

**Tertiary Sector Economics**

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**UKRAINE INFRASTRUCTURE
POST-WAR RECOVERY****Abstract**

The importance of infrastructure, its state and types, the necessity of its post-war recovery according to European standards is shown. Creation of energy storage at closed Ukrainian and Polish mines, and their inclusion into the network of European continental energy system is offered. The basic principles of international project to create conveyor cross-border land portal between Ukraine and Poland have been developed to facilitate cross-border bulk cargo clearance. Pro-

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posals are given to organise special branch that would use resources and materials recovered from civilian residential houses and industrial objects destroyed by belligerent activities. Special emphasis is on non-production social infrastructure. There are instances of its new elements creation, the need in which is imminent as a result of military activities, territory occupation, sufficient part of population's temporary internal displacement and migration abroad, the need in education and requalification of labour force, workplaces creation, involving of international organizations with their experience to provide economy and infrastructure recovery. Top priority civilian activities to increase safety level in Ukraine are offered.

Key Words:

Recovery formula, energetics, transport, priorities, education, science, innovations, startups, portal, recovered resources, demography, decent job, elderly age, migration, displaced population, top priority security activities.

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Literature review and problem statement

It makes sense to agree that the location of a researcher office has influence upon its owner's views (Rostow, 1964). There is a variety of views among those who have been developing programs of overcoming war consequences and post-war recovery, including the domain of Ukraine national economy (Deineko et al., 2014; Zveriakov, 2022; Kolot & Gerasymenko, 2022). Thus, e.g., «...building up strategic goals in recovery and defining its branch vectors are of top importance for Ukraine even today. One could include to branch vectors of recovery the transformation of economics structure by means of innovation renewal of industrial capabilities using organisational and economic factors implementation based on new information technologies in such branches as machine building and defence industry, steel, food, chemical, pharmaceutical, and timber industries, as

well as in new spheres of activities like bio- and nanotechnologies. To move along these vectors efficiently, state policy activities must be planned and implemented to create the rational structure of new industrial complexes in the regions, also including their relocation, renewal, and development of new logistic schemes and to build enterprises able to substitute destroyed production-sales chains...» (Deineko et al., 2022). Otherwise, «...comprehensive solution of social and labour issues requires, with no exaggeration, global, or to be more exact, neo global goal setting and mega views on how to achieve these goals. We have no doubt that the best social labour policy is the leveraged, highly professional and innovation oriented economic policy with such basic subsystems as socio-demographic, socio-labour, investment, technical and technological, innovation, financial and institutional, which could ideally become the components of Ukrainian «Marshall plan» (Zveryakov, 2022). Moreover, «...forming a new economic model as the basis of economy recovery must follow the way of new industrialization characterised by transition to principally new technics and technology. The inner interrelation between technical renewal of industry and economic development must become an immanent feature of post-war Ukraine market economy... New industrialization must begin with installation of such enterprises that could continue technological chain of raw materials production and easily substitute import. Added value in industrial branches is always sufficiently higher than in the ones of raw materials. This envisages new high technology jobs creation that will produce higher added value and provide the increase to population real income» (Kolot & Gerasymenko, 2022).

All this, undoubtedly constructive, research of scientists in higher educational establishments and scientific research institutes lack key formula that would lead Ukrainian society to achieve the necessary ultimate result effectively and systematically. For instance, very few remember the details of State Commission of Russia Electrification Plan (GOERLO) which was adopted in 1920, still the formula «...plus electrification of the whole country» remains in the memory of generations and boosted sufficient social and economic achievements. Therefore, it is important to formulate clear objective and necessary inputs in recovery and development of future Ukraine while gradually embracing all main links in economy, social sphere, and security. At the same time, conditions and opportunities should be created to optimize these efforts to develop modern knowledge-intensive, productive, and necessarily competitive production and, accordingly, decent living conditions for the country's citizens.

Ukraine's damage during the war makes billions of dollars but to a greater extent – 15-63% for various branches of industry – they are the results of existing infrastructure destruction (Tab. 1).

Table 1

Products export indexes in the years 2021-2022, USD million

Products	2021	2022	Loss, USD mln (%)
Food and agriculture industry	27708.9	23397.2	4311.7 (15.6)
Steel production industry	15991.0	6004.1	9986.9 (62.5)
Mineral	8414.4	4323.5	4090.9 (48.6)
Machine building	6107.5	4216.9	1890.6 (31.0)
Chemical	3919.8	1757.4	2162.4 (55.2)

Source: developed by the authors based on data from Ministry of Economy of Ukraine (2023).

Therefore, the future programme of overcoming war outcomes and recovery of Ukrainian national economy in the post-war period, and thus renovation of economic and social sphere, development of defence industry sufficient to provide national security, possibly with the need to restore of nuclear-weapon state, must be closely connected with infrastructure, along with the other components. On the other hand, the high level of infrastructure development in the country, comparable to the European one, is one of the most important precursors of Ukraine's economy successful entering European economic space and the entrance to EU.

Methodology

Studies on the restoration of the normal situation in the post-war period were conducted after a comprehensive and thorough analysis of approaches, the operation of all the main factors and mechanisms of implementation, and an assessment of the expected consequences of non-implementation of programs. They are grounded and focused on the future. Because, as you know, generals often tend to "prepare for the last war"¹. This quotation by Winston Churchill may be proven theoretically (Chipman, 1969), yet as well by real examples from history. Thus, during the time of USSR collapse, instead of choosing the way of Donbass alternative development with utmost restructuring of coal mining, ineffective in complicated subsurface conditions, it was decided to leave the situation without any essential change in the branch. The inconsistency caused by a number of considerations and the postponement of the decision on the Donbas issue

¹ Generals are always fighting the last war. Winston Churchill

to a more convenient moment (Styrykovych & Syniak, 1986), influenced negatively the further historical course, and proved to bring even more tragic outcomes.

It is paradoxical that even United Nations experts do not insist on defining the main components of the key strategy formula. However, it is mandatory for them to have a long-term (up to 50 years with a breakdown into five- to ten-year cycles) thinking in the categories of «great strategies and great undertakings», to identify the point of bifurcation, because its condition contributes to raising the level up, albeit with the risk of great danger to slide down (Steiner, 2010), and the probability of public disasters at the point of bifurcation determines the appropriateness and necessity of adopting deterrent or compensatory measures.

Summing up, it can be considered logical to continue the discussion of the post-war recovery of Ukraine based on the fact that it should be directly related to infrastructure and not just infrastructure, but infrastructure in the modern, broad interpretation of this concept. Consequently, this determined the further **goal** of the study, i.e. to prove that infrastructure development should be an important component of the formula for further state economy, social sphere, and security restoration strategy.

Research Results

The category of infrastructure in the meaning of roads, bridges, canals, ports, airports, and communication systems was introduced at the end of the 1930s, while in the 1950s the level of infrastructure development was used as the third factor of macrolevel production function, along with labour and capital (Prud'homme, 2004). Today economic infrastructure is a complex of branches and activities that serve production, and a state in general. While social infrastructure, in its turn, is the complex of branches and enterprises that provide normal functioning of population, including ones in industry, healthcare, pre-school, school, secondary and professional education, and so on. Also, the various types of infrastructure are differentiated, i.e. informational, military, innovation, market, space, touristic, etc. In general, national economy infrastructure is the complex of branches and activities creating the basis of national economy, simplifying, and making more efficient goods and services flow, as well as providing security to the state economy from outside threats. Therefore, any event in post-war development of Ukraine and preparation to entering the EU is at the end of the day the development of exact infrastructure types and, consequently, the further action strategy will result from prospective «infrastructural» development.

The definition of infrastructure is so refined that it is not always possible to differentiate infrastructural component. «If the world was ruled by logics, – as had

been stated in «The New York Times» just two days before the first Moon expedition, - one of honorary places on Cape Kennedy during Apollo-11 launch would be taken by Mykyta Khrushchov, USSR ex-President, and the former USSR Prime Minister and the first secretary of Soviet communist party...» (Schwartz, 1969). This passage was explained by the fact that in those times USSR defence industry to a certain extent became the infrastructure for the USA space industry development. The launch of the first soviet artificial satellite caused psychological condition in the USA which was called «sputnik crisis». John Kennedy, who followed Dwight Eisenhower as the US President, who was not the supporter of space race, increased the grade of opposition to the military one on the wave of «sputnik», which provided Werner von Braun, at that time American space construction engineer, with the outstanding investment and mobilization opportunities.

Another example, if to address soviet realia: historians still argue if the development of virgin soil in Kazakhstan was the individual strategic campaign or the cover operation to build cosmodrome, that is the element of space infrastructure.

It makes sense to subdivide infrastructure by two types from strategic point of view: those types that give economics the opportunity to earn funds, and those where it is viable or necessary to invest funds into. However in all cases, the infrastructure needs funds for its creation, taking into account the safety factor, and, if necessary, for modernization and development. For instance, according to one of the versions the centre of Europe is located near the Ukrainian village of Dilove near the town of Rakhiv, Zakarpatskyi region. Such geopolitical status provides Ukraine with the most important component to develop infrastructure required to convert the national economy into powerful logistic and energy operator (transitioner).

Gas transportation specialization of Ukraine is well known, however, at the times of the USSR the domestic fuel and energy complex was also of significant importance for the continental energy industry. There are three energy synchronous zones on the Eurasian continent. Union of the Coordination of Transmission of Electricity (UCTE) includes energy systems of 23 continental Europe countries that are part of UCTE. Since July 2003 till February 2022 the Western Energy System of Ukraine (the so called «Burshtynska thermal plant island») was working in a synchronized manner with UCTE. The Eastern synchronous zone, OCTE, includes the countries of CIS (Commonwealth of Independent States) (excluding Turkmenistan and Armenia, energy systems of which function in parallel with Iranian one) and Baltic countries (Lithuania, Latvia, Estonia). The Northern system (NORDEL) joins the energy systems of Northern Europe countries, i.e. Sweden, Norway, Finland, and the western part of Denmark.

These unions were developing independently from one another, though the links were being grown with time. The conference «Prospects of unification of energy systems «East-West»» in 2009 proved that there are no unsolvable technical

and institutionally legal obstacles to create pan-European energy markets with the possibility to create the largest energy space in the whole world with indicated power over 860 GW, which includes 12 time zones, 37 countries and about 900 million energy users. The united Eurasian space is the opportunity to increase the energy provision reliability throughout the territory along with the expanding of energy market borders and possibilities. However, it is exactly Ukrainian high tension electricity transmission ETL -750 and ETL-400, which are not active now, were to act as integrators of united Euro-Asian network and to be its transit corridor, and Poland, which is peripheric in the UCTE zone now, should have turned into the capital of common energy zone (Amosha & Kotliarenko, 2009). Unfortunately, both military and political situation in Ukraine and Europe makes implementation of pan-European energy space so far impossible. Nevertheless, the synchronizing of Ukrainian and European energy networks already took place, with the prospective creation of competitive and transparent electric energy market according to the requirements of European legislation and market practices (Cherevatskyi & Volchyn, 2022).

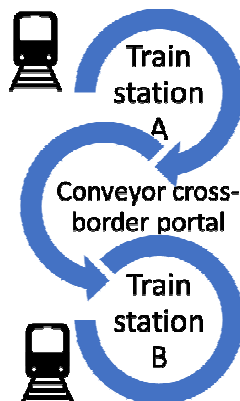
The use of non-working mines capacities could also be perspective for energy accumulation, the creation of international energy hubs in the mining regions of Ukraine and Poland. Such energy hubs based on closed Ukrainian and Polish mines could be useful if transferred into energy storages of gravitation type peak power plants with storages compressed air or condensed water. Thus, they could become components of Europe continental energy system. Concurrently, it would be a vivid example of resolving complicated issue of mono profile old industrial regions transformation. As neither Ukrainian, nor Polish economy are able to independently perform an active development of energy storages in mining regions, what is required is international consortia in investment, the design of construction and use of energy hubs in the areas where those deep mines are located.

According to Elon Musk version, 5 out of 11 branches of the fastest transport landlines Hyperloop could go through the territory of Ukraine, three of which cross Kyiv: the first one joins China, Europe, and Canada, the second one joins Asia, Middle East, Europe, and Northern Africa, while the third one is between Spain and China. It will be possible to get to India from Kryvyi Rih or Dnipro or to America from Kharkiv, Donetsk or Odesa.

Ukraine can and should seriously declare itself as a participant of the New Silk Road project, which requires a transparent and efficient customs clearance mechanism, a high-quality system of railway and road highways – the scale of Chinese investments in the implementation of the strategy can amount to several trillion dollars (Amosha, 2018).

It's significant that now discussions are being held on creation of conceptually new high-capacity cross-border portals in the area of Ukraine-EU border crossing (Fig. 1) with conveyor belts lines (Korpak & Alant, 2022).

Figure 1

Conveyor Cross-border Portal Scheme

Source: developed by authors.

The issue is that the Azov and Black Sea ports blockade has almost undermined national export, when 70% of cargo carriage was performed by water. There are huge queues of rail wagons loaded with grain, iron ore, and steel products that are agglomerated at western border crossing points. Under current conditions, the issue could be resolved by using cross-border transport inserts between two national railway systems, as well as automated terminals of border and customs services for freight flow.

Solution could be found in installing conveyor transport systems, e.g. with belt working body, from both sides of national border (e.g., between Rava Russka in Lviv region (Ukraine) and Polish town of Tomaszow-Lubelskie) at 32 km from one another. Such type of mutual project, i.e. European Logistics Operator was analysed and calculated through by experts from Austria and Finland and was discussed in Industry Economy Institute of Ukraine Academy of Sciences. After that, in November 2022, it was presented by the company GreenCert at Nobel Sustainability Trust, NST competition in Paris, where it was awarded a prize. NST was created in Zurich, the Swiss Confederation, in 2007 by the members of the Nobel family, Michael, Peter, Erik, Johann and Stefania.

According to the experts' calculation, the estimated investment volume to install conveyors and relevant infrastructure is circa 90 million Euro, with duration within the term of 530 days. This project is of a demonstrational character. Ukraine borders on other countries, e.g. Romania, thus the route from the town of Sotolvino could be not less viable. Such cross-border cargo transportation portals

are one-and-only models in world practices, even though the history of conveyor belts is long enough, and includes conveyors transporting bulk cargo to the distance of up to 100 km. The issue lies even in the fact that conveyor transport in Ukraine does not have the legal status of international transportation. It's advisable to create a task force that would include technology experts, economics, and legal specialists from interested countries to implement the pilot project of cross-border portal. Industry Economy Institute of Ukraine Academy of Sciences in co-authorship with foreign partners have already presented the concept proposals on portal project to the bodies of authority.

Notwithstanding the importance of transition infrastructure to Ukraine, it's irrational to underestimate the role of innovative infrastructure. According to Ukrainian Law «On Innovative Activity», innovation infrastructure is a complex of enterprises, organisations, institutions and their unities, associations of any form of property that give services in the provision of innovative activities (financial, consulting, marketing, information, and communication, legal, educational, etc). Besides, innovation ecosystems are created and developed in localization space where material, production, information, and labour resources are concentrated, and that allow develop and use innovative solutions, and every economy branch has specific traits of economic activities performing and innovative activity types (Soldak, 2020).

Although, under the environment of current industrial revolution this needs more detailed description. Old industrial regions of Ukraine (Dnipropetrovska, Donetsk, Luhanska and Zaporizka regions) are still not using the research potential to the full range. On the background of almost 82% of low marginal steel export, the ratio of investments into highly and medium technological branches of Donetsk oblast makes only 5,4% against 9,7% in Ukraine in general (Pidorycheva, 2020). If one considers startup as a sign and the fastest factor of innovation development, then the distribution of projects through the regions is significantly non-homogeneous: the largest number of them is registered in Kyivska region (almost 58% or 154 units), there's only one startup in Donetsk region (Wattagio), with also two in Dnipropetrovska and one in Zaporizka and Kyrovohradska regions each. Even though, according to the data of Startup Ranking service, Ukraine takes 42nd place among 192 world countries as for the number of startups (266 units) (Startup Ranking, n.d.). The most progressive Ukrainian startup sector is technology: the record breaking 544 million USD of venture investments were mobilized to this sector, the sum total of investments into Ukrainian technological companies within the period of 2014-2019 makes 1400 million USD (Sysoyev et al., 2020), which makes Ukraine one of the most attractive countries in Eastern and Central Europe for investment.

This limited number of startups in old industrial regions makes surprised those people, for example, who have very long driving experience and still remember the traditions of old Soviet "garage culture» that compensated the poor access to brand automobile service stations by the work of handy people. These craftsmen

who sprang from the school extracurricular activities of technical creativity or engineering construction groups at Pioneer Clubs or military and sports preparation associations did magic of creativity and wisdom. Based on this, the knowledge about the so-called Maker Movement in the USA gives the idea of modern examples of innovation: tech-shops have already appeared in California, Michigan and North Carolina, the movement of personal production FabLab has also increased. Tech-shop is a workshop, a shop, and a club at the same time. (Anderson, 2012). The owners of these establishments offer to their subscribers the access to various new generation industrial equipment with the overall cost of several million USD, including automatically programmed mills and tools, laser knives, etc., for a decent monthly payment. There is a movement of industrial labs called Hacklab where people produce not only for themselves but also according to the large companies' orders. In other words, a new class of industrial freelancers is emerging.

Within the scale of global state 3D-entrepreneurship is able to make such a giant leap of economic effectiveness based on additive production and owing to reducing of material quantity, good energy capacity, and energy and logistics spending and elimination, which was impossible to imagine even at the times of previous industrial revolutions (Cherevatskyi, 2017). For example, WhatsApp messenger that is now used by over one billion of people all over the world and was sold to Facebook for 22 billion USD in 2014 was created by Mr. Ian Borysovych Kum who was born in Ukraine (now American citizen).

It has been for dozens of years when the waste of production accumulated in old industrial regions – there are over 190 million tons of coal mining waste and remains, there are gob piles consisting of billions of dead rock metric tons floater from coal mines, slag dumps and other type of advanced reusable raw materials. A lot has already been said about its possible use. Apart from industrial waste, a lot of debris from buildings destroyed by belligerent activities have appeared. The demolition of only one five-storey building results in 3000 cubic meters of waste. Therefore, the use of waste must embrace all these objects, both industrial and civilian ones, everything, that is not used any longer. This approach received a name «bricolage». Apart from sufficient economic results, it can also add up to significant social effect (Soldak, 2021). Additionally, this should be, as the other above-mentioned projects, referred to separate, not less important infrastructural programmes of recovery and development.

The world is loaded with funds during the epoch of industrial revolutions. The owners take funds from old branches and try to use capital in a more profitable way. Innovation infrastructure, like transport and energy ones, should become a way to use this financial flow. It concerns funds investment into industry development infrastructure and through it into society in general, to increase labour efficiency, its intellectual level creation of decent conditions and security and by this increasing the life quality of people at enterprises. The issues of environment protection, the rational use of natural and, which is of utter importance, secondary resources will be resolved more efficiently.

The Ways of Social Infrastructure Development

There are ways of obtaining definite social results that impact people's life in non-production infrastructure. The ideas expressed by the specialists of the Institute of Demography and Life Quality, National Academy of Science of Ukraine and other Institutes of National Academy of Science of Ukraine boost to offer development of such specific types of this social infrastructure.

For example, the complex approach to achieving financial self-sustainability of families with children requires the services uniting employment and parenting, which would provide affordable and high-quality system of pre-school institutions, and individual childcare services. The growth of orphans' number requires the establishment of institutions that will bring up orphans in families or in environment close to family, implementation of the mechanisms to define (and search) children who lost their parents as a result of military activities, lost children, or families in hardship, etc. It's important to adjust support mechanisms for all forms of upbringing children with no parents – foster families, patronage families, family type orphanages, guardians' families, or national fostering.

The special type of infrastructure should be ageing people support with promotion of active longevity, which envisages efforts to increase ability of keeping good health condition and social integration for elderly people. This must include the development of respect (better since the very early age) to one of the basic values in people's life, that is health. Simultaneously, public awareness would be of importance, based on the example of an active elderly people that care about sticking to healthy lifestyle since childhood, as well as vivid examples of not following healthy lifestyle adverse effects, awareness of negative results of unhealthy lifestyle, the vivid examples and demonstration of difference in health condition depending on attitude to preserving health in previous years of life. It's enough to refer to the practices (including international one) of elderly people everyday life arrangements, e.g. in related care institutions, which can help these people to get involved in moderate activity they are able to perform.

Even the need in rapid increase of life expectancy, especially among men requires its infrastructural support, e.g. in high quality treatment and nutrition at workplace (with employers' involvement to provide one), labour conditions control with better and healthier practices, physical activities if a person has a job with sedentary lifestyle, support, if needed, to working flexitime or distantly, etc. One should not forget about high quality and sufficient nutrition of people as an important component of the state food, recurrent medical checkups, and preventive healthcare.

In addition, the decrease of immigration expenses is impossible without relevant infrastructure which has to keep contacts with compatriots abroad (labour, educational, cultural, financial, legal), support and develop their feelings of

being Ukrainians, their love to their Motherland, as well as «small» Motherland. Principal impossibility to ban migration causes the necessity to create mechanisms of preventing migration being one-way with no return by using potential positive effect, e.g. increase of Ukrainian labour potential by using new skills and knowledge of migrants, who returned back, as well as involving migrants' funds not only to keep their families but for investments into economy.

Now the infrastructure is required to create workplaces for internally displaced population (IDPs) and integrate them to its maximum within the territories of their temporary residence, as well as creation of their associations and representative bodies to circulate IDPs positive experience of employment and integration at a new place, and, with higher qualified IDPs, it is vital to use it to increase hosting employers' efficiency.

The lack of qualified workforce, which Ukraine economy will definitely face in post-war recovery and development period, will require infrastructure of foreign workforce involvement based on the principles of substitutional migration. It could be rational, for example, to establish the service of foreign students' recruitment during their studies or after they successfully graduate from educational establishments in Ukraine to maximally integrate them as long-term migrants into Ukrainian society.

There is a reason to have a new and more demanding approach to professional education of vocational jobs workers based on existing technical higher educational and vocational establishments, including would-be students, to stimulate their choosing engineering professions. Besides, practical training is required to educate people to get professional positions they are going to obtain after higher educational establishment graduation. To do so, universities must have closer contacts with enterprises and production businesses that are virtually the ones searching for young specialists. Moreover, the experience of some technical universities as for apprenticeship of their students in production is worth attention.

Furthermore, attention must be increased to scientific activity, research organisation and funding according to Ukrainian legislation with taking into consideration of previous national and international experience. Special emphasis should be made on human resources policy in science effectiveness improvement. For instance, academic degrees awarding might be put in order based on where the academic degree candidate works full-time.

Thus, current two-level order of academic degrees award – «candydat nauk» (candidate of science) and «doctor nauk» (Doctor of science) could be preserved in classical scientific institutions, individual scientific branches, and universities. This would be comfortable considering longstanding tradition, this practice exists in other countries, e.g., Doctor and Habilitated Doctor in the United Kingdom and Poland.

Continuation of awarding scientific educational degree that has been recently introduced by Ukrainian Ministry of Education, i.e. PhD (Philosophy Doctor, PHD in Education is as well possible) is logical for universities and other educational establishments, however, it should be done with obtaining their degree in higher educational establishment with the emphasis upon scientific economic and organisational issues of educational process, using scientific results in education, etc. Educators, if they wish, could be awarded with degrees of «candydat nauk» and «doctor nauk» according to the results of their theses defence in scientific establishments and requirements to these academic degrees. Besides, PhD degree can be awarded to scientists, and the ones aspiring doctoral degree that work in scientific institutions, which take part in educational process and design their thesis according to requirements. This way could be used for scientists doing doctoral degree whom apart from having their thesis according to the requirements to PhD degree got positive grade in educational disciplines and are preparing to work in scientific educational establishments affiliated to educational and scientific institutions.

It is worth practicing awarding MBA to successful industrial or managerial employees with their doing thesis /qualification projects in scientific or higher educational establishments, as it could be stimulating evaluation of scientific approaches use and development in production practices by the one aspiring to get a degree.

Increasing Development Security

As experience of dozens of years of Ukrainian history and current situation has shown, the crucial significance for population and the state security among various external threat prevention means is the existence of sufficient industrial-military complex with the capabilities of providing defence in the time of war and being potentially ready for it in the times of peace. However, considering requirements of industrial-military complex investigation, it is not included into this research rationale. Therefore, the further attention will be paid to the organization of civil protection, which would have to, on the one hand, prevent regular internal threats of industrial character, natural disasters, and other causes that could drive attention of occupational safety and security services. In peaceful times it is sufficiently controlled by the state bodies of occupational security, affiliated from Ukraine State Service in Labour Issues, and by trade unions of enterprises and industrial branches. Nevertheless, during war these threats could be intentionally initiated from outside and therefore must be in the focus of attention not only for occupational safety and security services, but for general civil protection services in the country in the state of war.

On the other hand, implementation of such general civil protection must include well-known structures of civil defence and fire safety from internal and external threats. These bodies of civil protection need additional persistent special attention of state power structures both at the central and regional level, at the enterprises and organisations. This is required to utterly change the population attitude to discipline at work and during production as well as to increase employees' responsibility in this sphere for the condition of permanent use of fundamental buildings, other means of collective and individual protection and their use when necessary (not formal lists «on paper» as one often encounters).

To avoid any display of formal approach to civil protection and to responsibility for decent life conditions provision to population, it is required to make a pivotal rise of the authority and responsibility of both state power per se and the employees of this protection sphere. There are all grounds to believe that it can be done by clear verticalization of effective power in the civil protection system, which would enjoy the same authorities as regular power, with transparent elections, post nominations and agreement, re-election after a certain period by the enterprise team or communities, relevant qualifications and experience in management, human and other type of resources, regular reporting, etc. The expediency of this system offered for implementation of civil protection management in Ukraine is proved by international experience, in particular, in Sweden. It would be effective to coordinate, or unite for a certain period of time, all functioning forms of civil protection, industrial and residential objects, infrastructure, possibly even, into the common civil protection system.

After the implementation of the aforementioned primary tasks on civil protection bodies work improvement, it is required to move to strategic issues of long-term conditions of post-war economy, infrastructure and population life-sustaining activities recovery and development. To achieve this goal, the next steps are required: to increase the role of science in raising state security, to use international experience of conflicts resolution between neighbouring countries to the uttermost, to make integration processes in which Ukraine takes place more profound. This must become the rationale for further inter-disciplinary research of scientists and specialists in infrastructure.

Conclusions

The analysis of publications and practical situation gave the chance to realise that strategic studies of post-war Ukraine recovery lack to a certain degree an important formula constituent that would give more impression not only about essence but also about the ultimate result of the programme product. This insufficient awareness of Ukrainian society as per the choice of strategic development way leads to a certain unclearness of priorities.

Nowadays there are every possible ground considering infrastructure to be one of the basic constituents for the formula of further state national economy recovery, its social sphere and security development. Consequently, one of strategic slogan for post-war recovery of our state must be «Future Ukraine is at the first place of the infrastructure of life, production and security at the European level».

Considering the importance of infrastructure, its nomenclature is worth preparation in its every type and in all three directions, and development of activities to normalise according to requirements, and, with time, possibly, correlation of achievement with world practices, and continuation of applied research as per needs.

Infrastructure development must correspond to the state development socio-economic dynamics and reliable national security requirements, be systematic, well-balanced in all types and directions, scientifically grounded in time and space, with the use of its best practices and ways to the uttermost. In addition, the need of Ukraine's participation in international migration processes and further establishment of the countries subjectivity in European peace-making process must be taken into consideration.

Infrastructure programmes development could be performed by a task force involving the representatives of central and regional state power, specialists, and scientists, including the ones from National Science Academy of Ukraine under the leadership of the relevant Minister, and, while considering various directions, under the lead of the Vice Prime Minister according to their authorities. To make these programmes operational, they must have funds invested and include exact projects, international ones as well; term of completion must be fixed and achievable; definite bodies, enterprises and organizations must be made responsible. After broad discussion within the society, accumulation of proposals and their systematizing, the programmes must be revised and approved at the level of relevant ministries and Cabinet of Ministers of Ukraine.

Effective control by the Cabinet of Ministers over programmes implementation (e.g., once in a quarter) would promote successful recovery and development of infrastructure. It is also required to get timely information from National Security and Defence Council of Ukraine and the country leadership on the implementation flow and possible issues. Society should be regularly informed about programmes implementation results, it must be used not only to achieve main economic goals and to resolve current and strategic development issues, but also to evaluate performance of programmes implementors, while promoting them to higher and elected positions.

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