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## L.V. Sergienko, D.Sc. in Public Administration, As. Prof. D.M. Zakharov, Ph.D.

*Zhytomyr Polytechnic State University* 

# War damage assessment methods: approaches to restoration and compensation

The article examines the methods of assessing losses due to war. The focus is on two fundamental approaches in valuation: cost and market. Each approach involves different evaluation methods, which are considered through the prism of their practical application, advantages, and limitations. Cost methods are beneficial for determining compensation for damage and destruction of assets, as they include all costs necessary to restore the lost function of the asset. The market value method determines the current market value of damaged assets, which is relevant for the valuation of residential and commercial buildings. The article emphasizes the importance of adhering to internationally recognized valuation standards to ensure fair and reasonable compensation. Regardless of the legal mechanisms to obtain financial compensation, the assessment process must be transparent and consistent. This quality characteristics is particularly important in international legal institutions, where compensation claims must be admissible to national and international bodies. The results of the study emphasize the relevance of using appropriate assessment methods for developing effective strategies for post-conflict recovery and making informed decisions about allocating resources and planning reconstruction activities.

*Keywords:* assessment; restoration; war; state; public policy; urbanization; urbanized areas; international aid.

**Relevance of the topic.** Financial and accounting assessment of war damage is important in the context of assessing the economic value of the damage and efficient allocation of resources for recovery, as well as from the standpoint of formulating and implementing a sound and effective state policy in various areas of socioeconomic development. Reliable and complete financial assessments of the consequences of the war are the basis for making informed decisions by public authorities in Ukraine and foreign governments, as well as international organisations and other donors. The article examines the main financial and accounting methods used to assess war damage and outlines their implications for post-war reconstruction.

Regardless of the legal mechanisms used to obtain financial compensation and restoration, the assessment procedure should be transparent, consistent, independent, and most importantly, compliant with internationally recognised valuation standards. Such compliance with international standards, and not just national ones, will help to safeguard potential future appeals and challenges to the fairness of damage assessments and compensation payments. The determination of financial compensation in post-conflict situations is case-specific, requiring a thorough understanding of the applicable valuation methodologies.

As of 1 January 2024, the estimated amount of losses made by the analytical team of the Kyiv School of Economics is \$155 billion. At the same time, the largest share in the total estimate of direct losses is residential buildings (\$58.9 billion), infrastructure (\$36.8 billion), business assets, and industry (\$13.1 billion) [12]. The intensity and nature of hostilities means that urbanised areas suffer the greatest damage. This increased level of destruction can be explained by several factors. Urbanised areas have a higher density of infrastructure, buildings and structures. This includes residential buildings, commercial properties, industrial plants, transport networks and utilities such as water, wastewater, heating and electricity systems. The concentration of these assets makes urbanised areas more vulnerable to large-scale damage during conflicts and disasters. Complex and extensive systems of key infrastructure and strategic facilities are developed in urbanised areas and, as a result, become targets during armed conflicts. These can include government buildings, communication centres, transport hubs and industrial facilities. Targeting these critical infrastructure not only causes direct physical damage, but also disrupts essential infrastructure networks and economic activity.

The study of war damage assessment methods is relevant due to the growing number of armed conflicts in the world that cause significant economic and social losses. In particular, determining the exact amount of damage is critical for fair compensation, recovery planning, formulation and implementation of public policies, as well as strategies to ensure security and minimise the threat of conflict and war. Without proper damage assessment, it is impossible to effectively rebuild destroyed infrastructure, compensate for business losses, and provide adequate support to affected communities.

Analysis of recent research and publications. One of the main problems in assessing damage caused by hostilities and the occupation of state territories is the inability to document the fact of damage caused due to the lack of or limited access to the object [11]. Additionally, the procedure for assessing damage is complicated by the scale of destruction, primarily of infrastructure, as the damage caused requires a comprehensive assessment,

not just determining the cost of damage to a physical object. The valuation of objects under conditions of uncertainty was studied by D.M. Isaev. The problem of economic uncertainty arises when costs or value need to be identified with two or more objects of accounting [13].

In the study of P.Thomas, L.Simonova [9] on the assessment of war damage for financial compensation after a war or armed conflict, three main categories of assessment are mentioned:

1. Damage to and destruction of assets and businesses – this includes physical damage to or total destruction of buildings, infrastructure and equipment. The replacement cost method is often the most appropriate basis of valuation in such cases because it estimates the cost of restoring or replacing damaged assets with new assets of the same type and quality;

2. Expropriation of assets and companies is a category in which profit-generating assets or entire companies are confiscated or expropriated, so the market value approach may be the most appropriate basis for determining value. This approach determines the value for which assets can be exchanged between knowledgeable, willing parties in an arm's length transaction;

3. Economic damage to assets and companies -a category that assesses the broader economic impacts, including loss of business profits and increased operating costs due to the conflict. Estimating these damages requires a detailed assessment of pre- and post-conflict economic conditions, often involving sophisticated financial modelling.

In order to apply effective methods of assessing war damage, it is important to take into account practical experience gained in the past. Cities such as Dresden, Tokyo, and London are examples of disproportionate damage in urban areas. During the Second World War, these urban centres suffered massive destruction due to strategic bombing aimed at undermining economic and military capabilities [1, 2, 10]. The war in Syria is an example of the displacement of millions of people and significant losses as a result of hostilities. Major urban centres such as Aleppo and Homs have suffered significant damage to critical infrastructure and cultural heritage sites, leading to large-scale internal and external migration processes [3, 5].

A separate example of critical destruction of a highly urbanised area is the city of New Orleans, which suffered infrastructure destruction as a result of the floods, leading to a humanitarian crisis and long-term recovery both economically and socially. It took more than 8 years to restore the physical environment and infrastructure, and the cost of damage was more than \$40 billion [7].

The concentration of assets, high population density, strategic importance, complex architectural environment and significant economic and social role of urbanised areas contribute to a higher level of destruction and damage during wars and disasters. Taking these factors into account is important when developing an effective methodology for assessing destruction and damage, formulating development and urban planning strategies and policies to minimise and/or overcome the effects of disasters in urban areas.

**Summary of the main material.** International Valuation Standards (IVS) regulate approaches to determining the value of assets and provide a comprehensive framework for assessing their value in various circumstances. At the same time, the IVS do not contain methodological recommendations and methods for valuing war damage for financial compensation purposes, but existing methodologies can be easily adapted to this context. The choice of the appropriate «basis of value» under the IVS framework depends on the specific circumstances of each compensation case.

Section 10.1 of the International Valuation Standards [4] identifies 3 main approaches, each of which includes different detailed methods of application and differs in the basis of valuation: market approach, income approach, and cost approach. Taking into account that the income approach and methods of this approach are based on discounting future cash flows to the present value, this approach cannot fully provide an objective assessment of losses and damage caused by hostilities. Accordingly, the market and cost approaches may be used to assess war damage.

The cost approach involves the use of three methods (IVS 70.1): replacement cost method, replacement cost method and summation method.

Each method offers a different way of estimating the value of an asset and is often used when market data is not available or when specific assets require a detailed approach to valuation.

*The Replacement Cost Method* is the value that is relevant to determining the price that a participant would pay because it is based on the reproduction of the asset's utility rather than the exact physical properties of the asset (paragraph 70.2 of the IVS). This method is particularly useful when an exact copy is not necessary or practical. The focus is on the utility and functionality of the asset rather than its exact physical characteristics. The method is typically used to value buildings, equipment and other assets where the primary objective is to recover the asset's value in use rather than to create an identical copy.

The principle underlying replacement cost is to ensure that compensation covers the full costs necessary to restore an asset to its pre-damage condition. For example, if a building is destroyed, the replacement cost would include all the costs of constructing a new building of similar size, occupancy and usefulness without deducting any depreciation that may have been incurred on the original building. The objective of this method is to ensure that the consideration provided is sufficient to restore the asset to its original functional standard.

Reproduction Cost Method measures an asset by calculating the cost of producing an exact copy of the original asset using the same materials, design and workmanship. This method is best suited for assets of historical or unique significance where it is important to retain original features.

According to clause 70.6. IVS, the use of the reproduction cost method is appropriate in the following circumstances: (a) the cost of a new (modern) equivalent asset is greater than the cost of reproducing a copy of the relevant asset, or (b) the utility offered by the relevant asset can be provided only by a copy and not by a modern equivalent [4].

This method is often used to value historic buildings, antiques and other unique assets where an exact copy is required to preserve authenticity and historical value.

Summation Method also known as the underlying asset method, is typically used for investment companies or other types of assets or entities for which cost is the primary factor in the value of their assets (IVS 70.8). A summary method that measures an asset by determining the value of the individual values of its component parts. Each component is valued separately, and the total value is the aggregate of those individual values. This method is appropriate for complex assets that consist of separate components where the value of each component can be measured independently. An example of an effective application of the method would be in the valuation of an industrial plant, where the summation method would involve valuing each machine, building, etc., independently and then adding those values to arrive at the total value of the asset.

The choice of valuation method for assets under the cost approach depends on the nature of the asset being valued and the specific circumstances of the valuation. The replacement cost method focuses on the restoration of utility, the reproduction cost method is important in circumstances where exact restoration is required, and the summation method aggregates the values of individual components. In the context of war, cost-based methods of assessing the cost of restoration are particularly useful because they provide a comprehensive assessment of the financial compensation required to restore primarily critical infrastructure: roads, bridges, hospitals, power plants, etc. In fact, the cost approach is based on determining the actual costs to be incurred for replacement, which creates a guarantee for the affected party to receive sufficient funds to fully restore its assets.

An example of the effective use of the cost approach in assessing damage and implementing a recovery strategy in urban areas is South Korea [6]. The country's problem arose as a result of rapid urbanisation processes, which led to severe soil erosion in mountainous regions, primarily due to improper soil management methods and improper field planning and mistakes in the development of urbanised areas. New land management methods have been proposed to address the problem, but the effectiveness of these methods needed to be evaluated. To assess the economic benefits of the new management methods, the researchers applied the RCM (Reproduction Cost Method), focusing on the costs associated with physically replacing lost soil, nutrients and water.

The net present value of annual restoration costs over a 15-year period was 2,045,754 won [6]. When estimating the cost of new management practices (costs included compensation payments, soil replacement, nutrient replacement, and mulching), the net present value of the costs was 1,074,249 won [6]. The analysis showed that the cost of implementing new soil management practices was approximately half the replacement cost of long-term erosion under current practices. The net present value calculation showed significant long-term savings and benefits, indicating that the new management practices were economically viable and worth implementing.

Effective implementation of RCM depends on accurate and complete data collection. In this case, accurate measurements of soil, nutrient and water losses were crucial. Ensuring reliable data is essential for realistic cost estimates.

RCM has provided a reliable basis for assessing the economic benefits of new land management practices in Korea. By taking into account replacement and depreciation costs, it facilitated a comprehensive assessment that contributed to informed decision-making by resource managers. The case study highlights the importance of accurate data, stakeholder engagement, and ongoing monitoring in the practical implementation of the DRC method for soil erosion control.

Full compensation for war-related land losses will encompass several important elements to restore its utility and value in Ukraine. This includes demining, environmental restoration and addressing the loss of agricultural fertility. These components ensure that the land is safe, suitable for future use and ecologically restored to its pre-damage condition.

A market-based approach should be used to determine the value of assets prior to the outbreak of hostilities. Pre-war valuation is important for assessing the extent of damage and calculating fair compensation. In addition, in the legal context, pre-war valuation helps to resolve disputes related to compensation and reimbursement, forming an objective basis for valuation.

Paragraph 30.1 of the International Valuation Standards defines *market value* as «the estimated amount for which an asset or liability would be exchanged at the measurement date between a buyer and a seller in an arm's length transaction, after due consideration of the market and where each party acted knowledgeably, prudently and without compulsion».

The market value approach takes into account factors such as the location of the asset, its condition and market conditions, which allows for a realistic valuation based on market dynamics rather than the replacement cost of the cost approach. The market approach is particularly suitable for valuation of residential property and commercial buildings. The difficulty in applying this approach lies in obtaining accurate and comprehensive historical data. Market conditions can change significantly, and valuations must take into account economic volatility and inflation to remain accurate. The valuation should also minimise subjectivity in decision-making and analysis of historical data.

An example of the application of the market value method to assess war damage is Syria, particularly taking into account the length of the war in the country. To accurately assess the financial impact and plan reconstruction, the market value method was used to estimate the value of destroyed properties. For example, many residential buildings in the city of Aleppo were severely damaged or completely destroyed.

A useful practice in assessing damage in the Syrian case study is to classify the level of damage. Based on the established level of damage, each asset was assigned a physical damage status based on three classifications: no damage, partial damage (less than 40 per cent of the asset is damaged) and total destruction (more than 40 per cent of the asset is damaged) and total destruction (more than 40 per cent of the asset is damaged) and total destruction (more than 40 per cent of the asset is damaged or the damage is structural). The working condition of the facilities (functional or non-functional) was assessed separately to determine the level and quality of service provision in different sectors [8]. The appraisers used the market value method to determine the market value of buildings before the destruction, taking into account the conditions of the local property market before the war. This involved analysing comparable property sales data, adjusting for factors such as location, size and condition of the property. The application of the market value method provided a realistic estimate of the financial losses incurred by homeowners. By estimating what the properties would have been worth on the open market before they were destroyed, stakeholders could better understand the extent of the economic damage. This assessment was crucial for compensation claims when displaced asset owners sought to recover their losses, as well as for international aid agencies planning financial assistance and reconstruction programmes.

The market value approach is useful in the valuation of commercial buildings because it takes into account the potential income generating capacity of these buildings, their strategic location and the demand for commercial property. This approach has helped business owners and investors understand the financial impact of the war on their assets and make informed decisions about restoring or relocating their businesses.

It is worth noting that losses from war may be indirect, but they cause significant damage to the socioeconomic state of the country. Thomas P., Simonova L. [9] point to the overall economic damage from war. This situation often arises due to the indirect impact of war on the normal business environment. For example, in Ukraine, maritime trade has been seriously disrupted, resulting in significant trade losses and increased costs, as businesses are forced to switch to land routes, incurring significant additional costs and loss of profit [9]. In such cases, the economic damage is calculated as the difference between the conditions of economic activity in the absence of war and the actual conditions that resulted from the war.

Economic damage is quantified by comparing the financial performance of the company under normal prewar conditions with that during the war. This involves a detailed financial analysis to identify the loss of revenue and increased operating costs that are directly attributable to the war. Businesses need to document the specific ways in which the war has affected their operations, such as disruptions to supply chains, increased transport costs and restricted market access. This documentation is the basis for calculating the financial impact.

The complexity of assessing war damage in Ukraine is exacerbated by the fact that entire urbanised areas have been destroyed and damaged. The high population density of urbanised areas means that any destruction has an impact on a larger number of people. Such destruction can lead to greater loss of life and injuries, which exacerbates the overall impact of the destruction. Destruction in urbanised areas has significant economic and social consequences. Such centres are often economic hubs, and their destruction affects businesses, leads to outmigration and undermines economic stability. It is the social fabric of communities that is affected by the displacement of families, and basic social services such as health, education and security are at risk.

Accurate assessment of financial compensation requires comprehensive data collection. This includes historical financial records, market data and any available information on pre-war business conditions. To meet strict evidentiary standards, companies must produce detailed documentation that is subject to verification. This may include contracts, invoices, shipping records, and communications that clearly demonstrate the impact of war on operations. Engaging independent auditors or assessments experts can help ensure that data and documentation meet the required standards and provide an impartial basis for compensation claims.

During hostilities, access to accurate and complete data can be difficult due to destruction, displacement, and other disruptions. The economic environment during and after war can be very volatile, making the assessment process difficult. The need for detailed and clear documentation to support claims can be burdensome for businesses already affected by war.

**Conclusions and prospects for further research.** The study of the methods of assessing the damage caused by the war, based on financial and accounting data, was conducted. These methods are important for understanding the economic consequences of the war and for planning restoration and reconstruction processes.

Major valuation methods such as the replacement value method, the depreciated replacement value method, and the market value method are reviewed through the prism of their applications, advantages, and limitations.

The study shows that in order to ensure fair and reasonable compensation for war damage, it is necessary to adhere to internationally recognized standards of assessment. Regardless of the legal mechanisms used to obtain financial compensation, the assessment process must be transparent, consistent and independent. This is particularly important in the context of international conflicts, where compensation claims must be acceptable to both national and international sides. Thus, the study of war damage assessment methods is relevant and important for the development of effective post-conflict recovery policies and strategies, as well as for making effective public-management decisions in various areas of socio-economic development. After all, the use of reasonable and adequate methods of assessing the consequences of war allows not only to reliably and fully determine the amount of damage caused, but also contributes to the adoption of effective decisions regarding the distribution of resources, planning of post-war recovery measures and, in general, the formation and implementation of a rational and effective state policy for the development of the affected territories as a result of the war.

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Sergienko Larisa Vasylivna – Doctor of Sciences in Public Administration, Associate Professor, Dean of the Faculty of National Security, Law and International Relations of Zhytomyr Polytechnic State University. https://orcid.org/0000-0003-3815-6062.

Scientific interests:

- the state policy of ensuring the security of urban areas.

**Zakharov** Dmytro Mykolaiovych – Doctor of Philosophy, Associate Professor of the Department of Information Systems in Management and Accounting of Zhytomyr Polytechnic State University.

https://orcid.org/0000-0003-3423-0093.

Scientific interests:

- accounting and analytical support for the management of the social capital of the enterprise;
- accounting and analytical system of transfer pricing.

### Сергієнко Л.В., Захаров Д.М.

## Методи оцінки збитків від війни: підходи до відновлення та компенсації

У статті досліджено методи оцінки збитків внаслідок війни. Основна увага приділена двом ключовим підходам в оцінці: витратному та ринковому. Кожен з цих підходів передбачає застосування різних методів оцінки, які розглядаються через призму їх практичного застосування, переваг та обмежень. Витратні методи особливо корисні для визначення компенсації за пошкодження та знищення активів, оскільки містять всі витрати, необхідні для відновлення втрачених функцій активу. Метод ринкової вартості визначає поточну ринкову вартість пошкоджених активів, що є актуальним для оцінки житлових і комерційних будівель. Стаття підкреслює важливість дотримання міжнародно визнаних стандартів оцінки для забезпечення справедливої та обгрунтованої компенсації. Незалежно від правових механізмів, які використовуються для отримання фінансової компенсації, процес оцінки має бути прозорим та послідовним. Такі якісні характеристики особливо важливі в контексті міжнародних правових інститутів, де компенсаційні претензії мають бути прийнятними як для національних, так і для міжнародних органів. Результати дослідження підкреслюють актуальність використання належних методів оцінки для розробки ефективних стратегій постконфліктного відновлення та прийняття обгрунтованих рішень щодо розподілу ресурсів і планування реконструкційних заходів.

**Ключові слова:** оцінка; відновлення; війна; держава; державна політика; урбанізація; урбанізовані території; міжнародна допомога.

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