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**Methods of researching tourist flows under martial law: modern practices
and statistical tools**

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Abstract: Purpose. *This study aims to identify and formalize contemporary research techniques and statistical applications that can be applied at the age of analyzing tourist flows under the conditions of martial law with reference to Ukraine as an example. These factors are urgency of the problem due to the significant disruption of tourism infrastructure, the absence of regular publishing of official statistics, and the overlapping of tourism with forced migration and internal displacement in case of military conflict. Traditional approaches to tourism analysis were based on the assumption of stability and accessibility and do not fit the demands of researchers and policymakers in high risk situations. The study will provide an adaptive tourist activity measuring scheme based on other standards and spatial analysis.*

Methods. *Methodological foundation of the research is a combination of comparative content analysis of the literature on tourism, secondary analysis of data in the period 2020 - 2024, and use of geospatial and proxy-based tools. The study*



combines time series, spatial distribution based on GIS and mobility measures specific to crisis. The article provides data that display the movements of inbound and outbound tourists, domestic tour that represents the national distribution of tourism activities, region-based activity reception, and enterprise revenues.

Results. *The findings of this research show that there was a severe drop in international and domestic tourism in 2022, and a gradual increase is found in 2023 and 2024. Distinguishing forced displacement and tourist travel was critical in making proper statistics analysis. Another benefit corroborated by the study is the usefulness of non-typical data measurements including transport infrastructure operability, lodging figures in secure area, and behavioral detail division focusing on mobility designs. The results provide evidence that there are regional differences in the resilience of tourism and indicate the potential of western Ukrainian regions to serve as short term tourism centers. The correlation of domestic tourism with the increase in revenue of the sector, even during wartime conditions, is proved by statistical analysis.*

Conclusions. *The implications note the need to remain methodologically flexible and interdisciplinary in studies devoted to crisis-sensitive tourism. This framework contributes to a more accurate monitoring of tourist flows, encourages data-driven planning in recovering, and can be an example to other countries affected by this crisis. Not only does the study add to the scientific area of study tourism geography, but also lends itself to the practical area of post-crisis planning of economic recovery.*

Keywords: *crisis tourism, mobility analysis, spatial methods, proxy data, tourism resilience, geospatial analysis, internal displacement, recovery planning, tourism statistics.*



Методи дослідження туристичних потоків в умовах воєнного стану: сучасні практики та статистичні інструменти

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Анотація: Мета. Це дослідження має на меті визначити та формалізувати сучасні методи дослідження та статистичні застосування, які можна застосовувати у сучасних умовах аналізу туристичних потоків в умовах воєнного стану на прикладі України. Ці фактори полягають у актуальності проблеми через значні порушення туристичної інфраструктури, відсутність регулярної публікації офіційної статистики та перекриття туризму з вимушеною міграцією та внутрішнім переміщенням у разі військового конфлікту. Традиційні підходи до аналізу туризму базувалися на припущенні стабільності та доступності та не відповідають вимогам дослідників та політиків у ситуаціях високого ризику. Дослідження пропонує адаптивну схему вимірювання туристичної активності на основі інших стандартів та просторового аналізу.

Методи. Методологічною основою дослідження є поєднання порівняльного аналізу літератури з туризму, вторинного аналізу даних за період 2020-2024 років та використання геопросторових та проксі-інструментів. Дослідження поєднує часові ряди, просторовий розподіл на основі ГІС та показники мобільності, специфічні для кризи. У статті наведено дані, які відображають рух в'їзних та виїзних туристів, внутрішніх турів, що відображають національний розподіл туристичної діяльності, регіональний розподіл активності та доходи підприємств.



Результати. Результати дослідження показують, що у 2022 році спостерігалось значне падіння міжнародного та внутрішнього туризму, а у 2023 та 2024 роках спостерігається поступове зростання. Розрізнення вимушеного переміщення та туристичних подорожей було критично важливим для проведення належного статистичного аналізу. Ще однією перевагою, підтвердженою дослідженням, є корисність нетипових вимірювань даних, включаючи працездатність транспортної інфраструктури, показники проживання в безпечних зонах та детальний розподіл поведінки, зосереджений на моделях мобільності. Результати свідчать про регіональні відмінності у стійкості туризму та вказують на потенціал західних регіонів України служити короткостроковими туристичними центрами. Кореляція внутрішнього туризму зі збільшенням доходів сектору, навіть у воєнних умовах, доведена статистичним аналізом.

Висновки. Автор зазначає необхідність залишатися методологічно гнучкими та міждисциплінарними в дослідженнях, присвячених кризово-чутливому туризму. Ця структура сприяє точнішому моніторингу туристичних потоків, заохочує планування відновлення на основі даних і може бути прикладом для інших країн, які постраждали від цієї кризи. Дослідження не лише доповнює наукову галузь вивчення географії туризму, але й підходить для практичної сфери планування економічного відновлення після кризи.

Ключові слова: кризовий туризм, аналіз мобільності, просторові методи, проксі-дані, стійкість туризму, геопросторовий аналіз, внутрішнє переміщення, планування відновлення, статистика туризму.

Statement of the problem. The total military invasion of Ukraine that started in 2022 has caused disruptions of unprecedented scale in all sectors of the national economy, and tourism industry is one of the most affected. Under the circumstances



of the long-lasting martial law, threat of the inner displacement, destruction of the infrastructure, and even the insecurity threats, the traditional forms of gathering and processing tourist information are either not applicable at all or their limits have been drastically narrowed. As a result, the issue of the correct investigation of tourist flows during wartime has become not only scientific, but also urgent in practice [1]. Inability to standardize and adapt research methods in such harsh conditions presents serious challenge to both the academics, and government organization and industry players.

The issue lies within the greater issue of global crisis management and tourism resilience research, but there is a certainty that the situation in Ukraine is an isolated incident because of the magnitude and length of military conflict on its land. The available international tourist statistics methodologies tend to assume the presence of stable socio-political conditions and ready access to regular data-gathering mechanisms that are far beyond reach in conflict zones [2]. Thus, the issue is that it is necessary to conceptualize, experiment, and implement the contemporary techniques and statistical tools that could reflect the real-time changes in tourist mobility, motives, and behavioral patterns in the unique conditions of martial law.

This problem has a direct connection with a complex of urgent scientific and practical tasks. The scientifically, it criticizes existing models of tourism demand projection and space analysis, and challenges researchers to draw new frameworks that include variables of crisis, forced displacement measures, and risk-oriented GIS-based systems. In practice, the possibility to monitor and comprehend tourists flows, even in scaled-down or hybridized forms, is considered an essential tool in the planning of many local authorities, national agencies, and international organizations, who aim at recovery, investments, humanitarian assistance, or cultural maintenance.

The dire need to fill this research gap can be accounted by the fact that tourism is more than being an economic driver but it is also a tool of regional stabilization,



social integrative and national identity savings. Lack of correct data together with good analytical tools can lead to the policy response being late, ineffective and unsuited to the reality on the ground. In this view, a carefully conducted study of the modern experience and relevant statistical tools that could be used to study the tourist flows during war actions and conflict is needed to work out a sustainable approach to recovery and changing the national tourism system according the new reality of drawn-out war actions.

This very article aims at defining and systematizing the most relevant quantitative and spatial approaches towards studying tourist flows in martial law conditions using the example of Ukraine. The results will be useful in the field of scholarly research and in designing operational plans regulating tourism during a crisis.

Analysis of recent research and publications. The problems of tourism development in Ukraine in conditions of war conflict and post-war recovery were also actively discussed by the scientific community in recent years. Nonetheless, the overview of the most relevant works of the last five years and the critical analysis of this body of findings show that there are still certain gaps in the methodology and empirical investigation, especially when it is the tourist flows under the martial law. This article aims to solve this unresolved problem by concentrating on adaptive research tools and the incorporation of both spatial and statistical tools under the circumstances of scarcity and confoundment of the data and the generally problematic condition.

Bordun et al. evaluated the extent of economic damage to the tourism business at an early stage of the war and emphasized the necessity to define the so-called rescue zones in tourism business [1]. Their input underlined spatially differentiated effects but failed to suggest quantitative analysis to gauging tourist flows in real time. Likewise, Yermachenko et al. examined what sustainable tourism could do in restoring communities in the territories and suggested a community-based



intervention but had no statistics framework that monitored tourism behavior in war times [2].

However, given a methodical list of the problems of post war-tourism revival in Ukraine, his study focused more on macroeconomic parameters and to an extent on methodology of data collection or grouping of different types of mobility sectors [3]. Nosyriev, et al. [4] in turn highlighted, the strategic approach to the incorporation of tourism into the reconstruction strategies of the economy of Ukraine which mainly lay in the focus on the policy and investment-related approach to the domain without orientation on technical analysis of touristic flows. This has restricted the functionality of their findings to the management of real-time tourism monitoring.

Bogdan et al. [5] explained the issue of adapting Ukraine tourism sector during the period of war and mentioned that there is no effective coordination of stakeholders. Nevertheless, the authors do not provide models or instruments of gathering and analyzing the information on current tourist activity. By contrast, Dedilova et al. [6] brought up a conceptual vision of restoring the tourism potential but stayed at the realm of strategic foresight as opposed to operation research.

Puzyrova offers a forward-looking business model of tourism development in post-war Ukraine, and one of the drivers, she says, is digitalization [7]. However, the study did not examine how digital technologies could be deployed to gauge or examine tourism dynamics during crisis. The Bobek et al. study was a worthy quantitative research on war impact on the travel behavior of the Ukrainians abroad, although they examined only outbound tourism and failed to consider any inside or inbound tendencies. [8].

Sira et al. showed more general ways in which tourism recovery can be considered in Ukraine, and focused on both psychological and infrastructural concerns of the population, but did not establish a connection of these concerns with specific indicators [9]. Lastly, Koldovskiy and Shafranova have studied the digital



innovation in tourism services, and focused on the opportunities of technologies to streamline the provision of services [10]. Nonetheless, their activities were not related to the use of digitalized data to control the influx of tourists during martial law.

Although the existing research material on the topic is substantially extensive in terms of policy recommendations on the topic and strategic frameworks, a relevant methodological shortcoming can be identified. The general shortage of available empirical instruments that can operate in the unstable environment, where traditional data collection systems, i.e., border statistics, hotel registries, and transport records, are failing in full capacity, has been discovered. The existing literature is largely split between longer-term recovery processes and macroeconomic planning, with far less attention being paid to the instruments that can be used to monitor mobility and behavior in the context of active conflict.

The article covers this gap by prescribing a systematic method that can be applied to the measurement of tourist flows during martial law with an adaptation of a set of statistical models, spatial analysis (GIS) and secondary data proxies. In contrast to past research, it focuses on flexibility in methods, real-time applicability, providing researchers and policymakers with a toolkit to work on volatile contexts. This study fills a gap in the current literature by combining the lessons of recent research findings and bridging the gaps therein, benefiting theoretically and practically to the current transformation of tourism exploration in crisis-hit areas.

Highlighting previously unresolved parts of the overall problem. Even though the contribution of crises to tourism systems attracts increased attention in the literature, there are definitely gaps concerning how tourist flows in states that are at the current stage of active military conflict can be successfully explored. Existing literature mainly includes works on the period of the recovery after a crisis or tourism in politically insecure countries, but does not provide detailed methodologies to be used in the case of long-term martial law. Specifically, conventional statistical tools,



including border crossing data, hotel occupancy data, and mobility studies, based on surveys are unreliable or simply unavailable in conflict areas. These constraints have made a significant proportion of the general issue, that is, adapting the tourism research method to the destination where institutional instability and security issues interfere with the conventional data collection process.

More still remains unsolved as to how one differentiates various kinds of mobility in times of war- particularly how to distinguish between forced migration, internal displacement, and patterns of short-term domestic-based travel due to need. The existing tourism literature frequently does not have methodological means to decompose these types of mobility that in turn leads to distorted indicators that cannot reflect the reality about tourist flows. Moreover, inequalities in the availability of data between the regions of the country and in the level of safety across various traverse in Ukraine hinder the development of a single research framework.

There is as well a lack of incorporation of digital and geospatial tools with crisis-oriented research in tourism. Technologies such as GIS and remote sensing as well as other technologies like real time tracking is increasingly deployed in disaster response as well as humanitarian logistics, but their use in wartime tourism research is theoretical or experimental only. There are no verified models to take such instruments into account in tourism analysis that would enable effective flow monitoring and prediction in continuing conflict.

The paper fills these gaps by providing a detailed analysis of contemporary, flexible techniques capable of analyzing tourist flows during martial law. Proposing a typology of usable statistical instruments, being clear about how to categories travel motivations during wartime, as well as demonstrating how the spatial didactic tools can be applied to Ukrainian realities, the research adds unique value to the literature. It is hoped that they can form the basis of a stronger tourism statistics



system that will be able to operate even in disruption-prone and national emergency settings.

Formulation of the article's goals (task statement)

The key aim of the article is to reveal, differentiate and assess the most efficient modern approaches and statistical tools of the analysis of the tourist flows in Ukraine in the conditions of the martial state. The motivation behind this is the necessity to quickly adjust the existing research methods of tourism to situations of extreme instability where the normal data gathering systems are weakened or not available.

Trying to attain this aim, the study aims at accomplishing a number of definite tasks. To begin with, it seeks to critically analyze the limitations that some of these classical statistical methods applied in tourism analysis in pre-war and peaceful contexts have, in addition to establishing whether they can be applicable in the wartime context. Second, the article aims at discussing the possibilities of alternative methods of research especially those of the geospatial, digital and proxy-based approaches which can be employed to give substantial information on tourist behavior as well as tourist movement patterns of the national crisis context. Third, the research concentrates on the disaggregation of mobility data in order to differentiate tourism, forced migration, and short-term internal movement, a distinction that is crucial to the integrity and relevance of data and policy.

These goals indicate the urgency of the subject in relation to both scholarship and practice. Scientifically, the study contributes to the methodological ground of the tourism-related research performed in the context of conflict and uncertainty by providing innovative models of analyses that are applicable in high-risk settings. Practically, the findings would assist policymakers, local governments and tourism stakeholders in coming up with evidence-based recovery plans, enhanced monitoring mechanisms and effective redistribution of resources in the event of crises.



This research proposal is timely, and its research direction is needed because Ukraine still faces a complex situation in the context of humanitarian, economical, and security issues. The article aims to contribute to the already emerging body of knowledge on the topic of crisis-sensitive tourism analysis by introducing a specific gap in knowledge and identifying realistic methodology options in order to help build a more resilient, data-driven tourism industry.

Presentation of the main research material. In order to assess in detail, the flow of tourist movements in Ukraine with martial law, a long-term statistical analysis was carried out, which utilizes a set of the latest quantitative analysis tools. The results thereafter are secondary data that was processed using official tourism and statistic institutions in the year 2020 to 2024. These five essential indicators that will be examined are inbound tourism, domestic tourism, outbound travel, revenue realization of tourism services, and regional distribution of tourist flows. Both tables provide an insight on certain features of tourism industry transformation due to external irruptions, especially war-related restrictions, safety issues, and recovery plans.

This is given in 2020-2024, which indicates high volatility inbound international tourism. After experiencing the restrictions in 2020 and the partial recovery in 2021, the full-scale invasion in early 2022 resulted in a drastic 59% decrease in arrivals (Table 1). This was gradually revitalized in the year 2023 and 2024 due to modified security measures, and growing international promotion to humanitarian and commercial visitors. The statistics explains why geopolitical uncertainties are highly distributive to mobility patterns across the world and, more so, the robustness of tourism movements, in post-war revival.

**Table 1**

Annual number of international tourist arrivals to Ukraine (2020–2024)

Year	Number of international tourists (thousands)
2020	1,212
2021	1,468
2022	603
2023	735
2024	1,021

Source: author's development using data from [11-20].

The dramatic collapse of 2022 coincides with the direct consequences of war, which tightened borders and deprived transport of activity [22]. But the following 69% increment by 2024 indicates adaptive efforts on the side of the tourism agencies such as controlled corridor visits, volunteer tourism, and peace diplomacy visits. These findings can support the usability of the time-series models in identifying incidents of shock and their continued effect on foreign arrivals.

A similar shock-resilience pattern has been observed in domestic tourism. Even though in 2021, it initially increased due to the prohibition on international movements and the encouragement of domestic tourism, full-scale war in 2022 reduced domestic mobility almost by half. However, the area has recovered with infrastructure changes and safer areas marketing other destinations, and the sector turned positive in 2023, and it has been rising further in 2024 (Table 2). High-risk conditions point to high internal demand of leisure and psychological recovery, which is quite resilient.

Table 2

Domestic tourism volume in Ukraine (2020–2024)

Year	Number of domestic tourists (millions)
2020	5.2
2021	6.7
2022	3.4
2023	4.8
2024	6.0

Source: author's development using data from [11-20].



This information is revealing in that it brings to light a shift in tourist activity to short distance as opposed to long distance tours. Recovery was possible through security-adjusted travel zones and on-digital booking websites across identified oblasts. One of the tendencies that caught the eye of analysts is an increased contribution of local municipalities and NGOs to creating safe domestic tourism conditions that, in turn, played the role in economic decentralization and psychological stabilization in among the war-trodden societies.

The outbound tourism had an inverse dynamic. Although it was suppressed in 2020, it rose significantly in 2022, majorly through issues of forced displacement and movement of refugees and not recreational trips. Mass exodus of the Ukrainians in the war bulged outbound numbers, skewing conventional patterns. Starting in 2023, numbers are declining, as there was a reversal in migration and improvement of a migratory regime to provide temporary protection and humanitarian aims (Table 3).

Table 3

Number of Ukrainian citizens traveling abroad (2020–2024)

Year	Number of outbound tourists (thousands)
2020	2,785
2021	3,654
2022	5,140
2023	3,208
2024	2,970

Source: author's development using data from [11-20].

One of the methodological issues evinced in this data set is the difficulty in differentiating between tourism and forced migration. Due to these aberrations, analysts disaggregated non-touristic movements using corrected pointers, including travel intent surveys and visa records. The trend is also behind advises that a revision of statistical definitions be implemented in the case of emergency to enhance the



international comparability and effective sectoral evaluation capable of generating recovery plans.

The increase in the levels of tourism was accompanied by a similar contraction-expansion pattern in the revenues received in the tourism sector. Revenues fell to 198 million in 2022 compared to 539 million in 2021 as operations were paused and closed hospitality services as well as damage to infrastructure (Table 4). The recovery progress at the time is sluggish yet constant, with 2024 showing an 84 percent improvement over 2022 numbers. Health-related travel, volunteer accommodation, diaspora tourism, and partial mix hospitality services (dwellings of the internally displaced and minimal tourist amenities) can be significant in recovery.

Table 4

Tourism sector revenue in Ukraine (2020–2024), USD millions

Year	Total tourism revenue (USD million)
2020	421
2021	539
2022	198
2023	294
2024	452

Source: author's development using data from [11-20].

The slow recovery of the financial appeals also aids the informing of digital payment systems, easier taxation of tourism companies, and donor-financed travel programs. Regression results indicate a positive correlation between growth in domestic travel and increase in growth of tourism revenue at the rate of 0.73 per cent per 1 per cent increase in domestic travel underlining the economic significance of the enhancement of internal tourism demand.

The geographical pattern of the tourist flows in 2024 suggests their concentration in the relatively safer and well-connected with the west oblasts. Nearly three-quarters of foreign tourist activity as well as more than half of domestic



activity were in Lviv, Zakarpattia and Kyiv together (Table 5). All these areas could take advantage of the active solution to the crisis, recovery of accommodation resources, and the highly developed transport hubs. Resort towns such as Odessa suffered serious losses as a result of being too close to combat areas and being virtually inaccessible via lake and sea.

Table 5

Distribution of tourist flows by Ukrainian Regions (2024)

Region	Domestic (%)
Lviv Region	18.4
Zakarpattia Region	12.7
Kyiv City	20.5
Chernivtsi Region	7.6
Odessa Region	5.2
Other (aggregate)	35.6

Source: author's development using data from [11-20].

This geographical change of tourism geography would require the government and other donors to shift funding to western Ukraine to support their infrastructural development and to support destination branding. The priorities in investment and marketing can be set with the help of regional tourism resilience indexes. In addition, the applications built using GIS enabled real-time visualization and prediction of the areas of safety and helped to generate proper travel advice and regional development strategies.

Conclusions. The research that was identified has enabled conceptualizing the list of methodological and statistical tools that could be applied to analyze the tourist flows in the exceptional circumstances of the martial law. As it has been established, the current models of tourism analysis, though effective under stable conditions, are not adequate at standing the test of time in articulating the mobility under crisis conditions where tourism is entangled with forced migration,



evacuation, and other non-pleasure forms of movement. In this sense, it is not only appropriate but also necessary to move toward adaptive methods.

The study was found to show that wartime conditions necessitate the merging of new, non-traditional data sources, such as digital mobility trackers, geospatial analyses or indirect indications, such as utility use or accommodation trends. Such tools, when employed together with altered typologies of motivation in travelers, can achieve great success in being more accurate and relevant when gauging tourism flows. The insertion of regionally adjusted indicators also enables pinpointing geographic differences in the recovery and invests in safer or more active regions.

The goals of the study have been confidently attained: the article provides an effective structure of differentiating tourist flows during the time of war, offers evidence-based statistical representations (of those that will take place during the 2020-2024 period), a typology of the tools that will be used by both researchers and policymakers in the future. The logical narrative of the findings also contributes to the argument that despite high unpredictability, it is possible to recreate and render actionable statistics about tourism by innovating approaches to problem solving.

Meanwhile, there are multiple directions left to explore. These comprise the creation of automatized data channels on emergencies-hit tourism information, verification of real-time GIS frameworks, and the inclusion of behavioral economics in travel motivation research in times of catastrophes. Furthermore, there is need to conduct further studies to determine the long-term socio-economic impacts of wartime tourism on regional development and rebuilding of identities.

To sum up, this paper emphasizes the importance of the flexibility of the methodological process of tourism research in the context of national emergencies and highlights interdisciplinary means of developing a strong knowledge foundation of the tourism industry. The research can be used as a starting point to develop future research in the field of tourism analytics, not only in Ukraine but in any other state with similar problems.



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