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TRANSFORMATION OF URBAN LAND USE IN THE ERA OF GLOBAL CHANGE: TOOLS FOR REGULATING SPATIAL DEVELOPMENT

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Abstract. *Recent transformations in the world, such as urbanisation, industrialisation and globalisation, have significantly changed ecosystems, human settlements, economies and politics. These changes have important implications for the environment, public health and socio-economic development. Foreign authors point out the uniqueness of a comprehensive study of urban land use, which covers various scientific disciplines and analyses anthropogenic adaptations of territories to meet social needs. Taking into account social, economic and environmental aspects in urban land use planning is important for sustainable development, which can improve the quality of life of the population and preserve environmental well-being. This article examines the impact of market forces on urban expansion from an economic perspective. As long as the benefits of using urban land outweigh those of agricultural land, cities continue to grow. However, the market mechanism can lead to an unequal distribution of benefits and loss of public land resources. Governments use policy instruments to control urban expansion, including defining urban growth boundaries, transferring land development rights, buying out state land, issuing building permits, setting infrastructure constraints, charging for environmental impacts, and more.*

Key words: *urban land use, policy instruments, uncontrolled urban sprawl, preservation of agricultural land, land use planning, market mechanism, globalisation, public authorities, zoning.*

Problem statement. Over the past half century, the world has undergone significant transformations that have fundamentally affected our daily lives. Urbanisation, industrialisation and globalisation have changed ecosystems, human settlements, national and local economies and public policies. These changes have far-reaching consequences for the environment, public health and socio-economic development of communities [1]. Therefore, a comprehensive study of urban land use, covering historical, current and projected anthropogenic adaptations of a certain territory to meet social needs, is unique in nature. This feature stems from the diversity of research approaches that prevail in the field of urban land use, often spanning several scientific disciplines. Furthermore, many of these studies are intertwined with different disciplines, with land use analysis often being a secondary objective. This phenomenon is rooted in the complex relationship between land use and its social, economic and environmental aspects. Taking these factors into account when planning urban land use is essential for sustainable development. By optimising the land use structure, we can increase productivity and the quality of life of the population, while maintaining environmental well-being. That is why the task of studying the concept of "urban land use" and analysing it on the example of research by foreign scientists is of paramount importance.

Analysis of recent research and publications. The formation of urban land use and its development in the context of reforms were studied by the following national scientists: Tretiak A. M., Dorosh Y. M., Dorosh O. S., Martin A. G., Tretiak V. M., Tretiak N. A., Kravchuk T. Yu, Kharytonenko R. A., Rohach S. M., Tsvyakh O. M., Openko I. A., Kolesa L. L., Humenyak R. I., Lakhmanova O. V., Nazarenko V. A., Prin Y. and others.

In the works of foreign scholars, considerable attention is paid to the study of the theoretical foundations of the formation of the structure of urban land use,

optimal use and zoning of urban land, institutional support for urban development, etc. The following foreign scholars have studied these issues: Duranton G., Puga D., Foster S., Qian J., Peng Y., Luo C., Wu C., Du, Q., Jepsen M. R., Kuemmerle T., Müller D., Erb K., Verburg P. H., Haberl H., Reenberg A., Nesru H. Koroso, Jaap A. Zevenbergen, Monica Lengoiboni, Mohd Zin Mohamed.

The monograph of I. Novakovska defines the basis for the formation of the structure of urban land use by socio-economic functions, types of economic activity and ownership status, as well as the regulatory and legal support for the development of urban land use. The conceptual foundations of urban land use management, the functioning of the urban land protection system, the basic principles and directions of urban land use forecasting, as well as organisational and economic mechanisms for improving the process of land use in the context of decentralisation of power are substantiated [16].

In the scientific work of S. M. Rohach, the main problems, contradictions and destructive factors of the existing institutional environment in the field of urban land use in Ukraine, which are due to the transformation processes in the national economy, are identified. The author identifies the need for systemic changes in the formation of the institutional environment in this area to balance its components [17].

Tretiak A. M. and Dorosh O. S. [18] identified the characteristics of urban land as real estate, including the following: «potential growth of land prices; uneven cash flows from land use; risk and uncertainty; flexible financing conditions and special tax policy; stratified (narrow, local, segmented and personalised) market».

In the scientific work of Dorosh Y. M. et al. "proves that the existing list of the main types of land plots for special purposes (based on the content of Article 38 of the Land Code of Ukraine) in the current classification is not complete and not fully justified. Examples of unjustified classification of land plots of other categories of land as residential and public development land have been identified. In this regard, a 4-level structure of classification of types of designated purpose of residential and public development land is proposed' [19].

Tretiak V. M. et al. [20] defined the concept of «urban land use within water protection zones, coastal protection and coastal strips. They believe that this is a territorial complex of optimal interrelations of land, water, organisms and atmosphere through the composition and structure of functional use of the land territory. It is also a system of organisation and methods of use of land and water resources on different property rights as an object of law, an object of economic, environmental, water and other land relations of a certain part of the unified land fund of Ukraine».

Tsviakh O. M. and Openko I. A. [21] note that given the limited free territories for further development of the city, including new housing construction, service and tourism facilities, industrial areas where production activities are suspended, should be considered as the basis for optimising land use in Kyiv. Taking into account the economic, social and environmental factors of optimising the industrial areas of non-functioning enterprises that occupy significant urban areas, it is also necessary to determine the most appropriate type of land use.

In the article by Medynska N. V. et al. «proves that a differentiated approach should be applied to the formation of a decentralised model of financial and investment support for environmental protection and natural resource management activities for urban and rural territorial communities, based on the significant gap between the size of public financial potential in these categories of communities» [22].

Martyn A. G. and Nazarenko V. A. [23] analysed the social, environmental and economic factors that influence the development of the economy of cities and individual amalgamated territorial communities of Ukraine. It was found that the key ones are the rapid development of neighbouring countries, such as Poland and Slovakia, where the average salary is much higher and amounts to USD 1,300, which has led to an outflow of the working population.

«The greening of urban land use should focus on the formation of environmentally safe agricultural and industrial zones, the organisation of nature reserve facilities and recreational land, compliance with the legal regime of use, conservation and restoration of landscapes, forests, and water areas» [24].

Prin Y.'s study allowed for the first stage of environmental risk assessment - identification of environmental risks for the urban environment. It has been established that a characteristic risk for the city of Ternopil at the moment is the compaction of urban development, mainly due to the reduction of green spaces.The most promising method of identifying areas of increased environmental hazard is the assessment of environmental risk at different hierarchical levels of territorial organisation [25].

Despite the comprehensive study of the issue of urban land use formation by domestic scientists, we consider it necessary to investigate the tools and measures of planning the territory of urban settlements in other countries of the world.

The purpose of the study is to analyse foreign experience in shaping urban land use and identify the main policy instruments and measures to limit uncontrolled expansion of urban areas. These instruments can be implemented in the relevant strategies in the state policy of Ukraine.

Materials and methods of the study. We used the scientific works of foreign scientists published in journals based on the Scopus and Web of Science scientometric databases. In the process of studying the problem under research, the following theoretical methods were used: system analysis - to study the theoretical and methodological foundations of the formation of the urban land use regime in selected countries; synthesis - to combine political instruments to prevent uncontrolled expansion of cities in different countries in a single table; abstract and logical - to clarify the essence of basic concepts, formulate principles and generalise the theoretical foundations of urban land use.

Research results and discussion. According to Duranton G., Puga D., urban land use is a fundamental factor that determines the physical world that surrounds urban dwellers, the majority of the world's population. Urban land use determines how the various places where urban dwellers go or would like to go are organised and connected. Therefore, the expansion of urban land use not only affects the vast resources allocated to housing, commercial property, open space and transport, it also potentially affects the labour market and the markets for the goods we buy. Land use

also affects the ability of businesses to produce goods. In turn, these broader land use impacts can have serious implications for welfare and equity [2].

Foster S. believes that a key aspect of urban land use expansion and planning is to adhere to environmental principles, as failure to do so can have a lasting impact on human communities at varying degrees and scales. Decisions about physical space, such as building layout, infrastructure density and land use, can have a negative impact on natural and physical resources. Much of the world's land use legislation is aimed at preventing or mitigating these potential impacts, such as air pollution, traffic congestion and overcrowding. However, it is important to understand that the choices we make about physical space can also have a significant impact on the social and economic networks of the communities that comprise that space. This is especially true in cities, where the interaction between people, businesses and infrastructure is essential for development and prosperity [3].

In turn, Qian J., Peng Y., Luo C., Wu C., Du, Q. noted that urban expansion from an economic point of view is the result of market forces. As long as the marginal benefit of using urban land exceeds the benefit of using agricultural land, cities continue to expand. However, a single market-based mechanism for allocating urban land resources can lead to market failures, including inequitable distribution of benefits and loss of public land resources. In order to serve the public interest, the government can use certain policy instruments to directly or indirectly control the spatial expansion of cities with regard to location, speed, timing, quality and cost. From a global perspective, with the emergence of theories and ideological trends such as New Urbanism, Smart Growth and Compact Cities, governments have begun to promote sustainable urban development and control urban sprawl through policy instruments [4].

For a broader comparison of experience in curbing uncontrolled urban sprawl, countries from the following continents were selected: Eurasia, North America and Africa. The area of their built-up or urban land varies from 0.5-29%, as shown in Table 1 below.

Table 1

Share of built-up/urban land in the total area of countries in the world

Country	Year of data availability	Land type (built-up/urban)	Share of total country area (%)	Data source
USA	2020	Urban	2	[5]
United Kingdom	2022	Built-up	8,7	[6]
Greece	2017	Built-up	3	[7]
South Korea	2017	Urban	16,6	[8]
Japan	2010	Urban	29	[9]
China	2017	Built-up	4	[10]
Ethiopia	2015	Urban	0,5	[11]
Ukraine	2016	Built-up	4,2	[12]

On the example of these countries, let us consider what measures have been taken to prevent the negative processes of urban sprawl and the loss of agricultural land when it is converted into building land (Table 2).

Table 2

Policy instruments and measures to curb uncontrolled urban sprawl implemented by the authorities of certain countries

Country	Політичні інструменти та заходи
USA	– Determination of urban growth boundaries; – transfer of rights to develop land plots; – purchase of state land; – issuance of construction permits; – setting infrastructure restrictions; – setting fees for the environmental impact of development.
United Kingdom	– The policy of "green belts" is the creation of a barrier in the urban space to limit the uncontrolled expansion of the city centre.
Greece	– Delegation of authority and renewed commitment to integrated policy at all administrative levels.
South Korea	– Transfer of urban functions;

	– relocation, which has contributed to the creation of new villages; – zoning to encourage the relocation of industry and curb population growth.
Japan	– Farmland Preservation Programme and Conservation Easement Policy.
China	– Tax system reform - redistribution of financial powers between the central government and local authorities.
Ethiopia	– High land tax to make land accumulation more controlled. – Land repossession can also be another policy tool.

Below, we will look at the experience of each of the selected countries in more detail. In the late 1970s, the United States introduced the concept of urban growth management. This concept is aimed at protecting open spaces, rationally expanding cities, conserving natural resources, improving public facilities and transportation, and preserving coastal resources. Various policy instruments have been used to limit the expansion of urban areas, such as defining urban growth boundaries, transferring development rights to land plots, buying out public land, issuing building permits, setting infrastructure restrictions and charging for the environmental impact of development.

In the UK, the Green Belt policy was used to control the expansion of London. This policy provided for the establishment of a green belt between cities and rural areas. Its purpose was to create a barrier in urban space to limit uncontrolled expansion of the city centre [4].

Integrated land use planning in Greece has been marginalised and haphazard due to a confusion of laws and regulations that have not been integrated into the overall spatial policy framework. As a result, important land use and management issues, such as sustainable spatial management, territorial cohesion, local and regional development, protection and use of natural and cultural resources, and the interrelationships between local, regional, and national production systems, have not been adequately addressed [4]. New tools, strategies and technologies of spatial

analysis and planning have also not been sufficiently tested, evaluated and adapted to the Greek reality. As a result of all of the above, land use changes in the country over the past twenty years have been mainly in four areas:

1) rural land is being converted to urban land, both in peri-urban areas and in rural areas;

2) forest/natural land is being converted to urban land, both in peri-urban areas and in general;

3) forest/natural land is being converted to rural land, both in the mountains and in coastal and island areas;

4) rural land is being converted to forest/natural land as a result of the outflow of rural population, as well as in coastal and island areas where economic activity is shifting to a tourism monoculture.

Although recent trends in administrative decentralisation have been reversed, genuine delegation of powers and resources, as well as a renewed commitment to integrated policies at all administrative levels, is necessary for crisis management reasons. The long-standing top-down and sectoral orientation of Greek land use policy should be complemented by decentralised measures that establish and strengthen endogenous development practices based on additional research, and that update these problems and related solutions in the context of global and regional changes [13].

In response to excessive agglomeration in Seoul, the South Korean government has also introduced other policy instruments. These included the transfer of urban functions, relocation, which facilitated the creation of new villages, and zoning to encourage the relocation of industry and curb population growth. These measures helped to effectively control the size of the city.

In Japan, redevelopment is often used as a means of limiting urban growth. In order to revitalise city centres, urban redevelopment policies have become a key tool for improving the quality of life in the US, UK, Germany and other developed countries. On the other hand, to preserve agricultural land that is being lost to urban sprawl, many developed countries have implemented policies to protect these areas

[4]. For example, the Farmland Preservation Programme and the policy of granting conservation easements. Studies confirm that such measures contribute to the efficient use of urban land, control of urban growth, reduction of the burden on transport and infrastructure, and improvement of environmental quality.

In China, the behaviour of local governments is a key factor in urban expansion. In the 1990s, China reformed its tax system and redistributed powers and financial authority between the central government and local governments. This led to an increase in the financial centralisation of the government and a large gap in local financial revenues and expenditures. Local governments have been forced to raise their own funds to support economic growth, and land fees have become the main source of financial revenues. On the other hand, the performance appraisal system has always used economic development indicators such as GDP and fiscal revenues as key criteria for assessing the performance of the head of the local administration, which has further deteriorated the usefulness of local officials as administrative decision makers.

In Ethiopia, studies show that land within built-up areas is underutilised. It is common practice to convert agricultural land to urban land use before the buildable land within settlements is exhausted. It is even worse when converted land is not used efficiently and productively. Leaving land idle, especially in cities where there is an acute housing shortage and where the demand for urban land and its value are very high, has dire consequences for the informal land market, informal settlements and urban sprawl.

The uncontrolled (unregulated) expansion of the built-up area without the development of a significant part of the buildable land within the existing built-up area is very problematic. This has undesirable consequences for sustainable urban land use. Serious measures need to be taken to achieve sustainable urban land use. This may include increasing building density (better urban compactness) through integrated public open spaces. Measures such as a high land tax may therefore be necessary to make land accumulation more controllable. Repossession of land could also be another policy tool to discourage rampant speculation. The policy of land

banks should be reconsidered in the city, where the demand for land and its value are very high [14].

All of the above shortcomings indicate that in order to effectively manage and control urban sprawl, it is necessary to form an urban land use regime using one of the main tools - planning. Planning in general, often referred to as urban development or urban and regional planning, is the process of organising, managing and regulating the use of land and its resources to ensure the socio-economic development of a country while preserving the environment. Planning helps shape cities, smaller communities, and even rural areas. Planning also helps determine how communities will develop and how they will adapt to change [15].

Usually, when we talk about planning, the first thing we think about is land use. It is true that planning and land use are closely related, as we need land (space) to develop an area. Planning is a broad topic, it concerns not only land use, but also many areas such as transport, housing, commerce, healthcare, urban design, neighbourhood development, environment, disaster prevention, tourism and many others. As you can see, since planning covers many areas, it will be related to many issues. That is why most planning issues are interrelated [15]. If one problem arises, it is related to another sector. For example, the problem in transport does not stand alone, it is connected to environmental issues such as pollution. This is due to the impact of transport on the environment.

Urban planners have to plan and control every development on land plots to ensure that people do not overstep their bounds and that natural resources are preserved for future generations. However, all the efforts made by planners will be in vain and meaningless if the community is not involved and does not support the efforts made by urban planners and authorities. In fact, it is not only the job of planners to control development and resolve planning issues [15]. These attempts cannot succeed without the participation of the public, including government officials, business people, trade unions, academics, teachers, indigenous people, women, youth and children. When everyone is involved in overcoming planning challenges, it will ensure that people are more sensitive to the environment and do not

overstep their bounds, and thus natural resources can still be used by future generations.

Conclusion. Given the experience of the countries studied, it is safe to say that the problem of urban sprawl, the unrestrained spread of urbanised areas on agricultural land and green areas, poses significant challenges for the whole world and for Ukraine as a whole. As they grow, cities consume valuable resources, fragment ecosystems and put a strain on infrastructure. Unfortunately, urbanisation often takes place without due consideration of the negative impact on society and the environment. To learn from the experience, we can identify the countries most similar to Ukraine in terms of the share of built-up/urban land, including: The United States of America, Greece, and China. Their example shows that it is extremely important to introduce policy instruments and measures into the urban land management system that will help shape cities, territorial communities and even rural areas in Ukraine. Among the proposed measures and policy instruments to minimise and control urbanisation are the following: defining clear urban growth boundaries in urban planning documents, setting infrastructure limits, establishing fees for environmental impacts, delegating authority and renewing commitment to integrated policy at all administrative levels. Equally important in reducing land-use conflicts, preserving critical ecosystems, protecting and managing environmentally sensitive habitats, restoring degraded protected areas, and ultimately ensuring a healthy and safe life for people is land use planning, which plays a vital role for the entire population.

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ТРАНСФОРМАЦІЯ МІСЬКОГО ЗЕМЛЕКОРИСТУВАННЯ В ЕПОХУ ГЛОБАЛЬНИХ ЗМІН: ІНСТРУМЕНТИ РЕГУЛЮВАННЯ ПРОСТОРОВОГО РОЗВИТКУ

Анотація. *Трансформації, які відбулися у світі останнім часом: урбанізація, індустріалізація та глобалізація суттєво змінили екосистеми, населені пункти, економіку та політику. Ці зміни мають важливі наслідки для довкілля, громадського здоров'я та соціально-економічного розвитку. Іноземні автори вказують на унікальність комплексного дослідження міського землекористування, яке охоплює різні наукові дисципліни та аналізує антропогенні адаптації територій для задоволення суспільних потреб. Врахування соціальних, економічних та екологічних аспектів при плануванні міського землекористування є важливим для сталого розвитку, що може підвищити якість життя населення та зберегти екологічне благополуччя. У статті розглядається вплив ринкових сил на розширення міст з економічної перспективи. Поки вигода від використання міських земель переважає вигоду від сільськогосподарських, міста продовжують зростати. Однак ринковий механізм може призвести до нерівного розподілу вигод та втрати державних земельних ресурсів. Уряди використовують політичні інструменти для контролю розширення міст, враховуючи визначення меж зростання міст, передачу прав на забудову земельних ділянок, викуп державних земель, видачу дозволів на будівництво, встановлення інфраструктурних обмежень, встановлення плати за вплив забудови на навколишнє середовище та інше.*

Ключові слова: *міське землекористування, політичні інструменти, неконтрольоване розширення міст, збереження сільськогосподарських угідь, планування землекористування, ринковий механізм, глобалізація, органи державної влади, зонування.*