ANALYSIS OF THE RELATIONSHIP BETWEEN THE CONCEPTS OF "INFRASTRUCTURE THREATS" AND "RESILIENCE OF THE POPULATION'S QUALITY OF LIFE"

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Abstract: *In recent years, structural infrastructural changes have significantly affected the resilience of the quality of life of the population of Ukraine. This is due to the fact that the quality of life is a complex indicator that reflects the level of satisfaction with the environment (assessment of the state of infrastructure, the quality of services provided in various sectors of the economy, and living conditions created for the population) and the personal comfort of residents.*
As a result of the study, it was found that today there is no single scientific position on the definition of the concept of "infrastructure". This is due, firstly, to the fact that researchers are representatives of different scientific schools with their own approaches and characteristics. Secondly, to the ambiguity and multifaceted nature of the term "infrastructure". Researchers mostly understand the term "infrastructure" as a system, a systemic economic category, a complex of types of economic activity, a part of the national economy, appropriate conditions, a resource, a mechanism, a critically important component of the environment, etc. At the same time, the vast majority of authors consider infrastructure as a "growth point" of the national economy, relying on the theories of location, economic growth and innovative development. Based on the generalization of theoretical approaches to the definition of the concept of "infrastructure", the author's interpretation of this concept is given. It is proposed to consider under it a set of various institutions (institutions, organizations), institutions (rules, norms), types of economic activity necessary for the effective functioning and management of the national economy in the context of achieving sustainable development and ensuring the resilience of the quality of life of the population.
It should be emphasized that military actions as a result of Russia's full-scale invasion of the territory of Ukraine pose serious infrastructure threats and risks that negatively affect the development of the national economy and the quality of life of the population. Therefore, the purpose of this article is to identify the relationship between the concepts of "infrastructure threats", "population's quality of life", and "resilience" by characterizing the evolution of key patterns of scientific publications on this problem. To achieve the goal, a relevant sample of scientific articles was formed based on identifying periods of publication activity and bibliometric analysis of keyword coincidences to identify promising areas of research in this area. Bibliometric analysis and visualization of its results were carried out using the VosViewer software product. Based on visualization maps, three clusters were identified and characterized by the content coincidence of keywords in publications and five stages of evolutionary development. The results of the analysis can be used in further research to determine the dominants of the infrastructural structure formation of the resilience of the quality of life of the population of Ukraine in conditions of external threats.

Key words: *national economy, structural changes, infrastructure changes, infrastructure threats, challenges, population's quality of life, resilience, bibliometric analysis.*

JEL: D40, H54, I31

1. Introduction.

In recent years, the economic system of Ukraine has been undergoing a transformation in the context of global instability, geopolitical challenges, hybrid threats to national security (Khaustova & Trushkina, 2024), military risks, external and internal structural changes.

One of the challenges, overcoming which requires systemic management decisions and a strategic approach, is infrastructural changes that negatively affect the quality of life of the population of Ukraine. And first of all, this is due to the full-scale armed aggression of Russia against Ukraine, which caused serious damage and destruction of infrastructure facilities (Kyzym, Khaustova & Trushkina, 2022) (housing, social, production, energy, transport, logistics, warehouse).

According to estimates by experts from the World Bank and the European Commission using the World Bank's Rapid Damage and Needs Assessments (RDNA2) methodology, the amount of damage caused by the war in Ukraine for the period from February 24, 2022 to February 24, 2023 amounted to 134.7 billion dollars. At the same time, the cost of damaged housing infrastructure amounted to 50.4 billion dollars, transport infrastructure – 35.7, energy infrastructure – 10.6, and critical infrastructure facilities in the water supply and water treatment sector – 2.2 billion dollars.

It should be noted that the needs for the restoration of the housing stock amount to 68.6 billion dollars (this is 36.1% more compared to the damage to housing), and infrastructure sectors – 156.4 billion dollars (this is almost 3 times more compared to the damage to strategically important infrastructure facilities) (World Bank, 2023).

However, it is worth noting that even in the pre-war period, Ukraine had problems with insufficiently effective infrastructure development. This became an obstacle to obtaining quality services and led to a deterioration in the living conditions of different segments of the population.

According to the results of a survey by the International Institute of Sociology commissioned by the Office of the President (Kochmar-Tymoshenko, 2020), 65% of respondents believe that the infrastructure of their locality does not generally or fully meet the needs of all categories of the population. And 26% believe that this infrastructure generally or fully meets the needs of everyone. At the same time, 58% of the population notes that in the period 2017-2020 no changes in infrastructure issues occurred. 18% of respondents saw an improvement in infrastructure development, and 12% saw a deterioration in the situation.

The monograph "Quality of Life of the Population of Ukraine and the First Consequences of the War" (Cherenko et al., 2023), prepared by a team of scientists from the M. V. Ptukha Institute of Demography and Social Research of the NAS of Ukraine (now the M. Ptukha Institute of Demography and Quality of Life Research of the NAS of Ukraine), shows the share of households that suffered from infrastructural restrictions for the period 2007-2021. Thus, the following are included in the key signs of infrastructural deprivation (author's: from the Latin deprivatio – loss, deprivation) meaning a social process of reducing or depriving households of opportunities to satisfy basic life needs (Lyubyva, 2007)): 1) absence of a medical institution or pharmacy near the home – 12.4% of households in 2021 (in 2007 – 18.4%); 2) lack of timely emergency medical services in the settlement – 13.1% (in 2007 – 22.9%); 3) lack of preschool institutions near the home – 1.6% (in 2007 – 4.7%); 4) lack of regular daily transport connections to a settlement with a more developed infrastructure – 9.3% of households (in 2007 – 12.6%) (Cherenko et al., 2023).

Therefore, from the point of view of the authors of this monographic publication (Cherenko et al., 2023), over the period 2007-2021 there was an accumulation of unresolved problems of the standard of living, namely: consistently low purchasing power of income and limited consumer opportunities; extremely low availability of improving housing conditions; slow development of infrastructure and, accordingly, narrowed access to quality services, especially in small settlements.

It should be emphasized that the full-scale Russian invasion of Ukraine has caused an even greater deterioration in the quality of life of the population due to infrastructural threats and risks. The crisis caused by the Russian-Ukrainian war has become the fourth most significant economic shock in

Ukraine, leading to significant losses in the production sector and infrastructure, a decrease in the quality of life of the population and social losses (Khaustova & Reshetnyak, 2023). In 2022, more than 7 million people worsened their material situation, and the poverty level reached 24% of the population. As a result of the war, the number of jobs and incomes decreased significantly, purchasing power and the volume of available assets decreased (Khaustova & Reshetnyak, 2023).
This is confirmed by the results of a survey of 2,018 respondents in the macro-regions of Ukraine, conducted by the Ilko Kucheriv Democratic Initiatives Foundation together with the sociological service of the Razumkov Center with the support of the MATRA program from December 13 to 21, 2022. Thus, 52.4% of respondents noted that they suffered from power, water, and heating outages as a direct result of the war. 20.8% of respondents experienced a significant decrease in income, which negatively affected their quality of life (Ilko Kucheriv Democratic Initiatives Foundation, 2022).
The study "18 Months Later: Assessment of Mental Health and Psychosocial Needs in Ukraine", conducted by HIAS Ukraine and the NGO "Girls" from June to August 2023 (Ukrinform, 2023), found that 35% of the population of Ukraine has a level of well-being and quality of life below average or low.
According to the results of a comprehensive survey of 1,000 respondents conducted on March 19, 2022 by the sociological group "Rating" as part of the "Ukraine in War" project, among Ukrainians who had a job before the war, half (53%) are not working today. 22% work in the usual mode, and 21% work remotely or partially. Only 2% of respondents found a new job during the war. The economic situation as a result of the war did not change for only 18% of citizens; for 52% it significantly worsened, and for 28% it most likely worsened (Rating, 2022).
If we consider the infrastructural changes caused by the armed conflict, it is worth noting the following. 51% of respondents believe that 5 years will be enough to rebuild Ukraine's infrastructure and national economy, and 13% – about a year (Rating, 2022). Among those surveyed, 61% are ready to join the economic and infrastructural restoration of Ukraine by working in construction, and 33% would like to, but do not have the opportunity. And only 5% note that the restoration of infrastructure is the sole responsibility of the authorities. At the same time, 90% of those surveyed claim that Russia should compensate for Ukraine's economic and infrastructural losses during the war; 21% – European countries; 17% – international organizations; 12% – the USA; 10% – Ukraine (Rating, 2022).
Therefore, the purpose of this article is to identify the relationship between the concepts of "Infrastructure Threats or Infrastructural Threats", "Population's Quality of Life", "Resilience" by characterizing the evolution of key patterns of scientific publications on this issue.

2. Basic content.

The study selected bibliometric analysis as a method that reveals the relationship between infrastructure threats, quality of life, and resilience of the population's quality of life. This type of analysis is based on mathematical graph theory, clustering methods, and scientific visualization, which makes it widely applicable in various fields of science (Kwilinski, 2023).
Based on the structuring of a large volume of metadata of scientific publications, bibliometric analysis allows us to identify the essence of the subject area and its conceptual foundations and to substantiate the evolution of the research area (Kwilinski, 2023). The research methodology includes such main stages as data collection and analysis, selection of a visualization tool, graphical representation of the identified relationships, and interpretation of the results obtained.
This was implemented using the VOSviewer v.1.6.19 software product. The functionality of this program includes the creation of keyword visualization maps based on compatibility data, author or country maps based on the number of citations, etc. (Khaustova, Kyzym, et al., 2024). In addition, network visualization maps in VOSviewer are displayed in several ways (for example, by content criterion, by publication period) (Kwilinski, 2023).

An important stage of bibliometric analysis, which ensures its quality, is the selection of the data source and the formation of a relevant sample of publications. The Scopus database was chosen as a data source due to the breadth of its coverage of such subject areas as computer science; engineering; social sciences; environmental sciences; Earth and planetary sciences; agricultural and biological sciences; energy; business, management and accounting; decision sciences; economics, econometrics and finance; multidisciplinary sciences, etc. The formation of the sample of publications on the selected topic was carried out in 4 stages:

1) selection of publications by search query "Infrastructure Threats" or "Infrastructural Threats" – 23718 documents were found for the years 1974-2025;

2) the sample was limited by the type and stage of publication, that is, only published works were taken – 10510 publications were found for the years 1974-2025;

3) selection of works by search query "Infrastructure Threats" or "Infrastructural Threats" and "Population's Quality of Life". The key categories for the selection of scientific publications were the title, abstract and keywords for them. And only the final scientific articles were taken. As a result of such a query, 84 scientific articles were found for the years 1994-2025;

4) a selection of works by the search query "Infrastructure Threats" or "Infrastructural Threats" and "Resilience" and "Population's Quality of Life". At this stage, restrictions were applied only by the stage of publication, that is, only published works were taken (scientific articles, review articles, books, chapters of books or monographic publications, works of an approbatory nature). Thus, the studied sample of publications included 44 works that met the above criteria, published in the period 2009-2025 and indexed by the Scopus database.

Let us consider each of the stages of the study in detail.

A quantitative analysis of the formed sample of 10,510 scientific works showed an exponential growth of research devoted to infrastructure threats during the period 1990-2025 (*Figure 1*). It is worth noting that before 1990, publication activity was quite low. Therefore, we analyzed the level of publication activity starting from 1990. On average, the growth rate of the number of publications was 19.4% for 1990-2024. At the same time, it can be assumed that by the end of 2025 there will also be a trend of significant growth in the number of publications on the specified topic compared to previous years. According to preliminary estimates, the annual growth rate of the number of publications for 1990-2025 will be 16.4%.

As the analysis shows, the main organizations involved in solving the selected problem are: Chinese Academy of Sciences (150 documents), Ministry of Education of the People's Republic of China (95), King Saud University (73), CNRS Centre National de la Recherche Scientifique (70), University of Chinese Academy of Sciences (65), University of Florida (57), Texas A&M University (53), University of Oxford (51), Consiglio Nazionale delle Ricerche (49), ETH Zürich (48), Delft University of Technology (47), University of Melbourne (47 documents).

At the same time, most of the works on the impact of infrastructure threats on the socio-economic development of the state are published by scientists from United States (2339 documents), China (1289), India (1068), United Kingdom (1012), Australia (524), Italy (466), Germany (461), Canada (398), Saudi Arabia (328), Spain (328), South Korea (307), Poland (275 documents). In Ukraine, 153 documents were found using the established search criteria.

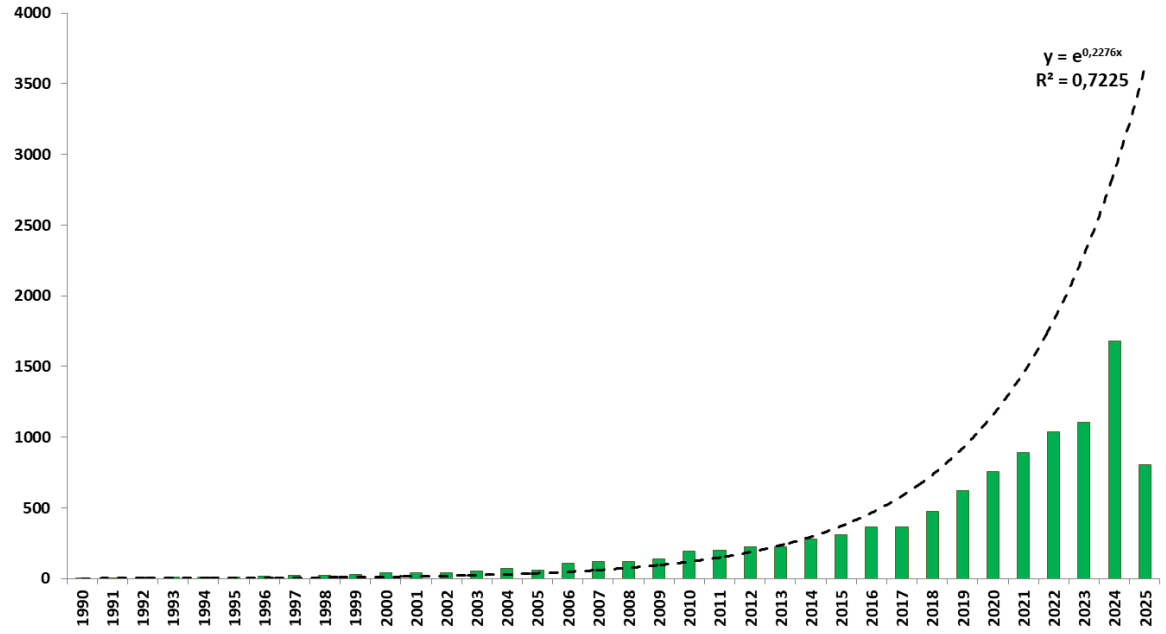

Figure 1. Dynamics of publications on infrastructure threats for 1990-2025

Source: based on the international scientometric database Scopus.

The main sponsors that finance scientific publications dedicated to infrastructure threats in various spheres of life and the national economy include the following: National Natural Science Foundation of China (514 documents), European Commission (452), Ministry of Science and Technology of the People's Republic of China (370), National Science Foundation (290), Horizon 2020 Framework Programme (250), UK Research and Innovation (180), National Key Research and Development Program of China (139), Fundamental Research Funds for the Central Universities (90), Engineering and Physical Sciences Research Council (83), Ministry of Education of the People's Republic of China (78), Government of Canada (68), U.S. Department of Defense (67), Australian Research Council (66 documents).

By relevance (the measure or degree of correspondence of the search results to the task set in the search query), the publications of the authors listed in *Table 1* should be indicated.

At the next stage of the search and research work, we searched for documents dedicated to identifying the impact of infrastructure threats on the quality of life of the population. Thus, by the title of the article, abstract, keywords "Infrastructure Threats" or "Infrastructural Threats" and "Population's Quality of Life" 84 documents were obtained for the years 1994-2025. The following keywords are mostly used in the publications: Human (17 documents), Quality Of Life (14), Climate Change (11), Sustainability (7), Environmental Protection (6), Environmental Impact (6), Urbanization (5), Population Statistics (5), Economic Aspect (5), Sustainable Development (4), Smart City (4), Risk Assessment (4), Population Growth (4 documents) etc.

This is also confirmed by the analysis of the "relevance of publications" indicator. It has been found that researchers (J. Padgett et al., 2009; G. Young et al., 2014; A. Veenapani & S. Chandra, 2024) pay much attention to consider various threats to sustainable infrastructure. Scientists emphasize that critical infrastructure systems provide the basis for socio-economic stability, sustainable development, national security and quality of life.

Next, we searched for the title of the article, abstract, keywords "Infrastructure Threats" or "Infrastructural Threats" and "Resilience" and "Population's Quality of Life" and received 44 scientific papers. It is worth noting that the issue of the relationship between infrastructure threats and the resilience of the quality of life of the population has not yet been sufficiently studied. Therefore, they require further scientific research and development.

Table 1. Relevance of publications devoted to the study of the impact of infrastructure threats on the socio-economic development of the country

Keywords	Scientists						
	M. Gross et al. (2024)	H. Liu (2021)	A. Van Os et al. (2015)	G. Moraitis et al. (2020)	A. Langenohl (2024)	S. Thakur (2021)	S. Fedulova et al. (2020)
Conflict	+	+					
Economic crisis	+						
Threat factors	+						
Identity threat			+				
Risk assessment			+	+			
Project management			+				
Consequences				+			
Cyber-physical attacks				+			
Risk management				+			
Financial infrastructures					+		
Global financial crisis					+		
Security-finance nexus					+		
Climate change						+	
Resilience						+	
Development							+
Infrastructure							+
Sustainability							+

Source: compiled based on the international scientometric database Scopus.

The first publication appeared only in 2009. And until 2024, a fairly low level of publication activity was observed: as a rule, from 1 to 3 papers were published each year. Only in 2017, 5 publications were published, and in 2024 – 11. The publications contain such keywords as Climate Change, Resilience, Disasters, Sustainable Development, Quality Of Life, Information Management, Sustainability, Life Cycle, Failure Recovery Mechanism, Environmental Impact, Economic and Social Effects, Decision Making, Cyber Security, Critical Infrastructures, Urban Resilience, System of Systems, Structural Resistance, Risk Assessment, Planning and Design etc.

In addition, it is advisable to study the geographical structure of scientific works on the issues of resilience of the quality of life of the population, taking into account infrastructure threats and risks. According to the geographical structure, the leaders are such countries as United States (12 documents), United Kingdom (8), India (6), Egypt (3), Canada (2), China (2), Czech Republic (2), Germany (2), Poland (2), Romania (2 documents) etc.

In our opinion, it is important to determine the most cited works devoted to the study of the impact of infrastructure threats on the resilience of the quality of life (*Table 2*). According to the data in Table 2, the work by A. Costello et al., published in 2009, has the largest number of citations. And to date, this work has 2159 citations. This work is devoted to the study of the impact of climate change on the health of the population. This can lead to changes in the nature of diseases, lack of water and food security, vulnerability of housing in settlements, extreme climatic events, an increase in the volume of migration flows, etc. The second place is taken by the publication of the authors K. Sinha et al. (2017), which considers the challenges, threats and opportunities of transport asset management, which directly affects the development of the national economy and the level and quality of life of the population.

In third place is the publication by K. Gopalakrishnan & S. Peeta (2010), which was cited 53 times. The authors of this article pay attention to sustainable critical infrastructure systems as a new paradigm in the era of resource depletion against the background of natural and man-made threats. The formation of these systems, in turn, ensures a sustainable and high standard of living with optimized resources, taking into account social, economic, societal and environmental considerations.

Table 2. Ranking of scientific papers by number of citations

Title	Authors	Year	Source	Number of citations
Managing the health effects of climate change	A. Costello et al.	2009	The Lancet	2159
Transportation infrastructure asset management in the new millennium: continuing issues, and emerging challenges and opportunities	K. Sinha et al.	2017	Transportmetrica A: Transport Science	55
Sustainable and Resilient Critical Infrastructure Systems: Simulation, Modelling, and Intelligent Engineering	K. Gopalakrishnan S. Peeta	2010	New York: Springer [Book]	53
ChameleonSoft: A moving target defense system	M. Azab et al.	2011	Proceedings of the International Conference	39
Evidence for improved urban flood resilience by sustainable drainage retrofit	J. Lamond et al.	2015	Proceedings of the Institution of Civil Engineers: Urban Design and Planning	36

Source: compiled based on the international scientometric database Scopus.

Table 3 shows the Top 5 journals with the largest number of publications on infrastructure threats and resilience of the quality of life of the population, indexed in the international scientometric database Scopus. The largest number of articles was published in the journal "Lecture Notes in Networks and Systems". These publications were analyzed according to such indicators as: 1) CiteScore (characterizes the average number of citations received by each document published in a periodical); 2) SCImago Journal Rank (estimates the weighted number of citations received by a series of publications; the weighted citation score depends on the field of knowledge and the prestige of the cited periodical); 3) SNIP (source-normalized citation rate of an article, which characterizes the number of citations actually received relative to the expected number for the field of knowledge of the series of publications.

Table 3. Top-5 journals with the largest number of publications on the selected research topic, indexed in the international scientometric database Scopus

Journal Title	Indexing Period	Publisher	Field of Knowledge	Cite Score 2023	SJR 2023	SNIP 2023	Number of Articles
Lecture Notes in Networks and Systems	from 2016 to 2025	Springer Nature	Computer Science, Engineering	0.9	0.171	0.282	2
Advances in Natural and Technological Hazards Research	2005, 2007, from 2009 to 2011, from 2013 to 2019, from 2023 to 2024	Springer Nature	Environmental Science, Social Sciences, Earth and Planetary Sciences	0.1	0.124 (2018)	0.000 (2018)	1
Biometeorology	2021, 2024	Springer Nature	Environmental Science, Social Sciences, Earth and Planetary Sciences	-	-	-	1
Chemical Engineering Transactions	from 2009 to 2025	Italian Association of Chemical Engineering – AIDIC	Chemical Engineering	1.4	0.258	0.420	1
Construction and Building Materials	from 1987 to 2025	Elsevier	Engineering, Materials Science	13.8	1.999	2.110	1

Source: compiled based on the international scientometric database Scopus.

Among universities, scientific institutions and think tanks whose researchers have studied the impact of infrastructure threats on the resilience of the quality of life, the leading position is occupied by University Politehnica of Bucharest, The University of Hong Kong, Purdue University, University College London, Virginia Polytechnic Institute and State University, National Center for Research on Earthquake Engineering Taiwan, The Bartlett Faculty of the Built Environment, Virginia Tech College of Engineering, Cascadia Consulting Group, Quinault Management Center. Based on the results of the analysis of the coincidences and closeness of the relationship between the keywords of the selected sample of publications (84 documents), network visualization maps were constructed (*Figure 2* and *Figure 3*), and 3 clusters on the studied topic were identified and characterized (*Figure 2*).

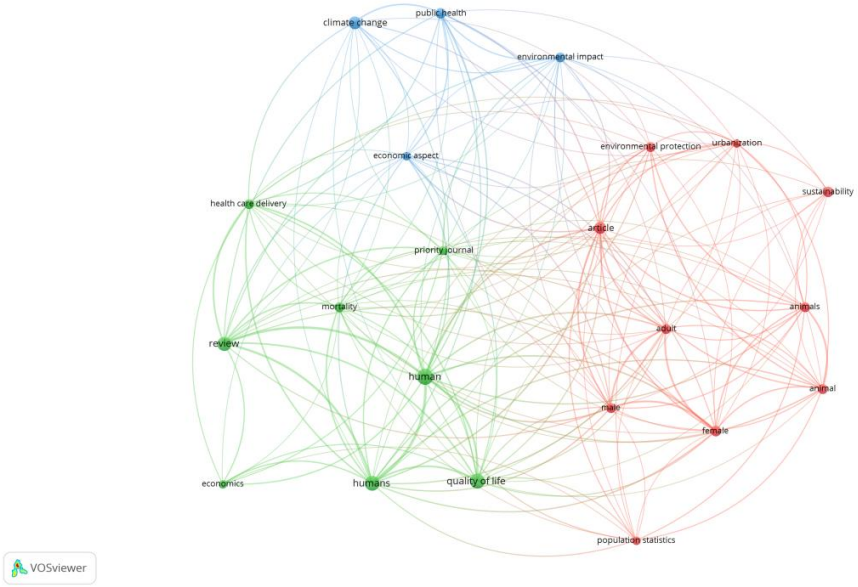

Figure 2. Map visualization of bibliometric analysis of publications devoted to issues of population's quality of life and infrastructure threats (content aspect)

Source: built on the basis of data from the Scopus scientometrics database using the VOSviewer program.

The first cluster (red colour) contains the largest number of terms (namely 10 items), among which the following can be mentioned: sustainability, environmental protection, population statistics, urbanization. Separately, it is worth noting the keyword "Sustainability", the frequency of joint use of which in the studied sample is 7, and the strength of the connection is 11.

The second cluster (8 concepts, green colour) combines such terms as economics, human, quality of life. In this cluster, the keyword "Quality of Life" has the highest frequency – the ratio is 14, while the strength of the association is 44.

The third cluster (4 elements, blue colour) describes the relationship between infrastructure threats and quality of life with the following terms: climate change, economic aspect, environmental impact. The main keyword in this cluster is "Climate Change", the frequency of its co-use in the studied sample of scientific publications is 11, and the strength of the association is 20.

Thus, based on the constructed terminological map of categories and the highlighted most significant keywords related to the issues of ensuring the quality of life of the population under the influence of infrastructure threats, it can be stated about the multidimensionality and cross-dependence of the studied areas, since there are numerous connections between the terms, as well as their high prevalence in research.

According to the results of bibliometric analysis in the evolutionary and temporal dimension, it can be stated that in the development of scientific research on the outlined topic, 5 most significant stages can be distinguished (*Figure 3*).

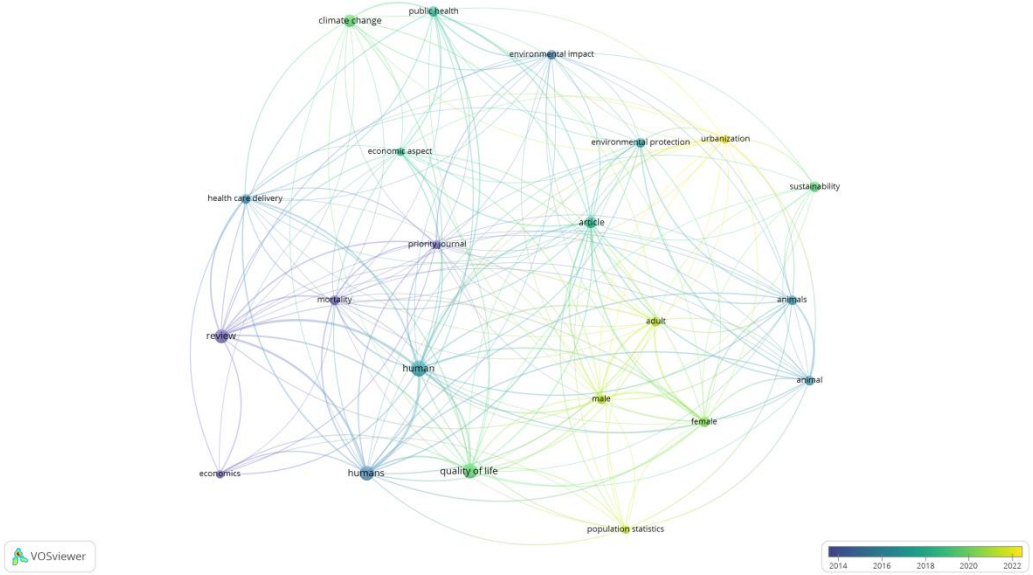

Figure 3. Map visualization of bibliometric analysis of publications that trace the relationship between infrastructure threats and the quality of life of the population (evolutionary and temporal aspects)

Source: built on the basis of data from the Scopus scientometrics database using the VOSviewer program.

The first stage of development was observed until 2014, when most publications considered economic and environmental issues. At the second stage, which lasted from 2014 to 2016, the focus of scientists' research shifted to various aspects of the development of society.

From 2016 to 2018, that is, at the third of the selected stage, the dominant key terms were "public health", "economic aspect", "environmental protection". The fourth stage (from 2018 to 2020) is characterized by the predominance of the terms – quality of life, sustainability.

The last, fifth stage began from 2020 to 2022. According to the results of its analysis, it can be stated that the main areas of research are devoted to the current issues of urbanization and its impact on the quality of life of different segments of the population.

Thus, summing up the above, we can trace a change in emphasis in scientific publications, caused by the socio-economic development of society, prevalent in the first – third stages, to the sustainable development of the national economy of the countries of the world and the formation of sustainable infrastructure systems in the fourth – fifth stages.

3. Conclusions.

Based on the purpose and results of the study, we can conclude that there is a high level of closeness of the relationship between the concepts of "Infrastructure Threats" or "Infrastructural Threats" and "Resilience" and "Population's Quality of Life". This article carries out a bibliometric analysis of scientific publications indexed in the international scientometric database Scopus, which highlight various aspects of ensuring the resilience of the quality of life of the population in conditions of infrastructure threats. This analysis made it possible to identify current trends in publication activity on the selected research topic. Using the VOSviewer software, network visualization maps of key word matches of publications indexed by the international scientometric database Scopus from 1994 to 2025 were created.

According to the content correspondence of the keywords of the studied sample, three clusters were identified and described, and the presence of five most significant stages of the development of

scientific research dedicated to identifying the relationship between infrastructure threats and the resilience of the quality of life of the population was established.
This, in turn, provides an opportunity to expand theoretical knowledge on the infrastructural structure of resilience of the quality of life of the population as an object of economic research. In addition, it also gives impetus to the development of a modern methodology for the formation and implementation of a sustainable development strategy.
In addition, it is worth noting that despite the challenges and threats, the Ukrainian economy has a strong potential for qualitative growth and ensuring resilience of the quality of life of the population as a result of the reconstruction and modernization of strategically important infrastructure facilities, as well as their adaptation to new operating conditions.
As noted in the study "Assessment of the Impact of War on People", prepared by UNDP in Ukraine (2023), IMPACT Initiatives and the Center for Sustainable Peace and Democratic Development, it is advisable to adapt recovery measures focused on changes in the needs of the remaining population and the population returning to their places of residence. It will be important to take into account the new needs of the population and determine priorities for innovative solutions and alternative service delivery models that can improve the ability of the infrastructure to meet these need (UNDP Ukraine, 2023).
According to scientists from the M. Ptukha Institute of Demography and Quality of Life Research of the NAS of Ukraine (Cherenko et al., 2023), the sustainable growth of population incomes and their purchasing power can become the basis for the formation of a fundamentally new model, the key elements of which are better housing conditions and accessibility; developed infrastructure of settlements (primarily social, transport, information and communication), etc.
At the same time, for the post-war restoration and modernization of infrastructure, it is necessary to attract investment resources and form various models of partnership with international donor and financial organizations. According to the Ministry of Infrastructure of Ukraine, by 2030 the volume of investments in infrastructure development will amount to 20-25 billion dollars. And half of the investment volume should come from private investors (Tymoshenko, 2021).
In this regard, it is advisable to further develop public-private partnership. As shown by the results of the survey to determine the status and assess the needs in the field of public investment at all levels of government, conducted from October 11 to 27, 2023 by the NGO "Civil Society Institute" within the framework of the project "Support for the formation of effective regional policy in the context of Ukraine's European integration and military challenges" (Fedyuk, 2023), the following are among the most important problematic issues that require immediate response:
- the distribution of investments in infrastructure is carried out mostly manually, that is, there is no openness, transparency, justification, selection criteria; this, in turn, leads to manifestations of corruption and bribery;
- the use of the public-private partnership instrument is not used due to the war.
However, it should also be noted about the positive aspects and attempts to intensify the process of investing in infrastructure development during the war period. Thus, according to the results of the annual industry survey "Infrastructure Index 2024", conducted by the European Business Association together with the law firms "Arzinger" and "Sayenko Kharenko", it was found that in 2024, 59% of transport companies invested in infrastructure development. The vast majority of investments were directed at the modernization of existing facilities (59% of companies), new capacities and infrastructure (44%), and the acquisition of ready-made facilities (16%).
At the same time, in 2024, companies mostly raised their own funds (79% of companies) and debt financing (30%). Only 9% of companies attracted grant financing for investments. Among the sources of financing, foreign investments accounted for 39%, Ukrainian ones – 61%.
A significant part of businesses (53% of companies) reported direct losses as a result of hostilities. At the same time, almost half of them assessed these losses as significant. However, 41% of companies have already restored damaged infrastructure facilities, and 25% plan to deal with

restoration issues in the near future or after the war (this is 28%). Only 6% note that restoration is impossible or impractical (European Business Association, 2024).

According to business, the state should focus on providing affordable risk insurance for investors, implementing the PPP mechanism, adopting a draft law on railway transport, as well as on targeted support for the restoration of damaged terminals and infrastructure.

In addition, the survey revealed that in 2025, 67% of transport companies plan to invest in business development and infrastructure facilities. That is, there is a positive trend for further development (European Business Association, 2024).

Therefore, active work to attract the necessary amount of investment will contribute to accelerating the country's economic growth, rebuilding infrastructure facilities in strategic sectors, and ensuring the resilience of the quality of life of the population. In further research, it is planned to identify infrastructure threats to ensure the resilience of the quality of life of the population in Ukraine.

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