

SIMILAR AND DISTINCTIVE FEATURES OF URBAN DEVELOPMENT ANALYSIS: METHODIC POLICY APPROACHES

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Abstract

The challenges facing Ukrainian cities today require a thorough analysis of their socio-economic development. This article proposes developing a clearer toolkit for assessing the ability of individual cities to build their economic capacity and sustainability, based on studying the socio-economic situations of urban territorial communities from different regions within Ukraine. Based on estimates of socio-economic status, an algorithm was worked out to assess this development. Taking into account the integrative nature of urban policymaking, the framework, mechanisms, and instruments of such a policy were developed, and a scheme was built to link scenarios, strategies, and instruments of urban policy. These can be applied to urban territorial communities at different stages of development.

In this study, we relied on available statistical data. However, in practice, we encountered fragmented and incomplete data, particularly regarding the migration patterns of internally displaced persons, their potential contributions to given individual city's economies, and the impact of displacement on urban planning. This made it impossible to address the challenges of maintaining security, building resilience, and developing urban planning visions. To conduct a thorough analysis of cities' resilience to challenges while also needing to maintain security, we propose expanding the range of municipal statistical data and updating the statistical observation methodology.

The practical significance of this study lies in the possibility of applying the proposed approaches to collecting and processing data on urban development and modelling scenarios and strategies for developing urban policies in Ukrainian cities with similar development conditions. Particular emphasis is placed on complying with the principles of sustainability, security, and smartification when developing urban policies for Ukrainian cities.

Keywords:

Urban territorial community, urban policy, municipal statistic observation, indexes of city economy, city smart specialization, economic security, urban resilience.

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1. Introduction

Current urban development in Ukraine is influenced by a number of trends. Some of these, such as a weak resource base, have emerged over a long period. Others have been provoked by external military aggression. Cities currently need to survive and maintain minimum living standards and protect infrastructure, while also planning for their future development. The different initial situations of individual cities, and the threatening prospects which some of them face, necessitate not only the formation of a common urban development policy, but also the adoption of different approaches for different cities. Various factors hinder this, primarily the different dynamics of urban development, the different socio-economic situation that exists in wartime, and the lack of comparable spatial data on cities. This raises the questions of how disparate city data can show trends in urban development; which factors stimulate or constrain them; and whether these factors are the same in all cities.

Achievement of the above also requires a different approach to analysing urban development. It follows, that three issues are relevant to this study: finding comparable data from different cities; determining what data should be included in statistical observations; and building an algorithm to regulate urban development indicators that can handle rapidly changing disparate data. This research analyses the development of cities in different regions of Ukraine that are exhibiting quite different conditions; determines what data is missing for analysis; and solves the issue of collecting it. The research also develops tools for regulating spatial development for a particular city.

The study creates a clearer toolkit for assessing the socio-economic situation of cities based on statistical observations. The methodology for studying the socio-economic development of cities was updated and an additional range of data was included in the analysis. The resulting toolkit should be disseminated to other Ukrainian cities.

2. Literature review

Existent scientific literature focuses on current urban processes, their strategic management, and the development of research methodologies. Many of the studies we relied on present the broader context of urban development and urbanisation processes. Thus, urbanisation should be viewed as a process of change between different states. According to Alam (2022), 'the development of urban settlements is a sequence of processes known as the urbanisation cycle: reurbanisation, urbanisation, counterurbanisation and suburbanisation'. Suburbanisation was the dominant process until the 1960s. Since then, counterurbanisation has increasingly influenced urban development. Reurbanisation has been the most recent phenomenon; having emerged since the 1990s.' It follows, that all urban processes can be analysed in terms of the growing scale of urbanisation around the world and in relation to individual settlements.

This situation is precisely in line with the context of decentralisation in Ukraine, where the formation of Urban Territorial Communities (UTCs) has led to urbanisation spreading to surrounding areas.

Considerable attention has been given to reforming local self-government in Ukraine, particularly with regard to decentralisation; a process that has increased the powers of city councils. Zhuk et al. (2023) assessed the results of implementing the national decentralisation reform in terms of the voluntary amalgamation of territorial communities within agglomerations. They concluded that additional management forms and opportunities are needed to regulate agglomeration processes in Ukraine.

The impact of global urban trends on the development of cities as socio-economic systems was examined in depth by Loiko et al. (2021). Relatively recent urban development trends have emerged, and researchers distinguish between the following: the effects of the pandemic on cities with broad self-governing powers (Rodríguez-Pose et al., 2023); the digitalisation of urban life aspects, city management, and the principles of development and features of digital transformation of Ukraine's regions (Irtysheva et al., 2020). Considerable attention has also been paid to the development of the smart economy (Baraniewicz-Kotasińska et al., 2022). According to Shpyliova et al. (2022), strategic urban development is based on progressive global experience and involves the introduction of e-government, e-democracy, open data, digital security, digitalised infrastructure, e-services, and the digitalisation of medicine and education.

Authors have also paid considerable attention to explaining the differences in innovation between cities, and have emphasised the importance of cities being aware of the constraints and incentives that impact innovation (Heinelt et al., 2021). Current trends also include the need for, and commitment to, implementing a low-carbon transition and building a green economy (Marino et al., 2022). Modern, widely used methods of studying urban processes are presented in Li et al. (2022). Among these methods, we note the use of cluster and factor analysis to study spatial data.

The article by Bubenko et al., (2017) presents strategic tools for urban development within the framework of established EU urban policies. The article by Borshchevskii et al., (2022) formulates proposals for public authorities and local self-government bodies to strategise regional and urban development, harmonise the strategic plans of different levels (cities and regions) with each other, and use spatial advantages.

It was also correct to take advantage of research approaches obtained in other works, as this enabled us to address issues related to our topic more broadly, including those related to security, internally displaced persons, and the effects of the pandemic. Benton et al. (2022) and Glauben et al. (2022), for example, discuss the threats to global food and energy security posed by the war in Ukraine, whereas, Voznyak et al. (2023), Mykhnenko et al. (2022) and Jurić (2022) have addressed issues relating to internally displaced persons. In addition, Lima (2024) and Long & Evans (2023) examined issues relating to supporting investment in affordable housing and changes related to the coronavirus pandemic.

This study's findings are important for informing the government's economic policies during times of crisis. In Voigtländer, & Whitehead (2023) the researchers noted that interest in rent control has increased over the last two decades as housing affordability has deteriorated, and the private rented sector has become increasingly important. This has led to increased political pressure for tighter rent regulation and a growing body of research into different ways of developing a better functioning private rented sector, including how best to support poorer tenants.

Problems of spatial balance are discussed in Buchholz (2022) and Liu et al. (2022). Glaeser and Gottlieb (2009) reviewed the concept of spatial balance, and demonstrated how it can be employed to comprehend urban growth.

Despite existing scientific developments, there are currently no scientific ideas or practical proposals for designing an algorithm that can organise and predict the dynamics of urban development indicators when dealing with scattered and stochastic data. Such tools should also be able to identify potential threats and formulate recommendations for the further spatial planning of cities which takes into account the need to respond to threats and build strategic resilience.

3. Materials and Methods

3.1. General methodic approach and theory

The long-term management of cities is based on an understanding of their vulnerabilities and growing needs, as well as the need to apply new research methods. In order to determine the prospects for city development, a long-term framework should be developed. Urban management involves ensuring the implementation of innovations and changes in a given city through resource allocation, adaptation to the external environment, internal coordination, and anticipation of future changes in activities. Ukraine's system for the strategic management of urban development is based on the Ministry of Regional Development's Order "On Approval of Methodological Recommendations on the Procedure for Developing, Approving, Implementing, Monitoring and Evaluating the Effectiveness of Implementing Territorial Community Development Strategies" (2022). Each city currently has its own development strategy for 2021–2027; these are presently being updated.

In light of Ukraine's potential integration into the EU, the study highlights the Lugano Principles (Guidelines for the Reconstruction of Ukraine) and the Guidelines for Sustainable Spatial Development of the European Continent. It also explores how these principles can be coordinated with Ukraine's state regional policies and the concept of territorial community development.

This study is based on current urban trends, specifically new regionalism and neoliberal theory. New regionalism is characterised by two interrelated features: it transcends the boundaries of national economies, and it pits regional development actors, including cities, against each other in competition without assigning them new roles in the international allocation of labour (Yuzhu, 2020).

The most notable global trend is the empowerment of regional entities, including cities. This is evident in the transfer of functions from the national level to regional and local administrative units. Many countries in Europe have gained experience in this area. Belgium, for example, has implemented federalisation, while the United Kingdom has transferred significant power from the central government to local authorities. Ukraine has also undergone decentralisation; significantly expanding the rights and powers of cities. This transformation has also included the formation of urban territorial communities with strengthened material and financial resources, as well as expanded rights. At the same time, urban policy is implicitly considered in relation to other types of public policy, and is also incorporated into public regional policies.

This paper adopts a neoliberal theoretical framework to study cities (Li & Zhang, 2022). When measured by indices of economic freedom, neoliberalism tends to be associated with economic growth and rising incomes across social classes. According to Lane (2023), the concept of neoliberalism envisages the comprehensive development of the rights and freedoms of a region's or city's residents, as well as the implementation of their initiatives and responsibility for the region's or city's development. These provisions are relevant to achieving the goals of decentralisation reform. Neoliberal theory helps explain how to ensure social stability and a minimum level of well-being under market laws; essential for urban sustainability.

This paper takes a systematic approach to analysing urban processes, and thus considers the city in the context of regional and national processes and connections. This method of cognition enables us to view the city as not only a distinct administrative and territorial unit and economic entity, but also as part of the country's governance system as well as the national economy. This enables us to evaluate the influence of macroeconomic and social trends on its development.

In this study, we define a city as an urban territorial community (UTC) formed following the reform of local self-government and the organisation of territorial authority (completed in 2020). This reform involved the consolidation of administrative units, and means that a UTC includes the city itself, as well as several surrounding villages and towns. Each urban territorial community analysed is a regional centre. Each has its own approved development strategy which contains strategic goals and measures for their implementation. These strategies contain approaches to identifying areas of smart city specialisation.

The authors relied on these facts when conducting the study, particularly with regard to determining the urban development policy.

For the analysis, cities from a range of regions within Ukraine that had been affected by the war in different ways were selected: (1) rear cities; (2) cities under periodic shelling; and (3) frontline cities under constant shelling. The rear cities (1) are Vinnytsia and Zhytomyr (central macroregion); far from the front line. Cities that are periodically shelled include Kyiv (centre) and Lviv (west). Frontline cities (3) include Kharkiv (northeast) and Odesa (south). These cities were taken into consideration to provide a broad spatial representation of cities in Ukraine.

3.2. Similar and distinct features in spatial city data gathering and curation

Existent scientific literature extensively covers the topic of urban spatial planning based on spatial data analysis. The development strategies of any city, and the implementation of urban development policies, are based on the city's current resource potential and its vision for the future (Li et al., 2022). The unevenness of socio-economic development indicators in different cities is the leading criterion for urban development (Odongo et al., 2021; Heinelt et al., 2021). To formulate urban development policies, it is important to understand the nature of such disparities and their potential impacts on cities. The relationship that exists between neoliberalism and urban socioeconomic inequality is ambiguous. Over the past two decades, inequality in income or wealth has not increased in some regions of the world, and has even decreased (for example, in Latin America) (Rutar, 2023).

The unevenness of urban development has objective reasons relating to differences in potential that have developed over time, as well as reasons relating to the current state. The main reason for this is basic resilience to external threats, which is formed differently in different cities. In Ukraine, this inequality has intensified further under martial law. This prompted a research question to study these resilience features in cities.

Our analysis of Ukrainian cities shows that the same comparable data could be used to study the socio-economic development dynamics of cities (UTCs). Statistical analysis of socio-economic development allowed us to examine data on various aspects of urban life including: industrial development, construction, sales amount, capital investment and foreign direct investment, service exports and imports, cargo and passenger turnover, and average monthly wages. The available data was analysed using economic modelling.

The study's statistical limitations are the fragmentation of spatial data. Since the data for cities was scattered, we identified what data was missing in order to obtain a thorough analysis of the spatial development of a particular UTCs. The absence of homogeneous spatial data prevents us from understanding the deeper nature of the problem. In addition, time series for different indicators and cities often do not coincide. This necessitates a focus on operating with a small amount of data. Accordingly, we used estimated data and the results of its processing. Where necessary, we applied data extrapolation methods to the data. Our analysis was based on two types of indicator: official municipal statistics and expert estimates – measurable quantitative statistical data was supplemented by qualitative expert assessments. The ways in which both the quantitative and qualitative results of statistical observations and surveys can be taken into account are described by Shevchenko (2024).

Each city that is addressed herein has both common and distinctive statistical observation data sets that are relevant to the scope of the study. Municipal statistical observations are currently conducted by the State Statistics Service of Ukraine and its territorial bodies specifically for urban territorial communities. This data is publicly available on city council websites. Municipal observations and the urban statistics based on them now offer systematic data up to, and including, 2021. However, the city council websites also contained scattered data on certain types of activities in urban communities for 2022–2024; often estimated and forecasted. The results of processing this disparate data were used in the study. The differences in the use of data from different cities are further illustrated by an algorithm for forming similar and distinct approaches to assessing the socio-economic development of UTCs.

3.3. Ways of using spatial urban data (in different cities)

Based on the above justifications for assessing similar and distinct approaches to analysing the socio-economic development of cities, as well as expanding the list of spatial data on urban development, we have developed the following algorithm for assessing the socio-economic development of cities (Fig .1).

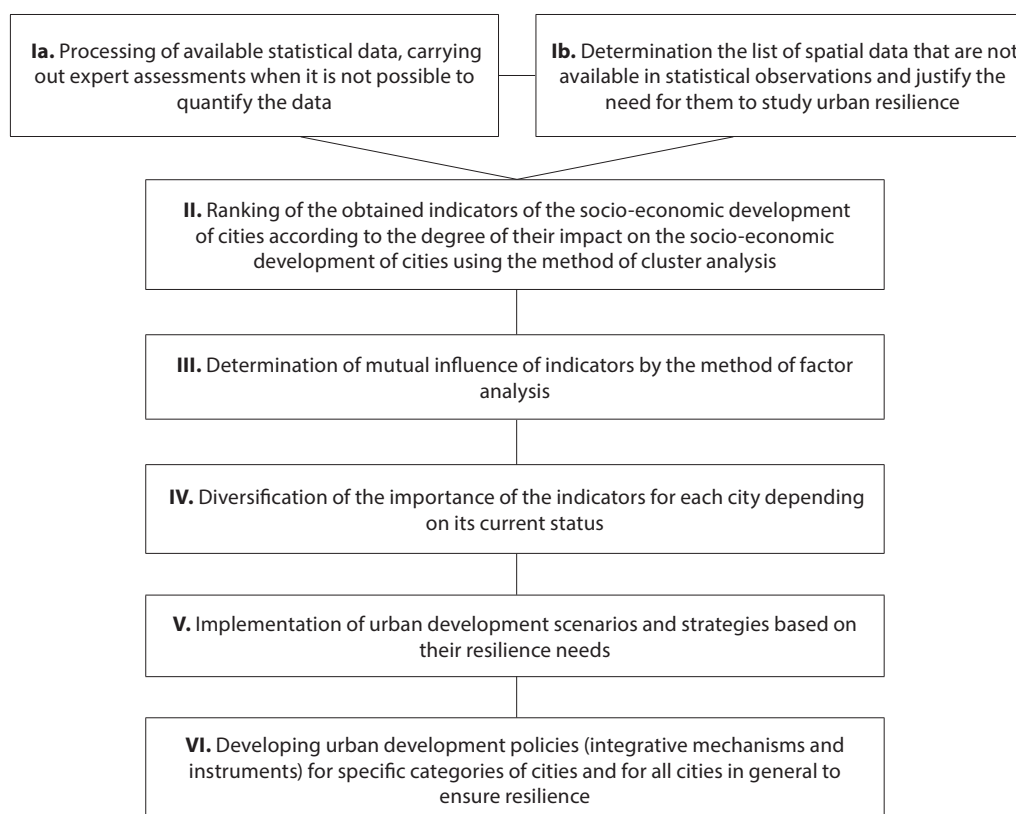


Fig. 1. Algorithm for forming similar and distinct features to assessing the socio-economic development of cities.
Source: Author's elaboration.

We applied this algorithm to Ukrainian cities with different initial conditions (rear cities, cities under fire and frontline cities) and analysed the resulting data. This allowed us to identify the most appropriate scenarios for urban development policies. Further we provide a brief summary of the application of the study algorithm for six Ukrainian cities mentioned above and the results obtained. For the purposes of this study, we focused on scenario modelling (stage V) and the development of urban development policy (stage VI).

In Stage I, we compiled a list of data monitored in municipal statistics (Ia). We also determined what additional data should be included in the analysis, given the current situation in the cities (Ib). To perform further calculations on the available data, the socio-economic indicators of urban development were converted into an analytical form. Conversion of a certain indicator for a given city into an analytical form was carried out using standard unipolar indicator normalisation (Formula 1).

$$y(x) = \frac{x - x_{\min}}{x_{\max} - x_{\min}} \quad (1)$$

In Stage II, we ranked the indicators of socio-economic development obtained for cities according to their impacts on the city's integrated development. For this study, we employed the k-medoids clustering algorithm, which involves searching for cluster centres as medoids of points during each iteration, i.e. the cluster centre must be among the points of the cluster. This enabled us to identify common features of cities' development.

In Stage III, we evaluated the indicators for analysis. Factor analysis was used to select the most significant indicators of socio-economic development. Factor analysis is used in multivariate models to reduce dimensionality by identifying optimal parameterised variables while eliminating issues related to variable correlation. In other words, factor analysis involves reducing the original data, and replacing it with new variables (factors) that emphasise the most significant differences between the original variables. At the same time, variables with similar characteristics can be grouped into one factor. This study employed the quartimax method of factor analysis, and involved rotating the factor axes to maximise factor loadings while considering the structure of all the components.

In Stage IV, we interpreted the results obtained in Stages I, II and III. We identified the significant qualitative and quantitative characteristics of urban development and their dynamics for each of the case study cities. The use of fuzzy logic methods, which are currently implemented in forecasting and modelling economic processes in environments characterised by increased complexity, dynamism, and uncertainty, shows promise in the formation, evaluation, and interpretation of socio-economic development indicators for UTCs. These methods can be fully applied to multidimensional and poorly organised systems of urban development indicators. The potential of the fuzzy-set approach is not limited to quantifying qualitative information in conditions of high uncertainty; it can also be successfully applied to solving management problems. In this study, for example, it was used to develop urban development policy measures.

In stage V, we proposed city development scenarios and strategies depending on the results of the analysis. According to the theory of strategic planning, there are three development scenarios for each city. The inertial (trend) scenario occurs when the city's development indicators remain unchanged, and it continues in its current direction of movement. The optimistic scenario occurs when the city's indicators are significantly improving due to external influences and internal conditions, and the city has the ability to initiate growth. The pessimistic scenario is when the city's development conditions are significantly deteriorating, and the city is on the verge of survival. The scenario that can be implemented is determined based on calculations and forecasts of the city's socio-political and economic situation.

Depending on the scenario and the current situation of the city in question, strategies for city development are formulated. The strategies are as follows:

- 1) Survival: for cities that are losing their potential and must maintain minimum living standards.
- 2) Building resilience: for cities that have the potential for resilience and must formulate development strategies.
- 3) Ensuring growth: for cities with stable and relatively safe development.

In stage VI, we identified urban development policy approaches and tools for the individual case study cities as well as Ukrainian cities in general.

One way to implement urban development policy is to build resilience and, at the same time, develop strategies for survival and growth (in accordance with the three identified urban development strategies). This can be achieved by encouraging individual cities to develop smart specialisation and build development strategies on that basis. The smart specialisation of the country's economy, including cities, is discussed in detail in articles by Tsymbal (2022) and Tsymbal et al., (2024).

In Ukraine, smart specialisation has been developed at regional level (oblasts), with smart specialisation areas formed on the basis of the indicators — the most intensive level of innovation activity and high rates of innovation. Each region has three or four types of activity within the framework of smart specialisation. As a component of both the socio-economic sphere and the spatial development of the region, a city — especially if it is the centre of a region (in this study, we analyse regional centres) — can realise the potential of smart specialisation to the fullest extent, and may also have its own smart specialisation. By 2025, each community must prepare and approve its development strategy (or update an existing one); providing an opportunity to determine the smart specialisation of each urban community. Such smart specialisation should ensure both community sustainability and its ability to develop, i.e. demonstrate ways to transform the community. It follows, that the issue of urban innovation should be considered in the context of its ability to ensure sustainability, resilience, and capacity for development.

3.4. Scenarios, strategies, and integrity of urban policy realization

As previously mentioned, in order to implement Stages V and VI of the algorithm, scenarios, strategies and types of urban development policies should be developed. A scenario is a path along which a city can 'move', as well as being a way of describing how events will develop with minimal intervention from the given city's authorities. A strategy is a targeted set of measures taken by the city's authorities that take into account the

city's development goals and its current situation. While the strategy does not directly follow from the scenario, it is closely related to it and depends on it.

The developed strategies have enabled us to formulate urban development policies and their practical implementation, i.e. tools for managing urban development. The components of strategy development are based on different types of integration (e.g. territorial or managerial). The policy instruments themselves were formed based on the types of integration. We have identified integrated approaches to creating a system for planning urban spatial development and implementing urban policy. As urban development policies involve forming a shared vision of a city's future through the coordinated efforts of various services, the following types of strategy development integration should be applied:

1. Integrated interpretation of the situation: understanding the interrelationships that exist between the various factors influencing the development of the city, such as education, income and housing, as well as the cause and effect of those factors.
2. Territorial integration involves considering the city as part of a larger area (district, region, etc.), as urban problems and desired development outcomes usually depend, at least to some extent, on the larger system of which the city is a part.
3. Integrated policy: coherence of urban development policies of different organisations and institutions involved in the city's management.
4. Integrated actions: cooperation of all stakeholders in implementing the city's strategies.
5. An integrated management team with representatives from different organisations and sectors.
6. Integrated formulation of development strategies: taking into account the wishes and interests of all participants and using the formulation process itself as a means of involving participants in a common cause.

- Integrated use of resources involves attracting resources from various sources.

The choice of individual urban development policy depends on calculations, the chosen development strategy and scenario and, to a large extent, on the current situation in the country and the particular city. It follows, that, urban development policy, particularly its content, is an indicative rather than prescriptive (direct) tool of strategic management.

4. Results

In accordance with the developed algorithm for identifying similar and distinct ways to assessing the socio-economic development of cities (see Fig. 1), the following results were obtained.

In Stage I, we compiled a list of data monitored in municipal statistics and available in the public domain (Ia). The time series ran from 2017 to 2023–24 (see Table 1).

Table 1 – List of statistical data used in the analysis

<i>Indicators in quantitative terms</i>	<i>Indicators in value terms</i>
amount of products sold	new construction – total area of residential building
capital investment	putting housing into use
foreign direct investment	cargo transportation
export and import of goods	cargo turnover
export and import of services	passenger transportation
manufacture of construction products	passenger turnover
retail trade amount	
average monthly salary	

Source: compiled by the authors based on official municipal observations (cities' councils' websites)

We found (Ib) that there is currently no systematic data on the number of people affected, the number of internally displaced persons (IDPs) in cities, the totality of area destroyed, the amount or nature of environmental pollution (e.g. air emissions and industrial construction waste), or the estimated funds needed for reconstruction.

Stage II revealed that the indicators can be ranked according to their degree of impact on the city's socio-economic development, from greatest to least (10 indicators with a visible impact were selected out of 14; see Table 2).

Table 2 – The degree of impact of statistical indicators on the UTCs socio-economic development

UTC	Degree of influence (from greatest to least) on the integral development of the city	UTC	Degree of influence (from greatest to least) on the integral development of the city
Vinnytsia	1. average monthly salary 2. foreign direct investment 3. new construction – total area of residential building 4. manufacture of construction products 5. export and import of services 6. export and import of goods 7. capital investment 8. retail trade amount 9. cargo transportation 10. passenger transportation	Lviv	1. average monthly salary 2. foreign direct investment 3. passenger transportation 4. cargo transportation 5. new construction – total area of residential building 6. export and import of services 7. amount of products sold 8. retail trade amount 9. capital investment 10. export and import of goods
Zhytomyr	1. average monthly salary 2. putting housing into use 3. manufacture of construction products 4. cargo transportation 5. passenger transportation 6. amount of products sold 7. capital investment 8. export and import of goods 9. export and import of services 10. new construction – total area of residential building	Kharkiv	1. average monthly salary 2. capital investment 3. export and import of services 4. retail trade amount 5. export and import of services 6. amount of products sold 7. passenger transportation 8. cargo transportation 9. foreign direct investment 10. cargo turnover

Kyiv	1. average monthly salary 2. foreign direct investment 3. export and import of goods 4. export and import of services 5. new construction – total area of residential building 6. cargo transportation 7. passenger transportation 8. amount of products sold 9. putting housing into use 10. manufacture of construction products	Odesa	1. average monthly salary 2. cargo turnover 3. amount of products sold 4. capital investment 5. retail trade amount 6. cargo transportation 7. passenger transportation 8. foreign direct investment 9. putting housing into use 10. passenger turnover
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Source: calculated by the authors based on official municipal observations (cities' councils' websites).

As shown in Table 2, average monthly salaries had the greatest impact on the socio-economic development of all of the UTCs that were analysed for this study. The ranking of this indicator depended on the type of city. If a city was located further from the front line, pre-war indicators remained high (for example, construction production in Vinnytsia and foreign direct investment in Kyiv). If a city was under fire, activities that could be quickly secured or that allow for the transformation of logistics chains were of great importance, such as selling products in Odesa and exporting or importing services in Kharkiv. It follows, that the importance of different types of socio-economic development depends directly on the security situation in the given city, and this determines the given city's development strategies and policies (they forms the basis for distinct approaches in UTCs' policies).

Stage III analysis showed that the following five indicators had the greatest impacts on the socio-economic development of cities in general: average monthly wages, foreign direct investment, new construction, cargo transportation, and exports and imports of services. These indicators are used as benchmarks for forming a sustainability strategy for Ukrainian cities in general, and provide the basis for implementing a similar approach to urban policies.

During Stage IV, we analysed the results obtained in Stages I, II and III regarding the impacts of the indicators on urban development in order to identify the essential qualitative and quantitative characteristics of urban development and their dynamics. Having used the fuzzy plural tool we obtained the following results:

For rear cities (Vinnytsia and Zhytomyr), we found that, based on the potential of activities that produce good results regardless of the social situation, it is advisable to establish strategic guidelines for further dynamic development.

For cities under periodic shelling (Kyiv and Lviv), we advise restructuring the economic structure and changing the priority of activities to stabilise the situation and find growth opportunities.

For frontline cities under constant shelling (Odessa and Kharkiv), we advised the need for a reorientation towards service and logistics sectors to ensure an active life and protect activities from damage and destruction.

During Stage V, we proposed city development scenarios and strategies. These were determined based on our calculations, the results obtained during Stage IV, as well as expert forecasts pertaining to the socio-political and economic situation. In the context of the situation evident in the different types of cities, the following strategies were proposed:

- a survival strategy for cities close to the front line (Kharkiv and Odesa);
- a resilience-building strategy for cities under periodic shelling (Kyiv and Lviv);
- a growth-promoting strategy for rear cities (Zhytomyr, Vinnytsia).

Stage VI identified urban policy approaches and instruments for the analysed cities, as well as for Ukrainian cities in general. In doing so, we focused on smart specialisation approaches.

The impact of military operations on cities in Ukraine has varied between cities, and, as a result, their individual levels of resilience also vary. Post-war reconstruction can also be based on smart specialisation in cities if this is specified in individual city's development strategies. The concept of the smart specialisation of Ukraine's economic activity encompasses the following areas: ecologisation (expansion of green spaces, energy efficiency, etc.); socialisation; intellectualisation; technologization; and digitalisation. When it comes to updating UTCs strategies based on the similarities and differences that exist with regard to approaches to urban community strategising, the need for urban community reconstruction should be considered when defining smart specialisation.

The following is an analysis of the presence of descriptions of these smart components (in the form of strategic goals and priorities) in the city development strategies available – for Vinnytsia, Zhytomyr, Lviv, Kyiv, and Kharkiv.

The issues of ecological production and living are covered in Kyiv's development strategies: 'Kyiv – the Greenest Capital of Europe', 'Preservation and Development of the Dnipro Riverfront', and 'Green and Balanced City'. Zhytomyr's strategy is called 'Green City', while Lviv's is 'A City where it is Comfortable to Live, Study, and Work'. Kharkiv's strategy is called 'Comfortable City', and Vinnytsia's is 'Green Economy and Smart Specialisation' and 'Affordable, Safe, and Environmentally Friendly Environment'.

Energy efficiency is a key focus in the strategies of Kyiv's ("Saving Energy"), Lviv's ("Developing a Competitive and Innovative Economy"), Zhytomyr's ("Efficient City", "Green City"), Kharkiv's ("Comfortable City"), and Vinnytsia's ("Municipal Investments").

The socialisation factor is addressed by the following city strategies: 'Cozy City, Improves the Quality of Life' (Kyiv's); 'Inclusive City, Comfortable City' (Zhytomyr's); 'City where it is comfortable to live, study and work' (Lviv's); 'Comfortable City' (Kharkiv's); and 'Accessible, Safe and Environmentally Friendly Environment' (Vinnytsia's).

The factor of 'intellectualisation' is highlighted in the strategies of Kyiv ('Clear City with Transparent Governance'), via Zhytomyr's ('Effective City'), Lviv's ('City of Traditions, Knowledge, Culture, Tourism and Sports'), Kharkiv ('Creative Industries') and Vinnytsia's ('Municipal Investments').

The factor of 'technologisation and digitalisation' is present in the development strategies of Kyiv's ('Implementation of modern urban management technologies'), Zhytomyr's ('Innovative city'), Lviv's ('Developing a competitive and innovative economy'), Kharkiv's ('A digital and safe environment'), and Vinnytsia's ('Digitalising municipal spaces').

Our analysis of the foundations for smartification in urban development strategies reveals all the proposed smartification elements. However, unlike regional development strategies, which clearly prioritise one or two aspects of smartification, UTCs' strategies do not prioritise smartification at all.

In light of the need to update or develop strategies for cities, towns, and villages (due to the adoption of amendments to the Law of Ukraine 'On the Principles of Public Regional Policy' and the commencement of work on the Public Strategy for Regional Development for the next planning period), it is advisable to establish smartification priorities within UTCs' strategies. These should be activities with the highest level of innovation or competitive potential.

When developing urban policy measures, we relied on widely published recommendations regarding the impact of urban policy on socio-economic indicators of cities (Bragaglia et al., 2022; Lane et al., 2023). Table 3 shows the list of proposed scenarios and strategies, the selected type of urban policy, and their interconnections and conditionality.

As mentioned in Section 3 of this article, the scenarios are based on general methodological approaches to strategising: inertial, optimistic, and pessimistic. These theoretical scenarios are heavily influenced by the current situations in the cities and the extent of the damage caused by shelling. The main criteria are quality of life in cities, socio-economic and public safety levels, and the ability to ensure or maintain economic growth. This lends practical meaning to the proposed scenarios and makes it possible to implement them over a specific time period. It follows, that different cities may belong to different groups in different scenarios.

When it comes to the strategy stage, which involves basing decisions on a long-term planning horizon and taking into account future situations rather than current ones, it is proposed that ‘upward’ strategies should be used; ranging from stabilisation to improvement. Urban development strategies, therefore, fall into three categories: survival (for cities that are losing their potential and must maintain minimum living standards); building resilience (for cities that have the potential for resilience and must formulate development strategies); and ensuring growth (for cities with stable and more or less safe development).

However, depending on the scenario and the current and forecasting situation at different stages of the given UTCs development, the type of strategy may differ. This is particularly pertinent given the rapidly changing situation in Ukraine. For example, the pessimistic scenario for Kyiv and Lviv is survival, the trend scenario is building resilience, and the optimistic scenario is growth. Conversely, for Vinnytsia and Zhytomyr, which have much better initial conditions, both inertial and optimistic scenarios could be performed to select growth strategies. Conversely, cities with poor initial conditions, such as Odesa and Kharkiv, are most likely to require a survival strategy. Depending on the actions and priorities of city authorities, urban policy measures may also vary. Table 3 shows the scheme of the links between scenarios, strategies, as well as the urban policies in use in Ukraine at the present time.

Table 3 – Relationship between scenarios, strategies, and urban development policies in Ukraine

Scenario	Strategy	Urban development policy
Inertial (trend)		
Rear city (Vinnytsia, Zhytomyr)	Ensuring growth	Stabilizing key indicators and laying the foundation for growth
The city under fire (Kyiv, Lviv)	Building resilience	Ensuring the parameters of socio-economic and public security and laying the foundations for economic growth
The city near the front line (Kharkiv, Odesa)	Survival	Defining security criteria and ensuring compliance with them
Optimistic	Strategy	Urban development policy
Rear city (Vinnytsia, Zhytomyr)	Ensuring growth	Shaping economic growth trends based on innovation and smart specialization
The city under fire (Kyiv, Lviv)	Ensuring growth	Turning sustainability fundamentals into a soft growth factor
The city near the front line (Kharkiv, Odesa)	Building resilience	Attempts to maintain parameters and quality of life
Pessimistic	Strategy	Urban development policy
Rear city (Vinnytsia, Zhytomyr)	Building resilience	Ensuring the functioning of the city without reducing the parameters and quality of life
The city under fire (Kyiv, Lviv)	Survival	Compliance with certain economic security criteria
The city near the front line (Kharkiv, Odesa)	Survival	Expanding security criteria and ensuring compliance

Source: author's elaboration

Different mechanisms and their implementation tools can be used to implement each type of integration of strategy and urban policy measures (elaborated in Section 3). The types of mechanisms, their mutual influence, and their essential expressions in urban policy are shown in Table 4.

Table 4 – Types of integration of the essential components of urban strategy development and their interpretation in urban policy

Type of integration	Mechanisms and tools for implementing urban policy
Integrated interpretation of the situation	Multidimensional scientific, analytical and expert research: policy briefs, opinion polls, monitoring, calculations
Territorial integration	Multidimensional scientific, analytical and expert research: cartographic methods, GeoAI, GIS, data visualization, logistics networks
Integrated policy	Comprehensive solution of issues: working meetings of stakeholders
Integrated actions	Discussion of proposals and consideration of the results of discussions: stakeholder workshops, strategy retreats
Integrated management team	Involving stakeholders in working groups and initiating discussions: meetings of working groups and situational discussions on urban development
Integrated development strategy formulation	Discussion of proposals and consideration of the results of discussions: meetings of working groups on strategy development; public discussions on the draft strategy
Integrated use of resources	Finding funding: budgeting, investing, borrowing

Source: author's elaboration

The integrative nature of the essential components of city strategies and their interpretation in urban policy, as presented in Table 4, enables a deeper understanding of the process of formulating city development goals and beginning work on the strategy. It also enables us to immediately identify ways to apply distinct approaches, mechanisms and tools to different cities. After all, each city has its own conditions, and these change dynamically over time. The long-term management of cities is based on an understanding of their vulnerabilities, strengths, and weaknesses.

5. Discussion

These scenarios and strategies should be used to form urban policies for different cities. The sustainability methodology is a common feature of the study of Ukrainian cities, but the specific content of such sustainability varies from city to city.

The capacity of individual cities was assessed by evaluating their existing potential and how it could be utilised. The first problem is the existence of a lack of data or fragmentation of data. The absence of systematic data on the number of people affected, internally displaced persons in cities, the total area destroyed, and environmental pollution, as well as the amount of reconstruction funds needed, reinforces the need to include such factors in a statistical observation system. It is necessary to determine the extent to which population changes and decreases in productive activity affect urban development indicators. Cities far from the front line that are periodically shelled, such as Vinnytsia and Zhytomyr, are also places where displaced persons are concentrated, and their potential should also be studied.

Since each city is unique, with characteristics that distinguish it from others, this potential can be transformed into innovative and creative potential. Given this, alongside existing innovation activity indicators such as 'patent activity' and 'number of cultural events held', we propose adding the following potential assessment indicators: 'city image' and 'actions of the city authorities and the community to improve sustainability'. Such

data can be collected through expert surveys. Introducing this data into municipal observations is the next step in developing the methodology for researching the distinctive features of each city. It follows, that the list of data in municipal statistical observations should be supplemented by various indicators that can be estimated using econometric models.

Given that it is often impossible to collect data through statistical observations defined at a national level, it is necessary to turn to alternative ways to obtain information. GIS could be used to collect data at the city level. This is particularly true of spatial data on land plots and their use.

The second research problem is to understand how cities can respond to today's challenges, and particularly those that result from warfare. It is important to identify how cities build resilience, and the criterion of 'ways of building urban resilience' is one of the future criteria by which urban development can be assessed. In other words, we have expanded the scientific research methodology to find responses to wartime challenges faced by cities affected by military operations.

The fundamental purpose of the algorithm proposed in this article (Fig. 1) is to make cities resilient to external influences. Strengthening cities' capacities to withstand current challenges is an important stage in urban studies. It follows, that the impact of the urban research algorithm's results on the social and economic security of cities is worth considering.

Each city has its own development potential, and assessing this helps to evaluate the opportunities that exist in the face of current threats, as well as opportunities for strategising and building resilience. Through six UTCs from different regions of being analysed, it was shown that these communities have different levels of initial potential and different ways of responding to military operations and threats. Previously, researchers have proposed categorising Ukraine's territories according to their level of security (Shevchenko et al., 2022); this categorisation can be applied to urban territorial communities too.

The current movement of resources (primarily human capital and investment) from one UTC to another has impacted economic security, and means that the methods used to monitor it must be updated. To preserve the integrity of Ukraine's urban spaces, steps must be taken to ensure the economic security of cities. This is indicated in Table 3 which shows the relationships that exist between scenarios, strategies and urban development policies. The first step is to assess the level of economic security in cities and to categorise them into groups. The second step is to assess potential risks to economic security. The third step is to minimise threats to cities with a low level of security, maintain a stable level of economic security, and strengthen the economic security of cities. The fourth step is to develop comprehensive measures for groups of cities according to their level of security, and to integrate these measures into urban policies.

The different levels of social and economic security should be compared with changes in population, investment, and the budget of UTCs. The relationship that exists between human capital indicators and changes in city performance should also be identified.

The proposed measures should prevent the growth of threats to the city's development and also promote sustainability management to maintain decent of living standards.

Further interpretation and research are required to understand the results obtained from the use of similar and distinct approaches to studying trends in the socio-economic development of UTCs.

5. Conclusion

This study develops a framework for applying similar and distinct approaches to urban policymaking. In so doing, it presents an algorithm for assessing the socio-economic development of urban territorial communities (UTCs) using a group of cities from different regions of Ukraine as an example. The algorithm considers the sustainability of urban policy. A list of statistical data for which statistical observations are carried out is provided, along with advice on analysing urban development. The high efficiency of socio-economic spheres

directly depends on the security situation present in a city and further determines the strategies and policies of that city's development; this forms the basis for the implementation of distinct approaches to policy-making in individual cities.

The basis for implementing a similar approach to urban policy in Ukraine was the finding that the following indicators have the greatest impacts on the socio-economic development of cities in general: average monthly wages, foreign direct investment, new construction, cargo transportation, and exports and imports of services. Such spheres can act as catalysts for development.

The authors propose three urban development scenarios — trend, pessimistic and optimistic — and their respective content. Three strategies for cities were then developed: survival, resilience and growth. The authors have demonstrated the connections that exist between these scenarios, urban development strategies, and the components of urban policies. They have also prove the variability of these strategies and the possibility of different combinations UTCs existing in different situations.

The components of the integrative strategy development process and their manifestation in the mechanisms and tools for implementing urban development policies have also been presented in this paper. These enable strategies to be formulated in reference to a dynamically changing situation, and the principles of urban sustainability and security to be implemented.

It is recommended that the list of statistical observation indicators should be expanded to include other quantitative indicators in the municipal observation system; these indicators are triggered by military operations. These indicators should cover changes in human capital, the extent of destruction, and the amount of funds allocated to economic and infrastructure recovery. Due to the uniqueness of each city, it is proposed that their individual innovation potential should be determined based on an analysis of qualitative indicators of the city's brand and the activities of the city authorities to promote it. The algorithm presented in this study expands the range of spatial data, particularly by including broader data on migration and internally displaced persons and their impact on the economy, as well as indicators of resilience to threats, the city's image, actions to increase resilience, and indicators of innovative city development. It also makes use of modern technologies for working with spatial data.

Including indicators of a city's resilience to internal and external threats, as well as its socio-economic and social security levels, can help develop policy mechanisms and protocols to prevent threats. Together, these indicators can help to ensure that cities are resilient to negative impacts. One element of sustainability is identifying the types of smart specialisation evident in a city's socio-economic activities. The necessity of identifying areas of smart specialisation in cities' strategies has been proven.

These results can be used as templates for assessing the socio-economic situation of cities, identifying threats and how they spread, and for planning further development.

The theoretical study and practical results obtained enable us to: identify the most dynamic areas of urban development and urban problems; develop ways to regulate vulnerable areas; expand the scope of municipal statistics; update municipal statistics to analyse the status of cities; and develop proposals to strengthen cities' resilience to threats. These recommendations also enable the experiences herein noted to be extended to other Ukrainian cities that are currently exhibiting an array of different conditions.

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