuznetsova et al., 2019).

Current research suggests that the most effective tool in the innovation management is the government regulation of integrated development of the region, which implies reducing socio-economic imbalances between sectors of the economy and intra-regional territories. The innovation interests of the region are closely linked to the current economic structure and sectoral development priorities, as investment resources are relocating towards the direction of their most efficient use (You et al., 2019).

Several studies use cluster analysis to assess the effectiveness of innovation in the regions. The most complete assessment of the regions' level of innovation environment is obtained using cluster analysis methods. In accordance with the chosen algorithm of regions typology, they are grouped into clusters. The process of unifying regions is carried out sequentially on the basis of a matrix of distances between regions. Each subsequent region joins a cluster that is closer (Kuksa et al., 2019). The principle of hierarchical agglomerative procedures is to combine groups of regions consistently, first of all, the closest, and then increasingly distant from each other. In the first stage, each region is considered as a separate cluster. As the distance to the source cluster increases, new and new regions and clusters are added. The operation of the algorithm ends when all regions are combined into one class (Nestle et al., 2019). If the source cluster (region) is the best in developing the innovation environment, then other regions will join it successfully with

increasing distance (or decreasing similarity). The newly acceding regions or their groups will be ranked lower than the original one in terms of the level of development of the innovation environment. This enables their ranking according to the level of innovation potential (Ullah et al., 2020). The dendrogram provides an opportunity to identify the regions, which are the closest to the level of similarity of the innovation environment, both leaders and outsiders in clusters of different similarity levels (Balaniuk et al., 2021).

Nowadays, applied research on measuring innovation development at the meso level is conducted quite extensively, and methodologies for measuring different elements of the innovation system have been developed and used. Sufficient methodological material exists on the analysis of innovation processes at the micro and macro levels. At the same time, a comprehensive assessment of the innovation effectiveness in the regions consists in the increased requirements for its development. Firstly, this assessment should reflect the development and functioning processes of the region's innovation system, and secondly, contain a systematic and comparative set of indicators; thirdly, reflect the availability of evaluation indicators with periodic and reliable (official) statistical information. Fourthly, the lack of a universal model that reflects the specific features of a particular region. This study aims to fill the identified scientific gap by developing a methodological approach to diagnose the effectiveness of innovation in the regions, which implements cluster analysis and takes into consideration a set of parameters to provide its high level.

This study was carried out using methodological approaches to clustering regions of Ukraine based on the “the nearest neighbour” and “k-means” methods. The study proposes an integrated indicator of regional innovations implementation. This study implies five consecutive steps, as



follows.

Step 1 – collection of statistical data by regions of Ukraine. Four key indicators by region were used as input data in order to conduct the study: Q1 is the number of companies that introduced innovations (products and/or technological processes); Q2 is the volume of innovative products (goods, services) introduced by companies; Q3 is the number of companies that sold innovative products (% of total number of industrial); Q4 is the volume of sold innovative products (thsd. UAH). These indicators were obtained from the official website of the State Statistics Service of Ukraine (State Statistics Service of Ukraine, 2021): the study was conducted according to the materials from 24 regions of Ukraine and Kyiv.

Step 2 – normalization of indicators. The resulting indicators of innovation implementation in the regions of Ukraine undergoes a normalization process in order to bring them into a single scale of measurement. In accordance with the results of the decision-making theory, the most holistic way to further promote innovation should be chosen, taking into consideration maximization of their expected effectiveness. In terms of normalization, a linear transformation according to the following formula was used in order to bring the indicators to a single scale of measurement (Singh and Singh, 2020):

$$k_{ni} = \begin{cases} \frac{k_i - k_i^{min}}{k_i^{max} - k_i^{min}}, & k_i \rightarrow max \\ \frac{k_i - k_i^{max}}{k_i^{min} - k_i^{max}}, & k_i \rightarrow min \end{cases} \quad (4.1)$$

where  $k_i$  is  $i$ -th indicator of innovation implementation in the region according to the defined system of indicators,  $i = \{1, 2, 3, \dots, 9\}$ ;  $k_i^{min}$  is the minimum value of the  $i$ -th indicator of innovation implementation in the region;  $k_i^{max}$  is the maximum value of the  $i$ -th indicator of innovation implementation in the region;  $k_{ni}$  is normalized value of the  $i$ -th indicator of innovation implementation in the region.

The third step is to determine the level of efficiency of innovation implementation in the regions of Ukraine. It is also proposed to use an integrated indicator, which consists of the sum of the indicators normalized in the previous step in order to diagnose the effectiveness of innovation in the regions in this study. The proposed integrated indicator of innovation implementation in the regions of Ukraine enables the determination of a comprehensive assessment that takes into consideration a set of indicators and makes it possible to compare the performance of regions in this area.

The fourth step is a cluster analysis of the regions of Ukraine in the context of innovations introduction in business. In this study, we used the “k-NN” clustering method, i.e. the “the nearest neighbour” method (Li et al., 2019). It makes it possible to easily calculate the degree of similarity between the surveyed regions for each indicator used to describe the effectiveness of innovation in the regions of Ukraine. In order to determine the degree of similarity, a metric (for example, the Hamming similarity degree) is introduced in the space of all parameters. In this space, the point corresponding to the current problem situation is determined, and according to the selected metric, the nearest point to it (the nearest neighbour is the applicant with the maximum degree of similarity with the current situation) is determined from points representing other applicants to enter a given cluster. For the selected metric (Hamming similarity) the degree of similarity and the current problem situation is calculated according to the nearest neighbour method. The method of determining the nearest neighbour (nearest neighbours) is used to solve the classification, clustering, regression and pattern recognition problems (Sarkar and Biswas, 2020). The advantages of this clustering method include the following aspects (Thomä and Zimmermann, 2020): firstly, simplicity of implementation; secondly, universality in terms of independence from the

specifics of a specific problem area; thirdly, guaranteed to get the best of possible solutions.

It should be noted that the nearest neighbour method can be used in conjunction with other clustering methods, when the initial sampling is performed using another method, and in the second stage, comparing precedents in pairs with the current situation, the nearest precedent method is extracted.

The nearest neighbour method is based on a certain way of measuring the degree of similarity (proximity) of the precedent and the current problem situation. Technically, it is necessary to enter a metric in the parameters space (features, properties) to describe precedents and current situation, and then, determining the distance in the selected metric between points corresponding to clusters and the point characterizing the current situation, choose the nearest point, which is “the nearest neighbour” to the current situation. Of course, the effectiveness of the nearest neighbour method greatly depends on the choice of metrics (similarity measures). Let the given precedent (C) and the current problem situation (T) in the  $n$ -dimensional feature space (properties, qualities) be  $x_1, x_2, \dots, x_n$  for C and  $y_1, y_2, \dots, y_n$  for T, then the degree of similarity or proximity can be determined, using one of the following basic metrics to calculate the distance between C and T ( $d_{CT}$ ) (Scott et al., 2019):

–Euclidean distance:

$$d_{CT} = \sqrt{\sum_{i=1}^n (x_i - y_i)^2}, \quad (4.2)$$

–square of Euclidean distance:

$$d_{CT} = \sum_{i=1}^n (x_i - y_i)^2. \quad (4.3)$$

Therefore, the nearest neighbour method uses a simple coordinate comparison of the current situation with the precedent (each parameter to describe the precedent is considered as one of the coordinates) and determines the distance  $d_{CT}$  between the current situation and the precedent. In

order to define the value of the similarity degree  $S(C, T)$  the maximum distance  $d_{max}$  in the selected metric should be found, using the bounds of the parameters ranges to describe precedents ( $x_{sti}$  i  $x_{fini}$ ,  $i = 1, \dots, n$ ). Then it becomes possible to calculate the value of the similarity degree  $S(C, T) = 1 - d_{CT} / d_{max}$  or as a percentage  $S(C, T) = \left(1 - \frac{d_{CT}}{d_{max}}\right) \cdot 100\%$  (Firsova and Chernyshova, 2020).

The fifth step is to develop a dendrogram of clustering of regions of Ukraine in the context of innovation introduction. The final stage implies the separation of groups of regions is carried out based on hierarchical clustering regarding the indicators of innovation implementation. Therefore, it is possible not only to integrate cluster in in a holistic manner, but also to group the studied regions for further research. RStudio software was used for the purpose of visualizing the obtained results.

The scientific contribution of this study is the proposed methodological approach to assessing the effectiveness of innovation introduction in the regions based on an integrated indicator, enabling the determination of a comprehensive evaluation that takes into consideration a set of indicators and provides an opportunity to compare performance of each region in this area.

In the future, the study can be complemented by statistical econometric approaches, in particular by implementing regression and correlation analysis for clusters of regions of Ukraine in the context of the innovation experience. Meanwhile, it is possible to extend the range of indicators serving as parameters for diagnosing the innovations implementing experience in business.

## **4.2 Clustering of Ukrainian regions in the innovation experience context**

The rapid spread of innovation in world markets enabled the rapid pace of technological progress. Different mechanisms and measures of regional innovation policy predominantly stimulate different types of innovation activity of entities, are characterized by differentiated effects and impact on indicators of socio-economic development of regions (expansion of production, job creation, competitiveness dynamics of enterprises and economic system in general, the level of impact on the environment, efficiency indicators of the use of territorial resources, etc.) (Ratten, 2021; Abi Younes et al., 2020). However, the same mechanisms and measures of regional innovation policy may display different levels of effectiveness in terms of stimulating innovation activity of the socio-economic system according to the sectoral structure of the region's economy and the readiness of regional innovation system to respond to the challenges posed by the crisis (Rosa et al., 2021).

In the post-crisis period of reactivation of suspended industries and launch of business processes in all spheres of economic activity after self-isolation, the design and introduction of anti-crisis management programs as well as the development of regional production subsystem are urgent issues (Kapoor et al., 2021). Moreover, the challenge of making the process of regional economic development more innovation-oriented becomes critical during the post-crisis period. The above-mentioned process comes to the fore since the need for innovation in all areas of socio-economic activity has especially increased with the onset of the crisis due to growing importance of the regional economy to the autonomous functioning (economic sovereignty) (Rowan and Galanakis, 2020). Under the background of the COVID-19

pandemic for local communities, particularly the regions of Ukraine, it is important to assess the number of companies that implemented innovations, the volume of innovative products (services), the number of companies that sold innovative products and the volume of sold innovative products. The following research issues are solved in the given study:

- firstly, the evaluation of the innovation effectiveness is carried out considering various indicators characterizing its level;

- secondly, the diagnosis of the innovation effectiveness in the regions of Ukraine was carried out on the basis of the proposed integrated indicator;

- thirdly, the clustering of regions was carried out using the method of “the nearest neighbour” and “k-means”, based on which the dendrogram of hierarchical clustering was formed.

Meanwhile, it is sometimes difficult to diagnose the effectiveness and quality of innovation in the regions based on a set of the indicators (Table 4.1).

From the above source data, it can be stated that the largest number of companies that have introduced innovations tend to have Kharkiv, Kyiv, Dnipropetrovsk, Lviv regions and city of Kyiv. The highest volumes of introduced innovative products (services) were recorded in Kharkiv, Kyiv, Zaporizhia, Lviv oblasts and city of Kyiv. At the same time, the largest number of companies that sold innovative products is observed for Ternopil, Cherkasy and Ivano-Frankivsk regions. And the leaders in terms of innovative products sales are Donetsk and Dnipropetrovsk regions, city of Kyiv, Poltava and Kharkiv regions.

Table 4.1. Indicators of the innovation effectiveness in the regions of Ukraine in 2020

Region	The number of companies that introduced innovations (Q1)	The volume of innovative products introduced by companies (Q2)	The number of companies that sold innovative products (%) (Q3)	The volume of sold innovative products (thsd. UAH) (Q4)
Vinnitsya	28	88	15,1	669645
Volyn	10	10	7,8	450488
Dnipropetrovsk	65	205	10,5	6393062
Donetsk	19	146	8,2	15398156
Zhytomyr	14	28	7,5	74817
Zakarpattia	8	9	6,3	89199
Zaporizhia	39	380	13,9	1989522
Ivano-Frankivsk	26	133	16	238652
Kyiv	50	480	12,7	1501543
Kirovohrad	19	46	17	1421588
Luhansk	9	36	13,6	740048
Lviv	56	377	11,8	1253064
Mykolayiv	12	39	9,7	310428
Odesa	28	59	11,2	824393
Poltava	31	101	10,2	4300978
Rivne	16	162	7,6	116767
Sumy	19	152	15,7	412819
Ternopil	32	91	19,8	532281
Kharkiv	82	610	15,6	3157266
Kherson	13	137	13,3	420578
Khmelnyskiy	13	23	6,9	387437
Cherkasy	29	107	16,2	549427
Chernivtsi	13	17	13,6	186392
Chernihiv	18	224	13,2	325742
City of Kyiv	69	288	10,4	4464500

Source: by the authors based on (State Statistics Service of Ukraine, 2021)

Based on the source data on the four defined indicators for 2020, it is possible to determine the leadership positions of distinct regions for each indicator. This creates a need to diagnose the overall comprehensive level of innovation effectiveness, so this study proposed an Integrated Indicator of

Innovation. In order to define it, the baseline data should be brought into a single measurement scale. To this end, the baseline data have been normalized and the results are displayed in Fig. 4.1.

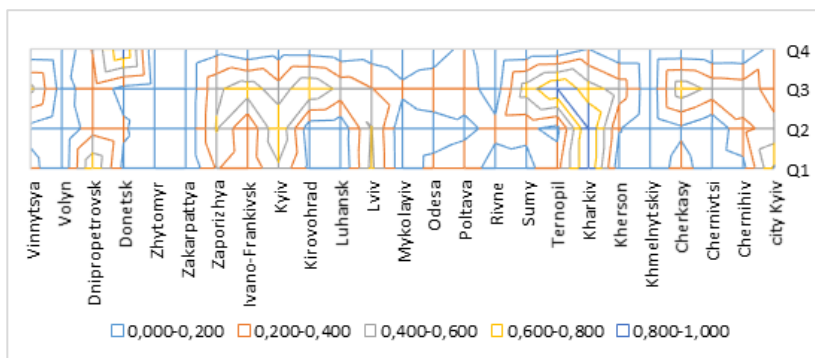


Fig. 4.1. Normalized indicators of the innovation effectiveness in the regions of Ukraine in 2020

Source: formed by the authors

According to the results of normalization of initial indicators, it can be determined that the absolute leader in the level of innovation in business is Kharkiv region, in terms of the number of enterprises sold innovative products – Ternopil, and in terms of sales of innovative products – Donetsk. The outsider in terms of indicators Q1–Q3 is Zakarpattia region, and in terms of the volume of sold innovative products (Q4) is Zhytomyr region. Given that no region is the absolute leader in all four indicators, an integrated indicator of the regional innovations implementation was calculated in order to allow for comprehensive diagnosis (Fig. 4.2).

Based on the diagnostics of the innovations implementation effectiveness with the help of an integrated indicator, the leaders among the regions of Ukraine can be identified. The average value of the integrated indicator of innovation implementation is 1.077. At the same time, the



Kharkiv region has the highest level of innovations introduction efficiency (2.89), which is twice the average value of this indicator in the regions of Ukraine.

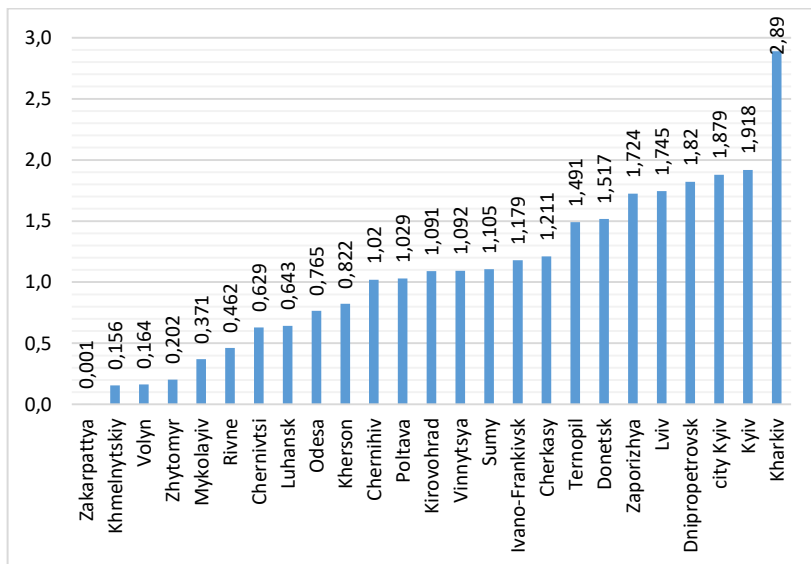


Fig. 4.2. Integral indicator of innovation implementation in the regions of Ukraine in 2020

Source: formed by the authors

The lowest level of innovation implementation efficiency was recorded in Zakarpattia region (0.001). This is due to the fact that the region has the lowest rates in terms of the number of enterprises that have implemented innovations and sold innovative products, as well as in terms of the volume of implemented innovative products. In general, most of the 25 surveyed regions (52%) have a level of innovation implementation efficiency above the average in Ukraine.

A cluster analysis was performed by the “the nearest neighbour” method in order to determine the common features of innovation experience in the regions of Ukraine. The results

of this analysis are given in Table 4.2 together with the corresponding Euclidean distances. Indicators of the number of implemented products and volumes of sold innovative products were used in order to define clusters.

Table 4.2. Euclidean distances for clustering the regions of Ukraine in the context of innovation by the “the nearest neighbour” method

Formed clusters by regions of Ukraine	Vinnytsya, Ternopil, Cherkasy, Ivano-Frankivsk, Kherson, Sumy, Rivne, Volyn, Zhytomyr, Zakarpattya, Chernivtsi, Khmelnytskyi, Mykolayiv, Luhansk, Odesa, Kirovohrad, Chernihiv, Poltava, Dnipropetrovsk, city Kyiv	Donetsk	Zaporizhya, Lviv, Kyiv	Kharkiv
Vinnytsya, Ternopil, Cherkasy, Ivano-Frankivsk, Kherson, Sumy, Rivne, Volyn, Zhytomyr, Zakarpattya, Chernivtsi, Khmelnytskyi, Mykolayiv, Luhansk, Odesa, Kirovohrad, Chernihiv, Poltava, Dnipropetrovsk, city Kyiv	0	0.596	0.222	0.543
Donetsk	0.596	0	0.958	1.111
Zaporizhya, Lviv, Kyiv	0.222	0.958	0	0.241
Kharkiv	0.543	1.111	0.241	0

Source: formed by the authors

Four clusters can be defined, the first one among which includes the most significant number of surveyed regions (80%). This indicates that most regions of Ukraine have similar characteristics in terms of the number of implemented products and the volume of sold innovative products. At the same time, a small Euclidean distance to the third cluster is observed,

including Zaporizhia, Kyiv and Lviv regions. This indicates that these regions are not significantly different, but have similar ratios, allowing them to be grouped into one cluster. In addition, there are two autonomous clusters formed from only one region: the second cluster, which is Donetsk region and the fourth cluster, which is Kharkiv region.

The largest Euclidean distances were observed between these clusters, characterizing them as the most different from each other in terms of the studied indicators. In particular, the autonomous cluster of Donetsk region tends to have the largest Euclidean distances to all clusters. This is a consequence of a substantial difference in the volume of sold innovative products in the region. For example, this volume in the Donetsk region is 5 times higher than in the Kharkiv region, which is also singled out into an autonomous cluster.

The k-means method was used in order to carry out a cluster analysis of a set of innovation effectiveness indicators under study in the regions of Ukraine, which were included in the integrated indicator. An important advantage of this method lies in the ability to take into consideration a whole set of indicators. The obtained results are visualized in the form of a hierarchical clustering dendrogram (Fig. 4.3).

The blue cluster comprises of the regions that have the highest efficiency indicators of innovation implementation: Kharkiv, Dnipropetrovsk, Zaporizhia, Kyiv, Lviv regions and city of Kyiv. These regions are actually leaders in Ukraine with regard to research on the proposed integrated innovation indicator (Fig. 4.2). The integrated indicators also correspond to the resulting cluster distribution for other regions. This confirms the feasibility of its use to measure the level of innovation effectiveness in the regions. It should be noted that this clustering method resulted in only one autonomous cluster – Donetsk region, which significantly differs from other regions with regard to the volume of sold innovative products.

The clustering of the regions of Ukraine in the context of innovation proved the effectiveness of using the proposed integrated indicator for rapid diagnostics and supplemented it with the separation of four clusters with regard to the set of parameters under study.

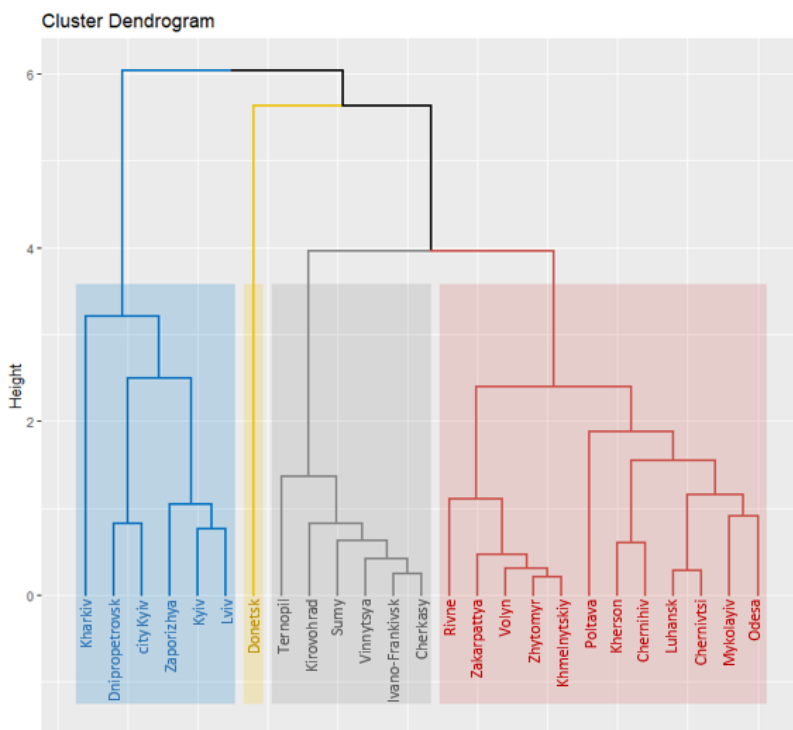


Fig. 4.3. Dendrogram of hierarchical clustering of regions of Ukraine with regard to the innovations implementation by the k-means method

Source: formed by the authors

The clustering provided an opportunity to identify leaders and outsiders in the context of innovation among the investigated regions of Ukraine. Using the k-means method allowed to identify four clusters of regions. The cluster with

the highest level of efficiency in the innovations implementation comprises of Kharkiv, Dnipropetrovsk, Zaporizhia, Kyiv, Lviv regions and city of Kyiv. At the same time, an autonomous cluster was obtained during the research. It is Donetsk region, which significantly differs from other regions with regard to the volume of sold innovative products.

The research is a matter of concern to scientists and individuals engaged in the development and implementation of strategic intentions and innovative development policies of the regions of Ukraine, business representatives and potential investors who investigate the regional features of the Ukrainian market.

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## **5 INNOVATIVE WAYS OF ENSURING THE SOCIAL SECURITY IN THE LABOR MARKET IN THE CONTEXT OF ACHIEVING THE GOALS OF SUSTAINABLE DEVELOPMENT**

### **5.1 Strategic tools for ensuring the social security in the labor market**

The modern conditions of development are characterized by increasing the role and importance of social innovations that contribute to solving important problems related to ensuring the protection of social interests of the population, a decent standard and quality of life, welfare of society. All this is actualized by the need to improve the socio-economic situation, which is currently complicated by the effects of the COVID-19 pandemic and the existing crises in labor sphere and employment, which, in turn, indicates a low level of social security and negatively affects all spheres of society. At the same time, the development and implementation of innovative solutions, especially in the formation of the knowledge economy, ensure not only the improvement of the current situation, but also provide an impetus to socio-economic development of the country.

According to foreign researchers, with the transition from industrial society to the economy of knowledge and services associated with the implementation of the paradigm of innovative development, there is a change in the relationship between technological and social innovation to increase the importance of social innovation (Howaldt, 2010; Schwarz, 2010).

Transformation processes have a significant impact on the development of economic systems and form fundamentally

new qualities of social and labor relations, focused on the priority of innovation and information component. At the same time, these changes carry numerous risks in the field of labor and employment, which contribute to the emergence of threats to social security in the labor market. Thus, the urgent need to ensure social security in the labor market, which is reflected in the formation of the state of protection of the interests of the population in the field of labor and employment, can be addressed through innovative solutions that will balance labor market development and improve living standards.

Currently Ukraine is participating in the implementation of the Global Sustainable Development Goals for the period up to 2030, which, among other priorities, include tasks in the field of labor market functioning. In particular, Objective 8 – Promote progressive, inclusive and sustainable economic growth, full and productive employment and decent work for all. Among the main key tasks in the field of employment and labor market development are the following (Sustainable Development Goals, 2016–2030):

- conducting of the development-oriented policy that promotes productive activities, job creation, entrepreneurship, creativity and innovation, and encourages the official recognition and development of micro, small and medium-sized enterprises, including by providing them with access to financial services;

- ensuring the full and productive employment and the decent work for all women and men, including young people and people with disabilities, and equal pay for work of equal value by 2030;

- significant reduction in the share of young people who don't work, don't study or don't acquire professional skills by 2020;

- protection of labor rights and promotion of safe and secure working conditions for all workers, including migrant

workers, especially migrant women, and those without stable employment;

– development and implementation of a global strategy for youth employment and implementation of the International Labor Organization Global Jobs Pact by 2020.

The Decree of the President of Ukraine of September 14, 2020 № 392/2020 put into effect the Decision of the National Security and Defense Council of Ukraine on the National Security Strategy of Ukraine “Human Security – Country Security”, which proclaims human security the highest social value of the state. One of the priorities of this Strategy is the development of human capital through the modernization of education and science, health, culture and social protection (President of Ukraine, 2020). In particular, the need to create jobs is determined; modernization of the education system by bringing educational standards to the needs of society and world practices; creating the conditions for cultural and sports development; ensuring the gender equality in the realization of labor potential; increasing the welfare of the population; creating conditions to increase the birth rate and reduce mortality; improving the health care system; ensuring inclusiveness and equal rights and opportunities for people with disabilities, etc.

Among the current positive developments in the direction of software of the social component of society development is the approval of the decision of the National Security and Defense Council of Ukraine of May 14, 2021 “On Human Development Strategy”. The importance and significance of this Strategy in modern conditions is that it will contribute to achieving most of the Sustainable Development Goals, in particular in the context of poverty reduction, decent work and economic growth, health, gender equality and education, reducing inequality. Thus, the purpose of the Strategy is to create conditions for comprehensive human development throughout life, expand opportunities for realization of

potential and freedom of the individual, his civic activity for the formation of a cohesive community of citizens capable of active creative participation in harmonious, balanced and sustainable development (President of Ukraine, 2021). Strategy envisages the achievement of 5 strategic goals: improving the medical and demographic situation in Ukraine; building an educated, virtuous, inclusive and innovative society in which every citizen has equal opportunities for learning and development, and science is a component of economic growth; formation of a comprehensively developed person, patriot of Ukraine, promotion of spiritual development and creation of opportunities for creative self-expression and self-realization in the cultural and sports direction; raising living standards, boosting employment and providing social support to the population; ensuring equal rights and opportunities for women and men in all spheres of society and implementing the best European standards of gender equality.

The important component of the process of determining priority areas and measures to ensure social security in the labor market is to take into account the recently adopted strategic documents that shape the vision of Ukraine's economic development in the future. Thus, on November 6, 2020, the Ministry of Economy and the Ministry of Social Policy presented the results of the country's economic audit and the Vectors of Economic Development by 2030. A separate section of this policy paper is devoted to quality of life, which, among other important issues, determines the need to achieve strategic goals in the field of employment and wages, including increasing employment in the population aged 20–64; reduction of the share of young people (aged 14–35) who don't work, don't study or don't acquire professional skills; increasing the ratio of the average pension and the average wage in the economy; achieving a level of income and social benefits not lower than the European average (Cabinet of

Ministers of Ukraine, 2020). According to the Vectors of Economic Development 2030, one of the important components of the sectoral sub-direction “Social Policy” is an effective employment policy, which provides for the creation of conditions for lifelong learning and increasing the competitiveness of individuals in the labor market and promoting de-shadowing of employment.

Considering the presence of numerous problems in the sphere of social and labor relations, among which the high level of informal employment, the presence of significant structural imbalances in the labor market, the low level of involvement of vulnerable groups in employment, the inconsistency of educational and professional characteristics and needs of the labor market, the predominance of passive employment policy, Vectors of Economic Development 2030 emphasize the need to intensify public policy in the labor market and attract positive experiences of foreign countries, in particular in the context of digitalization and improvement of the State Employment Service. Among the main directions of change are determined:

1. The need to reduce unemployment and increase employment through the reorientation of state policy to the use of its active forms, the strengthening cooperation of the State Employment Service with employers implementing investment projects, private employment agencies and other stakeholders in the labor market at both state and local levels, expanding opportunities for self-realization, in particular among young people, the elderly, other socially vulnerable groups, the implementation of measures to de-shadow the labor market.

2. The need of lifelong learning and increasing the competitiveness of the workforce through the use of new forms of education, improving the approaches to the provision of training and career guidance services of the State Employment Service, the introduction of updated professional standards and

qualifications, etc.

3. The need to ensure labor protection and social protection of workers through the provision of decent working conditions and the application of innovations in the field of safety, as well as social protection of all workers.

The Vectors of economic development by 2030 were taken as a basis in the development of the National Economic Strategy for 2030, which also emphasizes the importance of systemic human development as the main and most important potential in the XXI century, and one of the targets is reducing unemployment (according to the ILO methodology) up to 6 percent (Cabinet of Ministers of Ukraine, 2021).

So, the strategic course of economic policy by 2030 provides for the achievement of priority goals in 20 directions. Within the 20th direction (quality of life) among a number of strategic goals is to ensure equal rights and opportunities for everyone, a high level of social protection for a dignified life; increase the employment rate of women and men of the appropriate age groups and reduce the salary gap between women and men (Cabinet of Ministers of Ukraine, 2021).

Considering the critically low level of use of human resources and labor resources in Ukraine, which is reflected in the low level of labor force participation (56.3% in 2019) and one of the highest unemployment rates in Central and Eastern Europe (8.6% in 2019), the presence of high levels of informal employment, the structural and gender imbalances in the labor market, the mismatch of professional qualifications and needs of the labor market, the focus on passive methods of state support by the State Employment Service, there is the need for implementation of the effective employment policy. According to the National Economic Strategy by 2030, it can be achieved by the increasing employment, the creating conditions for lifelong learning and increasing the ability to compete in the labor market.

## **5.2 Innovations in ensuring the social security in the labor market: national experience and author's proposals**

In order to overcome threats to the labor market and ensure the high level of income and welfare of the population of Ukraine, we consider it necessary to focus on achieving four key goals, which, in our opinion, will provide a decent income, welfare and human development. Among the priority goals are balanced development and de-shadowing of the labor market, reduction of unemployment among the young people and the elderly people as the most vulnerable categories of the labor force, increase the salary level and the incomes of population.

Considering the recent changes in the legal and program securement of the development of labor market, we consider that the priority direction to neutralize the threat of unemployment, achieve the balanced labor market development, create the additional jobs, formation of the middle class is the development of small and medium businesses. Youth entrepreneurship deserves special attention in this aspect. In order to develop it, it is advisable to apply tax benefits, namely the exemption of newly established enterprises (including innovative enterprises, youth startups) from paying income tax in the first two years of its operation. This method of stimulating youth entrepreneurship is successfully used in developed countries. The effective state policy aimed at stimulating self-employment and entrepreneurial activity of young people, improving the legal framework in the context of preferential taxation of enterprises that hire young workers, active control and monitoring of labor market and educational services indicators in order to timely adjust and take the necessary measures, will help neutralize the threat of youth unemployment.

The important way to solve the problem is to form the mechanism for effective interaction between government,

business and education, which is reflected in the coordination of efforts and joint activities aimed at improving the labor market and providing young people with jobs. Among the useful regional initiatives in this aspect is the positive experience of the Dnipropetrovsk Regional State Administration, which together with the Public School of Business in Lviv successfully implements the project “Business Internship 2.0 – build your own business”, funded by the regional budget. People living in the Dnipropetrovsk region who want to start their own business, owners and managers of SMEs, startups, managers of existing enterprises, as well as their departments and divisions can take part in training on the peculiarities of creating and organizing a business to improve their knowledge. The purpose of the project is to develop the new business management models, strategic thinking of business leaders, create the new algorithms for running their own business, promoting the existing business to new markets (Business Internship 2.0, 2020).

Considering the importance of establishing partnerships between state authorities, employers and education, it is necessary to identify the main directions of its interaction aimed at improving the youth segment of the labor market and ensuring social security in it. Thus, the tools of preferential taxation can be applied to those employers who employ graduates of educational institutions in the first place, as well as hire young people for vocational training programs of the State Employment Service. In the context of the importance of the educational component in the process of ensuring social security of youth in the labor market, it should be noted the need to update educational standards for the formation of a system of competencies taking into account the opinion of employers (stakeholders); expanding the scope of partnership with business structures for the practical training of students (in



particular, in the field of dual education); involvement of employers in conducting joint lectures, seminars, trainings for students both on the basis of enterprises and on the basis of educational institutions; implementation of projects and scientific and technical developments commissioned by employers; development of career centers based on educational institutions aimed at helping to find the first job for future graduates, monitoring the employment of both students and graduates, establishing relationships with employers to form effective cooperation.

In addition to the above measures to address the problem of youth employment should be aimed at stimulating self-employment and entrepreneurial activity of young people by providing targeted state aid to start their own business, and creation of the youth coworking spaces and holding the state grant competitions taking into account current issues.

Important in the process of building the effective interaction between education and business are educational technologies, which should not only take into account the latest changes and innovations in a particular field of study, but also be based on interactive components of learning. In particular, this applies to the use of training as a form of training, which includes important elements of practical work of students and their development of relevant tasks, which result in the necessary skills and abilities. Similar properties are characterized by work in small groups (teams) with the solution of specific production tasks, and business games. Such interactive teaching methods involve constant, active interaction of all participants in the educational process and the unique involvement of each of them.

Among the features of interactive learning are the presence of a common goal that meets the needs of each participant in the process, the presence of a single information space in which teachers and students interact, the coordination

of efforts and joint actions to achieve the result. In our opinion, such interactive teaching methods as case method, project-based learning, training, educational game, educational discussion are especially relevant in modern conditions. The example of the successful application of case studies to teach students is the Casers for Universities project. The Ukrainian Casers community invites university teachers to take part in a project where representatives of business or government create business cases for them and offer them for implementation (Casers, 2020). The project aroused interest among teachers who use the interactive teaching methods and try to connect theory and practice. The main topics of the cases are management, finance, marketing, IT, law, technology and agro-industry and other spheres. In the content of the case, experienced managers or business professionals offer more ways to study the specialty, as well as guide in practical skills. By agreeing to participate in the project, the teacher: includes the case in his curriculum, considers a case with students in practical or seminar classes. Students with the best decisions are admitted to the final of the case (meeting with representatives of the company-customer of the case), awarding the winners with valuable (including cash) prizes and providing opportunities for internships / internships / employment in the company-customer of the case. This methodology not only promotes the development of educational practices in the universities, but also provides cooperation between education and business.

Another interesting example of intensifying the creative activity of student youth and cooperation of higher education and business institutions is the competition for the best scientific and practical development among students and graduate students “Intellect–Creativity–Success”, held every year until 2014 by the Dnipro City Organization of Employers (Dnipro, Ukraine). The competition was designed to intensify

the exchange of scientific ideas, stimulate promising research in various fields, help employers get acquainted with future professionals at the stage of their training in free economic zones, give students the opportunity to express themselves. Leading enterprises and organizations of Dnipro were the customers of the topics of the competition works and the founders of the prizes for the winners. The winners of the competition received diplomas, cash prizes, valuable gifts, as well as the opportunity to implement the proposed project in practice. Thus, interactive methods of case study are reflected not only in the process of direct teaching and learning the discipline, but also outside the classrooms.

The establishment of partnerships between educational institutions and employers is facilitated by activities within the framework of the all-Ukrainian project Uni-Biz Bridge, conducted by UGEN (UGEN, 2020). The project provides a range of educational activities for students (using the case method and forming teams of participating students from all regions of Ukraine, who jointly solve practical cases), and for teachers to improve the quality of teaching. All these examples of successful interaction between education and business show the presence of positive changes in the direction of forming a dialogue between educational institutions and employers.

In order to implement measures to enhance the effectiveness of cooperation between education, government and business, as well as reduce unemployment, we offer the author's project on youth entrepreneurship, which defines the set of measures aimed at developing knowledge and skills on the specifics of starting own business, startup schools (youth entrepreneurship schools) at the national and regional levels (Bondarevska, 2021). This project combines the possibility of simultaneously solving the several questions:

–achieving the balanced labor market by reducing the number of unemployed and creating additional jobs;

–promoting the de-shadowing of the labor market through information activities within the project for young people on the risks of informal employment and the hiding salaries from taxation;

–reduction of the unemployment among young people and the elderly through the development of small and medium enterprises (it is important to note the positive effect of the project not only for young people but also for older people, who can be involved in mentoring and coaching, transferring their professional experience to young people, and can be employed in newly established enterprises);

–increase the salary level and incomes of the population (youth entrepreneurship in the future will increase the income of workers and the formation of a significant share of the middle class in Ukraine, which is known to be the driving force of economic development).

Ukraine already has some positive experience with the development of startup schools. Thus, the first Startup School “Sikorsky Challenge” began its activities in 2014 on the basis of Igor Sikorsky Kyiv Polytechnic Institute. In the framework of cooperation with it, a regional network of startup schools was created to generate youth ideas and implement them. At the same time, it should be noted the low pace of creation of new startup schools at the current stage of economic development, as well as significant differences between startup schools from the proposed project “School of Youth Entrepreneurship”. In particular, startup schools aim to develop innovative entrepreneurship and are focused on generating innovative ideas with the subsequent search for investors for their practical implementation; while the school of youth Entrepreneurship is designed to promote the start and development of their own business, providing entrepreneurial skills and basic knowledge of business organization, as well as practical assistance in its formation by testing models of their

business in real businesses. Thus, the school of youth entrepreneurship has a more universal character, and is also determined by the active participation of state authorities, educational institutions and employers in their activities. The main stakeholders of the project will be:

- by the state: the Ministry of Economic Development, Trade and Agriculture of Ukraine; the Ministry of Education of Ukraine; the State Employment Service of Ukraine; the local state authorities and regional offices of the State Employment Service;

- by the employers: the Federation of Employers of Ukraine; the regional employers' organizations; the business entities;

- by the sphere of education: universities and institutions of higher and vocational education.

The target group of the project is formed by applicants and graduates of educational institutions, active youth who are interested in starting their own business. According to the results of the project implementation in the future it is expected to create jobs and increase the level of youth employment; increasing the level of income of the population; de-shadowing of social and labor relations; increase in state budget revenues. The mechanism of implementation of the project “School of Youth Entrepreneurship” is shown in Fig. 5.1.

In determining the main stages of implementation of the proposed project, it is necessary to take into account the specific measures to be implemented within each specific stage.

The preparatory stage includes:

- formation of the common space for future entrepreneurs (on the basis of educational institutions or employers' organizations);

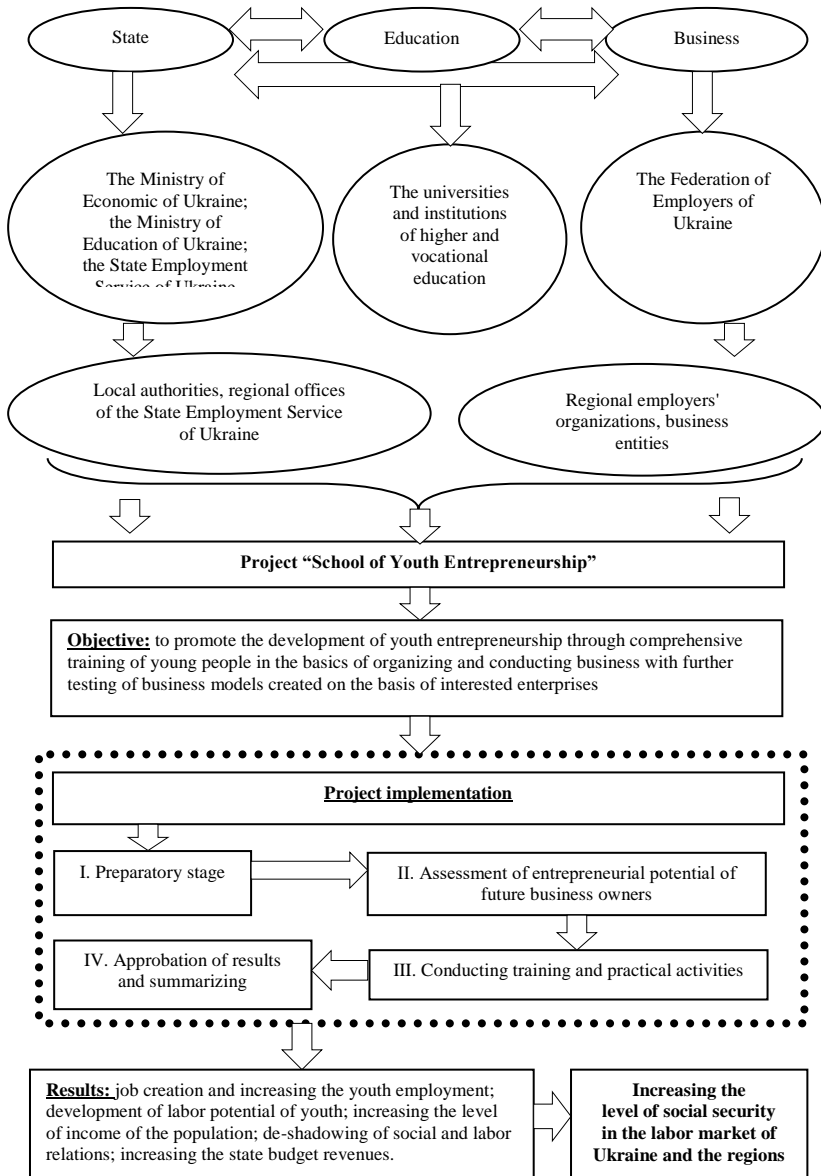


Fig. 5.1. Mechanism of implementation of the project "School of Youth Entrepreneurship"

Source: author's development

- search for the project partners (representatives of business communities, business owners, business development specialists) and discuss the terms of cooperation with them;

- announcement of the competition for participation in the project among educational institutions: the main selection criteria will be the availability of the necessary material and technical base and established links with employers who may be participants in the project;

- creation of the information platform on the Internet for start-up entrepreneurs;

- conducting the advertising campaign of the project among graduates and students of educational institutions, as well as all those wishing to organize their own business for persons under 35 years of age;

- announcement of a competition for participation in the project among talented young people. In order to get into the school of youth entrepreneurship, applicants will need to present their business idea and pass a test for entrepreneurial skills. Students and graduates who show the best test results and the most interesting ideas for starting a business will have the opportunity to study for free at school;

- drawing up the plan for the organization of the learning process and the project curriculum.

Following the above activities, a stage of detailed assessment of the entrepreneurial potential of young people and the formation of communication links between participants and trainers is proposed. This stage involves an in-depth acquaintance with future entrepreneurs and their ideas.

The next stage will be training and practical events in the form of trainings and workshops, including issues of acquaintance of participants with the latest changes and innovations in the legislation of Ukraine on business development; the features of creation and registration of new subjects of business activity; the possible risks and obstacles to

business development, as well as opportunities to avoid them; the features of domestic tax policy, the importance of paying taxes and paying “white” wages, as well as the conduct of formal social and labor relations and official employment of employees.

The important questions should be the study of conditions, factors and reserves for increasing the efficiency of economic activity and ensuring the social interests of employees, in particular in the context of the development of corporate social responsibility. At this stage, it is envisaged to actively involve entrepreneurs in the educational process, who can provide practical information on the real situation of business in Ukraine, give examples of successful business and remove obstacles in this way. As the characteristic feature of the school of youth entrepreneurship is the development and implementation of its business idea, it is planned to work on the participants' own business projects with active participation and using the base of partners of the School.

It is at the last stage of the project of the School of Youth Entrepreneurship that the results of the work and public defense of the business idea are envisaged among the main stakeholders (the representatives of business entities that were directly involved in the project, state authorities and the state employment service; the employers' associations; the educational institutions). Following the results of the stage of approbation of the results, the participants of the school are provided with further information-consulting, methodical and financial support of their own business development.

The proposed project will provide the opportunity to improve youth employment and youth entrepreneurship, which, in turn, will contribute to the protection of social interests of young people in the labor market and, consequently, will have a positive impact on social security in Ukraine and regions.

Implementation of the innovative solutions in the process



of ensuring the social security and further development of society is a leading tool for economic growth and achieving sustainable development goals. Considering the difficult economic, social and political situation in Ukraine, which causes a number of problems and obstacles to its development, there is a need to develop non-standard and fundamentally new approaches to addressing pressing issues. By means of a number of strategic tools that reflect the priorities of economic and social development, as well as gaining useful experience in ensuring the interaction of education, government and business aimed at improving employment, it is possible to implement the relevant initiatives.

In particular, in this direction it is worth noting the author's project on the development of entrepreneurship among young people, aimed at strengthening the effectiveness of cooperation between education, government and business to reduce unemployment and improve employment. Implementation of the proposed measures within the project will contribute to achieving the balanced labor market by reducing the number of unemployed and creating new jobs; de-shadowing the labor market through an information campaign on the negative effects of informal employment; reduction of unemployment, in particular among young people through the development of small and medium enterprises; growth of salary level and labor incomes, the formation of the middle class in Ukraine, which is the driving force of economic development.

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## **6 STATE REGULATION OF TRANSPORT INFRASTRUCTURE INNOVATIVE DEVELOPMENT**

### **6.1 Legislative support for the development of the transport complex in Ukraine**

Today, one of the key tasks of equal, competitive partnership of Ukraine in the system of international trade and economic relations is to ensure quality transformation of the country's current transport infrastructure, which serves domestic transport and is an important participant in global logistics chains. Despite the country's leading position in the international rankings of logistics efficiency, its technological degradation remains the main trend in the development of domestic transport infrastructure due to the extremely low level of innovation in transport. The lack of innovative changes in the transport sector is the result of inefficiency and inconsistency of state policy in the field of supporting and stimulating innovation processes in the industry, which stipulated the expediency of modernization for the system of state regulation of innovative transport infrastructure.

Currently, infrastructure is an integral part of any economic system. As a result, infrastructure development is a priority along with other processes. The emergence of infrastructure is preconditioned by objective processes in the division of labor and specialization of production and economic activities of economic entities and is the result of structural changes in the economy, which have necessitated a system that reconciles the results of the division of labor and structuring and compensates the costs of production disunity.

When assigning any object to the infrastructure, it is necessary to determine the main criteria by which you can

include the industry or object in this set. The main criteria for classifying transport as production infrastructure are as follows:

1. Transport does not produce new products, but is a continuation of the production process within the circulation process, it only moves products already created by other sectors of the national economy, thereby increasing their value by the amount of transport costs.

2. Transport products, namely transportation of goods and passengers, are inseparable from the process of transport production. It cannot be accumulated or stored. Therefore, the problem of reserves in transport is to create not the stocks of products, but the reserves of traffic and freight capacity.

3. Transport products do not contain raw materials. Unlike industries, transport does not consume raw materials, but uses large amounts of fuel, electricity, lubricants and other materials.

4. The scheme of the capital cycle in transport differs from the cycle in industry and agriculture: the increase in capital is not in the form of goods, but only in money form.

5. In the transport market not the goods in the form of new things are sold, but the production process of the transport complex. Thus, the requirements to the efficiency and quality of the transport system relate not only to its market products, the final results of transport activities, but also directly to the transport production process.

6. Problems of substantiation of the essence and content of the concept of “transport infrastructure” are extremely relevant for the countries with turbulent economies, including Ukraine. The term “transport infrastructure” has been used in the Ukrainian economy not for long. This is not surprising, as the need for market-type infrastructure cannot exist outside the market economy, much less develop. At the same time, the unresolved problem of transport infrastructure in the economic

science of Ukraine creates many difficulties for economic practice, as it still lacks a system of sound recommendations for creating adequate infrastructure for Ukraine, taking into account both world experience and economic situation (Beketov & Misyura, 2005; Tretiak, 2014).

To date the transport in Ukraine, as an infrastructure of the national economy, is a specific sector of the Ukrainian economy, which participates in a single production and technological process of manufacturing various industries products, which affects the level of transport costs in the country and overall production efficiency. Since the transport sector is always associated with the general development of productive forces, it is considered as one of the most important components of the economy infrastructure as a whole.

Innovative development of Ukraine's transport infrastructure, which would meet the modern imperatives of world economic development and create a solid basis for domestic national growth, is not possible without a high-quality system of state regulation.

A radical change in the vectors of development of the global transport infrastructure, as well as the active international systems of state regulation currently based on the digital economy, requires from Ukraine not only to adapt to global transport standards in technical and managerial compliance, but also to form a new own organizational and economic model of state regulation of the domestic transport complex innovative development.

To fulfill this, we will consider in detail the existing system of state regulation of innovation management of Ukraine's transport infrastructure, see into the peculiarities of its formation, compare it with world models of public administration.

In the field of state policy on Ukraine's transport infrastructure management, the principal role is played by the

Ministry of Infrastructure of Ukraine, whose main priorities are aimed at assurance of compliance of national transport infrastructure with the European level, gradual reduction of the role of the state in state monopolies; creation of normative and legal conditions for corporatization of budget-generating companies, decentralization of functions of the Ministry (Dmytriieva, 2019; Dmytriiev et al, 2019).

The following services and agencies are subordinated to the Ministry of Infrastructure of Ukraine (Ministry of Infrastructure of Ukraine. 2022): State Aviation Service of Ukraine; State Service of Ukraine for Transport Safety; State Agency of Motor Roads; State Agency for Infrastructure Projects of Ukraine; State Service of Ukraine for Maritime and River Transport.

The large-scale system of codes, laws, regulations, strategies, acts and other documents currently regulates the peculiarities of the innovative development of Ukraine's transport infrastructure.

First of all, it is the Law of Ukraine “On Transport”, according to which the purpose of public administration in the field of transport is to meet timely, fully and qualitatively the needs of population and public production in transportation and provide for the country defense, to protect consumer rights in transport services, ensure safe operation of transport, comply with the required pace and proportions of the transport system, etc. (On Transport, 1995).

The updated National Transport Strategy covers the period up to 2030 (On approval of the National Transport Strategy, 2018) and determines the direction of development of the transport sector. It is based on the provisions of the Association Agreement between Ukraine and the EU, the “Ukraine-2020” Sustainable Development Strategy (On the Sustainable Development Strategy, 2015), the EU White Paper “Roadmap of a Single European Transport Area to a

competitive and resource-efficient transport system” and the policy of trans-European transport networks (Single European Transport Area Development Plan, 2011).

The key goal of the National Transport Strategy is to create a conceptual framework for the implementation of public policy aimed at ensuring the effective functioning of the transport sector. In addition, the strategy is one of the main factors in the socio-economic development of the country, growing competitiveness of the national economy and the welfare of citizens (On approval of the National Transport Strategy, 2018).

According to the official statements of the Ministry of Infrastructure, Ukraine's transport sector should be as close as possible to the EU transport system, which will, in turn, lead to fulfillment of several tasks (EU international technical assistance, 2022). These tasks include securing the integrity of the country, increasing demand for transportation services, reducing greenhouse gas emissions, eliminating congestion problems, cutting the number of accidents, enhancing transport efficiency and completing integration into trans-European transport networks; improving the integration of road, rail, air and water transport (maritime and inland waterway transport) into a single logistics chain.

The national transport strategy is built in accordance with the overall goal, vertical and cross-cutting priorities. It focuses on five priority areas for the development of the transport sector for the period until 2030, which will determine the development of appropriate approaches and measures aimed at achieving this goal.

The first priority is the efficiency of public administration, which provides (On approval of the National Transport Strategy, 2018):

- improving the management system and transparency of the transport sector as an integral part of the fight against



corruption;

- deregulation and liberalization of the transport sector which will attract private operators, while improving the corporate governance of state-owned enterprises;

- strengthening the role of the Ministry of Infrastructure in policy development and impartiality of government agencies that regulate the transport sector (within the administrative reform).

The second priority is the provision of quality and efficient transportation services. It provides (On approval of the National Transport Strategy, 2018):

- introduction of integrated transport systems that will meet the requirements of users by increasing the economic benefits of using existing fixed assets;

- application of new technologies in order to increase the efficiency of transportation, prioritization of proper maintenance of fixed assets over new investments;

- improving energy efficiency and implementing environmental protection policy;

- elimination of existing barriers in the field of logistics and multimodal transport within national corridors, integration into TEN-T and improvement of transit conditions.

The third priority, which is ensuring sustainable financing of transport, includes (On approval of the National Transport Strategy, 2018):

- necessary and reliable financing of the transport sector (in particular, through direct and indirect taxes, other non-tax fees), which will be a prerequisite for the sustainable provision of transportation services;

- application of the “user pays” principle and introduction of a mechanism for targeted financing of the transport sector;

- attracting private capital to the areas of activity that demonstrate the indisputable feasibility (Value for Money) of

such attraction;

- continuation of dialogue with international financial institutions to support the development of the transport sector.

According to the strategy, the allocation of public funds should take place in compliance with a transparent priority mechanism. Proper administration of public funds should ensure cost-effectiveness and transparency in the application of public procurement rules, the establishment of open communication and the disclosure of information on budget planning and actual costs.

The fourth priority area, which is improving the safety and reliability of transport, aims at reducing the risks of transport for human life, in particular, transport safety in urban areas and ensuring the reliability of transport (On approval of the National Transport Strategy, 2018).

The fifth priority is perfecting urban mobility and regional integration of Ukraine. It involves the provision of affordable, reliable transport services that facilitate transport links between the regions of Ukraine, support the development of regional clusters and increase labor mobility (On approval of the National Transport Strategy, 2018).

Thus, the National Transport Strategy of Ukraine for the period up to 2030, approved by the order of the Cabinet of Ministers of Ukraine of May 30, 2018 № 430-r, largely affects various aspects of state participation in the development of Ukraine's transport system. Among the most important of them is the formation of a model of innovation transition to a higher level compared to the purely infrastructural model: focusing on customer needs, meeting quality requirements in the transport services market, diversifying activities, which allows obtaining more significant financial results in difficult macroeconomic conditions.

Implementation of large-scale innovative projects mentioned in the National Transport Strategy of Ukraine gives

a new impetus to the development of not only the industry but also the economy and the social sphere on a national scale, which requires the participation of the state.

At the same time, the successful implementation of this strategy requires immediate solution to the main problems that hinder the innovative development of transport infrastructure.

We will bring into focus the key ones. First of all, these are the established vague and local priorities of the intermodal policy, which means that the Ukrainian transport system is not considered as a whole. In addition, these priorities are too many, and it is a common knowledge that a big number of priorities means that they are ineffective, or even nonexistent.

The second is the lack of the most appropriate combination of actions for different modes of transport. The phased implementation of the outlined directions of Ukraine's transport infrastructure development has not been carried out yet, i.e., it has not yet been specified where the attention of public authorities and public funds should be directed – railways, motor transport, inland waterways, shipping, aviation or all at once. In addition, you need to know in what proportions these flows should be directed and for what purpose.

The third negative point is the lack of balance between internal development and external links of Ukraine's transport infrastructure, which could be a significant incentive to the innovative development of the national transport system. The fourth fact is that Ukraine's transport policy does not fully take into account the relations with the EU and is only indirectly in line with the EU-Ukraine Association Agreement. It is not only about communication with the EU, but also about compliance with European standards and requirements. To this end, regulatory actions of the government should be aimed at the timely implementation of the programmatic framework of regulatory acts for 2020 in accordance with the National

Transport Strategy of Ukraine for the period up to 2030 (Fig. 6.1). In addition, the National Transport Strategy of Ukraine provides a wide range of means to ensure the efficiency of transport infrastructure: support of the statistical base, monitoring of the situation in the industry, formation of the transport balance, project management of infrastructure development, implementation of intelligent transport systems and traffic management systems (On approval of the National Transport Strategy, 2018).

With regard to public transport management at the regional level, it seems important given the announced delegation and decentralization of power. After all, in Ukraine, unlike the European countries, the reform of decentralization of power is not yet complete. As defined by the “Ukraine – 2020” Sustainable Development Strategy, approved by the Decree of the President of Ukraine from 12.01.2015 № 5/2015, the purpose of the Strategy is implementation of European living standards in Ukraine and at the same time decentralization policy which provides shifting from the centralized model of government in the state, ensuring the capacity of local self-government and building an effective system of territorial organization of power in Ukraine, full implementation of the provisions of the European Charter of Local Self-Government, the principles of subsidiarity, universality and financial self-sufficiency of local self-government (Volik, 2017).

Decentralization is traditionally defined as the process of expanding and strengthening the rights and powers of administrative-territorial units or lower bodies and organizations while reducing the rights and powers of the center (Hnatiienko & Snytiuk, 2008).

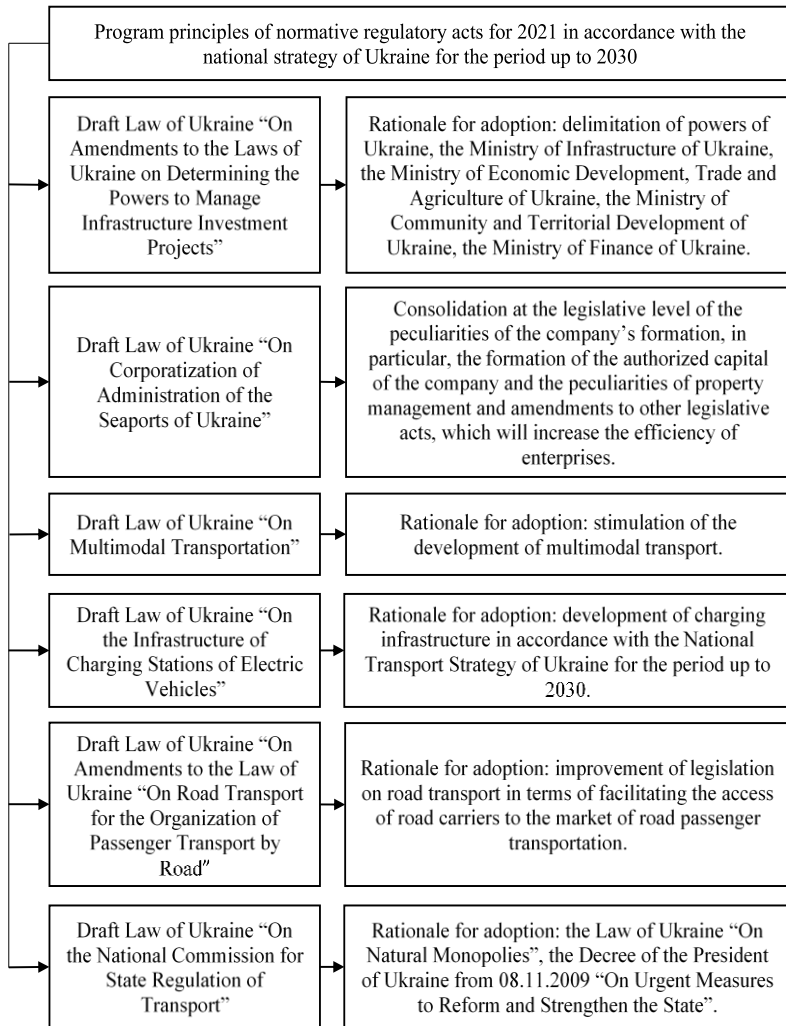


Fig. 6.1. Program principles of normative regulatory acts for 2021 in accordance with the National Transport Strategy of Ukraine for the period up to 2030

Source: formed by the author according to sources (On approval of the National Transport Strategy, 2018; On approval of the Plan for preparation, 2019)

It should be noted that the lack of an effective system of transport management at the regional level causes stagnation in its development, which, in turn, inhibits the growth of gross regional product, reduces the number and quality of economic ties with other regions. As a consequence, the indicators of the social sphere decline. The efficiency of functioning and uninterrupted production operations and the interaction of other sectors of the national economy depend on the management of the transport system at the regional level.

At the next level of management of the transport sector, the bodies of transport administration, non-administrative economic and financial structures and coordinating bodies are involved. At the regional and local levels, the following functions are performed: control over pricing, application of tax benefits, coverage of current losses of transport enterprises engaged in socially significant transportation, development of regional transport infrastructure (Rudchenko & Polishchuk, 2017).

In addition to this law, the dealings relevant to the activities of transport and development of its infrastructure are regulated at various levels of government by a large number of rule-making documents, the main of which are presented in Fig. 6.2.

However, a detailed study of the current technical and technological state of domestic transport infrastructure, the peculiarities of its current operation, taking into account the scale of management, as well as the exceptional role of the industry in ensuring economic growth of Ukraine allowed us to conclude that it is expedient to form individualized theoretical and methodological foundations of state regulation of transport infrastructure innovative development.

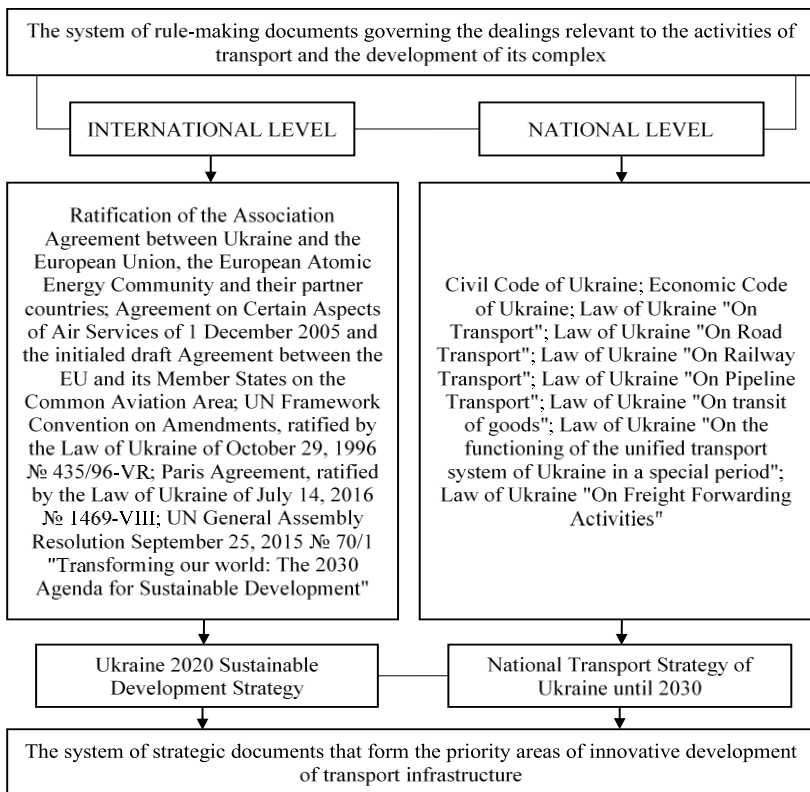


Fig. 6.2. The system of rule-making and strategic documents governing the dealings relevant to the activities of transport and the development of its complex

Source: formed by the author according to sources (Ratification of the Association Agreement between Ukraine and the European Union, 2015; Agreement on Certain Aspects of Air Services, 2006; UN Framework Convention on Amendments, 1996; Paris Agreement, 2016; UN General Assembly Resolution № 70/1, 2015; Civil Code of Ukraine, 2019; Commercial Code Ukraine, 2019; On Transport, 2019; On Road Transport, 2020; On Railway Transport, 2018; On Pipeline Transport, 2020; On transit of goods, 2020; On the functioning of the unified transport system of Ukraine, 2020; On Freight Forwarding Activities, 2012; Dmytriieva, 2020).

Thus, in general, the system of state management of innovative activity in domestic transport infrastructure is characterized by a branched organizational component of the state regulation, which is represented by a large number of institutions that regulate all stages of innovative development of transport in Ukraine.

## **6.2 World trends and patterns of innovative development of transport infrastructure**

Comprehensive analysis of effective foreign experience with further implementation in the context of positive examples and taking into account undesirable mistakes can contribute to solving the problem of forming effective mechanisms of state regulation of innovative development of the transport complex. The study of the current experience of European countries in the field of state regulation of transport in the countries with developed economic relations helped identify and summarize the key aspects of this issue (Table 6.1).

The study focused on the countries that are now leaders in ensuring the innovative development of their own transport complex (Netherlands, Germany, France, Spain, Belgium). From the presented analysis it follows that the regulation of transport is aimed primarily at the tools of indirect regulation through tariff policy, pricing policy, coordination of the subjects and objects of the transport complex.

In the EU countries, state regulation of the development of the transport complex is manifested through the implementation of strategic planning and tariff control. EU public policy is mainly aimed at creating a healthy competitive environment through the development and adoption of relevant regulations.



Table 6.1. European experience of state regulation in the field of transport

Country	Features of state regulation
Netherlands	Preference is given to market regulatory mechanisms, especially in the field of financing public transport through the implementation of the Concession for the provision of public transport services, leaving the state the right to determine the requirements and standards for transport service providers. This approach stimulates competition and the quality of transport services.
Germany	The basis of German transport legislation is the following codified acts: German Civil Code and German Commercial Code. The first document does not define transport as a separate object of regulation in terms of law, and the emergence of ownership of the vehicle is governed by the contract of sale. With regard to shipping contracts and their classification, such regulations are contained in the German Trade Code.
France	State regulation is carried out at the federal level by such structures as the National Railway Society, the National Shipping Administration, and the High Transport Council. Funding for the development of transport infrastructure is mainly provided by public-private partnerships.
Spain	State regulation of transport infrastructure is carried out by the Ministry of Transport, Mobility and Infrastructure. The establishment of Consortia is the prerogative of the coordinating and regulatory functions of the state.
Belgium	The government has created a special fund, which subsidizes the activities of urban passenger transport in full, while not allowing the use of money from this fund for any other needs.
EU	The European Parliament and the European Council regulate the transport sector of the EU member states. The basic right of the regulatory document in the field of transport policy includes the Treaty “On the Establishment of the European Economic Community”, which sets out the provisions on the competence of states in the process of regulating their own transport policies.

Source: formed by the author according to sources (On approval of the Plan for preparation, 2019; Koryakin, 2011; Zatonatska, 2015; Ovchar, 2017; Ovchar, 2019; Kukharchyk, 2015; Novikova et al, 2010; Stukalo, 2014; The accelerating transport innovation revolution, 2019; Taeihagh Lim, 2019).

In terms of funding, all EU countries can be divided into two groups. The first group includes the countries that receive funding for transport infrastructure development projects from European funds on condition of co-financing from the state budget of the recipient country (Poland, Hungary, Czech Republic). The second group consists of such countries as Italy, France, Germany, Spain, where the financing of road infrastructure development is carried out mainly through the tools of public-private partnership (Zatonatska, 2015; The accelerating transport innovation revolution, 2019).

What the transport system has in common in the conditions of developed market relations and the economy whose formation is still at the stage of active development, is that the activities of transport companies are aimed at achieving the goal – maximum customer satisfaction, and public authorities act to create conditions to achieve the purpose of transport enterprises (Volik, 2017). Another aspect in the context of which the foreign experience of state regulation of the transport system and its infrastructure should be considered and analyzed is the organization of the most innovative activities of the world's leading transport companies.

Analyzing the European transport sector, it should be noted that its innovative development is stimulated by the European Commission, which, recognizing the need for innovative solutions including new technologies, infrastructure and organizational improvements, considering such solutions as a way to maintain global competitiveness, launched the Strategic Research Program in the field of transport and innovation (STRIA) in 2012 (Research and innovation for Europe's future mobility, 2012). This program identifies the areas where the EU needs to work with EU countries and stakeholders to radically change the transport. Seven roadmaps describe how to speed up and secure work in the short and long

term. They cover such priorities as electrification, alternative fuels, vehicle design and production, connected and automated transport, infrastructure, network and traffic management systems, smart mobility and services.

Unlike other elements of the transport sector, transport infrastructure mainly belongs to public sector organizations at the national and regional levels. In cases where the private sector manages the infrastructure, it is subject to economic regulation in accordance with the policies set by the EU member states.

The European Parliament's Committee on the Decarbonization of Transport has identified optimal pricing, the use of alternative fuels, the development of a multimodal transport system and innovative transport infrastructure as the key areas for the development of the EU transport system. The pricing guidelines outlined in Transport White Paper are: “polluter pays” and “user pays”.

In order to address the current socio-economic challenges in conditions of constant changes and unsteady competitive environment, the European Commission has developed a separate roadmap for 2019 (Bousmanne et al, 2020), which highlights key governance issues: pricing, taxation and financial issues, harmonization of modality, inter-modality, compatibility and integration of transport systems, life cycle optimization and operation of transport infrastructure.

Fig. 6.3 presents the areas of state regulation of innovative development of EU transport infrastructure in the areas that are key in the process of securing the effective functioning and innovative development of transport infrastructure of any country in the world: planning; normative framework and regulation; government procurement; standardization.

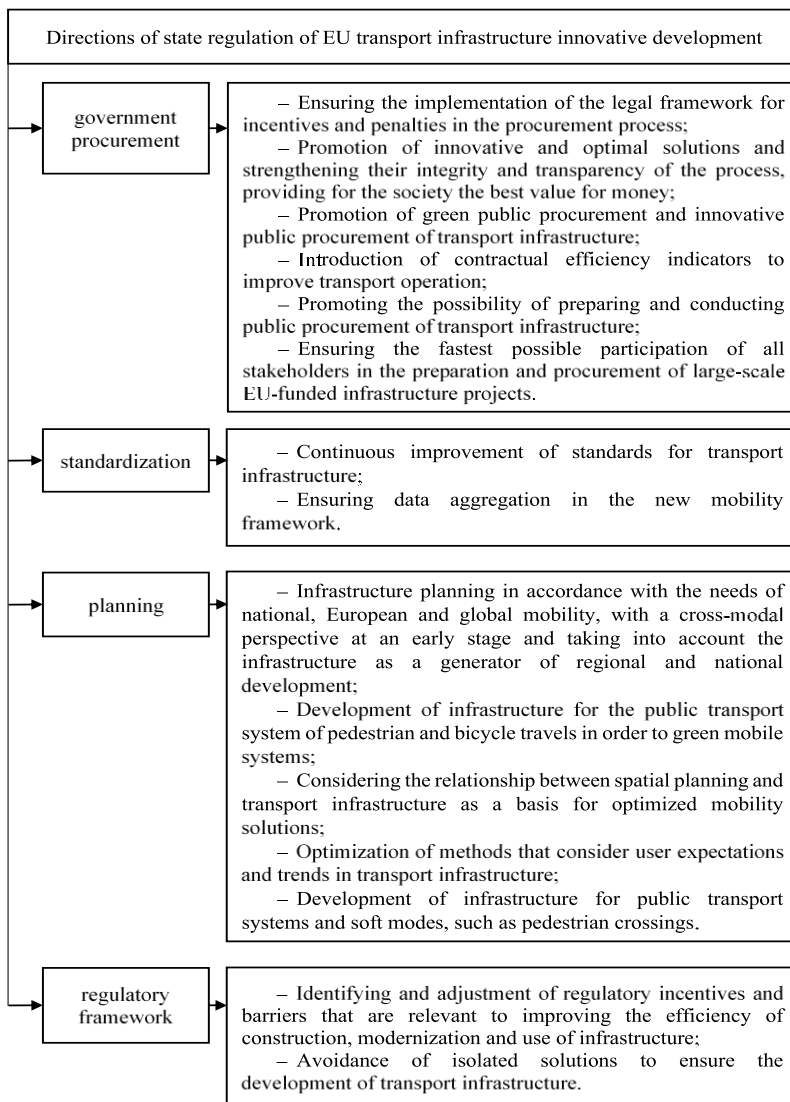


Fig. 6.3. Directions of state regulation of EU transport infrastructure innovative development

Source: formed by the author according to source (Bousmanne et al, 2020)

Given the current conditions connected with the need to implement measures to reduce the negative impact of the transport system and its infrastructure on the environment, increase safety, implement optimization measures for management, financing and pricing, taking into account the life cycles of transport and infrastructure innovations, integration of elements digitalization in transport systems, infrastructure development must be adapted to overcome these problems primarily through ensuring the necessary competitiveness of European transport companies, territorial cohesion in the form of clusters and multimodality of the transport system. The developed roadmap of strategic transport research and innovation in its essence emphasizes and strengthens the role of R & D in improving transport infrastructure to address these issues.

The EU seeks to create a modern integrated transport system that will strengthen the global level of competitiveness of the transport system of the participating countries and meet the challenges of sustainable development, the trends in digitalization of the society and inclusive growth.

In Table 6.2 the projects are presented that demonstrate effective and high-performance examples of innovations in the field of management, planning and development of the EU transport complex.

The presented projects are completed and demonstrate effectiveness.

Thus, the analysis of the most effective EU projects for the development of transport complex showed that Europe regulates the innovative development of the transport complex primarily by stimulating research in this area.

Table 6.2. EU projects for the development of transport complex

Name	The purpose of the project	The features of the project
REFINET (2015-2017)	Achieving a common European vision of how to concretize, design, build or renovate and maintain a multimodal European transport infrastructure	Aims to create a sustainable European and international network for stakeholders, including all modes of transport and transport infrastructure
PANDHUB (2014-2017)	Testing the spread of disease and assessing the impact of countermeasures, thus providing information for major transport hubs for the effective implementation of rapid response to a border incident	Aims to create an integrated set of tools to assist transport operators and relevant participants of major transport centers in developing current plans for pandemic and dangerous pathogenic response
SCOUT (2016-2018)	Advising on policies and regulatory standards for the secure connection and automated support of the unmanned vehicle control network	Aims to create a sustainable European and international network for the operation of unmanned vehicles, including representatives of all modes of transport and transport infrastructure
ALLIANCE (2016-2018)	Developing advanced research and higher education in the field of transport in Latvia, based on the Institute of Transport and Communications	It is based on three main principles: organization and management, operational services and quality of service, the level of customer satisfaction. Activities are aimed at preparing a curriculum with the purpose of improving the knowledge about current and future research
BRIDGE SMS (2015-2018)	Emphasizing the need for collaboration and joint strategic decisions of public institutions, private transport sector and professional engineering sectors across Europe, in order to create a climate-sustainable transport infrastructure system	The project aims at developing an intelligent decision support system based on cloud open code for assessing and managing the hydraulic vulnerability of bridges over water
SMARTV2G (2011-2014)	Creating a system that allows electric charging stations to operate as an energy storage system that can be used by the grid when the vehicle is not using it	The project focuses on connecting the power supply to the grid, monitoring energy flows and their efficiency in terms of security. This requires an improved system of communication, automation and control of information on the energy used

Source: compiled by the author according to sources (Dmytriiev et al, 2019; Volik, 2017; Koryakin, 2011)

Thus, the research was conducted on the domestic experience in the state regulation of Ukraine's transport complex innovative development and the advanced theoretical, methodological and practical provisions of European countries in this field.

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## **7 CURRENT STATE AND PROSPECTS OF ORGANIC PRODUCTION IN UKRAINE**

### **7.1 Scientific principles of biological (organic) agriculture in the world and Ukraine**

Agricultural production always combines its production base with the surrounding ecosystem, which is based on natural resources: soil, water, air and landscape. Farmers specializing in both agriculture and animal husbandry must protect the environment, and the level of load of agricultural production on its eco-state should not exceed the maximum allowable levels. In general, the management methods used have a direct impact not only on soil, water and air pollution, but also on the environment.

Organic (biological) agriculture covers various areas of production of healthy biologically complete ecologically safe food products of crop production, animal husbandry, horticulture, beekeeping and poultry farming. The concept of sustainable economic-ecological-technological and socially harmonized development in the field of agriculture develops organic (biological = ecological = self-renewable = biodynamic) agriculture for the production of environmentally safe food, preservation of fertility and protection against pollution and toxicity of soils, rivers, lakes, reservoirs, wells, purification of drinking water sources from toxic chemicals, reduction of greenhouse gas emissions, development of the market and international trade in organic farming, increasing jobs, creating innovative farms farms, producers of biologically valuable agricultural products at small costs and low cost (Shikula, Gordienko, Bikov, 2005).

Inhabitants of villages and cities as a result of natural

resources; irrational usage, as a rule, contribute to the degradation of nature, not thinking that will remain the next generation. Quite often this is due to the lack of knowledge in this area and the use of traditional (intensive) management methods (excessive use of organic and mineral fertilizers, pesticides, genetically modified plants, etc.), which have a negative impact on natural resources. Issues of environmental safety and quality of food are reflected in the Basic Law of Ukraine (Articles 16 and 50 of the Constitution of Ukraine) (Vidomosti Verkhovnoyi Rady Ukrayiny, 2018, July 10, № 2496-VIII).

Today, a program of balanced agriculture development and rural areas is widely promoted in Ukraine, which is reflected in the EU policy, which supports agricultural technologies aimed at preserving the environment. Quality food products on the world market have been, are and will be in short supply in the near future. In developed livestock countries, the requirements of the organic market and the EUROP standard contribute to the quality development of breeding, feeding and keeping systems (Bashchenko, Voloshchuk, Nebelitsya, 2017).

In the conditions of the world market of agricultural products and its processing in Ukraine, organic production, including livestock production, is gaining relevance, is a more characteristic phenomenon for the EU, the US and a number of developing countries. For example, Ukraine has adopted an appropriate legal framework that defines the principles, rules and methods of organic production.

Legal framework of Organic Production in Ukraine. Organic production is regulated by the Law of Ukraine “On Basic Principles and Requirements for Organic Production, Circulation and Labeling of Organic Products” dated July 10, 2018 № 2496-VIII, which on August 2, 2019 repealed the previous Law of Ukraine “On Production and Circulation of

Organic Agricultural Products and raw materials” from 03.09.2013 № 425-VII (Vidomosti Verkhovnoyi Rady Ukrainy 2018, July 10, № 2496-VIII.; Vidomosti Verkhovnoyi Rady Ukrainy, 2013, September 03, № 425-VII.; Lushpaev, 2019)

Detailed rules of organic production and circulation of organic products of the following branches of organic production: organic crop production (including seed production and nursery); organic livestock (including poultry, beekeeping); organic mushroom growing (including growing organic yeast); organic aquaculture; production of organic seaweed; production of organic food (including organic winemaking); production of organic feed; procurement of organic objects of flora is determined by the Resolution of the Cabinet of Ministers of Ukraine № 970 of October 23, 2019. On approval of the Procedure (detailed rules) of organic production and circulation of organic products (Resolution of the Cabinet of Ministers of Ukraine, № 970, 2019, October 23).

At present, the legislation on organic production according to EU Standards has evolved: on 28 June 2007 Council Regulation (EU) № 834/2007 on organic production and labeling of organic products and repealing Regulation (EEU) № 2092/91 was adopted; On 5 September 2008, Commission Regulation (EU) № 889/2008 was adopted, laying down detailed rules for the implementation of Council Regulation (EU) № 834/2007 on organic production and labeling of organic products with regard to organic production, labeling and control; May 30, 2018 of the adopted Regulation (EU) 2018/848 of the European Parliament and of the Council on organic production and labeling of organic products and the cancel of Council Regulation (EU) № 834/2007, which due to quarantine restrictions due to Covid-19 01.01.2022 on the territory of the EU, and outside it only in a year (Council Regulation (EC) No 834/2007 of 28 June 2007 (EEC)

No 2092/91; Commission Regulation (EC) No 889/2008 of 5 September 2008 (EC) No 834/2007; Regulation (EU) 2018/848 of 30 May 2018).

Only for the last year, normative legal acts provided by the Law of Ukraine “On Basic Principles and Requirements for Organic Production, Circulation and Labeling of Organic Products” have been developed and adopted in a total of 12 acts: 3 resolutions of the Cabinet of Ministers of Ukraine and 9 decrees related to organic production.

Biological farming has been developed by scientists from around the world since the 1970s for almost half a century. It is based on the use of natural biological laws developed by nature. It significantly reduces or completely eliminates the methods of chemicalization of agriculture and at the same time uses the agricultural laws of minimum and return to achieve the law of optimum in which plants are best provided with living and development conditions, then they will provide maximum yield, environmentally safe and biologically complete crop products. There are 2 concepts of growing environmentally safe crop products: Western European for poor sod-podzolic soils and Ukrainian for rich black soils. The Western European concept is based on the fact that the area of land use (farm, husbandry) is divided into 3 types of land: arable land, hayfields and pastures. Arable land on the farm is one-third or one-fourth of land use. Livestock on the farm is fed at the expense of all three lands, but manure is applied only on arable land, which allows the concentration of manure on one third or fourth of the farm immediately to expand reproduction of soil fertility, making 25-27 t / ha of manure per 1 ha of arable land. Extended reproduction of soil fertility allows even on poor sod-podzolic sandy soils to obtain not only environmentally safe, but also biologically complete crop products. The Ukrainian concept of producing environmentally safe products on black soils is based on the high potential

fertility of these soils, the ability to use to reproduce soil fertility almost all non-commercial harvest and green manure, and minimize tillage, which accelerates low biological turnover and energy flows. It allows to expand the reproduction of soil fertility in the area of the entire arable land, which in the farms of the black soil zone is 70-90% of land use.

The necessity of biologization of agriculture in Ukraine arose due to the fact that the existing volumes of traditional organic fertilizers in Ukraine are insufficient and agriculture is working on declining fertility. Among scientists, there is an opinion that by abandoning the chemicalization of agricultural production is guaranteed to reduce crop yields by 30-40%, indeed, this view occurs in traditional agriculture, but with the use of organic farming yields can be maintained and increased (Shikula, Gordienko, Bikov, 2005; Pisarenko, Antonets, Lukyanenko, 2017)

Scientific schools of Ukraine on organic farming. The following Scientific Schools of Organic Production have been developing in Ukraine since the 1970s: Mykola Shykula Ukrainian System of Organic Agriculture (National Agrarian University – NULES) and Semyon Antonets System of Organic Agriculture (Poltava State Agricultural Academy, PE Agroecology). Both two scientific schools researched, developed and implemented the system of organic farming in Ukrainian production.

Mykola Shikula Ukrainian Biological Farming System has developed the Concept of Practical Biological Farming in Ukraine, which includes a large list of conceptual provisions, the main of which we cite: Organic farming is organized on ecologically clean lands not contaminated with radionuclides, heavy metals, pesticides their land use for ecological purity of soils. Farms use insecticide-free technologies for growing crops, which exclude the use of herbicides, fungicides, insecticides, desiccants, defoliant in the fields. Weed crops are



protected by agronomic measures (cultivation, semi-steam) and crops of post-harvest cruciferous greens, which have an allelopathic effect on weeds. Protection of crops from pests and diseases will be carried out by agrotechnical, preventive and biological methods. Synthetic mineral fertilizers, genetically modified plants, radiation-irradiated seeds, plants and millorants are not used in the production of biological products. Soil protection technologies are introduced with the use of special equipment and agro-technical measures. Biological farming products must be departmental or state certified for environmentally safe in accordance with Ukrainian or international standards (Shikula, Gordienko, Bikov, 2005).

Semen Antonets philosophy of the system of organic farming is based on the creation of an agroecosystem as close as possible to natural formations. The system takes into account the basic principle of planetary development, as the origin of life on Earth was ensured by 2 global processes that will support the development of the biosphere now and in the future, including photosynthesis and nitrogen fixation. Technological measures of the system are based on scientifically sound structure of sown areas and specialized crop rotations with saturation of perennial legumes up to 25–27%, shallow tillage that preserves the natural structure of the arable layer without destroying the vertical orientation of aeration pores, use of perennial legumes and greens. The introduction of scientifically sound norms of organic goods, which provides plants with nutrients and forms a positive balance of humus, the use of environmentally safe agrotechnological and biocoenotic measures in technologies for growing crops (Pisarenko, Antonets, Lukyanenko, 2017).

History of organic production development in Ukraine. Organic production in Ukraine historically dates back to the period when traders in cereals, oilseeds and industrial crops were commissioned to certify Ukrainian farmers under Council

Regulation (EEU) № 2092/91 of 24 June 1991 on organic production of agricultural products and guidelines for agricultural production. products and food products (Council Regulation (EEC) No 2092/91 of 24 June 1991). Due to their poverty, Ukrainian farmers did not have the financial means to buy and use synthetic fertilizers and plant protection products after the collapse of the USSR, so the products obtained at that time were not contaminated with synthetic substances. In the early 2000s, farmers opportunities grew. Some farmers order certification on their own and begin to become players in the organic market up to direct exports of organic products, primarily to EU markets.

In 2007, the first Ukrainian certification body was established in Ukraine – Organic Standard LLC (Organic Standard, 2022).

Innovations in Organic Agriculture are created by achieving several areas of goals:

- economic (economic efficiency, focus on local resources, long-term confidence in the yield of agricultural crops);

- social (development of rural areas and support of local communities, meeting local needs, regional self-sufficiency in food production, use of own labor resources);

- ecological goals (functional ecosystems, sustainable development, biodiversity, conservation of local animal breeds, etc.).

All existing standards for organic production can be divided into international, national and private (Fig. 7.1).

Key principles of organic production:

- prohibition on the use of chemically synthesized substances in the production process;

- prohibition on the use of GMOs;

- prohibition on the use of synthetic additives;

- use only permitted fertilizers, plant protection products,

soil improvers, etc;

The type of standard	Marking
International	 
National	  
Private	  

Fig. 7.1. Classification of organic production standards

Source: author`s approach

- application of methods of production caring for animals and the environment;
- control of requirements of organic standards on all links of a chain;
- prohibition of parallel production.

## 7.2 General principles and fundamentals of animal products and vegetables organic production in Ukraine

General principles, goals. Creating a stable system of agriculture that: respects natural systems and cycles; increases the level of biological diversity; respects high standards of animal welfare; promotes the production of high quality products. Detailed principles for each area, including recasting

(EU Regulation №834/2007 Art. 4).

The whole farm transition. Simultaneous transition of crop and livestock production is possible (no parallel production, different species of animals (plants), traceability) (EU Regulation 834/2007 Art. 17; 889 Art. 35).

Prohibitions. Prohibition of the use of chemically synthesized substances or ingredients (EU Regulation 834/2007 Articles 4, 12 and 16).

Prohibition of the use of genetically modified organisms or their products (EU Regulation 834/2007 Art. 9).

Prohibited hydroponic production (EU Regulation №889 / 2008 Art. 4). Prohibition of the use of growth regulators, defoliant (EU Regulation 834/2007 Articles 12 and 16).

Prohibition of the use of ionizing radiation and treated products (EU Regulation 834/2007 Art. 10).

Control and certification. Annual certification for all operators, including inspection at least once a year (EU Regulation 889/2008 Art. 65).

Transition period. 2-3 years for perennials; may be reduced to 1 year for individual enterprises if no prohibited substances have been used in the last 3 years (EU Regulation №889 / 2008 Articles 36, 37, 38).

Step-by-step conversion, parallel production. Transition plan for perennial crops, if varieties cannot be easily distinguished: special control requirements, maximum 5 years (EU Regulation №889 / 2008, p. 40).

Exceptions: parallel production of the same species for the production of seeds and planting material, for pastures, restricted research areas (EU Regulation №889 / 2008, Art. 40).

Legislation on the protection of the environment, water resources and animal welfare. Compliance with relevant national legislation.

Nutrient balance. Maximum number of animals per 1 ha

of sown area, equivalent to 170 kg of nitrogen (EU Regulation 889/2008 Art. C, 15, Annex IV).

The origin of animals. Livestock for organic production must be born and raised in organic production units; for breeding animals that were not kept in the conditions of organic production are allowed to introduce into the livestock production unit, taking into account certain conditions. (EU Regulation 834/2007 Art. 14a).

No more than 20% of adult pigs may be imported as females (who have not farrowed yet) from inorganic livestock complexes per year to replace or repair the herd (if organically reared animals are absent). (Exceptions: males for breeding; to restore livestock after disease outbreaks) (EU Regulation 889/2008 Art. 42).

In compliance with the organic principles of production, preference is given to breeding local (aboriginal breeds) of farm animals.

Practical methods of animal husbandry and conditions for keeping pigs. Personnel: must have the necessary basic knowledge and skills to ensure the health and proper maintenance of animals (EU Regulation 834/2007 Art. 14b (I)). Animals must have constant access to open-air areas, preferably pastures, whenever weather conditions and soil conditions allow (EU Regulation №834 / 2007 Art. 14b (III); EU Regulation №889 / 2008, Art. 14).

Feeding. Products for feeding animals must, first of all, come from the same unit where they are kept (EU Regulation 34834/2007 Art. 146). The maximum permitted proportion of inorganic feed in the daily diet is 25% (dry matter) (EU Regulation №889 / 2008, Art. 43B).

At least 50% of the feed must come from the farm itself or produced in collaboration with other organic farms, preferably in the same region. (EU Regulation №889/2008, Art. 10).

Feed produced in the transition period is up to 30% in the calculation of feed rations. If such feeds are produced on the same farm, their share can be increased to 60%; feed from permanent pastures during the transition period up to 20%) (EU Regulation №889 / 2008, Art. 21).

Use of inorganic feed for a limited time in a certain area by individual operators in case of catastrophic circumstances (EU Regulation №889 / 2008, Art. 47). The same rules and criteria for processed animal feed (EU Regulation 34834/2007 Art. 18).

Only inorganic substances are allowed, prohibition of the use of growth stimulants and synthetic amino acids (EU Regulation 34834/2007 Article 14 (1, criteria in Article 16). Detailed list of approved feed additives and substances for animal feed (EU Regulation №889 / 2008, Annex VI).

Breeding. Maintaining health by stimulating the animal's natural immune defenses, as well as the choice of appropriate breeds and methods of animal husbandry (EU Regulation 34834/2007 Art. 5e).

Prohibition of treatment with hormones or similar substances, but it is allowed to treat an individual animal in the form of veterinary therapeutic intervention according to the indications (EU Regulation 834/2007 Art. 14e).

Cloning and transfer of the embryo is not allowed (EU Regulation 834/2007 Art. 14c (III)).

Surgery. Any suffering, including surgery, must be kept to a minimum (not permanent, only for safety or in certain cases) (EU Regulation №834 / 2007, Art. 14.b (VIII); EU Regulation №889 / 2008, p. 18).

Disease prevention and veterinary treatment. The use of chemically synthesized traditional veterinary drugs or antibiotics for prophylactic purposes is prohibited (EU Regulation №889 / 2008, Art. 23.1).

The use of substances to stimulate growth or hormones is

prohibited (EU Regulation № 889 / 2008, Art. 23.2).

Treatment of parasites: a maximum of 3 courses of treatment with chemically synthesized substances for 12 months or one course of treatment if the productive life cycle of these animals is less than one year (EU Regulation №889 / 2008, Art. 23.2).

Double waiting period after the use of medicines (EU Regulation № 889 / 2008, Art. 23.5).

Pigs. Special requirements for access to pasture and holding areas (EU Regulation №889 / 2008, Annex III).

Daily ration of roughage for rearing and fattening pigs (EU Regulation №889 / 2008, Art. 20.3).

Sows should be kept in groups, except during the last periods of pregnancy and the period of suckling piglets (EU Regulation №889 / 2008, Art. 11.4). Transition period for imported conventional pigs for meat production: 6 months (EU Regulation №889 / 2008, Art. 38.1B).

Transportation. There are no special requirements, only recommendations for minimizing the duration of transportation (EU Regulation 34834/2007 Art. 14b (VII)).

Processing and storage. The processing of organic foodstuffs must be separated in time or space from the processing of ordinary foodstuffs (EU Regulation 834/2007 Art. 19.1). The use of inorganic ingredients, additives and technological additives must be permitted in accordance with specific criteria (EU Regulation 834/2007 Articles 19.2 and 21).

Inorganic agricultural ingredients are allowed for food products processing (EU №889 / 2008, Annex IX).

Authorized substances for food products processing (EU №889 / 2008, Annex VII, A and B).

Organic farming

Crop rotation. Relevant long-term crop rotations with the use of legumes, etc. plants for green manure, no special

detailed legislation (verified by national inspection and certification bodies) (EU Regulation 834/2007 Art. 12).

Zones of ecological restoration. There are no special legal requirements on this issue. Fertility and biological activity of soils. Improving the level of biological activity of soils and their natural fertility, stability and biological diversity of the soil, prevention of compaction and erosion of soils, as well as fertilization of plants mainly through the soil ecosystem. In addition, fertilizers and soil improvers can be used only if they are allowed in organic production (EU Regulation 834/2007 Art. 5, 12).

Application of fertilizers and soil improvers. Only permitted fertilizers and soil improvers listed (EU Regulation №889 / 2008 special Annex I).

Seed or vegetative planting material. Seed or vegetative planting material must be obtained by organic production (EU Regulation 834 / 2007 Article 1 (I)). Exceptions if there is no material obtained by the method of organic production (database) (EU Regulation №889 / 2008 Art. 45). There are no special requirements for growing vegetables, fruits and winemaking.

Crops protection. To prevent damage from pests, diseases and weeds, we should defer mainly on: protection by appropriate natural enemies, appropriate choice of species and varieties, crop rotation, cultivation methods and thermal (EU Regulation №834 / 2007 Ct.12g). Only substances listed in the special list of permitted plant protection products (EU Regulation №834 / 2007 Articles 12 and 16; EU Regulation №889 / 2008 Article 5, Annex II). Copper use: maximum 8 kg / ha, calculated on the basis of an average of 5 years, from 2006 to 6 kg / ha, calculated on the basis of an average of 5 years (EU Regulation №889 / 2008 Annex II, 6). pyrethroids in traps are allowed, organic herbicides (EU Regulation 889/2008 Annex II, 4).



### Optimization of phytosanitary condition of crops.

An important aspect of organic production, based primarily on a set of organizational and economic and agro-technical measures and technologies, namely the structure of sown areas, use of perennial and annual legumes, science-based crop rotations, shallow tillage, use of organic fertilizers sowing of nutritious crops, greens that inhibit the development of the pest, quality seed preparation, the use of microbiological drugs, control of economic thresholds of harmful diseases, weeds, pests. The system provides for the complete abandonment of the use of pesticides and mineral fertilizers, with the exception of seed inlays and the use of macro- and micronutrients to improve the properties of organic fertilizers in the process of processing manure into compost. Optimizing plant nutrition by adding organic fertilizers and greens, which promotes their growth and development has a positive effect on increasing resistance to pests and especially diseases. Good germination, vigorous development of large leaf surface inhibits the growth of weeds, plants become less susceptible to damage by wireworms, fleas, weevils, leaf-eating caterpillars, root rot, this is facilitated by increased microbiological activity of the soil. Flowering plants in the fields of agricultural crops create conditions for the life of beneficial entomophytic insects, which will help reduce the number of pests and diseases and is defined as the effect of agro-phytoncide. The reduction of some pests due to natural regulation of beneficial organisms is confirmed, the development of diseases is restrained by stem microclimate, optimization of phytosanitary condition of organic farming is based on the formation of heterogeneous species and varietal structure microorganisms (Pisarenko, Antonets, Lukyanenko, 2017).

### 7.3 Introduction of organic production in the conditions of local communities of Ukraine

In order to obtain organic products in animal husbandry, special attention is paid to feed (without preservatives, GMOs, growth stimulants, appetite stimulants) and stress-free conditions of detention and transportation, the use of antibiotics and hormones is prohibited. Given the above: the production of fodder of plant origin – concentrated, waste processing of crop products, other industries – is an important part of the production of livestock products (Fig. 7.2).

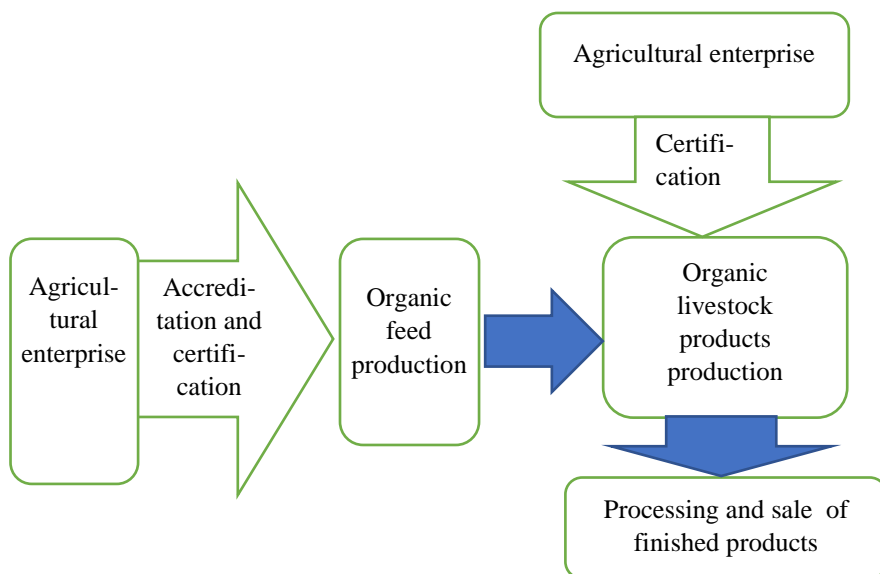


Fig. 7.2. Schematic diagram of production and processing of organic livestock products  
Source: Nitsenko, 2019

A study of the structure of enterprises for the production of organic livestock products according to Organic Standard

(Organic knowledge platform. Base of organic producers) as of 01.01.2022 (Fig. 7.3) proves that the most popular is the production of organic eggs (38% of the total number of organic livestock entities), The second place is occupied by the production of organic milk (31% of the total number of organic entities in animal husbandry), the third place is occupied by the production of organic pork (2 entities or 13%). Meat cattle, meat poultry and beekeeping account for 1 business entity or 6% each.

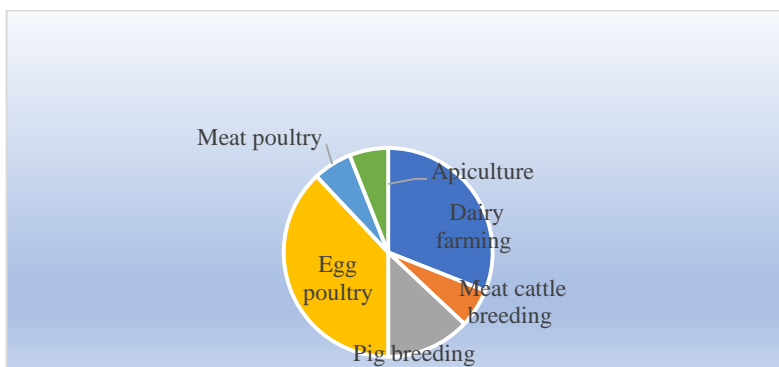


Fig. 7.3. The structure of enterprises (% of total) for the production of organic livestock products according to Organic Standard, 2022  
Source: Organic Standard, 2022

We believe that the picture obtained from the certification of enterprises for the production of organic livestock products according to Organic Standard reflects the general situation in Ukraine.

The most successful example of organic production in general and animal husbandry – organic milk, in particular, is PE “Agroecology” Shishak District of Poltava Region, which is certified as a producer of organic crop products, in accordance with the standard. The company has developed crop production and a highly productive dairy herd of Simmental and Ukrainian Red Dairy breeds of cattle. In the

fields of “Agroecology” we get high yields of winter wheat, buckwheat, oats, barley, sunflower, corn, from the grain of which cereals and flour are produced. Livestock is fully provided with environmentally friendly feed of its own production. The company is certified as a producer of milk for baby food, as well as certified as a breeding plant for breeding Ukrainian Red Dairy cattle. Cattle are kept loose in the most comfortable conditions (they spend a lot of time on pastures), milking takes place in the milking parlor, feeding – with the equipment of feed tables and distribution of mono-feed using special equipment (Organic knowledge platform. Base of organic producers, 2022).

Introduction of organic production in the conditions of local communities of the south of Ukraine

One of the leading organic farms in Ukraine, located in the south of the country in the Odessa region is LLC “Danube Agrarian”, which grows organic products per 2000 hectares of organic land. The company is certified by the domestic company “Organic Standard” and foreign operators BIO SUISSE, COR, NOP, GRASP-GLOBALG.A.P. Risk Assessment on Social Practice.

The main directions: Crop, livestock, vegetable and horticultural, from 2021 medicinal herbs are grown, it is planned to organize a greenhouse of vegetable crops and establish new organic gardens.

From the direction of crop production the main crops which are grown on the farm: wheat, barley, rapeseed, millet, peas, sunflower, corn, mustard, lentils, onions, garlic, pumpkins, melons, watermelons, sweet potatoes, plums, peaches and nectarines. Since 2021, a successful project with the company ENZA ZADEN for growing vegetable crops is being implemented. A plantation of medicinal and spicy crops has been established: chamomile, calendula, mint, savory, echinacea, sage and others. Danube Agrarian is the only

company in Ukraine that grows organic peaches and nectarines and the only one in the world that grows organic cubic watermelon.

The products of the Danube Agrarian (rapeseed, millet, sunflower) are used in the production of baby food by the world-famous company HIPP, whose representatives come to the farm 3-4 times a year to take samples.

In the field of animal husbandry, Danube Agrarian is the only company in Ukraine engaged in the cultivation of certified organic ducks, broilers and sheep. Danube agrarian is one of the three leaders – producers of organic eggs in Ukraine.

Prospects for the development of an organic enterprise Danube Agrarian LLC in the south of Ukraine

The unique geographical location and agro-climatic conditions of the south of Ukraine allow to implement many interesting projects in crop production, vegetable growing and fruit and berry industry. But the limiting factor for the southern zone of Ukraine is moisture. The farm has 120 hectares of fields under irrigation, and it is possible to transfer up to 850 hectares of land for irrigation.

Danube Agrarian LLC is provided with all necessary equipment, warehouses for floor storage of grain over 6000 m<sup>2</sup> and refrigeration facilities: fruit and vegetable cooling chamber (one in Bessarabia), sweet potato storage (one in Ukraine).

In crop production it is planned to increase the area of growing trend crops (legumes, millet, high-oleic sunflower) In the fruit industry it is planned to plant a new garden on drip irrigation: cherries, apricots, plums, early apples. There are very few organic stone crops in Europe, early organic apples are practically absent, demand in the European market contributes to the development of this direction in the economy. It is also planned to increase the area under vegetables and melons (melons and watermelons), both for

domestic and European markets. In animal husbandry, it is planned to increase the number of laying hens, ducks, broilers and sheep.

The farm is mastering new industries and directions, namely medicinal herbs from 2021 and greenhouse vegetables from 2023.

The farm is actively involved in the management and marketing of the Danube Agrarian brand. Meetings and trainings are held with representatives of supermarkets together with “Organic Standard” and other operators of the organic market. “Islands” of organic vegetables and fruits are being created in supermarkets.

Work is underway to develop a fruit and vegetable business cluster, for the creation of which in the south of Ukraine there are all the necessary prerequisites: favorable agro-climatic conditions, geographical location at the same latitude as the subtropical Crimea. The south of Bessarabia has always been famous for its early fruits and vegetables, the presence of rivers and reservoirs in the region allows you to actively use the system of merging. 30 years later, Izmail had the second largest cannery in Ukraine for the production of green peas, jade and halva. The infrastructure of the region includes the river ports of Izmail, Reni, Kiliya. Close to the Belgorod-Dniester river and Odessa and Black Sea seaports, which promotes active trade and economic activity. Training of specialists is an important component of successful business development, Izmail and Belgorod-Dniester agrarian colleges and Odessa State Agrarian University provide staff in the agricultural sector (Danube agrarian, 2022; Kurkuliv, 2022; Glossary. Organic Products, 2022).

Ukraine in terms of its agro-climatic conditions, labor resources and economic potential today is one of the most promising countries in the world in the development of organic production.

Ukraine produces such organic crop products as grain, cereals, fruits, vegetables, flour, pasta, oil, juices, herbal teas, chocolate, spices, canned foods (berry pastes, jams, syrups), semi-finished products, snacks; organic livestock products – dairy products, meat, eggs, honey.

The organic market of Ukraine is aimed mainly at exports, and the development of the domestic market of organic products is hampered by low purchasing power and ignorance of the population. The distribution of exports of organic products from Ukraine by parts of the world has the following structure – Europe (85%), North America (12%), Asia (3%), Africa (<1%).

Prospects for the development of organic production in the south of Ukraine in terms of crop production are quite broad, but for the production of organic livestock products there are some difficulties associated with the general processes observed in animal husbandry (economic situation, feed shortages, reduction livestock, high production costs, certification, etc.).

For the effective implementation of organic production in the south of Ukraine it is necessary to create specialized organic clusters with the involvement of agricultural producers, businessmen, financial institutions, trade enterprises, research institutions and educational institutions.

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## **8 CONCEPTUAL FOUNDATIONS OF PROGRAMMING FINANCIAL SUPPORT FOR BRIDGE CONSTRUCTION IN UKRAINE IN THE CONTEXT OF PUBLIC-PRIVATE PARTNERSHIP**

### **8.1 Public-private partnership as a factor of financial security: problems and prospects for Ukraine**

It is impossible to overestimate the role and importance of such a factor as PPP in attracting investment resources.

In Ukraine, the PPP institute is at the stage of formation, development and improvement. At the same time, the process of adapting the existing positive world experience to domestic political, economic, and regulatory realities is also continuing. Part 2 of Article 4 of the Law of Ukraine “On Public-Private Partnership” defines the scope of public-private partnership. The defined list of spheres of activity is not exhaustive, since according to the decision of the state partner, PPP may be applied in other spheres of activity, except for types of economic activity, which, in accordance with the law, may be carried out exclusively by state enterprises, institutions and organizations. In addition, when determining the potential scope of the PPP project, it is essential to take into account the peculiarities of the legal regime in relation to individual objects and certain types of activities established by law (Levchenko, 2020).

The Priority Action Plan of the Government of Ukraine, approved by the Decree of the Cabinet of Ministers of Ukraine No. 418-r dated 27.05.2016, provides for a number of tasks of the Ministry of Economic Development aimed at supporting and developing PPP (Levchenko, 2020).

Moreover, the legislation of Ukraine provides for a

number of draft laws designed to promote and develop PPP on the territory of the state.

In addition, a list of regulatory legal acts has been developed in order to bring the provisions of regulatory legal acts in line with the Law of Ukraine “On Amendments to Certain Laws of Ukraine Regarding the Elimination of Regulatory Barriers to the Development of Public-Private Partnership and Investment Promotion in Ukraine”.

In order to ensure the rapid and effective development of the PPP mechanism in Ukraine, the Project Office for the Development of Public-Private Partnership was established under the Ministry of Infrastructure in 2015. The main task of the Project Office is to launch the mechanism of public-private partnership in Ukraine. Since 2015, the Foundation has been implementing the technical assistance program in Ukraine, the main elements of which are export promotion, local economic development, social investment and economic leadership (PPP, 2019).

Attempts to establish relations and promote them between Ukraine and a potential investor seem to exist, but there are neither significant projects nor partnerships. That is, there are no special achievements in the development of PPP.

A negative contribution to this unstable regulatory process is brought by poor organizational and coordination activities of public services, a high level of corruption, as well as insufficient state support for enterprises in all spheres of activity. Thus, attempts to introduce a PPP mechanism in Ukraine are unproductive. This is also confirmed by the report of the Investment Attraction Department of the Ministry of Economic Development, Trade and Agriculture of Ukraine dated 26.07.2019, where, according to central and local executive authorities, 186 agreements have been concluded in Ukraine on the basis of PPP as of 01.07.2019, of which 52 agreements are being implemented (35 – concession

agreements, 15 – joint activity agreements, 2 – other agreements), 134 agreements are not being implemented (4 agreements have been expired, 17 agreements have been terminated, 113 agreements are not being fulfilled) (Giones, 2020).

But what about the bridge construction? After all, there have been no such projects in Ukraine. Undoubtedly, in order to avoid confusion, one can follow the construction path, following the example of the construction of the Akashi Kaikyo Bridge (Japan) or the Great Belt Bridge (Denmark), built at the expense of public funds. A fare, which goes to the budget, thereby compensating for the state's construction costs and ensuring the payback of the project is charged after the commissioning of these bridges. However, considerable amount of available budget funds are needed to implement such project (Britchenko, 2020).

To confirm the author's idea about the need to introduce PPP in the construction and reconstruction of bridges, we will conduct a study of the implementation of similar examples of PPP in other countries.

Today, Turkey remains the leader among the countries of Eastern Europe and Central Asia in terms of cooperation with the private sector through public-private partnership mechanisms, thanks to which it has managed to triple its GDP, attracting 115 billion US dollars of investments in 193 PPP projects. At the same time, 29 projects were implemented in the road infrastructure (including bridge construction), which accounted for 15% of the total volume (Akbulaev, 2019).

In Poland, over the past 10 years, about 42% of all PPP financing falls on transport infrastructure, which confirms its importance for the state (Hendricks, 2018). Thus, as of 2019, the Bridges Plus Construction Program, the purpose of which is to promote the economic development of small settlements, has been launched. This program will last until 2025. Within the

framework of this program, 22 new bridges will be built and existing ones will be reconstructed, for which about 640 million US dollars will be spent. At the same time, the contribution of public funds ranges from 75% to 80%. The other 20-25% of funds are provided by local authorities, including local investment resources.

The states of the post-Soviet space, being on the path of formation and development of PPP, are just beginning to implement such projects. Thus, in his study Bystriakov has proposed to introduce PPP in the construction of highways and bridge construction in particular, as a promising and key area of the state's economy. Given this, there is a need to develop the PPP tools and implement them in the construction and reconstruction of bridges.

Today, every state in the world is fighting for investment resources, spending significant funds on it. The leader in this direction is China. Since 2015, the government annually allocates 500 million yuan to develop this form of cooperation between business and the state. Financing is spent on planning, evaluation and development of programs, preparation of commercial proposals, financial and legal advice, as well as asset valuation of more than 700 private enterprises that intend to cooperate with the state (Lee, 2001).

Taking into account the experience of the advanced countries of the world, it should be noted that Ukraine should pay close attention to this direction. There cannot be a universal PPP program for all industries and all states. It is expedient to take into account the specifics of each industry and develop appropriate projects for each separately.

The analyzed current situation of making investment under PPP in the construction, repair and reconstruction of bridges indicates their significant insufficiency. However, it also testifies to the sufficient prospects for the development of the problem identified in the framework of this study. The

urgent need for investment encourages the development of new forms of cooperation within the framework of PPP and in the context of the construction, repair and reconstruction of bridges in particular.

The neglected state of the infrastructure of bridges, the increase in their accident rate, the insufficiency of public funds for their construction and reconstruction only encourage the state and science. Here we are talking about the development and implementation of new forms of cooperation within the framework of PPP on the basis of mutual benefit, by adopting positive foreign experience and creating a unique national form of cooperation.

In order to understand the seriousness of the situation, we will focus on the investment financial support of Ukraine as a whole.

Investments are directed to the already developed areas of economic activity. As of 01.10.2018, significant volumes of direct investment receipts were directed to industrial enterprises – 33,4% and institutions and organizations engaged in wholesale and retail trade; repair of motor vehicles and motorcycles – 15,5%.

The main investor countries include Cyprus – 27,9%, the Netherlands – 20,2%, the United Kingdom – 6,4%, Germany – 5,7%, Austria – 3,2%, the Virgin Islands (British) – 4,1%, and Switzerland – 4,8%. The volume of utilization of capital investments of Ukrainian enterprises in January – September of 2018 was UAH 337,0 billion, which was 19,9% more than the volume of capital investments for the corresponding period of 2017.

The leading areas of economic activity, in terms of capital investment utilization in January-September of 2018 remain: industry – 34,5%, construction – 10,6%, agriculture, forestry and fisheries – 13,4%, information and telecommunications – 6,2%, wholesale and retail trade, repair

of motor vehicles and motorcycles – 8,2%, transport, warehousing, postal and courier activities – 8,5%, compulsory social insurance – 5,8%, real estate transactions – 4,4%.

The main source of financing for capital investments is still the own funds of enterprises and organizations, at the expense of which 73,2% of capital investments were utilized in January-September 2018.

The share of bank loans and other borrowings in the total volume of capital investments was 7,0%. 9,7% of capital investments have been utilized at the expense of the state and local budgets. The share of funds from foreign investors amounted to 0.3% of all capital investments, the share of public funds for housing construction – 7,1%. Other sources of financing were accounted for 2,7%.

Thus, Ukraine remains attractive for making investment, at the same time it is not on the sidelines of global processes, is sufficiently integrated into the world economy, and the violation of macrostability in foreign markets has its echo in Ukraine.

## **8.2 Ways of stabilization and development of investment activity in the context of ensuring public-private partnership**

In addition, steps are being taken to contribute to the stable development of the economy of Ukraine and the intensification of investment activity, namely, work is being carried out in the following areas:

- in the direction of protecting the rights of investors;
- within the framework of the implementation of the Action Plan for Deepening Cooperation between the Organization for Economic Cooperation and Development (OECD) and the Government of Ukraine, developed in order to

implement the measures provided for by the Memorandum of Understanding between the Organization for Economic Cooperation and Development and the Government of Ukraine on deepening Cooperation dated 07.10.2014;

– Measures are being taken to join Ukraine to the OECD Declaration on International Investment and Multinational Enterprises (hereinafter referred to as the OECD Declaration).

Thus, the Decree of the Cabinet of Ministers of Ukraine dated 01.03.2017 No. 130-r approved a draft Agreement (in the form of an exchange of letters) between the Government of Ukraine and the Organization for Economic Cooperation and Development on accession to the Declaration on International Investments and Multinational Enterprises, relevant Recommendations and procedural Decisions of the Council of the Organization for Economic Cooperation and Development.

On March 15, 2017, the Agreement was signed (in the form of an exchange of letters) between the Government of Ukraine and the Organization for Economic Cooperation and Development on accession to the Declaration on International Investments and Multinational Enterprises, relevant Recommendations and procedural Decisions of the Council of the Organization for Economic Cooperation and Development.

There is a positive trend at the state and regional levels of the use of the PPP mechanism. Thus, by the Order of the Ministry of Energy dated 03.11.2017 No. 684, a decision was made to conduct a PPP under the Ukraine – EU Energy Bridge Project. By the Order of the Ministry of Energy No. 404 dated 30.07.2018, a commission was established to hold a tender to determine a private partner for the implementation of PPP under the Ukraine – EU Energy Bridge Project. The tender documentation is being formed now.

In order to accelerate the development of the GCHP mechanism in the field of infrastructure of the Ministry of Infrastructure, work continues on the preparation of pilot



projects in the field of port infrastructure, in particular, the granting of integrated property complexes to concession for the Olvia Stevedoring Company State-Owned Enterprise, Kherson Maritime Trade Port State-Owned Enterprise. The conclusions of the Ministry of Infrastructure based on the results of the analysis of the effectiveness of the implementation of PPP have been agreed upon by the Ministry of Economic Development.

In addition, the Ministry of Economic Development has carried work to improve legislation in the field of PPP, in particular:

1. Shortcomings of the current legislation have been eliminated by adopting the Law of Ukraine “On Amendments to Certain Laws of Ukraine Regarding the Elimination of Regulatory Barriers to the Development of Public-Private Partnership and Investment Promotion in Ukraine”, which, in particular, made comprehensive amendments to the Law of Ukraine “On Public-Private Partnership”.

2. Procedures for holding a tender to determine a private partner and conducting an analysis of the effectiveness of PPP have been approved by adopting the Resolution No. 815 of the Cabinet of Ministers of Ukraine dated 16.11.2016 “On Making Changes to the Procedures Approved by the Resolution No. 384 of the Cabinet of Ministers of Ukraine dated April 11, 2011”.

3. Mechanism of replacement of a private partner has been introduced taking into account the best world experience (Resolution of the Cabinet of Ministers of Ukraine No. 298 dated 26.04.2017 “On Approval of the Procedure for Private Partner (Concessionaire) Replacement under the Agreement Concluded within the Public-Private Partnership”).

4. Draft laws on the reform of concession legislation have been developed, which will enable to balance the interests of the parties concerned, which in turn will provide conditions for the growth of external investments for modernization and

creation of new infrastructure and provision of high-quality socially significant services.

5. The Law “On Concessions” was adopted on 03.10.2019.

The following bills have been submitted to the Verkhovna Rada of Ukraine:

– draft Law of Ukraine “On Amendments to the Budget Code of Ukraine regarding the Creation of Conditions for Infrastructure Modernization by Implementing Projects on the Terms of Public-Private Partnership, Including Concessions” (No. 8126 dated 15.03.2018);

– draft Law of Ukraine “On Amendments to the Tax Code of Ukraine Regarding the Creation of Conditions for Infrastructure Modernization by Implementing Projects on the Terms of Public-Private Partnership, Including Concessions” (No. 8127 dated 15.03.2018);

– draft Law of Ukraine “On Amendments to the Article 2 of the Law of Ukraine “On Public Procurement” (No. 8128 dated 15.03.2018) was considered at the meeting of the Economic Policy Committee and recommended to be adopted in the first reading after taking the draft Law of Ukraine “On Concessions” as a basis.

It should be noted that the adoption of the draft laws will enable to implement the PPP large-scale projects and attract investment in the economy of Ukraine.

In addition, in compliance with paragraph 91 of the Government’s Action Plan for 2018, by the Order No. 1607 of the Ministry of Economic Development dated 02.11.2018, the PPP Support Agency, which will prepare for the implementation of high-quality and investment-attractive projects of PPP in the transport, municipal, energy, social and other spheres has been created. Measures are being taken in the direction of investment infrastructure development, namely: in accordance with the State Strategy of Regional Development

for the Period up to 2020 (approved by the Resolution No. 385 of the Cabinet of Ministers of Ukraine dated 06.08.2014), the issue of creating a regional network will be raised providing state support to the entities that create such parks, and are defined as one of the priority areas of regional development. The development of industrial parks will contribute to the activation of investment and innovation activities, the stimulation of industrial production, the creation of new high-tech industries and tens of thousands of high-performance jobs, increasing the volume and range of export-oriented product manufacture and, as a result, increasing the competitiveness of the economy and the welfare of Ukrainian citizens.

As of 01.01.2019, 36 industrial parks have already been included in the Industrial Park Register (in 2017 – 13 industrial parks, in 2018 – 9 industrial parks). Management companies are identified in 17 industrial parks, and participants are registered in five industrial parks. In addition, industrial parks, which have been created even before the formation of the legislative base for their support operate in Ukraine (in Belaia Tserkva on the basis of an aircraft repair plant – 2000, in Malinovka Urban-Type Settlement, Olymp Company – 2002, Patriot in Sumy on the basis of a worsted and spinning factory – 2008, Cheksil in Chernihiv at the base of the worsted and spinning factory – 2010, in Zaporozhie, Zaporozhkran Company – 2011). The IE subjects may also use the tools and support mechanisms provided for by law. Thus, financing the development of the infrastructure of industrial parks included in the Register is possible at the expense of the State Regional Development Fund, as provided for in Article 241 of the Budget Code of Ukraine. Thus, 4 projects in three industrial parks have already been funded. The financing of relevant projects and works is also carried out at the expense of local budgets. Support may be provided under the Tax Code of Ukraine, which provides for, in particular:

- powers of local self-government authorities to establish rates and benefits for the payment of local taxes and fees, including real estate tax other than land and land fees;
- possibility of VAT installment payments for up to 2 years when importing manufacturing equipment;
- possibility of exemption from payment of profit tax for newly created enterprises in case of compliance with the criteria set by the list.

Moreover, it is possible to import goods to the customs territory of Ukraine as part of the concluded agreements on free trade zones, primarily with the EU, from where the largest share of investments is attracted to Ukraine and high-tech equipment is imported. A dialogue with business has been started, on a regular basis, to resolve problematic issues with investors – quarterly work meetings with the participation of representatives of ministries and businesses.

According to the Order of the Cabinet of Ministers of Ukraine dated 21.03.2018 No, 174-R, the Investment Attraction and Support Office State-Owned Institution, which belongs to the sphere of management of the Economic and Financial Department of the Secretariat of the Cabinet of Ministers of Ukraine, has been created as well. The Regulation on the Office has been approved by the Order No. 76 of the State Secretary of the Cabinet of Ministers of Ukraine dated 23.04.2018. According to the Regulation, the main tasks of the Office are:

- information support for foreign investors in the preparation and implementation of their investment projects, and during their activities in Ukraine in order to ensure the acceleration and effectiveness of interaction between foreign investors and public authorities and local self-government authorities, whose competence includes the regulation of the sphere economic activity in which investment is made;
- attracting investment, as well as ensuring the

cooperation of executive authorities and local self-government authorities aimed at creating a favorable investment climate in Ukraine;

- promoting the improvement of the investment image of Ukraine and supporting the investment development of Ukraine;

- coordination of actions of foreign investors with executive authorities, their officials and employees in order to resolve problematic issues arising from foreign investors in the activities of the latter in Ukraine through their investment facilities;

- preparation of proposals to the Government Authorized Representative on Investment Issues, the formation and implementation of the investment potential of Ukraine, implementation of the program of the Cabinet of Ministers of Ukraine to attract investment, support priority investment projects, improve the investment climate in Ukraine, help protect legally protected rights of investors;

- improving the efficiency of central and local executive authorities, temporary consultative and advisory bodies formed by the Cabinet of Ministers of Ukraine, local self-government authorities, state institutions and organizations for interaction with investors and improving the investment attractiveness of Ukraine.

In addition, the Presidential Decree No. 365/2016 dated August 29, 2016 approved the Regulation on the National Investment Council. The main tasks of the Council are: the development of proposals for stimulating and developing investment activities in Ukraine, formation of an attractive investment image of Ukraine, including taking into account the best international practice; assistance in forming the main directions of state policy to improve the investment climate in Ukraine; development of proposals for strategic directions of investment potential development in Ukraine, promotion of

foreign and national investments in the development of the national economy; study of initiatives and potential proposals for investment projects, as well as the practice of interaction of investment entities with state bodies; analysis and generalization of problems hindering investment in the economy of Ukraine, preparation of proposals regarding ways to solve them, in particular measures to help protect the rights of investors; participation in the development of draft legislative acts on investment issues.

On May 25, 2018, the first meeting of the National Investment Council was held.

In addition, the Resolution No. 578 of the Cabinet of Ministers of Ukraine dated August 9, 2017 created an interdepartmental working group to consider problematic issues related to the excitation of the rights of economic entities by law enforcement agencies; the Resolution No. 226 of the Cabinet of Ministers of Ukraine dated March 21, 2018 created an interdepartmental working group on preparing proposals for solving systemic problems and establishing effective cooperation and dialogue with foreign investors to implement their proposals for improving the investment climate.

In order to ensure effective interaction between representatives of the scientific community, executive authorities and the real sector of the economy in the formation and implementation of a uniform state policy in the field of scientific and technological activities, the Resolution No. 226 of the Cabinet of Ministers of Ukraine dated April 5, 2017 established the National Council for the Science and Technology Development, which is a permanent consultative and advisory body, formed under the Cabinet of Ministers of Ukraine. The Order No. 520-R of the Cabinet of Ministers of Ukraine dated August 9, 2017 approved the composition of the National Council for the Science and Technology Development.

### **8.3 Development of a set of measures to improve the investment attractiveness of bridge construction in the context of its financial support**

In Ukraine, the state program for the development of road infrastructure dates back to 2013, when the State Target Economic Program for the Development of Public Roads for 2013–2018 was developed and approved. This program was not fully implemented due to underfunding. In these years, work on the construction of highways was actually suspended, the volume of work on the current average repair was ten times less than standard, pit elimination was carried out untimely and not on all roads. As a result, the condition of the roads has deteriorated to catastrophic. The problem of insufficient financing was also aggravated by the fact that in 2015–2016, target sources of financing for the road sector were canceled, and the Treasury underfunded expenditures on road development planned in the General State Budget Fund. In 2018, the Resolution of the Cabinet of Ministers of Ukraine approved the State Target Economic Program for the Development of Public Highways of State Significance for 2018–2022. As of 01.01.2020, deviations due to non-completion of the program reach 30%. There is a high probability of failure of this program. At the same time, the program states that the construction of some bridges will be carried out at the expense of international financial organizations and investors (under concession agreements). To a significant extent, this program document is a continuation of the State Target Economic Program for the Development of Public Roads for 2013–2018, as it contains a number of similar tasks, measures and expected results, as well as structural and content shortcomings. Structural and content shortcomings of these program documents are proposed to be leveled by developing a set of measures, namely:

- 1 – Assigning the status of a priority bridge construction industry;
- 2 – Creating favorable conditions for investors;
- 3 – Tax benefits;
- 4 – Tax refund;
- 5 – Maintaining related industries;
- 6 – State guarantee to the investor;
- 7 – Involvement of international guarantors;
- 8 – Price regulation under concession agreements;
- 9 – State aid for the Western Cluster (Volyn, Ternopol and Ivano-Frankovsk Regions);
- 10 – State aid for the the North-Eastern Cluster (Poltava and Chernihov Regions);
- 11 – State aid for the South-Eastern Cluster (Donetsk and Zaporozhie Regions);
- 12 – Creation of an effective system of personnel support for the development of bridge construction by establishing cooperation between bridge construction enterprises and higher educational institutions in the process of general provision of educational services based on a dual form of training;
- 13 – Creation of the Bridge Development Council under the Ministry of Infrastructure;
- 14 – Creation of the Concession Coordination Committee under the Bridge Development Council;
- 15 – Creation of a special website for providing institutions, local authorities and entrepreneurs with up-to-date information on PPP (tenders, market analysis, research on PPP, changes in the legislative framework);
- 16 – Ensuring the distribution of risks between participants depending on the riskiness of making investment resources (the level of investment attraction, the risk of investment in a sector or territorial cell);
- 17 – Providing guarantees from the state to prevent the export of objects under state-private agreements;



18 – Introduction of automatic dimensional and weight control for the purpose of price diversification, depending on the frequency and degree of loading by cargo carriers;

19 – Receiving payments from users directly, without involvement of the state partner.

#### **8.4 Model for making decisions about choosing a region for financing**

Choosing the final single compromise solution taking into account various criteria is quite a difficult task when planning and making decisions (Levchenko, 2021).

The Analytic Hierarchy Process (AHP) developed by the famous American mathematician Thomas L. Saaty, is successfully used to solve many practical problems at various levels of planning. This method has become widespread in the last decade. According to this method, the selection of priority solutions is carried out using paired comparisons.

To present the results of the assessments in quantitative terms, Thomas L. Saaty introduces a scale of paired comparisons. According to this scale, we will not be interested in the absence of physical or objective units of measurement. The main advantage of this method is that it is dimensionless, and there are no problems when reduced to the same units of measurement.

The validity of this scale has been proven theoretically and practically when compared with many other known data. Experience has shown that when conducting paired comparisons, basically, the questions arise: “Which of the elements is more important? Which is the most likely? Which one is the most attractive?”

AHP is a systematic procedure for the hierarchical representation of elements that define the essence of any

problem. The essence of AHP is schematically presented in Fig. 8.1.

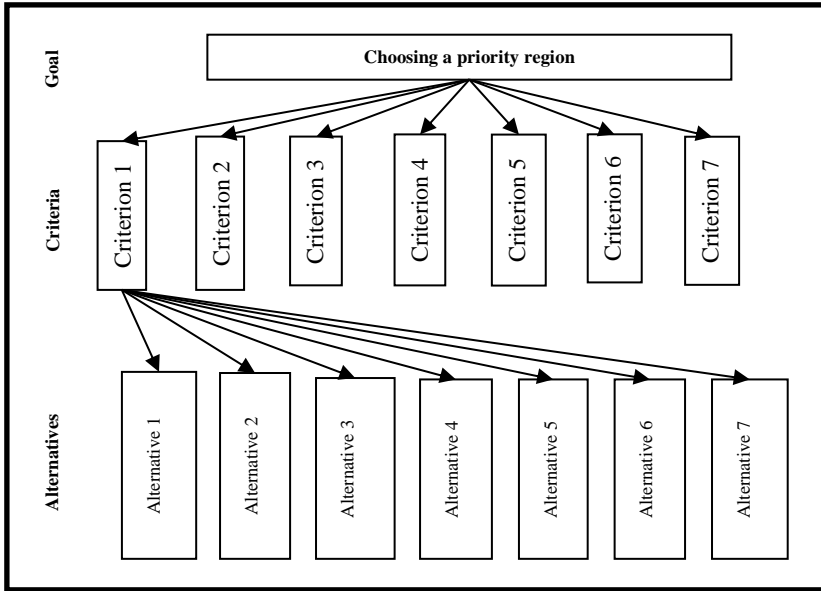


Fig. 8.1. Hierarchical structure of the decision-making task of choosing a priority region

Then we turn to the mathematical apparatus of the hierarchy method. Table 8.1 shows the scale of paired comparisons.

Table 8.1. Saati's scale of paired comparisons

Score	Definition
1	Equal importance
3	Moderate advantage of one over the other
5	Substantial advantage
7	Significant advantage
9	Absolute advantage
2, 4, 6, 8	Corresponding intermediate values

Consistency of judgments is checked by determining value of the degree of consistency by the acceptability assessment. The consistency index (*CI*) is used as an indicator of the degree of consistency of matrix elements (*D*) in the framework of the hierarchy analysis method, which characterizes the deviation of the value of  $\lambda_{max}$  from the value of *m*, which corresponds to the ideal variant:

$$CI = \frac{\lambda_{max} - m}{m - 1} \quad (8.1)$$

The assessment of the acceptability of the degree of consistency of the matrix elements is carried out by calculating the value of the consistency ratio (*CR*):

$$CR = \frac{CI}{CIS} \quad (8.2)$$

where *CIS* is the average value of the consistency index (selected from Table 8.2).

Table 8.2. Experimental value of the consistency index

<i>m</i>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<i>CIS</i>	0,58	0,90	1,12	1,24	1,32

Random consistency or threshold value of the dimension of the model matrices  $7 \times 7$  *CIS* = 1,32.

The value of the indicator (threshold value) *CR* shall be less than 10%. Exceeding the threshold value of the indicator *CR* is a reason to revise the considerations adopted in the process of comparing elements.

To solve the problem, it is necessary to set the initial data by region and criteria. The alternatives to the task are 7 areas. For the convenience of the solution, the conditional areas and designations for them will be as follows:

Donetsk – A1;  
 Volyn – A2;  
 Zaporzhie – A3;  
 Ivano-Frankovsk – A4;  
 Poltava – A5;  
 Ternopol – A6;  
 Chernigov – A7.

Criteria and their designations are conditionally selected as criteria:

Level of investment attractiveness – K1;  
 Youth unemployment rate – K2;  
 Youth employment rate – K3;  
 Tax burden on enterprises – K4;  
 Risk of default – K5;  
 Level of autonomy of educational institutions – K6;  
 Staff turnover rate – K7.

Table 8.3. Initial values

Areas / Criteria	A1	A2	A3	A4	A5	A6	A7
K1	20,7696	16,0896	18,3497	16,9034	18,5966	17,0363	16,4676
K2	8,2124	6,3619	7,2556	6,6837	7,3532	6,7363	6,5114
K3	12,6627	9,8095	11,1874	10,3056	11,3379	10,3866	10,0399
K4	37,0568	28,7069	32,7393	30,1588	33,1798	30,3959	29,3813
K5	5,5000	2,9300	2,8500	3,0500	2,7100	0,8100	2,3100
K6	25,2337	19,5478	22,2937	20,5365	22,5937	20,6980	20,0071
K7	10,5523	8,1745	9,3228	8,5880	9,4483	8,6555	8,3666

Calculations are given in the following tables below.

Table 8.4. Matrix of paired comparisons for criteria and its numerical estimates

	K1	K2	K3	K4	K5	K6	K7	Priority vector
K1	1	2	2	2	1/9	2	2	0,1174
K2	1/2	1	3	2	1/7	1/3	5	0,0934
K3	1/2	1/3	1	2	1/7	1/3	1/2	0,0491
K4	1/2	1/2	1/2	1	1/7	1/2	1/2	0,0452
K5	9	7	7	7	1	5	5	0,4890
K6	1/2	3	3	2	1/5	1	3	0,1247
K7	1/2	2	2	2	1/5	1/3	1	0,0811

$$\lambda_{\max} = 7,711; CR = 8,98\%$$

Table 8.5. Matrix of paired comparisons of alternatives according to criterion K1 (level of investment attractiveness)

	A1	A2	A3	A4	A5	A6	A7	Priority vector
A1	1	9	3	9	3	5	9	0,4035
A2	1/9	1	1/7		1/7	1/3	1	0,0327
A3	1/3	7	1	7	2	3	5	0,2213
A4	1/9	1	1/7	1	1/7	1/3	1	0,0327
A5	1/3	7	1/2	7	1	3	7	0,1905
A6	1/5	3	1/3	3	1/3	1	3	0,0849
A7	1/9	1	1/5	1	1/7	1/3	1	0,0343

$$\lambda_{\max} = 7,249; CR = 3,14\%$$

Table 8.6. Matrix of paired comparisons of alternatives according to criterion K2 (youth employment rate)

	A1	A2	A3	A4	A5	A6	A7	Priority vector
A1	1	1/9	1/3	1/9	1/3	1/7	1/7	0,0251
A2	9	1	7	2	7	3	3	0,4042
A3	3	1/7	1	1/7	1/2	1/7	1/5	0,0410
A4	9	1/2	7	1	5	1/2	1/2	0,0001
A5	3	1/7	2	1/5	1	1/7	1/7	0,0500
A6	7	1/3	7	2	7	1	1/3	0,2082
A7	7	1/3	5	2	7	3	1	0,2716

$$\lambda_{\max} = 7,702; CR = 8,86\%$$

Table 8.7. Matrix of paired comparisons of alternatives according to criterion K3 (youth unemployment rate)

	A1	A2	A3	A4	A5	A6	A7	Priority vector
A1	1	9	3	5	3	5	5	0,021
A2	1/9	1	1/7	1/3	1/7	1/5	1/3	0,340
A3	1/3	7	1	5	2	5	5	0,034
A4	1/5	3	1/5	1	1/3	1/3	1/2	0,159
A5	1/3	7	1/2	3	1	3	3	0,042
A6	1/5	5	1/5	3	1/3	1	2	0,175
A7	1/5	3	1/5	2	1/3	1/2	1	0,228

$$\lambda_{\max} = 7,662; CR = 8,36\%$$

Table 8.8. Matrix of paired comparisons of alternatives according to criterion K4 (tax burden)

	A1	A2	A3	A4	A5	A6	A7	Priority vector
A1	1	1/9	1/7	1/7	1/5	1/7	1/5	0,0257
A2	9	1	5	5	5	3	2	0,3307
A3	7	1/5	1	1/5	3	1/7	1/5	0,0571
A4	7	1/5	5	1	5	1/2	1/2	0,1326
A5	5	1/5	1/3	1/5	1	1/5	1/5	0,0438
A6	7	1/3	7	2	5	1	1/3	0,1722
A7	5	1/2	5	2	5	3	1	0,2380

$$\lambda_{\max} = 7,786; CR = 9,39\%$$

Table 8.9. Matrix of paired comparisons of alternatives according to criterion K5 (risk of default)

	A1	A2	A3	A4	A5	A6	A7	Priority vector
A1	1	1/5	1/7	1/5	1/7	1/9	1/7	0,0191
A2	5	1	1/7	3	1/3	1/5	1/5	0,0574
A3	7	3	1	5	1/2	1/5	1/5	0,1060
A4	5	1/3	1/5	1	1/5	1/7	1/7	0,0371
A5	7	3	2	5	1	1/5	1/2	0,1473
A6	9	5	5	7	5	1	3	0,4019
A7	7	5	5	7	2	1/5	1	0,2311

$$\lambda_{\max} = 7,643; CR = 8,12\%$$

Table 8.10. Matrix of paired comparisons of alternatives according to criterion K6 (level of autonomy of educational institutions)

	A1	A2	A3	A4	A5	A6	A7	Priority vector
A1	1	5	3	3	3	3	3	0,3184
A2	1/5	1	1/5	1/3	1/3	1/3	1/3	0,0389
A3	1/3	5	1	3	1/2	5	3	0,1937
A4	1/3	3	1/3	1	1/3	1/2	1/2	0,0692
A5	1/3	3	2	3	1	3	2	0,1926
A6	1/3	3	1/5	2	1/3	1	1/2	0,07839
A7	1/3	3	1/3	2	1/2	2	1	0,1089

$$\lambda_{\max} = 7,611; CR = 7,72\%$$

Table 8.11. Matrix of paired comparisons of alternatives according to criterion K7 (staff turnover rate)

	A1	A2	A3	A4	A5	A6	A7	Priority vector
A1	1	1/9	1/3	1/7	1/3	1/7	1/9	0,021
A2	9	1	5	2	7	3	2	0,310
A3	3	1/5	1	1/5	3	1/5	1/7	0,050
A4	7	1/2	5	1	7	3	1/3	0,190
A5	3	1/7	1/3	1/7	1	1/5	1/5	0,035
A6	7	1/3	5	1/3	5	1	1/3	0,125
A7	9	1/2	7	3	5	3	1	0,270

$$\lambda_{\max} = 7,576; CR = 7,28\%$$

By multiplying the matrix made up of alternative vectors by the priority vector of criteria, we obtain a productive vector – the global vector of regional priorities (Fig. 8.2).

$$\begin{array}{|c|c|c|c|c|c|c|}
 \times & \begin{array}{|c|} \hline 0,117 \\ \hline 0,093 \\ \hline 0,049 \\ \hline 0,045 \\ \hline 0,489 \\ \hline 0,125 \\ \hline 0,081 \\ \hline \end{array} & = & \begin{array}{|c|} \hline 0,103 \\ \hline 0,131 \\ \hline 0,114 \\ \hline 0,060 \\ \hline 0,132 \\ \hline 0,262 \\ \hline 0,200 \\ \hline \end{array} \\
 \begin{array}{|c|c|c|c|c|c|c|}
 \hline 0,403 & 0,025 & 0,021 & 0,026 & 0,019 & 0,318 & 0,021 \\
 \hline 0,033 & 0,404 & 0,340 & 0,331 & 0,057 & 0,039 & 0,310 \\
 \hline 0,221 & 0,041 & 0,034 & 0,057 & 0,106 & 0,194 & 0,050 \\
 \hline 0,033 & 0,000 & 0,159 & 0,133 & 0,037 & 0,069 & 0,190 \\
 \hline 0,190 & 0,050 & 0,042 & 0,044 & 0,147 & 0,193 & 0,035 \\
 \hline 0,085 & 0,208 & 0,175 & 0,172 & 0,402 & 0,078 & 0,125 \\
 \hline 0,034 & 0,272 & 0,228 & 0,238 & 0,231 & 0,109 & 0,270 \\
 \hline \end{array} & & & & & & 
 \end{array}$$

Fig. 8.2. Matrix for determining the effective vector

Based on the calculations performed, the following results are obtained (Table 8.12).

Table 8.12. Global vector of regional priorities

Region	Regional priorities	Rank
Donetsk Region	0,103	6
Volyn Region	0,131	4
Zaporzhie Region	0,114	5
Ivano-Frankovsk Region	0,06	7
Poltava Region	0,132	3
Ternopol Region	0,262	1
Chernigov Region	0,200	2

It can be seen from the results of calculations that the most priority are the Ternopol, Chernigov and Poltava Regions. Less priority are Volyn and Zaporozhie Regions. Donetsk and Ivano-Frankovsk Regions are non-priority.

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**9 INNOVATION AS A WAY TO CREATE A  
COMPETITIVE ADVANTAGE OF ENTERPRISES IN  
THE ERA OF SUSTAINABLE DEVELOPMENT**

**9.1 Theoretical fundamentals of system research of  
innovative development of enterprises**

The new, difficult stage of Ukraine's economy needs reliable ways to create a competitive advantage, one of which, in our opinion, is innovation.

In general, the issues of research on the creation of competitive advantage by means of innovative influence are characterized by continuity of development and soundness of research. However, so far some issues related to the innovative development of enterprises have not received a complete and appropriate scientific solution, and therefore require additional theoretical justification and methodological elaboration.

The theoretical and factual material of the article is based on a critical generalization of research results on the innovative development of purposeful systems based on the study of the new role of knowledge, science, informatization and innovation, which are reflected in the works of many scientists. Among them – P. Drucker, F. Nixon, M. Porter, B. Santo, J. Howe and others. The theoretical basis of the study were the basic and latest provisions of the theory of social development, systems and cybernetic analysis, economic information theory, constructive logical and mathematical theories, institutional and neo-institutional economic theory, structural functionalism. Factual material is based on data from public authorities, periodicals, and open sources on the Internet.

Thus, the civilizational subjectivity of Ukraine in the thirtieth year of independence is marked by the state's ability to

ensure freedom, security and development. By its encyclopedic nature, development is a directed and natural change. It is one of the many properties of the system, along with stability, balance, integrity, structure, hierarchy, state, emergence, behavior.

The concept of system is inextricably linked with the concepts of elements, structure, integrity, communication, relationships, subsystems, and so on. For a long time under the system, scientists have considered the interdependence of a set of elements that work together for a specific purpose. Thus, there was no doubt in the potential and «good intentions» of all elements of the system: some institutions help others, long-term strategies are built, and technological devices naturally change. In a hybrid global war, the situation is changing radically. Increasingly, with the development of systems theory, the system is seen as a limited part of the economic space that has integrity and stability. There is already competition, limited, the predominance of income over other values. Thus, a natural environment is created for innovation and their diffusion.

The economic component of the socio-economic system is manifested in a particular historical period in accordance with institutional changes. Having gone from the Soviet model of the economic system of command and people's democratic socialism to distorted capitalism and, finally, the liberal economy of transition and partly market capitalism, Ukraine has changed the regime of development regulation, ownership structure and, in fact, entrepreneurship, but as befits intensive development, goes together with the world community to a new type of economic system. In the process of formation of the modern system of economy the nature of development was constantly changing: from development full of depressive tendencies (1991–1995) to development as an end in itself (1996–2002), movement by inertia (2003–2006) to more

sustainable, unbalanced by internal factors (such as corruption of power systems, stereotypes of post-Soviet society, low level of trust between business and government, irresponsibility of business and government to the public) (2007–2013), to artificially directed distrust of state institutions, chaos, conscious outflow of human resources (2014–2021). Speakers at the World Economic Forum on January 25, 2021, leaders of European countries, including French President Emmanuel Macron, called for a review of the economic system to close the gap between rich and poor: “the capitalist model and the market-based model no longer work. The main thing today is to focus on tackling inequality, the crisis of democracy and climate change” (World Economic Forum, 2021).

Like any really functioning, an innovation system changes its state to a specific one at a certain point in time and can be represented as:

$$S_1 (A_1, G_1, N_1 \dots) \rightarrow \dots \rightarrow S_n (A_n, G_n, N_n \dots) \dots \quad (9.1)$$

$S_1 \dots S_n$  – the state of the innovation system, which determines its behavior and is influenced by social, political, economic and other factors of the external and internal environment:  $A_1, G_1, N_1 \dots A_n, G_n, N_n$ : A – interests of actors of innovative activity; G – goals; N – legal, tax, social, institutional and other norms and codes.

The main states of the system have characteristic features, such as: transient (non-return to the previous state), recurrent (permanent return to the previous state), absorbing (being in the same state), metastable (transition between one group of states is very likely in the second group of states – unlikely), indecomposable (transition from one state to another in a finite number of steps), periodic (return to the state occurs in 1 step), aperiodic (return to the state occurs in more than 1 step), ergodic (exact hit from one state to another using a

universal value), trigger (inherent in innovative systems).

As the nature of innovation deepens, so do their sources. For example, in today's changing world of circular economy, high prices for energy, raw materials and supplies are increasingly driving eco-innovation. Innovation always arises in difficult and unstable conditions, but it is a strong backbone of a competitive economy and the productive potential of enterprises. In order to conceptually define innovations, we will use well-studied natural science and philosophical ideas about them.

The category of “innovation” is borrowed from the English language. Latin *innovare* (in *novare*) means “renew, change, rework”, *novus* – “new, different”, “innovation” – “in the direction of change”. In Chinese, this term means “innovation, innovation, reform”, in the etymological aspect of the hieroglyphs in the name means “skinning” and «chopping wood”, and together – “innovation”.

Using chronological, genealogical, structural-logical and functional (species) approaches to the formation of the conceptual apparatus, we obtained a wide list of definitions of the category “innovation”, which indicates a very diverse interpretation of this category by different scientists according to their research goals. From the analysis of the conceptual and categorical apparatus follows the following:

- first, the inconsistency of the definition of innovations in the legislation of Ukraine and the scientific field;

- second, many researchers still draw a parallel between innovation and innovation. In the Latest Online Dictionary of the Ukrainian Language (2013–2018) in one of the options for the definition of innovation means “innovation, latest change or invention” (Free explanatory dictionary, 2018). It is worth noting that the differences between inventions and innovations are fundamentally different. The latter mean, first of all, market success;

– and, thirdly, scientists now pay little attention to the processes of commercialization and diffusion of innovations, often considering innovations in a purely economic or purely technical aspect.

The definition of innovation can be presented as a result of combining intellectual resources and information in the same and related and non-related activities and areas in the process of extremely controlled by modern economic laws of civilizational change to achieve high results for society, valuable products, services or processes.

## **9.2 Economic imperatives ensuring sustainable competitive advantage**

From the analysis of world technological development in the regional context, it follows that today there is a very high level of differentiation of the world, i.e. there is a clear global technological gap. In the absolute sense, everyone will benefit from the development of new technologies, while in the relative sense, the countries of the technological core will certainly benefit – the United States, China, Japan, the Federal Republic of Germany, the United Kingdom of Great Britain and Northern Ireland and the French Republic. Technology Circle – Canada, Italian Republic, Kingdom of Sweden, Australia, Kingdom of the Netherlands, Republic of Korea. In fact, the globalization of major markets does not leave Ukraine with an effective opportunity to maintain the current situation in the country. Either Ukraine accepts new challenges and assumes the risks of participating in the international division of labor, actively trying to find its place in the world economy, or preserves the current structure and trend of socio-economic and innovative development, and its innovation ecosystem becomes recurrent or absorbing.

It is a question of formation of new economy of the country under the influence of intensive processes of creation and distribution of knowledge in all spheres of a life of a society.

In terms of global R&D spending in 2018–2019, such sectors of the economy as ICT equipment and electronic equipment, pharmaceuticals and biotechnology, automobiles, software and ICT services took the lead.

The basic industries of Ukraine can reach a new level of development only through the growth of productivity and innovation, parallel growth of Hi-tech, Fin-tech, R&D, IT solutions for B2B, ISO, bioengineering, high humanitarian technologies.

The Ukrainian economy has the potential and unique opportunity to become harmoniously high-tech and highly competitive. However, it faces a whole range of issues discussed in the previous sections. In addition, there are a number of restrictions on the use of standard marketing approaches in the sale of industrial products, primarily innovative. Among the main obstacles are the specific purpose of the products of innovative enterprises, the high risks associated with procurement, the technical complexity of goods. But there are other obstacles: the complete inconsistency of the current institutional structure of the Ukrainian industrial complex with the global challenges of competition and globalization (a small number of powerful national and transnational companies, industrial and financial groups, research and technical centers, technology incubators, venture firms and clusters). A significant shortcoming of the functioning of transnational corporations in the country is the inability to maintain the competitive position of Ukrainian enterprises and neglect to improve marketing tools.

Thus, the main condition for Ukraine's active participation in global integration processes is an innovative

model of economic development.

The experience of small business (“hidden champions”) of Germany can be valuable for Ukrainian small businesses (Center for Economic Strategy, 2019). In order to involve German small businesses in digitalization, agencies have been set up at the government level to implement digital innovations and make them accessible to small and medium-sized businesses, interact with them and pass on experience. Some of the agencies provide support for the use of cloud computing technology (Mittelstand 4.0 for the Cloud), the second – is assistance in the field of digital processes and resources management (Mittelstand 4.0 for Processes), third – support in the field of innovation management and the use of digital communications (Mittelstand 4.0 for Communication), fourth – consulting services on new technologies in digital trade (e-Billing) and equipment trade. These agencies in Germany pass on the experience to expert centers, which in turn pass information to small businesses.

Thus, civilization and globalization changes with pronounced international integration, the principles of postmodern economy and the all-encompassing impact of digitalization, have a very positive impact on SMEs, which until recently were deprived of the opportunity to participate in high-income projects (virtual, networked, insourcing, offshoring, etc.).

It is worth focusing on creating competitive advantages of special organizational business structures – startups.

Potential investors in startups can be private and public capital, business angels, business accelerators (business incubators) and venture funds. The most famous in the community of domestic business angels is the Ukrainian Association of Business Angels – UAangel, UAban (EBAN), business incubators – EastLabs, iHUB, Happy Farm, GrowthUp, WannaBiz, Voomy IT park, Polyteco.



As can be seen from Table 9.1, successful business activities, including large-scale ones, are characterized by functioning mainly in knowledge-intensive industries, which is the result of a long path of innovative development of the economies of the world's leading countries.

Table 9.1. The largest investment agreements among startups in the Ukrainian venture market in the IT segment in 2020

The name of the startup	Sector of activity	Description of the activity	Stages of investing
Reface	Software	An artificial intelligence application where people can change faces in videos, GIFs and images in seconds	Seed
Love& Live	E-commerce	Selling clothes, shoes and accessories of their own brands online	Seed
Promo Republic	Online services	Marketing support services for creating content for social media	Seed
Hologryph	Games	Game studio and multiplayer game Secret Neighbor	M&A
Stream HERO	Software	Integrates unobtrusive banner ads into the broadcast and places a call-to-action link in the chat	Pre-Seed

In this regard, given the innovation gap between Ukraine and the United States and Europe and in order to inspire Ukraine's entrepreneurial economy, it is worth quoting P. Drucker, who in his work describes the 100 largest American joint stock companies in 1982, including “in The list included 5 catering chains, 2 manufacturers of lingerie and clothing, as well as 20 medical institutions, and only 20–30 knowledge-intensive enterprises” (Drucker, 2006); “The most profitable investments made by venture investors in new companies, ahead of all in terms of growth in both income and profits for three years, from 1981 to 1983, are investments in the most banal and unscientific industry – a network of hairdressers.

They are followed by a network of dental services, both in terms of sales growth and profitability, followed by hand tool manufacturers and financial companies engaged in leasing for small businesses” (Drucker, 2006).

In our opinion, the state needs to partially follow the international practice of developing innovative entrepreneurship in the above areas and develop its own practice, finally agree on state innovation policy, monitor the implementation of development strategies. Domestic innovative enterprises must have all possible support and be a leader in building an innovative ecosystem that will ensure sustainable development and, consequently, focus on the needs and problems of the population. Returning to startups, according to world experts, from the new startups of the next decade 2021-2030, will expect innovative products in the field of ecology, personalization, digitalization of health, robotics. Abstracting from the idea of rapid enrichment and solving «non-priority» problems for the country, it is worth looking for ideas in the unrealized potential in all areas of the country's economy. Thus, with almost a third of the world's black soil, small businesses and startups can be recommended to develop and implement ideas for the use of the world's most fertile land fund. For large businesses in basic industries, the recommendations may be to increase mining; production of unique furniture (having at its disposal 18% of forests from the existing territory); implementation of startup ideas in energy and railway infrastructure, etc. With a well-established innovation-oriented economy, partnership between the subjects of the innovation ecosystem – enterprises, universities, investors, corporations, Ukraine will be able to find its place in international business by selling IT products and processed goods, not just IT outsourcing services and raw materials.

Strategic recommendations can be the creation of an effective coordinating body capable of developing a single

strategy for innovative development of entrepreneurship with the participation of all ministries, departments, and business elite, end customers of innovation, technology and engineering companies in economic opportunities comparable to financial and technological standards, competence, democracy and collegiality. In the «Strategy for the development of innovation for the period up to 2030» such a strategy is called a cross-sectoral document, which is aimed at the development of innovation in all sectors of the economy (Table 9.2).

Table 9.2. Forecast decisions in achieving the targets of the Strategy for the Development of Innovation until 2030

Business	Power
Increasing business motivation for research and scientific and technical (experimental) development and innovation; business as a potential customer of innovations; creation of a network of competitive innovative enterprises for cooperation with international high-tech companies; merging industrial enterprises with vocational (technical) education institutions into clusters	Creating a favorable regulatory framework; increase R&D funding; creation within the settlements of places intended for development of intellectual, creative activity, innovation movement, development of creative industries; state support of inventors and entrepreneurs; introduction of European technical standards; support for startups

### **9.3 Methodological approaches in the evaluation of sustainable development in the aspect of innovative entrepreneurship**

Based on the data of the State Statistics Service of Ukraine and the Main Departments of Statistics in the regions that characterize the level of economic (financial, innovative), social and environmental development of the leading industrial regions of Ukraine, significant economic, social and environmental factors were selected indicators.

Table 9.3 demonstrates the interconnection of all

components, the inclusion of the innovation component in the general economic.

Table 9.3. Key indicators of sustainable development of regions

1	2
Economic	GRP for the year (on a 1 person)
	Retail commodity turnover is for a year (on a 1 person)
	Amount of enterprises for a year on (1 person)
	Volume of the realized products, hrn. (on a 1 person)
	An amount of the concerned workers is on enterprises (thous. people)
	Charges are on a personnel on enterprises, hrn. (on a 1 person)
	Capital investments, hrn.s (on a 1 person)
	Indexes of agricultural produce, % to previous year
	Indexes of building products, % to previous year
	Indexes of industrial products, % to previous year
	Profits of population, hrn. (on a 1 person)
	Research and development costs (in% to GDP)
	Volume of exports of goods, thousand dollars USA
	Social--ecological
Concerned population (thousand persons)	
Employed population in the field of education, IT, professional, scientific and technical activities (thous. persons)	
Morbidity of population (on a 1 person)	
Extrass of contaminants (tone is on a 1 person)	
General volume of wastes (tone is on a 1 person)	
Extrass of contaminants are in atmospheric air from the stationary sources of contamination (tone is on a 1 person)	
Volume of services provided by enterprises in the field of information and telecommunications, thousand UAH	

\* 1 – Components of Sustainable Development; 2 – Indexes

Estimation with the help of these indicators allows determining the rating of industrial regions by the level of information support of socio-ecological and economic potential in order to identify areas of innovation and information resources and reduce imbalances in overall regional development, as well as consistency in socio-cultural and

environmental potential. Therefore, to assess the level and trends of sustainable development of regions, it is advisable to use the method of building integrated indices, which allows to objectively determining the problems of such development, the choice and validity of goals and strategic directions. It is determined that, despite the significant number of available approaches, there is no single systematic approach that would allow to summarize disparate information and was the basis for determining the effectiveness of the mechanism of sustainable development of the region. As a result, the authors propose an updated list of indicators related to all three aspects of sustainable development.

Sustainable development today is an innovative process. The main economic actors – industrial enterprises – determine the main conditions for sustainable economic development. Business now needs balanced control, restoration of trust in state institutions, partnership, and decisive action from above. However, as practice shows, many entrepreneurs in Ukraine face problems of planning, strategy development, mission and implementation, and short-term planning, lack of strategic vision, corruption prevail in many types of domestic business. In addition, with the advent of the pandemic, the planning horizon for all has shrunk sharply and we have to focus on survival and adaptation. Many strategies do not work, as they are often uncoordinated and unconnected and lack practical support. The Ukrainian business elite has to live by a successful, correct, but alien scenario. We can admire the missions of the world's leading companies: “organize all the information available in the world and provide it with quick and easy access” (Google), “become a platform for real-time communication” (Skype), “enable everyone and every organization on the planet to achieve more” (Microsoft), but now, 30 years in a row and in the near future, our government and business institutions are not ready (financially,

economically, institutionally, morally, professionally) to develop and engage in effective strategies and missions. Thus, Ukraine needs to overcome the financial and economic, political, institutional (minimize the impact of extractive economic institutions in favor of inclusive) crisis, as well as the crisis of trust and responsibility and continue to create and implement its own strategies. It is vital for Ukraine to accept new challenges and take the risks of participating in the international division of labor, to find its place in the world economy.

A methodological approach to assessing the parameters of sustainable development of regions is proposed, which can be used in the development and implementation of strategies for sustainable development of regions and in the process of regional development management for effective decision-making at the level of regional administrations and local governments.

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**10 MODERN STATE OF DIGITALIZATION  
DEVELOPMENT OF UKRAINIAN TERRITORIAL  
COMMUNITIES**

**10.1 Problems of digitalization of territorial communities in  
Ukraine**

The study of the formation and development of innovation processes in economically developed countries indicates that the state innovation policy is a necessary component of socio-economic policy, which outlines the main objectives, forms and principles of public authorities in science and technology, reflects the direction of state measures for innovation. Today in Ukraine, improving the efficiency of territorial communities (TC) is impossible without the introduction of the latest information and communication technologies (ICT). In particular, their use is aimed at improving the quality of TC activities, improving the interaction between government and the community, and, in general, promoting social innovation in Ukraine. In this context, according to international experience, strengthening the digital capacity of TC provides citizens with self-service and quick search for information on various issues, public services, reporting, registration for appointments, etc. and, as a result – the formation of progressive “digital” communities.

The formation of a common digital capital market and a single market for consumer services in local communities necessitates the prompt revision of existing standard solutions to stimulate new business models, programs and processes based on startups of secure communication platforms using regulatory technologies designed to use distributed resources. unification of internal and external networks of all sectors of



the economy and their identification on the basis of the mechanism of commercialization of intellectual property of network infrastructure in the digital assets market as a basis for building the digital economy of the future.

Problems of digital capacity of TC in Ukraine, highlighting their main problems and determining future prospects are the subject of research by domestic scientists such as O.Boyko (2021), S. Kvitka (2020), L.Krupnova (2020), N.Lytvyn (2020), N.Novichenko (2020), O.Yevsyukova (2021), O.Saenko (2019), O.Shevchenko (2020), G. Shaulska (2019) and many others. Paying tribute to the above specialists and the results of their research, some issues related to the digital capacity of TC have not found a final solution and require additional study, which determines the relevance of these materials. In particular, this is the issue of creating a progressive “digital” TC; current issues that hinder the implementation of measures for digital transformation of TC in Ukraine; prospects and measures to strengthen the digital capacity of TG in Ukraine, etc. In view of the above, the main idea is to study the digital capacity of TC in Ukraine, highlight its main problems and identify the main prospects for development. The digital transformation of society and the resulting changes in the organization of power have a significant impact on the development of TC, formed in the process of decentralization of power in Ukraine.

One of the current trends is the active introduction of elements of the digital government system in the activities of local self-government bodies. Information and communication technologies are now becoming more and more “smart” within the IT industry. The formation of effective market relations implies a balanced development of both the services market and the network infrastructure, which are able to unite all branches of the service sector into a single whole. Thanks to the use of artificial intelligence, it is possible to optimize the

social content of each consumer and turn these statistics into a template for financial service providers. This is more active in cities, but has recently become widespread in newly created TCs. Therefore, the success of the decentralization reform should be strengthened by expanding the effectiveness of TCs at various levels: education, health, social protection, energy, public transport, public safety, etc. by strengthening their digital capacity. In particular, we are talking about the introduction of new, digital processes and modern technological solutions, the spread of network communications independent of the Center, the mastery of digital tools to implement the extended powers of TC, etc. (Shevchenko, 2020). In addition, the positive aspects of the digital capacity of TC are:

1) widespread use of modern ICT to achieve the required level of efficiency and effectiveness;

2) the ability to make effective management decisions (collect and store statistics for many years, analyze data that can immediately plan actions and respond quickly to community challenges);

3) identification of best practices (taking into account data from previous years, the availability of forecasts for future periods makes it possible to draw up an action plan to obtain the most effective result);

4) the possibility of exchanging unified documents;

5) reduction of corruption risks at all levels and in all areas (citizens do not communicate directly with government officials, but receive services online);

6) the process of control and transparency (in the management and analysis of decisions);

7) the ability to receive administrative services during quarantine, etc. (Lytvyn, 2020; Krupnova, 2020).

Thus, strengthening the digital capacity of TC means the process of creating electronic services for more effective

management decisions and providing quality services within the TC and transforming them into progressive “digital” communities (Lytvyn, 2020; Krupnova, 2020). The concept of “digital” community is used as a generalized definition of the organization of local government management based on the processes and mechanisms of digitalization. This concept is increasingly used in the scientific literature and deserves wider use, but, of course, requires more detailed and in-depth study (Kvitka, 2020; Novichenko, 2020; Husarevych, 2020; Piskokha, 2020; Bardakh, 2020; Demoshenko, 2020).

In our opinion, the following general problems of TC digitization in Ukraine can be singled out.

The benefits of digitalization in community management can only be realized by ensuring the availability of digital technologies and maximizing the involvement of the majority of the population. In other words, the lack of interest of municipal authorities in the creation of “digital” TC is due to the low level of high-speed broadband Internet access in small towns and rural settlements. A possible solution to this problem is to expand the capabilities of 3G / 4G mobile access to the global network (Kvitka, 2020; Novichenko, 2020; Husarevych, 2020; Piskokha, 2020; Bardakh, 2020; Demoshenko, 2020). Public authorities, when developing and implementing plans for “digital development” of districts, cannot and should not replace private operators providing network services. Their role is to coordinate the efforts of various participants in the digitalization of public life to achieve a synergistic effect of their actions, the rational use of local property provided to various private operators to develop the necessary infrastructure, promote private initiative” (Kvitka, 2020; Novichenko, 2020; Husarevych, 2020; Piskokha, 2020; Bardakh, 2020; Demoshenko, 2020).

Common problems in the creation and operation of digital communities include insufficient funding, as well as

inefficient use of funds allocated for digital transformation projects. Often the allocated funds are spent, first of all, on the creation or modernization of morally and technically outdated information infrastructure. As a rule, such costs are aimed at solving local temporary tasks, without taking into account the problem of future hardware and software integration of created resources into a single municipal information system and connecting it to regional, national and, in the future, global network communication (Code: innovative communities, 2021).

A significant number of TCs in Ukraine already have their own digital development concepts and programs. However, it is not necessary to say that they are fully implemented. Rather, it is about the right direction in urban development, which can be implemented in the future. For example, the EGAP Program, implemented by the Eastern Europe Foundation and the Innovabridge Foundation in partnership with the Ministry of Digital Transformation of Ukraine and funded by the Swiss Agency for Development and Cooperation, was developed to use the latest ICT to improve governance, social innovations in Ukraine.

## **10.2 Applied aspects of digitalization of communities**

The digital transformation of regions is taking place through the receipt of services by Ukrainians related to the implementation of innovations (economic, technological, environmental, social) in local communities.

In general, digitalization of regions is an important component of Ukraine's transformation. In most regions, there are CDTOs (Chief Digital Transformation Officers) – Deputy Heads of the Regional State Administration for Digitization. These are people who use digital solutions to implement

change at the local level and deal with electronic registers, processes and services. CDTOs work to make services more convenient for Ukrainians and community management more effective.

“Regional digitization is already working effectively – many digital solutions for residents, a significant reduction in corruption and time savings,” said Vadym Bortnyk, director of the Regional Digitization Directorate (Tetiiv local community, 2021), who led the CDTO. CDTOs work to make services accessible to all communities, improve community governance, provide institutional capacity to implement projects at the local level, and establish interoperability between local and national systems.

During the year of optimization of activities related to the digital transformation of local communities succeeded:

- to develop a “community digitization package” – a road map, instructions, examples of regulations that will soon be published on the new portal Action. Digital Community;

- organize a study of digitalization needs in 125 communities. This is necessary to help focus on more effective implementation of digital technologies;

- create a Smart City Club – a platform where relevant representatives of 40 major cities exchange best practices every week and find solutions to carry out digital transformation of cities as soon as possible;

- Conduct more than 100 training sessions for digital leaders.

For example, within the framework of the Norway-Ukraine project, Lviv Polytechnic National University together with partners has developed a special free program for ATO participants, members of their families and servicemen who want to become civil servants or local government employees – Strategic Development territorial communities”. The course program includes areas:

1. Community development strategies.
2. Digitalization of public administration.
3. Legal support for community development.
4. Technologies for the development of territorial programs and projects.
5. Resource management of local communities.
6. Social dimensions of community work.
7. Business English.

The course introduces many innovations, including the use of modern technologies and startups for the development of territories and communities, the use of space information, helicopters, warning systems, security and mobility, smart parking and IT management products. Many meetings and interactions with best practices from the World Forum of Smart Cities, the Association of Cities of Ukraine, the Association of Small Cities of Ukraine are planned. At the same time, there is a recruitment for the already traditional, also free program for startups and makers from among the participants of the anti-terrorist operation and members of their families – “Technology for developing startups for local communities”.

#### E-solutions for communities project

Implementation of the project “E-solutions for communities” will make the process of providing administrative services to the population as convenient and fast, implement the necessary IT tools of the project (registers, budget module, GIS, open data portal), modernize software, increase efficiency of work of specialists, to pass a full course of training on the educational online platform – edu.cid.center and to receive consulting support of project experts. Almost 300 communities from 23 regions of Ukraine have applied for participation in the project “E-solutions for communities”, of which 50 communities that have met all the requirements of the tender commission have been selected to participate in the project and implement IT tools. As an example, the

participating communities include Tetiiv TC.

The goal of the E-Solutions for Communities project is to help communities move to Office 2.0, based on analyzed, verified data using IT. The project is implemented by the Center for Innovation Development with the support of the U-LEAD with Europe Program.

#### Digital Community Project

It is advisable to implement the Digital Community project in the united territorial communities, which helps to increase efficiency in the field of accounting and asset management. Ruslan Mastruk, the head of the Tetiiv community, told about this at a press conference in Ukrinform (Tetiiv local community, 2021). Tetiiv City United Territorial Community won the Digital Community Competition under the U-LEAD with Europe Program, received software provided by Global GIS, and made registers of all lands in the community . This made it possible to create a register of all land plots and have information about each share of land. Also in this program you can use aspects of architectural and construction cadastre and various networks that run through the community. And it can also be used in agriculture. This will allow us to work better with investors.

As Vitaliy Bilenkov, Technical Director of Global GIS, said at the press conference, this tool can be used to make effective management decisions, as it allows centralized storage of current cartographic data, take into account and combine various data, and quickly add the necessary information. This system is also combined with a comprehensive database of documents of the Urban Cadastre, with various information systems such as C1 or CRM. The process of digitalization should include everyone, from OTG to all professionals and all residents. Then this system will work. In particular, the implementation of such a project makes it possible to trace property rights to each individual land plot,

obtain information on lease agreements for land plots, and thus information on rent payments, etc.

“Smart Community – Creating together” is implemented with the support of the Agency, innovation, sustainable development and resource efficiency. The project web service “Roll-call voting of deputies of Tetiiv OTG” (Tetiiv local community, 2021) and web service “Investment portal of Tetiiv OTG” (Fig. 10.1), is a series of successful launches of “smart” web services within the project “Smart Community – Creating Together”, which continue to be implemented by the Tetiiv City Council (start of roll-call voting <http://pg.tetiivmiskrada.gov.ua/uk>). The roll-call voting service allows you to cover the activities of OTG deputies. Each resident of the community can see how many deputies voted for each of the issues included in the agenda and who specifically voted, and you can get acquainted with the activity of deputies.

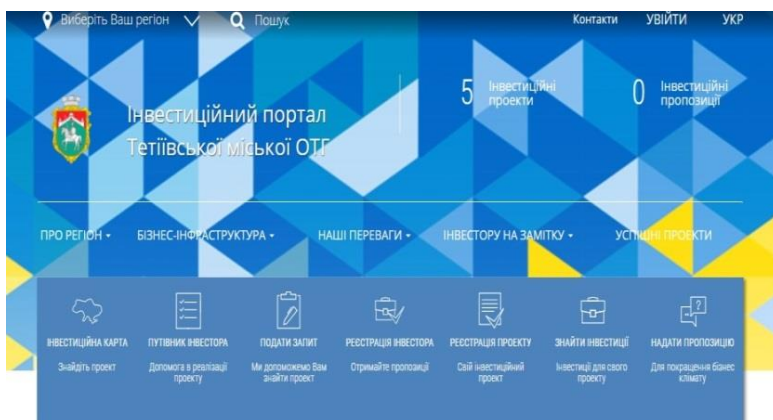


Fig. 10.1. Project web service "Investment Portal Tetiiv TC" (Tetiiv local community, 2021).

Roll-call voting has the function of attaching draft decisions of the session to each issue on the agenda, which



gives each citizen the opportunity to get acquainted with the issue of interest to him. For example, when issues related to land relations are submitted to the session, a resident of the community can go to the service page, view whether his issue is included in the agenda and download the draft decision for review. After the session, he can get acquainted with: which of the deputies voted “for”, who “against” or “abstained”.

Prior to the implementation of this service, the results of voting and decisions of the session were posted in the relevant sections on the official website of the Tetiiv City Council. Because the results of the vote and the decisions of the session were in different tabs, it was not always convenient to find them. With the introduction of the web service, it has become much easier for community residents to find information on issues and decisions made at the session, as well as the opportunity to observe the activity of the deputies they elected.

An effective tool in the implementation of digitalization is the creation of community residents' own initiatives, which are taken into account as a budget for participation in improving the territory of local communities. The participation budget is a unique opportunity for the community to create their own initiatives to improve their city, town, village with local budget funds. If members of the community have socially important ideas, the local authorities, with quick access to the web portal “Submit a proposal”, are ready to implement them mobile: a new playground, a space for young people, a flower garden or bicycle parking and more. Thus, in Tetiiv TC (Tetiiv local community, 2021) the Department of e-Government and Public Relations implements the Project “Free creation and implementation of a web service electronic public consultations” aimed at facilitating communication between citizens and the authorities, involving communities in public and public issues. life, ensuring transparency of local government. The project is funded by the Agency for

Innovation, Sustainable Development and Resource Efficiency. In March, Ruslan Mastruk, Chairman of the Tetiiv City TC, signed a Memorandum at the Ukrainian House within the framework of the conference “Starting a New Partnership” dedicated to the start of direct work of U-LEAD with Europe executors on creation and modernization of Administrative Service Centers. with the program “U-LEAD with Europe”.

According to the Memorandum, the Center for Community Administrative Services will receive new jobs (computers, multifunctional devices, furniture), software and staff training. In turn, TC undertook to renovate the premises where the CNAP will be located, ensure accessibility to the Center for Low-Mobility Groups and create conditions for their stay in the premises. Repairs are planned to be made at the expense of the Subsidy for the development of TC infrastructure.

The provision of administrative services is an extremely important criterion for the development of local self-government. Availability and quality of administrative services in communities is one of the key factors in the success and capacity of local governments. One of the goals of the ULEAD with Europe Program is to empower united communities and small towns to provide high-quality administrative services to their residents. The program aims to support local governance, accessibility and quality of public services through the modernization and establishment of up to 600 appropriate Centers for Administrative Services.

Properly chosen algorithm of digital transformation of a territorial community is a sequence of actions and technologies to achieve maximum efficiency of invested resources of the municipality and residents and quickly obtain a result that will radically change the life of the community (Community digitization algorithm, 2021). It is expedient to place the stages of digitalization of territorial communities as follows, which

optimizes the process of life of local centers (Fig. 10.2).

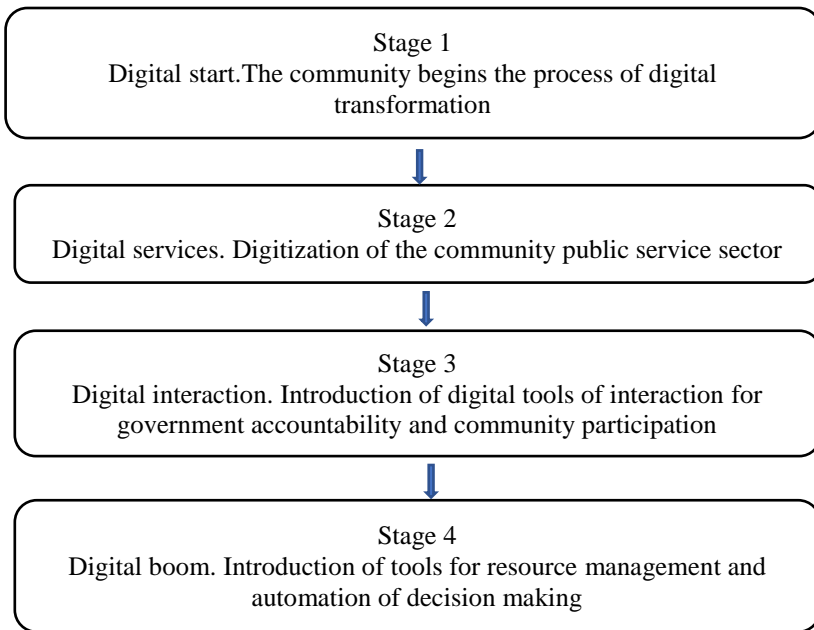


Fig. 10.2. Algorithm of digital transformation of the territorial community

Every resident will experience the benefits of the latest technologies after the introduction of digital tools in the strategic development of local communities. Moreover, the strategy of development of territorial communities should be both reactive, ie to help local governments to adapt the development of the territory to external changes, and proactive, ie to direct action in the right direction.

Digitization in the strategy of development of territorial communities activates all processes that take place in local ones communities (Fig. 10.3).

Forms a pre-planned reaction of territorial communities to changes in the external environment	It connects all parts of local development into one	
Activates the means of achieving the end result	<b>STRATEGY development of territorial communities taking into account digitalization</b>	Provides a long-term plan for the development of local communities
Analyzes the strengths and weaknesses of local communities and optimizes the end result		Covers all major aspects of local development of local communities
Ensures the compatibility of all development plans of territorial communities	Provides answers to key problems of development of territorial communities	

Fig. 10.3. Strategy of development of territorial communities taking into account digitalization

Successful strategies for the development of local communities in the light of digitalization should be characterized by the following features that optimize the implementation of digitalization in local communities:

1. Partnership and broad participation approach;
2. High level of public consensus, efficiency and business approach;
3. Involvement of a large number of stakeholders from all spheres of life of territorial communities;
4. Use of powerful analytical tools;
5. Awareness that the quality of one completed phase of the digitalization process affects the success of the next phase;
6. General coordination of the process of digitalization implementation in territorial communities.

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## **11 CHARACTERISTICS OF SUCCESSFUL INNOVATIVE COMPANIES IN THE WORLD**

### **11.1 Commitment and trends in innovation**

In today's economic environment, characterized by increasing globalization and integration processes, digitalization, rapid spread of technology, intensification of competition, every company, and every brand seeks to consolidate its image as unique, best, successful and innovative to stand out from others, remain relevant and in demand.

The geography of innovation is changing dynamically, due to the growth of international cooperation in research and development, gaining experience in this field, accelerating the introduction of innovations and ideas into production and consumption. Based on research by Jaruzelski B., Schwartz K., Staack V. (Jaruzelski, 2015; Schwartz, 2015; Staack, 2015), it was found that about 94% of the world's largest innovators implement their research programs abroad. This is due to the advisability of investing in innovation in countries with the highest sales, the right market, and, last but not least, access to skilled and lower-skilled workers than in highly developed countries. This, in particular, applies to Ukraine – a country where the market of IT services is highly developed, and the level of wages for similar work of developers is many times lower than not only European but also global indicators. Therefore, one of the important conclusions is that it is necessary to determine not only the amount of corporate investment in research and development, but also other key characteristics that will ultimately affect the success of innovation, the performance of innovative companies, and the development of the country or region.

Studies conducted by Ringel M., Baeza R., Panandiker R., Harnoss J. (Ringel, 2020; Baeza, 2020; Panandiker, 2020; Harnoss, 2020 (1)) from 2005 to 2020 indicate that size, ambition, and skills are important for innovation success, and given the impact pandemic covid-19 – a series of innovations, leadership, and benefits of big business in the availability of resources to implement their developments. Equally important is flexibility in the ability to adapt to rapidly changing market conditions. However, the creation of so-called serial innovations is quite a challenge. Based on the analysis of the activities of the world's most successful companies in the field of innovation for the period 2005–2020, which is 14 years, it was found that from the list of 162 companies that are currently ranked in the top 50, almost 30% were there only once, and 57% – three or fewer times. Each year, only 8 companies are included in the list, including: Alphabet, Amazon, Apple, HP, IBM, Microsoft, Samsung, Toyota Johann D. Harnoss (Ringel, 2020; Baeza, 2020; Panandiker, 2020; Harnoss, 2020 (1)).

However, the world's leading companies show different commitment to innovation (Ringel, 2020; Baeza, 2020; Panandiker, 2020; Harnoss, 2020 (1)):

- only 45% of companies surveyed identify innovation as a top priority and support this commitment with significant investment (mainly in the financial and pharmaceutical sectors);

- 30% do not consider innovation a strategic priority and do not allocate significant funding to it (this trend is most noticeable in industry and trade);

- 25% are in the middle – i.e. determine the strategic importance of innovation, but the amount of funding does not meet the stated goals.

A distinctive feature of successful and innovative companies is the widespread use of artificial intelligence and the involvement of external innovation channels, including

incubators, partnerships with research and academic institutions. They focus on the development of digital design, digital solutions, improvement of technology platforms, and advanced analytics. At the same time, for innovatively successful companies the most difficult task is the repetition and scaling of success (Ringel, 2020; Baeza, 2020; Panandiker, 2020; Harnoss, 2020 (2)), ie the transfer of high results of pilot projects in serial production, long-term fixation of already obtained positive results.

The positive experience of Target, which is a shining example of innovation and success, can be used in Ukraine, not only in trade, but also in the transport sector, tourism, restaurant business. At one time, Target made significant capital investments to combine offline and online shopping and make the store more interactive, giving consumers the opportunity to “try on” products, imagine how it will fit into their home, interior with a display of outlets with added reality. Also the creation of omnichannel travel of customers, which allows you to order at home, and pick up in stores, optimize logistics and traffic flows. As a result, in 2019, Target was ahead of competitors, and the implementation of these innovations increased its financial result by 25% (Ringel, 2020; Baeza, 2020; Panandiker, 2020; Harnoss, 2020 (1)). In 2022, such technologies are already used by all major participants in the retail market, but at the stage of innovation, they brought Target significant competitive advantages.

Among the important trends in the field of innovation is the diversification of sectors of large innovative companies. Examples include Amazon, which has joined the healthcare industry, and Alibaba, the financial services industry. The experience of innovations in road transport is interesting. Large companies that are innovative and ambitious create so-called ecosystems to bring together multiple participants or different types of services on one platform. For example, the



introduction of autonomous driving in the automotive industry, the use of drones and artificial intelligence elements by companies that did not previously belong to this industry – Sony, Alphabet and Apple, as well as well-known car companies: Tesla, Volkswagen, Bosch. With the development of the Internet and technology, manufacturers are simultaneously developing software with cloud services and related services. Impressive transformations in the automotive, aviation and agricultural industries, when companies move from production equipment to a combination of equipment, data, software and connectivity to provide completely new types of solutions (Ringel, 2020; Baeza, 2020; Panandiker, 2020; Harnoss, 2020 (1)). Accordingly, the dynamics of profits is in favor of those market participants who have gone beyond their usual activities and sectors.

## **11.2 Characteristics of successful innovative companies**

Careful research does not determine the existence of a long-term correlation between the amount of funds invested in development and innovation and the financial performance of companies as a whole (The Global Innovation 1000 study, 2018). Moreover, the biggest innovators, who spend less on research and development as a percentage of sales than others, can get much better results from similar competitors due to the successful use of resources, talents, abilities of employees, their motivation, decision-making, creating those products that ensure the commitment of existing, and the interest of new customers and consumers.

In total, we can identify six characteristics of successful innovative companies (Fig. 11.1) (Global Innovation 1000, 2021).



Fig. 11.1. Key characteristics of successful innovative companies by version Global Innovation 1000

Source: formed on the basis of processing (Global Innovation 1000, 2021)

So, let's analyze the main ones:

1) coordination of innovation and business strategy (allows more rational allocation of resources and coordination of business processes, clearly define goals for employees and managers, direct efforts to research and development);

2) support for innovation at the level of corporate culture (for example, Apple, which focuses on finding the need for innovation, defines its innovation spirit, integrated into the mission and organizational structure under the slogan “innovation in our DNA”);

3) leadership and innovation of senior management (support of innovation programs at the highest level of management, coordination of efforts to conduct research and development, teamwork, involvement of management in innovation models);

4) customer focus (understanding customers is crucial to the success of innovation);

5) selecting the right project or idea (innovation program begins with the idea, project development, selection, approval, and ends with the implementation and commercialization of results, so the selection of the project and the idea is crucial for further success);

6) holistic approach and continuous development (large and successful companies strive to consolidate positive results and develop, be the best, increase their market presence and increase competitive advantage through innovation).

The analysis of innovative models shows that the success and return on investment is higher in those who focus on market needs – the analysis of existing and search or formulation of potential needs and ways to meet them. Such companies have higher profitability and revenue dynamics. The survey, the results of which are described in (Global Innovation 1000, 2021), showed that such companies account for 84% and they have a close relationship between business strategy and innovation strategy, which significantly exceeds the rate of “market readers” (fast followers of new products, in which coherence of business and innovation strategies is present in only 48%) or “technology drivers” (which are focused on accelerating the development of technologies, in which coherence is present in 53%).

To achieve success and the highest performance in the field of innovation, it is necessary to take into account the effect of scale, as in the vast majority of large companies have an advantage in choosing and developing profitable innovative products, services, and business models (The Serial Innovation Imperative, 2020). Also mainstream in the scientific literature is the recognition of the concept of innovation culture, which obviously affects the success of innovative companies and is closely linked to the corporate culture of the entity. However,

today it is quite difficult to assess the innovation culture, determine its level, key features and characteristics, as it was, at one time, for intellectual capital. In the future, the definition of innovation culture can also be an important object of research and management, as this category combines components such as talent, ambition, motivation, the formation of innovative thinking in employees and management. Leaders who strive for success work to create a successful innovation team, attracting external and making the most of existing talents and abilities of employees.

Large innovative companies also increase their chances of success through organizational leverage, the use of independent management practices and their constant adjustment to changing needs and market fluctuations. For example, most large companies have a diversified set of elements in their innovation activities: internal incubators, venture funds, and accelerators to accelerate innovation by complementing internal development efforts.

Obviously, one increase in funding is not enough to succeed in implementing innovative programs. This is an important component of success, but not crucial, so highlighting these features of successful innovative companies, their combination will achieve the desired systemic or synergistic effect, where innovation can change the entire business landscape of the enterprise.

### **11.3 Priorities for innovation funding**

Significant financial resources are needed to implement innovative projects. At the same time, financing has an impact on absolutely all stages of the innovation cycle – from idea to implementation, commercialization of results, expansion and long-term sustainability of the business. Today, funds,

corporate ventures (the largest venture capital centers are concentrated in Singapore, China, Hong Kong (China), the United States, Luxembourg, India and the United Kingdom), intellectual property (IP) markets, and crowdfunding, public funding are effective in the field of innovation financing (Cornell University, INSEAD, and WIPO, 2020). Changes in the economic environment of enterprises, in particular under the influence of the pandemic, the challenges of climate change have affected the priorities in the allocation of financial resources, and the choice of innovative projects and ideas. Venture capital transactions are significantly reduced in Europe, Asia and North America in 2020 compared to previous periods. Much attention is paid to startups, despite the reduction in funding, they have a fairly high chance of successful implementation.

Promising areas of innovation funding include: medical, and healthcare, distance learning and learning, e-commerce, robotics, and a variety of mobility solutions. There is also multidisciplinary in the direction of innovative projects – a combination of different industries, areas of application, and tasks. The vast majority of investments are now intangible assets in the form of direct intellectual property, intellectual capital, data, and knowledge. Innovations in the development of virtual reality allow you to visualize objects and processes of economic life, demonstrate all stages of the project life cycle, most fully present and analyze the interaction of components in achieving common goals, the possibility of achieving additional system effects. Here, in particular, the construction of smart ports, smart cities, infrastructure solutions, the formation (education or formation) of a smart society, the organization of large databases into smart databases. Caring for people, their health, safety, the environment, the fight against poverty – all these are important tasks that will be solved by further innovations, including in the field of virtual reality and

modeling. For example, the Smart City platform of the Virtual Singapore type solves an important task not only in the performance of city management functions, but also in the development of the latest approaches to health care, transport services, communication. In the near future, it will be possible to create a virtual counterpart of the human body (Cornell University, INSEAD, and WIPO, 2020), which will also help address pressing issues related to health and inclusion. The most ambitious innovations need an appropriate level of financial support, so a special role in its provision belongs to the public-private partnership under the slogan “invest together” in innovation for a better life. Here, too, investments in virtual reality play an important role: “to make the right investments and invest in the age of experience, we need a virtual universe to make the invisible visible” (Cornell University, INSEAD, and WIPO, 2020, p. 12).

According to the Global Innovation Index (GII) of the World Intellectual Property Organization's (WIPO), despite the crisis and processes, high-tech industries continue to trend of significant funding for innovation in 2020. In the top three countries investments in research and development according to the GII rating include (sequentially according to the rating): Switzerland, Sweden, USA, UK, Korea, Netherlands, Finland, Singapore, Denmark, Germany, France, China, Japan, Hong Kong (China), Israel, Ireland, Austria. At the same time, Switzerland has been a leader in the index since 2011 (Fleming, 2021) and continues to be considered the most favorable country for innovation in the world for eleven years.

An analysis of innovation funding trends in 2020 showed that despite the huge economic losses and losses among people due to the covid-19 pandemic, increased investment in innovation underscores the recognition that new ideas are very important in overcoming the pandemic, the effects of the economic crisis, and ensuring further economic growth (Global

Innovation Index, 2021). As in the pre-crisis period, the expenditures on research and development (R&D), intellectual property applications, and venture capital agreements (VC) are growing in 2020 as well. It is clear that the pandemic crisis has had an uneven impact on the various sectors of the economy and their ability to sustain and continue to fund innovation. While industries related to tourism, transport logistics, in particular, passenger transport have suffered significant losses, sectors such as software, Internet and telecommunications, pharmaceuticals, biotechnology, hardware and electrical equipment (Global Innovation Index, 2021) have increased funding. innovative projects and, accordingly, research and development efforts. Thus, the digital, technology, and innovation sector remains the most sustainable and promising.

The geography of global innovation is also changing unevenly. Regions such as North America and Europe continue to be leaders in innovation.

North America, which includes the United States (3rd place for the third year in a row) and Canada (which rose to 16th place in 2020), remains the most innovative region in the world. The United States is a leader in the number of patents, scientific and technical clusters, the influence of universities and scientific publications, global companies engaged in research and development. Canada leads in the number of venture capital agreements, strategic alliances and joint ventures.

Europe also remains a powerful innovation hub: 16 of the 25 GII leaders are European countries, and seven of them are among the best. Switzerland has been a world leader in innovation for the 11th year in a row and has remained among the top three in Sweden for more than a decade. For the past three years, Switzerland, Sweden and the United Kingdom have been in the top five. In total, ten European economies rose in the ranking for 2020. The greatest positive dynamics was

demonstrated by France (11) and Estonia (21). In particular, Finland (7) is the world leader in the rule of law, Sweden in the number of international patent applications, and along with Switzerland and Norway (20) are leaders in the use of information technology and education spending, while the UK leads in the quality of its universities and the influence of scientific publications. Switzerland is a regional leader in terms of innovation, including patents on the origin and proceeds of intellectual property (Global Innovation Index 2021).

The efficiency of innovation in South-East Asia, East Asia, and Oceania is growing significantly, thus, this region is most dynamically catching up with the leaders. The only middle-income country in the top 30 is China. At the same time, Bulgaria (35), Turkey (41), Thailand (43), India (46), Ukraine (49), and Montenegro (50) entered the top 50 GII (Global Innovation Index 2021). For Ukraine, the opportunity to catch up is to complement its domestic innovation programs with international cooperation in technology transfer, development of technologically dynamic services that will be in demand in the international market, balancing the innovation system, and involving the state and foreign partners in financing innovation (Semenova, 2021; Fomina, 2021; Moshkovska, 2021).

As a result, it can be argued that investment in innovation has reached a historic high before the pandemic, in 2019, funding for research and development grew at an exceptional rate – by 8,5%. In 2020, budget expenditures to finance innovation projects in the countries that spend the most on development and innovation continued to grow. The largest global corporate spending on research and development increased by 10% in 2020 (60% among companies that are actively engaged in innovation). The number of venture agreements in 2020 increased by 5,8%, which is the highest figure for the last 10 years. Also in 2020, the number of



publications of scientific articles worldwide increased by 7.6% (Global Innovation Index, 2021). The efficiency and activity of investing in innovation can significantly change the performance of countries in the ranking. A clear example of the rapid growth of GII in 2020 is the Republic of Korea, which managed to rise from 10th to 5th place, in particular, due to innovative results in terms of global brand value, brands, exports of cultural and creative services. Prior to that, outstanding results are France (11) and China (12), which came close to the top 10 countries in the GII (Global Innovation Index, 2021). All these examples emphasize the importance of government support and stimulating innovation.

Thus, an overview of the experience of successful innovations of the most famous companies from around the world allows us to draw important conclusions. The modern world is changing and innovation is the driving force behind such changes. This is a multifaceted concept, category, a panacea for business recovery, victory over competitors, attracting the attention of customers, achieving their commitment, the opportunity to make a profit. At the same time, innovations help to develop society, meet needs, solve important problems. Innovation is essential to achieving sustainable development goals. Innovation breaks down borders and provides opportunities, transforming sectors of the economy into technology industries, and facilitating their interconnectedness. Large companies that are innovative, such as Sony, Nike, Xiaomi, and JD.com, are demonstrating a breakthrough from the main traditional industry and expanding the scope of activities, there is multisectoral. The characteristics of successful innovation companies in the world are: coordination of innovation and business strategy, support for innovation at the level of corporate culture, leadership and innovation of senior management, customer focus, choosing the right project or idea, holistic approach, and continuous

development. The most successful are those who seek to stand out, be remembered, develop their brand and the intangible components of the value of their own business through the introduction and use of innovations. At the same time, innovation is an integral tool in overcoming global problems and building a better future.

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Scientific Edition

**TERRITORY OF INNOVATIONS: BEST PRACTICES FOR  
SUSTAINABLE DEVELOPMENT AT THE LOCAL LEVEL**  
Part 1: digest of analytical stage of international scientific and  
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