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INFRASTRUCTURE DETERMINANTS OF SOCIAL VULNERABILITY OF THE POPULATION

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Abstract. Improving the research methodology and practice of regulating the social vulnerability of the population requires more attention to infrastructural impacts. Conceptualization of the infrastructural determinants provisions of social vulnerability presupposes a scientific substantiation of the role in creating favourable social conditions and ensuring the resilience of the social system to risks. Infrastructure determinants are an indicator of economic development, a factor in minimizing the vulnerability of the population due to risks, and at the same time, they are a basic condition for creating opportunities for development and self-realization in a modern society of opportunities. When analyzing the impact of infrastructure on the social vulnerability of the population, one should take into account the problematic nature of infrastructure dependence and load. The deepening of interstate divergence in terms of the level of infrastructure development actualizes the priority directions of its development and modernization in the context of reducing the social vulnerability of the population. Initial attention should be given to the critical infrastructure in terms of ensuring the sustainability of the facilities. Information and analytical approaches to the integral assessment of the quality of infrastructure in connection with social processes need to be revised with the introduction of a unified method at the international level. Interstate divergence in infrastructure development has been revealed in the context of competitiveness, social protection, and adaptation potential assessments, which exacerbates inequality in access to infrastructure and social benefits. Six key areas of infrastructure impact regulation have been identified: strategic and managerial, information and analytical, security, modernization, innovation, and protection. It is argued that consideration of infrastructure determinants should form the basis for the unification of methodologies for assessing social vulnerability at the international level. It has been proven that infrastructure can both reduce social vulnerability and exacerbate it in the event of inaccessibility, degradation, or inefficient functioning. The proposed conclusions and classifications form the basis for the development of adaptive social protection strategies for the population in the context of the multifactorial risk-prone nature of the modern world.

Keywords*:* Infrastructure, Resilience, Social System, Risks, Regulation of Social Vulnerability, Infrastructure Dependence, Infrastructure Load.

JEL Classification: H53, I38

1. INTRODUCTION

The research of social vulnerability is of high practical importance. This is a complex category that allows to determine a wide range of risks and threats to human life and society, their ability to

withstand destructive influences. Regulation of social vulnerability of the population based on the functioning of resilient social systems. Justification of their formation priorities requires clarification of the determinant of social vulnerability. Their list is significant, and in the context of the risks of a COVID-19 pandemic, it characterized by an even more complex nature with crosscutting interactions.

The complexity of the determinants of social vulnerability determines various areas of its research – natural (impact of natural-technogenic, climatic conditions and disasters on the population vulnerability), ecological (impact of environmental changes on natural systems and, as a result, on the population), economic and legal (impact of opportunities for implementation access rights to available resources), socio-demographic (influence of characteristics of age, sex, health status, etc.), spatial (specific conditions of different settlement types), socio-economic (influence of social conditions on the population vulnerability), managerial (strategic planning and regulation of vulnerability).

2. THEORETICAL BACKGROUND

The concept of social vulnerability is developing in an interdisciplinary way. Empirical results dominate in research, accompanied by conceptualization of the causes and consequences of vulnerability. Theoretical studies deepen the methodology that needs constant development, and practical conclusions aimed at determining priorities, measures, mechanisms for reducing social vulnerability for different countries, types of settlements, socio-demographic groups, etc. The causes of social vulnerability considered usually through the prism risks. However, as K. Bergstrand, B. Mayer, B. Brumback, Y. Zhang (USA) (2015) noted, in the regulation of vulnerability it is important to take into account social conditions and the level of infrastructure development to understand the potential losses due to risks. S. Spielman, J. Tuccillo, D.K. Folch (USA) (2020) argues that social vulnerability reveals socio-economic differences in experience and recovery from hazards through a combination of social, cultural, economic, political and institutional processes. Such conclusions confirm the importance of infrastructural determinants of social vulnerability of the population.

The impact of infrastructure on social vulnerability remains a scientific issue for every society. Updating the infrastructural determinants of social vulnerability of the population was carried out in the works of S. Cutter (USA), Sh.V. Linn (USA), B. Boruff (Australia) (2003), among the factors of vulnerability due to environmental threats, the type and density of infrastructure, the state of rescue networks and housing stock.

I.M. Karaye and J.A. Horney (USA) (2020) considers vulnerability as an increased risk due to lack of access to quality infrastructure and services.

E. Climent-Gil (Spain), A. Aledo (Spain), A. Vallejos-Romero (Chile) (2018) raise the issues of increasing social vulnerability due to the implementation of large infrastructure projects.

In addition, the impact of infrastructure on the social vulnerability of the population requires determining the vulnerability of the infrastructure facilities themselves to the impact of natural and manufactured risks. At the same time, the vulnerability of infrastructure should be considered in relation to the vulnerability of communities that have benefited from the infrastructure, as evidenced by R. Palliyaguru (Sri Lanka), D. Amaratunga (Great Britain), R.P. Haigh (Great Britain) (2010).

The studies carried out require development, conceptualization of the infrastructural determinants of social vulnerability and the identification of priority directions for its reduction due to the development and modernization of infrastructure. Infrastructure determinants identify the resilience of the system (society, economy) of risks, while social vulnerability characterizes the system as a whole, including those features that can weaken its resilience in crisis conditions.

The aim of the article is to deepen the theoretical and applied research foundations of social vulnerability of the population through the prism of increasing the infrastructural determinants importance. The modern world, developing according to the ideology of a society of opportunities, needs infrastructure support that can create favourable basic conditions for human life, his development

and self-realization.

3. RESEARCH OBJECTIVE, METHODOLOGY AND DATA

The most developed methodology is studying social vulnerability in the context of natural determinants. At the same time, the high dynamics of progress in developed countries, while maintaining global social inequality, increases the relevance of the socio-economic problems of scientific research on social vulnerability, including the analysis of infrastructural determinants.

This study combines the methods of theoretical generalization, analysis, synthesis, systematization to determine the main provisions of the influence of infrastructure on the social vulnerability of the population, highlight approaches to its classification, topical problem areas of regulation.

The research is of a theoretical and applied nature, however, for a comprehensive understanding of the infrastructural determinants of social vulnerability of the population, it takes into account the methods of its assessment.

Assessment of social vulnerability with the support of the authorities is practiced in the United States, where since 2000 the method based on the developments of S. Cutter, B. Boruff, W. Shirley (2003) has been periodically improved. Infrastructure indicators are taken into account when assessing vulnerability using the SoVI 2010-14 method. They include the population provision with hospital facilities (hospitals per capita), the housing affordability (the share of households spending more than 40% of their income on housing costs, the share of tenants, the average cost of housing, the average gross rent, the share of mobile homes, the share of unoccupied dwellings). In the SoVI method of 2000, the indicator of housing density was taken into account, but later it was rejected (Hazards & Vulnerability Research Institute, 2021).

In the United States, a method for assessing social vulnerability with an emphasis on the relationship between public health and environmental influences is also widespread – the CDC/ASTDR SVI 2018 method of The Geospatial Research, Analysis, and Services Program (GRASP) (Centers for Disease Control and Prevention. Agency for Toxic Substances and Disease Registry, 2020).

In European countries, an integral assessment of social vulnerability is not carried out with the coordination of authorities, although the statistical analysis of social processes is quite deep. One of the illustrative studies of the social vulnerability specifics of the population in Europe is the work of C. Ranci (Italy), where the scientist analyzes a number of indicators of the income level, housing conditions, employment, provision of care for disabled persons, family structure, characteristics of the transition to an independent life, etc. That is, of the infrastructural determinants, the main attention was paid to the improvement of housing (Ranci, 2009).

The natural riskiness of social vulnerability in Europe, the United States and other countries is assessed, as a rule, due to the mapping of threats of specific natural disasters – earthquakes, floods, landslides, etc. This takes into account indicators of age, health status of the population and access to medical services, income, property, language proficiency, mobility, social media, crime, insurance, physical access to roads, level of urbanization, etc. (Breil et al., 2018). Such indicators determine the resilience of public systems to natural risks and the specifics of reducing social vulnerability in priority areas.

Methodical tools for assessing social vulnerability, including taking into account the infrastructure component, scientists have formed in various studies. In particular, I.S. Holand (Norway), J.K. Röd (Norway), P. Lujala (Finland) in the method of assessing social vulnerability attributed indicators of housing to the socio-economic component, and indicators of distance to the nearest hospital, population density and development, age of residential buildings and their improvement, road network (Holand et al., 2011).

D.B. Karakoc, K. Barker, C. Zobel, Y. Almoghathawi (USA) (2020) propose a method for assessing social vulnerability and resilience of the population (community) in the context of critical infrastructure

development.

A. Dwyer, C. Zoppou, O. Nielsen, S. Day, S. Roberts (Australia) (2004) point to the advantages of assessing the risk of natural hazards for determining the social vulnerability of the population. Scientists propose a method for assessing vulnerability at the household level, where they take into account the type of residence and stay (the density of infrastructure of different types of settlements, in particular urban ones, can increase the risk of natural hazards), car ownership, insurance indicators (medical, housing); community-level vulnerability assessment takes into account access to health and social services, support services, welfare; the country level takes into account the amount of funding through special government and charitable foundations.

To improve the method for assessing social vulnerability and it's spread in different countries (in particular in Ukraine), it is important to substantiate the weight of infrastructural determinants. In this context, it is relevant to deepen theoretical and applied provisions regarding the infrastructural determinants of social vulnerability of the population with further improvement of methodical approaches to its assessment.

4. RESULTS AND DISCUSSION

Social vulnerability in its content characterizes the degree of development of the problem of self-satisfaction of needs and realization of the rights of the population due to limited resources or falling into especially difficult social conditions.

It follows from this definition that the infrastructural determinants of social vulnerability of the population should be considered through the prism of social conditions.

The social conditions of the population's vulnerability are the result of the use of natural and human resources in reproduction processes with the corresponding institutional (government, business, community), infrastructure and market environment, which determines the ability of the social system to be resilient to risks (Pylypiv et al., 2020).

The main indicators of the social conditions of the vulnerability of the population are the parameters of economic development in relation to the level of income of the population, its employment, as well as the development of infrastructure (Fig. 1).

Infrastructure determinants of social vulnerability reveal the state and quality of infrastructure facilities that determine the resilience of a public system to the impact of risks.

Infrastructural determinants of social vulnerability of the population acquire the highest importance in conceptual and applied aspects:

- in the conceptual sense, infrastructural determinants expand the understanding of social vulnerability. On the one hand, they are a secondary (consequence) indicator of economic development and a factor in minimizing vulnerability due to risks for the entire population. On the other hand, they are a basic condition for creating opportunities for development and self-realization in a modern society of opportunities; - in practice, taking into account the infrastructural determinants of vulnerability emphasize a proactive approach to its regulation (reduction). Inaction is also a cause of increased social vulnerability.

The research of infrastructural determinants of social vulnerability can be carried out according to different approaches:

- institutional and functional – by defining a list of infrastructure facilities and specifying their functionality;

- economic – by defining the role and importance of infrastructure in the economy (infrastructure objects form the spheres of the economy);

- social – by defining the role of infrastructure for the population and meeting its needs;

- qualitative – by assessing the quality of infrastructure facilities and their services in the context of economic development and meeting the needs of the population;

- ecological and social – by optimizing the development of infrastructure, the needs of the population and the restoration of ecosystems.

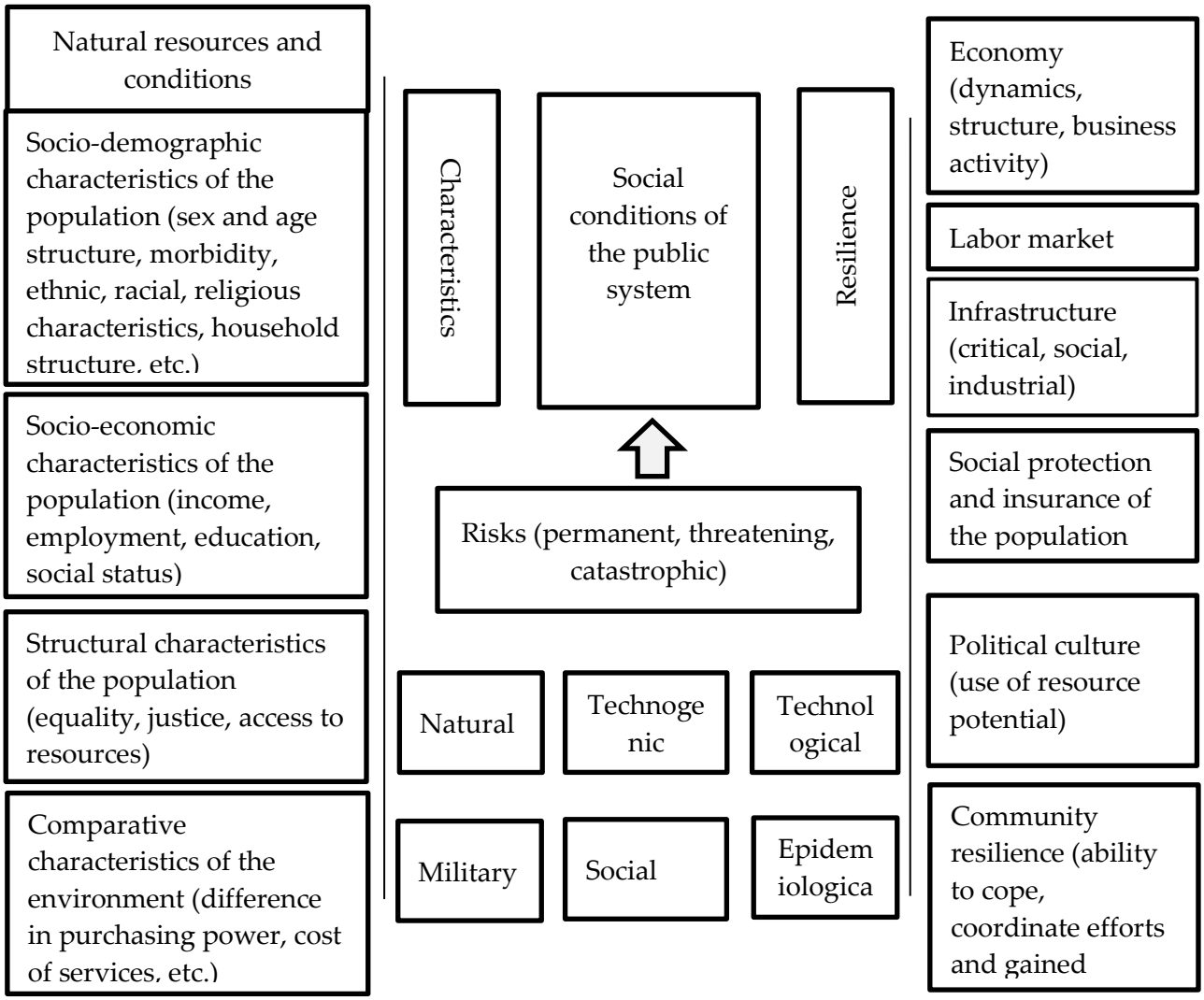

Fig. 1. The nature of the social vulnerability formation of the public system
Source: author's development

These and other approaches confirm the wide range of problems in the study of infrastructural determinants of social vulnerability of the population, each of which requires specific methodological support.

A variety of approaches to the study of infrastructural determinants is proved by the classification of infrastructure, which concretizes the object of research:

a) depending on the subject orientation in meeting needs (Hrynchyshyn et al., 2019):

- infrastructure focused on meeting the needs of the population – reproduction, personal development, mobility, security, welfare, recreation, recreation, communications;
- infrastructure focused on meeting the needs of business – ensuring activities, development, differentiation, logistics, stability, profit, corporate culture, intersectoral cooperation;
- infrastructure focused on meeting the needs of the authorities – maintaining the demographic potential, territorial development, resource mobility, constancy, economic development, quality of life, inter-institutional interaction;

b) depending on the functional purpose:

- critical (physical) infrastructure – includes objects necessary for the life and safety of society (road networks, power grids, gas supply, sewerage and waste disposal systems);
- social infrastructure – includes objects focused on meeting the needs of the population (first of all),

as well as business and government;

- industrial infrastructure – includes facilities that are mandatory for economic processes;

c) depending on belonging to the economic sphere:

- social infrastructure (creating conditions for human reproduction and meeting his needs) – includes objects of housing and communal services, consumer services, trade, public catering, transport and communications;

- socio-cultural infrastructure (reproduction of spiritual, intellectual, physical properties of a person) – includes objects of education, health care, culture, sports, social services, employment, environmental protection;

d) depending on the form:

- real infrastructure;
- virtual infrastructure;
- hybrid infrastructure.

Consideration of infrastructure in the context of social vulnerability of the population actualizes the problems of its condition and quality of services with the clarification of infrastructure dependence and load.

Infrastructure dependence is considered in relation to:

- objects of critical infrastructure and the risk of its development on an interconnected basis (Laugé et al., 2015);

- population and business, which in conditions of infrastructural failures can suffer differently from the situation (this difference is especially evident for business entities, whose infrastructural dependence depends on the nature and scope of activity);

- states and authorities, which, in the context of geopolitical confrontations, in the absence of their own infrastructural facilities or elements of ensuring their functionality, may suffer from the situation in different ways.

Infrastructure dependence has a direct impact on the social vulnerability of the population in the face of risks caused by natural, technogenic or military reasons (critical infrastructure facilities are an attractive target for military and terrorist attacks).

The state and quality of infrastructure services depends on the load on them. Infrastructure load involves the determination of acceptable standards of capacity, throughput of facilities, as well as the volume of services provided by them, balancing production capacities and results, meeting the needs of the population, business and government, as well as the state and restoration of the environment.

Infrastructure load in the context of social vulnerability of the population determines the availability of services. For the conceptualization and regulation of social vulnerability from the standpoint of infrastructural determinants, a strong role is played by the type of settlement and the socio-demographic characteristics of its population (Tab. 1). One of the topical objects of modern scientific research of infrastructure is large metropolitan cities developing in conditions of high population density. The development of infrastructure facilities in conditions of increased demand does not always ensure the availability of quality services and gives rise to specific problems of vulnerability of society with different socio-demographic and socio-economic characteristics. In addition, an increase in the concentration of population, assets and infrastructure in combination with threats and hazards (natural, technological, technogenic) causes high damage in urban settlements, as S.A. Martin (USA) (2015).

At the same time, the feature of remote settlements polarizes the problem of social vulnerability of the population with difficult access to quality infrastructure services. This is especially important for infrastructure facilities, the services of which meet the basic needs of the population in medicine, landscaping, mobility with access to transport services.

Tab. 1

Specifics of infrastructure load for different types of settlements

Specifics	Large metropolitan cities	Settlements with transit function	Settlements with seasonal tourist and migratory attractiveness	Remote settlements
A common problem	Excessive load on infrastructure High cost of social infrastructure services	Negative impacts on the local population	Uneven load on infrastructure	Low quality or lack of services in conditions of low demand
Network of roads	Congestion and significant time spent on overcoming distances	Additional risks of transport safety	Excessive load in the season	Poor quality of coverage or lack of roads
Lodging	High cost of buying a home, ensuring its improvement and rent	Additional demand for temporary stay services and accompanying service	Excessive rent per season	Decline in the housing stock (increase in non-residential buildings)
Additional problems expressed	Social inequality according to the criterion of access to quality services in conditions of high demand	Unstable community environment	Language and cultural barriers to accessing services	Demographic losses in the conditions of underdeveloped infrastructure

Source: author's development

Destructive of the inter-settlement divergence of infrastructure development in the context of social vulnerability of the population is manifested in the creation of conditions for economic development. The developed infrastructure provides:

- formation of sufficient resource capabilities of the authorities in regulating the social vulnerability of the population (financing of expenditure programs of social protection);
- formation of a market environment with opportunities for human development and self-realization.

In the context of the mutual influence of the economy and infrastructure, the destructiveness of interstate divergence is manifested and, as a consequence, the differentiated social vulnerability of the population in different countries of the world.

The various levels of infrastructure development in relation to economic and human development are confirmed by numerous interstate ratings.

The most authoritative in this regard, the Global Competitiveness Index of the World Economic Forum, the key components of which include infrastructure. In the top 100 countries in terms of infrastructure quality, the leader of Singapore was rated at 95.4 points, Bolivia – 57.1 points in 2019 (Ukraine – 70.3 or 57 position) (Statista, 2020).

In the research of the Notre Dame Global Adaptation Initiative, which assesses the adaptation of countries to climate change, including in terms of infrastructure, the gaps between countries are significant: 0.085 for Norway as a leader – 0.741 for Guinea-Bissau as an outsider, which were estimated in 2019 (Ukraine – 0.293 or 50 position) (ND-GAIN, 2020).

In a special study by the OECD in 2020, when identifying the possibilities of countries for recovery

through a combination of expert and statistical assessments, infrastructure determinants were taken into account, which confirms their importance for overcoming risks and crisis conditions. In particular, the infrastructure was taken into account: accelerating the energy transition and expanding access to electricity and information and communication technologies; care for children and the elderly, provision of medical services. At the same time, significant gaps were identified from the countries assessed: 78.47 (Finland) – 42.84 (Russia) to accelerate the energy transition; 75.87 (Sweden) – 24.73 (Greece) for care infrastructure (Ukraine not assessed) (The Global Competitiveness Report, 2020).

Among other integral assessments of infrastructure, confirming its interstate divergence, one should mention the initiative of independent consulting companies "Mesopartner" (Germany) and Analyticar (Argentina) – the GQII Program (The Global Quality Infrastructure Index) for research and dissemination of data on quality infrastructure. According to their estimates, the leading country Germany received 99.5 points, and the outsider East Timor – only 27.0 out of 184 countries that were evaluated in 2020 (Ukraine – 87.9 or 32nd position) (GQII 2020, 2020).

Interstate divergence in the level of social vulnerability, including due to infrastructural determinants, is confirmed by the results of ILO research on social protection, which includes access to health care and income security in case of unemployment, disability, old age, etc. The ILO analyzes these problems and reports that in the world only 47% of the population has access to social protection services, less than 66% – to health care services (International Labour Organization, 2020). The global results are still satisfactory, since social protection is a basic condition for reducing the vulnerability of the population on a permanent basis, which is exacerbated by risks.

Certain ILO assessments should be expanded taking into account the infrastructure component, in particular, the services of facilities that meet the needs of the population at the basic level. Access to social infrastructure should be a key indicator of individual overcoming vulnerability in a modern society of opportunity.

The diversity of understanding and assessment of the infrastructural determinants of social vulnerability of the population requires a scientific substantiation of the priorities of regulation. Determination of the relevant directions for the development of infrastructure in the context of reducing the social vulnerability of the population should be carried out with a combination of international standards and adaptation according to national and territorial specifics.

Taking into account the conceptualization of the provisions of the infrastructural determinants of social vulnerability and approaches to its assessment, the priority areas of infrastructure development should be:

1) strategically managerial direction:

- international agreement on a set of standards for infrastructural support of basic human needs in the context of ensuring his security and society's resilience to risks;
- territorial differentiation of infrastructure development strategizing in the context of the impact on the social vulnerability of the population, in particular in the context of different types of settlements and their natural, socio-demographic, socio-economic, etc. features (see Fig. 1);
- development of infrastructure in order to facilitate the recovery of the economy and population with the priority of supporting facilities that provide services to children and the elderly, ensure accessibility to benefits and innovations (relevance of the World Economic Forum);
- strengthening the participation of communities in the construction of infrastructure facilities, in particular through participation in the distribution of funds from local (public) budgets (this practice began to actively spread in Ukraine after 2014 and is one of the positive examples of the success of the implementation of the decentralization reform);
- strengthening program-targeted financing of activities (including the experience of Australia in the implementation of a package of programs to mitigate the consequences of natural disasters);

2) information and analytical direction:

- development of an international methodology for assessing the social vulnerability of the

population, primarily based on assessing the risk of natural hazards (SoVI (Social Vulnerability Index, 2015), methodology of the team of authors A. Dwyer (2004);

- inclusion of infrastructure indicators in the assessment of social vulnerability of the population in terms of determining the norms of loading and the distance to the subjects of the provision of services;

- popularization of various assessments of infrastructure, including with the participation of research and innovation structures. For instance, the CoST (Infrastructure Transparency Initiative) study, which cooperates with different countries and conducts research on the transparency of infrastructure projects (in 2021, corresponding research was initiated in Ukraine);

3) security direction:

- ensuring the resilience of critical infrastructure networks, taking into account their interdependence and the definition of measures of critical components (component importance measures – CIMs (Karakoc et al., 2020));

- ensuring the organizational sustainability of critical infrastructure subjects (assessment method of New Zealand scientists Ch. Brown, E. Seville, J. Vargo (2017);

- determination of minimum standards for supply in situations of serious failure of critical infrastructure (Garschagen, 2019);

- introduction of mechanisms of disaster relief and recovery adapted to the territorial characteristics (based on the US practice – The Natural Disaster Relief and Recovery Arrangements (NDRRA));

- strengthening measures to counter cyber attacks (cyberwarfare) on critical infrastructure facilities;

- formation of infrastructure "reserves" in case of force majeure calls. For example, the challenges of the COVID-19 pandemic have necessitated an increase in the number of beds in healthcare institutions);

- development of plans for the restoration of infrastructure, including with communication and psychological support of the population (post-disruption restoration schedules);

4) modernization direction:

- introduction of technologies for the modernization of residential buildings with critical limits of service life (this problem is relevant for Ukraine with low-quality buildings of panel multi-storey buildings, the so-called "khrushchovki", etc.);

- improvement and development of infrastructure facilities, taking into account the load norms;

- implementation of programs to finance the reduction of the vulnerability of infrastructure facilities on the basis of the principles of strategic disinvestment (Novak, 2019);

5) innovative direction:

- development of infrastructure to ensure mobility of the population with a developed network of roads, an alternative to transport and balancing the aims of environmental safety and access to transport services, owning your own vehicles;

- introduction of smart technologies in the activities of infrastructure facilities, especially those using limited natural resources;

- purging and implementation of technologies for overcoming infrastructure dependence, in particular in terms of transport transit, meeting the needs of improvement;

6) protective direction:

- development of additional infrastructure and adaptation of the existing one for socially vulnerable persons;

- ensuring the availability of services required in crisis conditions (Post-incident services);

- provision of medical and property insurance for the population.

The list of activities can be differentiated depending on the resource capabilities of the authorities, the level of political culture and the sustainability of communities.

5. CONCLUSIONS

Conceptualization of the causes and consequences of social vulnerability of the population

substantiates the relevance of the research of its infrastructural determinants. Infrastructure determines the resilience of a public system to risks. Social vulnerability for a modern society of opportunities should be considered from the standpoint of creating favourable social conditions for the development and self-realization of a person. At the same time, social conditions are the result of the use of natural and human resources in reproduction processes with reflection in the development of the economy, labor market and infrastructure.

The problem of studying the infrastructural determinants of social vulnerability is wide. It combines institutional and functional, economic, social, quality and ecological and social approaches. The research complexity of infrastructural determinants is complemented by the classification of infrastructure objects according to the criteria of subject orientation in meeting needs, functional purpose, belonging to the sphere of economy and form.

In practice, taking into account the infrastructural determinants of social vulnerability of the population emphasizes a proactive approach to its regulation (reduction). The need for a proactive approach is confirmed by the problems of infrastructure dependence and load with a pronounced spatial divergence of the quality and condition of the infrastructure. Interstate divergence was confirmed by the analysis of various ratings of the infrastructure component in integral assessments of competitiveness, quality, countries' capabilities for recovery, vulnerability to climate change, social protection, etc.

Based on the results of studying various approaches to understanding and assessing the infrastructural determinants of social vulnerability of the population, the priorities of its regulation are determined, which are relevant for each society. Key activities are distributed in the areas of infrastructure development in the context of reducing the social vulnerability of the population – strategically managerial, information and analytical, safe, modernization, innovative, protective.

The results of this research are the basis for further deepening the methodology for analyzing the social vulnerability of the population with an increase in the importance of infrastructure determinants and the development of appropriate methodical approaches on this basis.

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Удосконалення методології дослідження та практики регулювання соціальної вразливості населення потребує більшої уваги до інфраструктурних впливів. Концептуалізація положень інфраструктурних детермінант соціальної вразливості передбачає наукове обґрунтування їх ролі у створенні сприятливих соціальних умов та забезпеченні резилентності суспільної системи до ризиків. Інфраструктурні детермінанти є індикатором економічного розвитку, чинником мінімізації вразливості населення внаслідок дії ризиків і в той же час вони є базовою умовою для створення можливостей розвитку і самореалізації в сучасному суспільстві можливостей. При аналізі впливу інфраструктури на соціальну вразливість населення слід враховувати проблемність інфраструктурної залежності і навантажень. Поглиблення міждержавної дивергенції за рівнем розвитку інфраструктури актуалізує пріоритетні напрями її розбудови і модернізації в контексті зниження соціальної вразливості населення. Первинна увага має бути приділена критичній

інфраструктурі в частині забезпечення стійкості об'єктів. Потребують перегляду інформаційно-аналітичні підходи до інтегрального оцінювання якості інфраструктури у взаємозв'язку з соціальними процесами з впровадженням уніфікованої методики на міжнародному рівні. Розкрито міждержавну дивергенцію інфраструктурного розвитку в контексті оцінок конкурентоспроможності, соціального захисту та адаптаційного потенціалу, що посилює нерівність доступу до інфраструктури й соціальних благ. Виокремлено шість ключових напрямів регулювання інфраструктурного впливу: стратегічно-управлінський, інформаційно-аналітичний, безпековий, модернізаційний, інноваційний та захисний. Стверджується, що врахування інфраструктурних детермінант має стати основою для уніфікації методологій оцінювання соціальної вразливості на міжнародному рівні. Доведено, що саме інфраструктура здатна як знижувати соціальну вразливість, так і поглиблювати її у випадку недоступності, деградації чи неефективного функціонування. Запропоновані висновки та класифікації є основою для формування адаптивних стратегій соціального захисту населення в умовах багатофакторної ризикогенності сучасного світу.

Ключові слова: інфраструктура, резилентність, суспільна система, ризики, регулювання соціальної вразливості, інфраструктурна залежність, інфраструктурне навантаження.