

Urban Resilience in EU Cities: Insights from Ukrainian Citizens with an Understanding of War Risks

Nataliia Yehorchenkova

**Affiliation: Slovak University of technology in Bratislava, Bratislava, Institute of Management
Email:nataliia.yehorchenkova@stuba.sk**

Oleksii Yehorchenkov

**Affiliation: Slovak University of technology in Bratislava, Institute of Management
Email:oleksii.yehorchenkov@stuba.sk**

Abstract

This paper considers urban resilience by drawing insights from Ukrainian citizens who have firsthand experience with the risks of war, aiming to provide practical lessons and examples to enhance urban adaptability and preparedness. Their unique perspective enriches the discourse on urban resilience in EU cities, shedding light on the challenges faced in the aftermath of conflict. The narrative begins by highlighting the stark realities experienced by Ukrainian citizens due to the lack of preparedness in their cities, setting the stage for an exploration of resilience issues post-conflict. Key areas of concern include energy system resilience, with real examples emphasizing vulnerabilities and the need for EU cities to fortify their energy infrastructure. This paper contributes to academic discourse while offering pragmatic lessons to inform policies and practices, fostering resilient, compassionate, and inclusive cities ready to face future uncertainties.

1.Introduction

In the face of urbanization and globalization, the resilience of cities has become a paramount concern. As urban environments evolve and face various challenges, from climate change to socio-political unrest, understanding and bolstering urban resilience is imperative for ensuring the safety, stability, and well-being of urban populations. The authors consider the realm of urban resilience through a unique lens, drawing insights from Ukrainian citizens who have firsthand experience navigating the complexities of conflict and its aftermath. The backdrop against which this exploration unfolds is Ukraine, a nation that has grappled with the devastating impacts of war in recent years. Through the eyes of its citizens, we gain invaluable perspectives on the realities of urban resilience in the midst of crisis. The aim of this research is twofold: to illuminate the challenges faced by Ukrainian cities during the conflict and to extract practical lessons and tangible examples that can inform and empower urban resilience efforts, particularly within the European Union (EU).

The journey begins by immersing ourselves in the stark realities confronted by Ukrainian citizens as they contend with the ravages of war. In Ukrainian cities, where the prevailing sentiment was often one of disbelief in the possibility of conflict, the unanticipated and unprecedented challenges underscored the critical importance of preparedness. This introductory narrative lays the foundation for a comprehensive examination of resilience problems encountered ongoing-conflict, with a specific focus on three key dimensions: the energy system, transportation, and the provision of bomb shelters.

Within the energy system, disruptions wrought by conflict reveal vulnerabilities that demand attention. Real-life examples gleaned from the experiences of Ukrainian citizens shed light on the strains placed on energy infrastructure and the urgent need for reevaluation and fortification of energy resilience strategies in EU cities.

The provision of bomb shelters emerges as a crucial but often overlooked aspect of urban resilience. Drawing on the experiences of Ukrainian citizens, the importance of robust and accessible shelter systems is underscored, prompting EU cities to assess and enhance their own shelter infrastructure to

ensure the safety and well-being of their populations during emergencies (Deepak, 2022; UNESCO, 2023; Olcese, 2024).

The insights garnered from Ukrainian experiences serve not only as a reflection of past challenges but also as a beacon guiding future resilience efforts. By examining tangible challenges and practical solutions, this paper aims to prompt a reevaluation of urban planning paradigms, emphasizing the imperative of proactive preparedness and dispelling notions of implausibility regarding conflict. Ultimately, the lessons gleaned from Ukrainian cities contribute not only to academic discourse but also to the development of policies and practices that foster cities resilient in the face of uncertainty, compassionate in their response, inclusive in their design, and well-equipped to navigate the complexities of the future.

2. Aim of the paper

The paper aims to provide EU cities with a robust framework for enhancing their resilience to conflicts and other uncertainties, ensuring the safety, stability, and well-being of their residents. The insights from Ukrainian citizens serve as a valuable resource, offering a unique perspective that enriches the discourse on urban resilience and highlights the necessity of comprehensive and forward-thinking planning in the face of potential crises.

3. Overall situation with Ukrainian cities

The full-scale war in Ukraine is one of the most brutal in recent decades. The last time Europe saw such destruction was in the 1990s, when fighting broke out in Yugoslavia. Despite the absurdity of war in the 21st century, Russian troops continue to target civilians and commit war crimes.

According to estimates, as of the beginning of 2023, the Russian army has launched about 5,000 missiles and 3,500 air strikes against Ukraine. The invaders launched almost 1000 more strikes using kamikaze drones. These figures do not include shelling from artillery and multiple launch rocket systems (Visit Ukraine Today, 2023).

Based on investigation of the Kyiv Schools of Economics (Kyiv School of Economics, 2024), the total documented damages inflicted upon Ukraine's infrastructure due to Russia's full-scale invasion stand at a staggering \$155 billion, inclusive of the destruction caused by the explosion of the Kakhovka Hydroelectric Power Station dam in June 2023. This assessment, derived from the "Russia Will Pay" project conducted by the KSE Institute team, in collaboration with various ministries including the Ministry for Communities, Territories and Infrastructure Development, the Ministry of Health, and the Ministry of Economy, as well as the National Bank of Ukraine, reflects a grim reality of devastation and loss. The escalation in the overall damage is attributed to the widespread destruction across various sectors, including housing, industry, energy, education, and healthcare. Housing, in particular, bears the brunt of the devastation, with nearly 250,000 buildings damaged or destroyed, amounting to an estimated direct loss of \$58.9 billion.

Infrastructure damage has reached \$36.8 billion, while direct losses in industry and businesses stand at \$13.1 billion. The destruction of numerous enterprises, both private and state-owned, underscores the severe economic repercussions of the conflict. The energy sector alone has incurred direct damages of up to \$9 billion, exacerbating the challenges in restoring vital services to affected areas (fig.1-2).

**Total estimate of infrastructure damage by industry
in monetary terms, as of January, 2024**

Property type	Damage, \$ billion
Housing	58,9
Infrastructure	36,8
Assets of enterprises, industry	13,1
Energy	9,0
Agriculture and land resources	8,7
Education	6,8
Utilities	4,5
Forests	4,5
Transport	3,1
Healthcare	3,1
Trade	2,6
Culture, sport, tourism	2,4
Administrative buildings	0,5
Digital infrastructure	0,5
Social sphere	0,2
Financial sector	0,04
Total	154,9
Ecology*	16,4

*Environmental damages are calculated as damages from air emissions and are not direct damages of real estate or other assets of Ukraine

Figure 1. Total estimate of infrastructure damage by industry in monetary terms (January 2024)



Figure 2. Damaged and destroyed infrastructure objects of Ukraine total

Here are some key points illustrating the extent of destruction caused during the conflict:

1. **Kyiv.** Russian missile attacks have targeted civilian areas in and around Kyiv, the capital of Ukraine. An apartment block was hit by a Russian missile, resulting in significant destruction (fig.3).



Figure 3. A destroyed house in Kyiv
(Photo retrieved from: <https://unsplash.com/>)

2. The city of **Irpın**, located northwest of Kyiv, has also suffered severe damage due to artillery and air strikes. Residential areas have been almost completely destroyed.



Figure 4. A destroyed house in Irpin
(Photo retrieved from: <https://unsplash.com/>)

3. **Kharkiv**, Ukraine's second-largest city, has been intensely bombarded by Russian forces, causing significant damage to its center.



Figure 5. People Hiding from Bombing at a Metro Station, Kharkiv, Ukraine
(Retrieved from: <https://www.pexels.com>)

4. In **Borodyanka**, a town northwest of Kyiv, Russian airstrikes have destroyed several residential buildings, leaving the area in ruins.



Figure 6. Destroyed house in Borodyanka
(Retrieved from: <https://www.pexels.com>)

5. **Chernihiv**, northeast of Kyiv, has faced heavy shelling, resulting in casualties and damage to schools and residential buildings

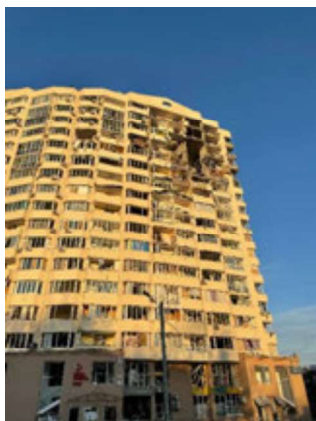


Figure 7. Destroyed house in Chernihiv
(Retrieved from: <https://unsplash.com/>)

4. Residents insights about the war risks

There was interviewed representatives from such cities as Kyiv, Irpin, Cherkasy, Kharkiv, Gysin. Understanding the firsthand experiences of citizens living through war-torn regions provides invaluable insights for bolstering urban resilience strategies in EU cities. The challenges faced by Ukrainian residents during times of conflict shed light on critical areas that demand attention for enhancing preparedness and adaptability in urban environments.

1. Security Challenges Faced During the War. Ukrainian citizens encountered significant security challenges, particularly during the early stages of conflict:

- Lack of air raid alarms during initial missile activity left residents vulnerable to potential strikes, highlighting the need for reliable early warning systems in urban areas.
- Residents grappled with the unknown locations of bomb shelters, resorting to improvised hiding spots and facing heightened anxiety due to the lack of clear guidance from authorities.
- The absence of clear directives or programs from governmental bodies exacerbated residents' sense of insecurity and contributed to confusion regarding safety protocols.

2. Mobility Challenges During the War. Mobility became a critical issue for residents navigating the urban landscape amidst conflict:

- Residents faced difficulties accessing distant bomb shelters during air raid alerts.
- Suspension of public transportation compounding mobility challenges and leaving many without viable shelter options.
- Shortage of fuel at gas stations especially in the first year of the war made it difficult to use personal vehicles.

3. Energy-related Issues Encountered. The war brought about disruptions to energy infrastructure, posing significant challenges to daily life:

- Attacks on energy infrastructure led to widespread power outages, impacting essential services such as cooking and elevator access.
- Scheduled power outages necessitated residents to adapt their routines, while darkened streets and non-functional traffic lights heightened safety concerns and necessitated careful route planning.

4. Recommendations for Enhancing City Resilience. Insights gleaned from the experiences of Ukrainian citizens offer valuable guidance for bolstering urban resilience in EU cities:

- Implementing autonomous energy systems, ensuring widespread access to bomb shelters, and relocating critical facilities away from densely populated areas.
- Establishing stockpiles of essential supplies and creating emergency response bases to facilitate swift aid distribution during crises.

- Equipping households in industrial areas with chemical protection gear to mitigate potential industrial accidents.
- Installing comprehensive air raid alarm systems to provide prompt and clear alerts to all residents, enhancing overall safety and preparedness.
- Improving governmental transparency and communication to empower residents to make informed decisions during crises, thereby fostering a sense of security and trust in authorities.

5. Discussion

Incorporating insights from Ukrainian citizens into urban planning and resilience initiatives can significantly fortify EU cities against the uncertainties of conflict, ensuring the safety and well-being of their residents. This comprehensive approach involves several key strategies, which are essential for creating urban environments that are both resilient and adaptable in the face of potential crises.

First, enhancing infrastructure resilience is crucial. Cities should invest in renewable energy sources and backup power systems, such as solar panels, wind turbines, and local battery storage systems, to maintain essential services during disruptions. Additionally, constructing robust bomb shelters in all new buildings, and retrofitting existing structures to include accessible and well-equipped shelters, can significantly enhance civilian safety.

Improving mobility solutions is another vital component. Developing resilient public transportation networks that remain operational during emergencies, such as using fuel-efficient or electric vehicles with backup power sources, can ensure that residents can reach safe locations swiftly. Designing transit stops and routes to include protective structures that can serve as temporary shelters during attacks will also help safeguard commuters.

Strengthening communication and information systems is critical. Implementing advanced air raid and disaster alert systems that provide clear, real-time information to residents is essential. Integrating these systems with mobile apps and public broadcasts ensures widespread awareness. Governments must establish clear, consistent communication channels to provide residents with accurate information and actionable guidance during crises. Regular updates and preparedness drills can foster trust and readiness.

Emergency preparedness and response must also be prioritized. Creating reserves of food, water, medical supplies, and other essentials in strategic locations throughout the city will ensure quick access during emergencies. Conducting regular emergency response training for both officials and residents can improve overall preparedness and resilience. Educational programs should focus on survival skills, first aid, and the use of emergency shelters.

Community engagement and inclusivity play a significant role in urban resilience. Building strong community networks can enhance collective resilience. Initiatives that encourage neighborly support and cooperation can create a more unified and resilient populace. Ensuring that urban planning processes include input from a diverse range of community members, especially those who have experienced conflict, can lead to more comprehensive and effective resilience strategies.

Industrial and environmental safety should not be overlooked. Establishing stringent safety measures for industrial zones, including regular inspections and emergency response plans, can mitigate risks associated with industrial accidents. Protecting and managing urban green spaces and water resources can enhance resilience to both man-made and natural disasters, providing critical resources and refuge areas during emergencies.

By integrating these strategies into urban resilience frameworks, EU cities can better withstand the impacts of conflict and create safer, more adaptive, and supportive environments for their residents. These measures ensure that cities are not only prepared for emergencies but are also places where communities can thrive despite the challenges posed by uncertain times.

6. Conclusion

The insights gained from Ukrainian citizens who have endured the ravages of war offer invaluable lessons for enhancing urban resilience in EU cities. This paper has highlighted the urgent need for cities to be prepared for the uncertainties of conflict by focusing on several critical areas:

infrastructure resilience, mobility solutions, communication systems, emergency preparedness, community engagement, and industrial and environmental safety.

By prioritizing the development of autonomous energy systems, EU cities can ensure the continuity of essential services during disruptions, reducing their dependency on centralized power grids and increasing their overall resilience. Constructing robust bomb shelters and retrofitting existing structures to include accessible and well-equipped shelters will significantly enhance civilian safety during emergencies.

Improving mobility solutions, such as developing resilient public transportation networks and designing protective transit stops, ensures that residents can swiftly and safely reach secure locations during crises. Strengthening communication systems through advanced air raid and disaster alert mechanisms, coupled with clear and consistent information from authorities, can empower residents to make informed decisions and foster a sense of security and trust.

Emergency preparedness and response are vital components of urban resilience. Establishing stockpiles of essential supplies and conducting regular training for both officials and residents can enhance overall preparedness. Educational programs focused on survival skills and first aid are crucial for ensuring that the population is well-equipped to handle emergencies.

Community engagement and inclusivity are also essential. Building strong community networks and ensuring that urban planning processes include input from diverse community members, particularly those with firsthand experience of conflict, can lead to more comprehensive and effective resilience strategies. Inclusive planning fosters social cohesion and resilience, making cities more unified and prepared for adversity.

Finally, ensuring industrial and environmental safety through stringent safety measures, regular inspections, and the protection of urban green spaces and water resources can mitigate risks and provide critical resources during emergencies. These measures can contribute to the overall well-being of residents and enhance the city's ability to withstand both man-made and natural disasters.

Incorporating these strategies into urban resilience frameworks can enable EU cities to better withstand the impacts of conflict and create safer, more adaptive, and supportive environments for their residents. The experiences of Ukrainian citizens can serve as a valuable guide, demonstrating the importance of proactive preparedness and the need to dispel notions of implausibility regarding conflict. From these insights, EU cities can develop robust, resilient, and inclusive urban environments that are well-equipped to navigate the complexities of the future, fostering a culture of preparedness and adaptability.

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