

# Complex Modernization of Public Infrastructure and Hospitality as a Factor in the Sustainable Development of the City in Ukraine

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## Abstract

The sustainable development of the city involves the solving of economic, environmental and social problems through the modernization of various spheres of the urban economy. The modernization of related and interrelated spheres of the city's economy should be based on an integrated approach. The hospitality and public infrastructure are such spheres. Their relationship is due to both technical and technological features and the possibilities of achieving the goals of sustainable development of the city (the hospitality sector contributes to the growth of openness of the city and the life support and environmental sustainability of the city directly depends on the state and development of public infrastructure). The priorities of the modernization of public infrastructure and hospitality for sustainable development of the city have been determined. The condition of the public infrastructure and hospitality in cities of Ukraine was analyzed from the point of view of modernization for sustainable development. The experience of modernization of public infrastructure and hospitality in sustainable European cities (including improving energy efficiency, strengthening environmental safety, creating a barrier-free environment) has been studied. The technical, technological, financial and institutional features that determine the feasibility of modernizing the public infrastructure and hospitality based on the principles of an integrated approach have been determined. The recommendations of the mechanism of public-private partnership using in the implementation of projects for the modernization of public utilities infrastructure and hospitality of the city have been developed. The decision-making tools for managing resources have been proposed for the justification and implementation of a project to modernize public infrastructure and hospitality based on a comprehensive approach.

*Key Words: city, sustainable development, public infrastructure, hospitality, modernization, integrated approach.*

## 1. Introduction

The sustainable development of the city is declared in global European and national strategies. In particular, it is the UN resolution "Transforming our world: Agenda for Sustainable Development till the 2030" September 25, 2015 (The transforming our world: 2030 Agenda for Sustainable Development: United Nations),

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Leipzig Charter of “Cities of Europe on the Road to Sustainable Development,” May 25, 2007 (Leipzig Charter 2007). The Leipzig Charter for Sustainable European Cities, which was adopted in 2007, is based on the fact that an integrated approach to urban planning is a prerequisite for the long-term development of European cities. The policy of integrated urban development is a process in which the spatial and temporal aspects of the main directions of urban development were coordinated. The concept of a “smart city” enables the using of digitalization, using of clean energy and technologies, including transportation, according to the New Urban Agenda (adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) which was held in Quito, Ecuador from October 17 to 20, 2016). As a result, opportunities are provided for choosing environmentally friendly solutions, stimulating sustainable economic growth and improving the quality of service delivery (New Urban Agenda 2017).

The relevance of the research is emphasized by the fact that on January 1, 2019 there are 461 cities in Ukraine, the urban population is 69.4%, and in some regions from 75 to 90% (Dnepr, Donetsk, Zaporizhzhya, Luhansk, Kharkiv regions) (The population of Ukraine 2019). The State Strategy for Regional Development of Ukraine for the period until 2020 (About approval of the State strategy 2014) sets the task of developing and approving development strategies for the region and the city on the principles of sustainable development, which is being successfully solving currently. In addition, the “Covenant of Mayors” has been signed by 235 leaders of Ukrainian cities where 19.8 million people live. (**Covenant of Mayors East**). The “Covenant of Mayors” was initiated by the European Commission in 2008 after signing the package of EU climate and energy initiatives. The task of the “Covenant of Mayors” is supporting in the efforts of local authorities in the development and implementation of sustainable energy development policies for the territory.

The ensuring openness, security, resilience and environmental sustainability of cities (Paragraph 11, Part 1), accessibility and sustainable management of water resources (Paragraph 6) and providing access to affordable, reliable, sustainable and modern energy sources for all (Paragraph 7, Part 1) are the Sustainable Development Purposes of Ukraine for the period until 2030 according to the President of Ukraine Decree (September 30, 2019 №. 722/2019) (About the Sustainable Development). These purposes are guidelines for the development of draft forecast and program documents, legal acts in order to ensure a balance of economic, social and environmental dimensions of sustainable development of Ukraine.

The achieving purposes and solving problems of sustainable development of the city depends on the availability of appropriate potential. The composition of the potential for sustainable development includes material, labor and financial resources that are used or can be attracted to implement the tasks of sustainable development of the city. These resources are owned and/or managed by government, local governments, people and businesses. These resources are included in the process of managing the city to solve economic, social and environmental problems and urban development tasks. The enterprises and organizations engaged in economic activities in the city take part in solving the problems of sustainable development. The degree of their participation is determined by the functions performed and the potential available. Thus, the

implementation of the 11 purposes of sustainable development related to ensuring openness depends on the activities of hospitality facilities, which includes enterprises providing accommodation and food services to guests visiting the city. At the same time, ensuring the resilience and environmental sustainability of cities, accessibility and sustainable management of water resources, as well as providing access to affordable, reliable, sustainable and modern energy sources for all, largely depends on the activities of the enterprises of the city's municipal infrastructure.

Both the hospitality industry and public infrastructure play a role in ensuring the sustainable development of the city through the practical implementation of the concept of a smart city (New Urban Agenda 2017). The management of sustainable development of the city is aimed at achieving strategic purposes and objectives, adapting the economy to changes in the external and internal environment, ensuring the implementation of priority modernization projects. There is interaction of population, government bodies and local governments, business structures and scientific institutions, public associations with the aim of improving the economic, social and cultural conditions of life in the process of managing the sustainable development of the city. The hospitality industry unites enterprises of various forms of ownership and areas of activity that affect both the image of the city and the replenishment of the city budget. The city affects the activities of the hospitality sector, in particular, the municipal infrastructure: water, electricity, gas, heat supply, removal of municipal solid waste, road transport infrastructure. Thus the management and regulation of public infrastructure and hospitality requires special approaches from local government and self-government. It especially concerns of comprehensive modernization of solving the problems of sustainable development of the territory in the economic, environmental and social aspects.

## **2. Research methodology.**

It is necessary to justify the possibility and feasibility of modernizing the municipal infrastructure and hospitality of the city for sustainable development in the process of research. It is necessary to solve problems using general scientific and special methods of cognition in accordance with the purpose: to characterize the process of sustainable development of the city and the organization of its management; determine the role of public infrastructure and hospitality for the sustainable development of the city; to consider the modernization of public infrastructure and hospitality and identify priority areas for achieving sustainable development goals. To solve these problems, a systematic approach was used, which represents the city as a complex economic system. An important role in this system is played by public infrastructure and the hospitality sector, which contribute to the achievement of the sustainable development purpose of the city. The structural and functional analysis allowed to determine the local priorities for the modernization of the municipal infrastructure and the hospitality industry in the context of sustainable development. The decision of the problem is assessment of the state of the public infrastructure and the hospitality sector in Ukrainian cities from the point of view of sustainable development. We used the methods of economic analysis (horizontal, vertical, trend) for this. The grouping method was used to form the table "Key indicators of innovative activities of public infrastructure enterprises in 2015-

2017.” The comparison method for researching of the experience of implementing priority spheres of modernization of public infrastructure and hospitality in sustainable European cities was used. The method of analysis and synthesis as justification of an integrated approach to the modernization of public infrastructure and areas Hospitality in the context of sustainable development of the city was used. The method of analogy and structural analysis for development of proposals for using public-private partnership mechanisms to finance projects to modernize the public infrastructure and hospitality for sustainable development of the city was used. The logical analysis method for systematization of the steps and procedures of the decision-making process was used. The abstraction and formalization method for development of decision-making schemes for managing the resources of the project for modernization of public infrastructure and hospitality based on a comprehensive approach was used. The mathematical modeling made it possible to formalize the process of resource-communication interaction between the participants in the project of modernization of public infrastructure and hospitality based on a comprehensive approach. The method of logical generalization and systematization was used in the formation of conclusions and recommendations

### **3. Area under research (management process for sustainable development of the city; public infrastructure, hospitality and their modernization)**

We can give such a definition for the sustainable development of the city based on the results of studies on the sustainable development of the city presented in (Albayrak 2017, Batty 2013, Christopherson 2010, Muller 2011). The sustainable development of the city is a process aimed at the balanced use of the potential of the territory (for economic growth), harmonization of relations and improving the quality of life of the population (to achieve social consensus), preservation and phased restoration of the integrity of the natural environment, creating opportunities for ecological balance. At the same time, the interconnection of environmental, economic and social problems is taken into account, which should be solved subject to close cooperation and coordination of efforts of all participants in the interaction.

The city provides significant effect of scale, which includes reducing time and material resources on the production process, improving service and infrastructure services, using of information technology and innovation and market mechanisms. The social welfare of the population depends on the social development of the city on the basis of ensuring social standards (including life expectancy, health status and educational level). The economic development should be considered as a process of improving the quantitative and qualitative characteristics of the economic system of the city through the using of production, natural, labor, financial resources.

The process of managing sustainable development of the city is the justification, adoption and implementation of economic, social, environmental or innovative decisions that ensure the development of the city and improving the quality of life of the population. It is carried out in compliance with the principles of complexity, integrity, adaptability, information content. The sustainability of the development of the city is influenced by economic, social, environmental conditions, demographic and innovation-

investment processes, the availability of legal support, the state of infrastructure and property relations.

The local governments, people, business, public organizations take part in the process of making decisions on the development of the city. They are interested in providing quality living conditions through the implementation of appropriate strategies, programs and projects. Sustainable development of the city is managed through planning, organization, coordination and control.

A typical algorithm for managing sustainable development of a city includes such successive stages: analysis of the state, determination of the goal and objectives of development; formation of strategic planning documents; development of measures based on strategic planning documents; evaluation and approval of program activities; implementation of program activities. The strategic planning documents for the sustainable development of the city reflect general and local priorities. The practice of determining local development priorities in Ukraine indicates the using of functional and sectoral approaches. For the purposes of this research, a sectoral approach is interesting, which involves the development of modernization priorities in accordance with industry specifics and taking into account the possibilities of their effective use in the modernization process. The modernization is the introduction of economically sound innovations, the development and application of new technologies, technological solutions aimed at improving the efficiency of operations.

We characterize the features of the public infrastructure and the hospitality sector, taking into account the functional and sectoral approaches to determine the local priorities for their modernization. The public infrastructure is a system of production and property facilities that are technically and organizationally connected, the functioning and development of which is aimed at meeting the needs for utilities and ensuring the vital functions of a certain territory. The condition and development of urban public infrastructure quite seriously affects the functioning and livelihoods of the city. It is evidenced by documents adopted at the state level, which recognized the need and importance of facilitating and comprehensively supporting the development of public infrastructure, attracting investment in the construction / reconstruction of its important facilities by enhancing interaction in the system of "local government - business - society" and using mechanisms of public-private partnership (About approval of the State strategy).

From the point of view of sustainable development, municipal infrastructure has both a positive and negative impact on the state of environmental safety. In particular, water and heat supply enterprises use water resources, and in the process of production they discharge into the atmosphere and pollute the air and cause the so-called "greenhouse effect". The enterprises that provide landscaping services related to flora and fauna (parks, squares, street greening) use water and land resources, as well as contribute to air purification. Enterprises that provide services for the collection and disposal of household and industrial waste associated with the use of land resources in the production process (waste incineration) have a negative impact on the air condition. Thus, the priorities of modernization of public infrastructure in the context of sustainable development are associated with strengthening environmental safety.

Hospitality is a system of events and the procedure for their implementation in order to satisfy the most diverse household, economic and cultural needs of the clients of tourism enterprises, providing the provision of appropriate services. The hospitality industry unites enterprises specializing in the provision of services related to the reception and servicing of guests. These are collective accommodation facilities (hotels, campsites, hostels, other types of places of residence and stay), companies providing catering services (restaurants, cafes, bars, etc.), entertainment venues (exhibition centers, attractions, entertainment centers, sports facilities and concert complexes) (Martienko 2017). The main component of the hospitality industry is the hotel industry. The hotel industry enterprises are constantly improving the comfort of their guests, for which they introduce innovations in various functional systems. The consequences of the environmental impact of the hotel industry in cities are private, it is difficult to identify them, because they affect enterprises in other fields of activity (industrial, transport, construction, etc.), and the population. Hotel network systems use waste processing and recycling facilities, which reduces their negative impact on the environment. Despite the use of the latest technologies, special equipment for saving energy, water, chemicals, hygiene products, food and other resources, their impact on the environmental situation remains significant. In addition, hotel enterprises among service companies create more waste, which is associated with an increase in the level of comfort of living and updating of the interior, elements of technical systems are being renewed. The chemical air pollution is characteristic of all hotel industry enterprises, but it is most significant with autonomous generation of electric current and heat production.

These circumstances require the modernization of the public infrastructure and hospitality of the city in the context of ensuring its sustainable development. Modernization is carried out on the basis of the development and implementation of appropriate strategies, programs and projects. The initial prerequisite for the formation of a modernization strategy for individual industries and spheres is a general strategy for the sustainable development of the city. The process of forming a modernization strategy includes the following stages: the general period of its formation, determining the strategic purposes of modernization: developing the most effective ways to implement strategic goals by identifying strategic directions of modernization and forming resources for their implementation; concretization of the modernization strategy by the periods of its implementation with the provision of external and internal synchronization in time. In the process of implementing the strategy, modernization programs and projects are developed, which are management decisions that must meet the requirements of scientific soundness, timeliness and multi-aspect.

The process of managing the sustainable development of the city, identifying local priorities for the modernization of public infrastructure and the hospitality industry, the need to develop a modernization strategy and related programs and projects allow us to proceed with the following research tasks. These tasks are connected with the substantiation of an integrated approach to the modernization of the hospitality and public infrastructure of the city as a factor in sustainable development through the use of the appropriate methodology.

## 4. Results of research

### 4.1. The state of public infrastructure and hospitality in Ukrainian cities in terms of sustainable development

The management of sustainable development of public infrastructure is based on the fact that development should guarantee the satisfaction of the population's needs for quality services that are provided in a timely manner, subject to the conditions of reproduction of the material and technical base based on modern resource-saving technologies, in accordance with sanitary standards and environmental requirements. Moreover, the tariff policy should be aimed at rationalizing expenses and reducing social tension. Sustainable development management implies a strategic orientation and defines activities to create conditions that ensure the progressive development of the housing and public sphere of the city.

The identification of the basic principles of sustainable development (self-preservation, adaptability, security and self-development) of the city's public infrastructure, without denying market relations, allows us to approach the analysis of its main problems and determine approaches to solving them. A systematic approach to reforming and ensuring its sustainable development involves the identification and analysis of signs and indicators of instability, which can conditionally be divided into socio-economic, technical, technological, environmental, economic, organizational, economic and financial, although they are all closely interconnected and interdependent. The detailed analysis of these phenomena using time factors identifies current, medium-term and strategic problems.

According to the Ministry of Development of Communities and Territories of Ukraine, currently the public infrastructure, with 1560000 million objects, the cost of fixed assets of which is one third of the country's fixed assets, is in critical condition (Ministry of Development of Communities). The total level of depreciation of fixed assets in the sphere is more than 60%, and equipment (boilers and pumps) is energy-intensive. The length of water supply networks in Ukraine is 180 thousand 951 km (only 9% of them are not emergency (whose service life does not exceed 25 years)), sewer networks is 51 thousand 397 km, the wear of which exceeds 60%, resulting in some cities network losses reach 70-80%. A difficult situation is also observed in the heat sector: there are 21.2 thousand boiler houses in Ukraine with 50.6 thousand boilers in operation, the length of the heating network in the country is more than 20 thousand km, of which 12.7 thousand km are in emergency condition, and 60% of heating networks require repair (Ministry of Development of Communities). About 90% of high-rise buildings in Ukraine require thermal modernization (Ministry of Development of Communities). The operation of inefficient, physically worn-out equipment and networks leads to an increase in unproductive costs of energy resources, water and heat, deterioration of the quality of services while increasing the cost of their production and provision.

Therefore, housing and public services received by consumers do not always meet the established standards and the requirements of the existing rules for their provision currently. So, in particular, in more than 260 settlements, drinking water does not meet the requirements of quality standards. In the regional context, the highest proportion of non-standard samples of drinking water for sanitary-chemical indicators was recorded in Luhansk, Nikolaev, Poltava, Rivne, Zaporizhzhya regions, and for microbiological

indicators - in Rivne, Ternopil, Nikolaev, Ivano-Frankivsk, Khmelnytsky, Odessa regions, where this indicator is one and a half times or more higher than the national average (The National report about drinking). Among the main factors that negatively affect the quality of drinking water in centralized water supply systems are the unsatisfactory sanitary and technical condition of water supply facilities and networks, a high percentage of wear and tear, ranging from 30% to 70% in different regions, untimely overhauls and ongoing preventive maintenance and liquidation of accidents. Delays in the inclusion of heat or a sudden cessation of heating during the heating season (in particular in the cities of Kriviy Rig, Smela, Shepetivka) and the non-compliance of the temperature regime with the established standards also, unfortunately, are realities of public services in a number of Ukrainian cities.

The main problems that need to be resolved include: ensuring the reproduction of the material and technical base of the industry while meeting the population's needs for quality services, supporting environmental safety, rationalizing energy and resource consumption, economic responsibility for economic decisions made, location of production taking into account environmental feasibility, information transparency decisions taken, as well as public participation in the processes of their adoption (Grotenbreg, S., 2018).

As for the hospitality sector, according to the State Statistics Service of Ukraine, collective accommodation facilities totaled 4,155 units in 2017, which is 12% less than 2011. So, 2474 hotels and similar facilities are located, which on 63 units more than in 2011. The number of hotels was increased by 463 units. The growth of the hotel fund was observed in Vinnitsa, Zhytomyr, Zaporizhzhia, Lviv, Khmelnytsky, Ternopil regions. The volume of tourist tax revenues in 2016-2018 annually increased by 29-30%. The leaders are Kiev, Lviv, Odessa, Zaporizhzhya, Ivano-Frankivsk region. In the structure of local budgets in 2018, tourist tax in Kiev amounted to 34.7%, in Lviv 16.6%, and Odessa 13.6%.

The innovations in the sphere of hospitality can be aimed both at increasing competitiveness (improving living conditions, diversifying services, etc.), and reducing environmental stress (eco-hotels) and solving social problems (hotels or rooms for people with disabilities). The introduction of environmental and social innovations in the field of hospitality can be stimulated by local government and self-government through the establishment of benefits and preferences. An important aspect is the ongoing processes of decentralization in Ukraine and the expansion of the powers of local governments in the disposal of financial resources, setting local tax rates and fees.

In addition, the hospitality industry can be included in the city's smart specialization industries when the amount of income received significantly exceeds the amount of development costs. Innovative strategies in the field of hospitality, implemented on the principles of sustainable development, should be agreed with all interested parties (in particular, hospitality enterprises, local government and self-government, the public).

The issues of water supply and sanitation, as well as the management of solid waste (collection, sorting and disposal), which are carried out by municipal utilities within the cities, deserve special attention. And if the electricity, gas and heat supply can be autonomous, then autonomous water supply and, especially, water disposal within the city are almost impossible. Therefore, achieving the goal of sustainable development of



the city must be supplemented by purpose of 6 and 7 and measure the possibilities of implementing innovative strategies in accordance with the restrictions on water and energy resources.

The improving the quality of the provision of public utilities is not possible without ensuring the restoration and modernization of public infrastructure, the introduction of industrial and economic activities, innovations and low-waste, resource-saving, energy-efficient advanced technologies. At the same time, the intensification of the introduction of innovations and modern innovative technologies by municipal enterprises, both with the aim of improving the quality of the provision of residential and public services, and in general, to ensure improved management efficiency and sustainable development of the housing and public services sector, is inextricably linked with the search and attraction of sources of financing for implementation relevant costly innovation and investment projects. At the same time, the slow pace of attracting investments, introducing technical innovations and technological modernization of enterprises performing housing and public services, and, accordingly, the need to disseminate various forms of state participation in the implementation of infrastructure projects, ensuring a flexible tariff policy to create attractive conditions for investors, as well as an unsatisfactory level of implementation of public private partnerships, is noted in the National Report “Aims Development: Ukraine”, which presents a vision of guidelines for achieving Ukraine the Sustainable Development Purposes, approved at the UN Summit on Sustainable Development in 2015 (Sustainable Development Goals: Ukraine).

This is also confirmed by the results of the analysis of the main indicators of innovative activity of business entities - public utilities (in particular, companies providing electricity, gas and air conditioning, water supply, sewage, waste management services) for 2015-2017. (Table 2), which allow us to state a very small share of enterprises engaged in such activities that introduced innovations in their total volume during the analyzed period, which at the same time has a negative dynamics of reduction. So, only 8.9% of enterprises providing services for the supply of electricity, gas and air conditioning and 7.3% of enterprises providing services for water supply, sewage, waste management, of their total number in 2017 were engaged in innovative activities (this compared to 2016, the indicator decreased by 2.5% and 1.8%, respectively). Even less is the share of enterprises, which in 2017.

This is also confirmed by the results of the analysis of the main indicators of innovative activity of utility infrastructure enterprises in 2015-2017 (Table 1). The results of the analysis allow us to state a small share of enterprises that introduced innovations in their total volume during the analyzed period, and having negative dynamics.

**Table 1.** The main indicators of innovative activities of utility infrastructure enterprises in 2015-2017

Indicators	Enterprises providing services for the supply of electricity, gas and air conditioning			Enterprises providing water supply, sewage, waste management services		
	2015	2016	2017	2015	2016	2017
The number of enterprises in total, units	294	308	316	383	373	386
Including engaged in innovation, units (%)	31 (10,5)	35 (11,4)	28 (8,9)	21 (5,5)	34 (9,1)	28 (7,3)
The number of enterprises that introduced innovations, units (%), including :	22 (7,5)	25 (8,1)	25 (7,9)	14 (3,7)	26 (6,9)	18 (4,7)
Introduced innovative processes,	20 (6,8)	21 (6,8)	25 (7,9)	13 (3,4)	25 (6,7)	18 (4,7)
From them low-waste, resource-saving	12 (4,1)	12 (3,9)	14 (4,4)	6 (1,5)	13 (3,5)	9 (2,3)
Introduced innovative products,	3 (1,0)	5 (1,6)	2 (0,6)	2 (0,5)	10 (2,7)	1 (0,3)
From which are new to the market	1 (0,3)	2 (0,65)	1 (0,3)	1 (0,3)	1 (0,3)	-
Total amount of financing of innovative activity, thousand UAH	345628,9	516793,5	315196,4	15874,8	109034,7	70102,0
Including at the expense of funds, thousand UAH (%) :						
Own	304536,2 (88,1)	422272,5 (81,7)	250622,5 (79,5)	8864,0 (55,8)	18357,3 (16,8)	19647,2 (28,0)
State budget	7312,7 (2,1)	11369,0 (2,2)	-	303,3 (2,0)	24832,3 (22,8)	*
Local budgets	31986,0 (9,3)	31023,6 (6,0)	*	5989,3 (37,7)	59867,8 (54,9)	*
Foreign investors	-	5400,5 (1,1)	-	-	-	-
Loans	-	26299,1 (5,1)	-	718,2 (4,5)	5977,3 (5,5)	*
Others	1794,0 (0,5)	20428,8 (3,9)	*	-	-	*

Source: compiled by the authors based on (Karmazın 2017, Karmazın 2018) (excluding the temporarily occupied territory of the Autonomous Republic of Crimea, Sevastopol and part of the zone of the operation of the United Forces)

\* Data is not made public in order to ensure compliance with the requirements of the Law of Ukraine "On State Statistics" regarding the confidentiality of statistical information.

So, only 8.9% of enterprises providing services for the supply of electricity, gas and air conditioning and 7.3% of enterprises providing services for water supply, sewage, waste management, of their total number in 2017 were engaged in innovative activities (this compared to 2016, the indicator decreased by 2.5% and 1.8%, respectively). Even less is the proportion of enterprises that introduced innovations in 2017: 7.9% of enterprises

providing services for the supply of electricity, gas and air conditioning and 4.7% of enterprises providing services for water supply, sewage, waste management (Karmazin 2018). During the analyzed period, low-waste, resource-saving innovative processes were introduced most actively in the presented sample of enterprises providing utility services, while the rate of introduction of innovative types of products by these business entities is characterized by a very low level and has a tendency to decrease in dynamics. It should also be noted that, based on the analysis, the negative dynamics of a decrease in the total amount of financing innovative activities of enterprises of Ukraine providing utility services in 2017 compared with the corresponding indicator in 2016 (in particular, for 201597.1 thousand UAH (or 39%) for enterprises providing services for the supply of electricity, gas and air conditioning and 38932.7 thousand UAH (or 35.7%) for enterprises providing services of water supply, sewage, waste management).

Regarding the sources of financing the innovative activity of enterprises providing services for water supply, sewage, waste management, it should be noted the uneven distribution of them during 2015-2017. So, if in 2015 the largest share (55.8%) of the total volume was accounted for by the own funds of business entities, then in 2016 this indicator amounted to only 16.8%, giving way to local budget funds, whose share in the total Innovation financing amounted to 54.9%. The share of funds of both local and state budgets in the total amount of financing innovative activities of enterprises providing services for the supply of electricity, gas and air conditioning is much smaller, amounting to 6.0% and 2.2% in 2016 respectively. Among the sources of financing the innovative activity of enterprises providing services for the supply of electricity, gas and air conditioning, the largest share during the analyzed period falls on their own funds, decreasing from 88.1% of the total in 2015 to 79.5% in 2017 at the same time, the share of other funds, loans and funds of foreign investors in the total volume of financing of innovative activities presented in Table 1 sample of enterprises providing utilities is very small, fluctuating in 2015-2016 in the range of 0.5% - 5.5%, which indicates a low level of their innovation, investment and credit activity in modern business conditions.

#### **4.2 Experience in implementing priority areas for the modernization of public infrastructure and hospitality in sustainable European cities.**

The main directions of modernization of public infrastructure and hospitality in sustainable European cities are improving energy efficiency, environmental safety, creating a barrier-free environment. They have gained considerable experience in using renewable energy sources in the field of life support of the city. So, in particular, in years with satisfactory wind conditions, wind energy competes with power plants using non-renewable fuel sources. In Denmark, one fifth is produced with the help of wind generators, one sixth in Portugal and Ireland, and one seventh of the required energy in Spain. Solar energy is widely used in EU countries. In particular, through the use of solar collectors, almost half of Germany's energy balance is provided, 20% of the necessary heat energy in Denmark and 60% of the water heating needs in Barcelona (Spain) (Boyle 2012, Donovan 2017). In Iceland, 90% of homes are heated by geothermal energy. In the housing stock of Sweden and Germany, heat pumps are actively used. Power plants in Denmark, which burn urban solid waste in cities, as well as power plants in Italy that use biogas of landfills for solid household waste, are widely used. This situation in the

EU on the use of renewable energy sources (RES) is associated with their ability to compete with traditional non-renewable sources. Environmental and energy safety programs are working in favor of the active introduction of renewable energy sources. The most important issue that arises in assessing the potential of renewable energy is the choice of the optimal level of its use. The instability of energy production using renewable energy creates significant difficulties when using a significant part of the energy of renewable energy in the energy system, which operates on the basis of traditional management procedures. However, control methods for power systems with variable load already exist in traditional energy and are cost-effective. Another important condition is the promotion of the use of renewable energy sources (Boyle 2012, Donovan 2017). In particular, in almost all EU countries, the “green tariff” is applied, which provides a guarantee of connection to the network and a long-term contract for the purchase of all produced energy at a fixed tariff. In addition, in Germany and Denmark, a premium tariff is used, which provides that renewable energy producers can choose to use the “green tariff” or receive a fixed premium (premium) to the market price for electricity for a certain period of time. Also, “green certificates” are applied to producers and suppliers of electricity, establishing an obligatory share (quota) of renewable energy in the total amount produced (Norway, Sweden). Tenders and auctions for renewable energy and biofuel producers are held in Italy, France and the United Kingdom - a system of government tenders for signing contracts for the construction and operation of renewable energy projects at the lowest price.

In the most developed urban agglomerations with built-in intelligent systems, integrated management platforms are being created (Energy and Urban), which have feedback from the infrastructural subsystems and allow for continuous improvement of the infrastructure's efficiency by involving all interested parties in this process in real time on the basis of a developed communications and communications network. Such integrated platforms have been implemented in urban metropolitan areas of Spain and Brazil, providing a reduction in energy consumption of the utility infrastructure by 35-40% and reduction of air pollution by 20-25%.

The recommendations adopted at the 20th session of the UNWTO General Assembly of June 11, 2013 give the following definition: “Tourism accessible to all is a form of tourism that envisages a process of cooperation among participants in the tourism process, allowing people with access needs to including those related to mobility, vision, hearing and cognitive functions, to function independently, fairly and with dignity by providing them with tourism products, services and environments developed on the basis of the principles of universal design” (World Tourism Organization).

As mentioned above, the term "tourism for people with disabilities" has a variety of terms, as well as the interpretation of "barrier-free tourism", where researchers also did not come to a consensus. For example, the Australian researcher of affordable tourism and the wheelchair user Simon Darcy defines this type of tourism as follows (hereinafter referred to as the author's letter) “Accessible tourism is a continuous attempt to provide tourists with destinations, travel products and services that are accessible to all people, regardless of their physical limitations, disability and age (Darcy 2009, Ambrose 2012).

The formation of a barrier-free environment in the city is connected both with the development of tourism and its component - the sphere of hospitality, and with the

corresponding modernization of the city (municipal) infrastructure. According to an analytical study (Buhalis 2015), more than 7% of the global tourist flow has certain health restrictions. People with disabilities are characterized by a less active life position than other citizens, but, nevertheless, in Europe, about 11% of all travelers and, according to some estimates, 50 million people have health deviations - in the UK this figure reaches 37% and in Germany 53% (Darcy 2009)

The cities in Europe have a higher level of development in terms of accessibility. According to opinion polls, one of the leaders in terms of accessibility among European cities is Barcelona. Tourism organizations succeeded in this area thanks to the public-private partnership (PPP) system. An example of an accessible environment in France is Nantes. It was the city in the west of the country with a population of 600 thousand people that was recognized as the most favorable for people with disabilities (Pedosyuk 2014).

“Stockholm - the most affordable city” - such a program, aimed at improving the lives of people with disabilities, began in Sweden in 1999. At the moment, the Stockholm Transport Agency is doing everything necessary by adapting the city buildings, pedestrian areas and highways for the movement of people with disabilities: pedestrian paths adjacent to transport highways are designed for people with wheelchair access, and for partially sighted or completely blind people. Residential areas are equipped with ramps. Almost all museums in the city are equipped with special platforms for easy access to exhibits (Mezhova 2015)

According to studies, only in Europe affordable tourism services can be demanded by 127 million EU citizens, which make up more than 27% of the European population. About 70% of them have financial and physical ability to travel. Given that they are accompanied by friends, relatives and guardians, the estimated revenues in this tourism sector exceed 80 billion euros. According to WHO, there are about 1 billion people with disabilities in the world. And this figure is constantly growing due to the global processes of population aging and increased life expectancy. More than 21% of the world's population will be over 60 years old and reach 2 billion people, which will triple the current rate by 2050 (World report on disability).

The ecological reconstruction of urban areas is due to the process of gentrification, as well as the obsolescence and inefficiency of the urban housing stock. In particular, a high level of energy efficiency in the Vauban quarter in Freiburg, built on the site of a French military base in 2000, is provided by solar and geothermal energy. Also examples of ecological reconstruction are the eco-cities of Austenborg (Malmö, Sweden), the Newbau quarter in Vienna, a residential settlement in the city of Solovury (Sweden), a residential area in Koldinga (Germany).

### **4.3. The implementation of projects for the modernization of municipal infrastructure and hospitality in the city based on an integrated approach**

The use of a comprehensive approach to the implementation of projects for the modernization of municipal infrastructure and the hospitality sector of the city is due to the following circumstances. Public infrastructure and hospitality are factors in ensuring the implementation of the goal of sustainable development of the city associated with the openness and environmental sustainability of the city. The public infrastructure and the

hospitality of the city are adjacent, dependent on each other. This applies, first of all, to environmental and social innovations (energy saving and a barrier-free environment). But in conditions of high deterioration and breakdown of public infrastructure - this can be an obstacle to the introduction of innovations related to improving the quality of customer-oriented services in the hospitality sector. The Comprehensive approach is also due to the need to evaluate innovations in terms of their compliance with economic, environmental and social criteria.

Thus the strategic task of managing hospitality urban enterprises in the context of ensuring sustainable development of the sphere is to promote the introduction of innovations aimed at modernizing the existing heat, water supply system and, in general, objects and networks of public infrastructure; the use of modern methods in the field of household waste management; updating and technological re-equipment of business entities - executors of housing and public management, improving technological processes, creating the prerequisites for improving the quality of services, reducing energy and resource consumption, improving energy efficiency and ensuring greening at all stages of production, transportation and provision of services. Planned measures for the introduction of innovations should be included in the respective investment program approved by the business entity, the financing of which is carried out with funds from the investment component of the tariff for services, and its intended use is controlled by the relevant regulatory body. In addition, it seems advisable to develop mechanisms of state support and facilitate the attraction of extrabudgetary funds for the restoration, modernization and development of public infrastructure, as well as expanding sources of financing for innovation. Various mechanisms can be used for this, including public-private partnerships. At the same time, a hospitality company can act as a private investor confirms the successful experience in the effective use of various models for the implementation of public private partnership mechanisms in almost all sub-sectors of the public infrastructure of European countries (Goldstein 2016, Koppenjan 2009, Pattberg 2012).

Based on the results of project implementation, budgetary and commercial effectiveness is determined. Over the past twenty-five years, in Ukraine, dozens of projects have been and are being implemented on the basis of public private partnerships. Moreover, the largest share (74.2%) among those implemented as of January 1, 2019, according to the Ministry of Economic Development, Trade and Agriculture of Ukraine (Ministry of Economic Development), is occupied by projects in the field of production and provision of housing and public management. In the industrial context, projects for the collection, treatment and distribution of water (63.3%) predominate among projects in the housing and utilities sector, projects for the production, transportation and supply of heat (16.3%) take the second place, implementation is somewhat less quantitative projects using public private partnership mechanisms in the areas of waste treatment (14.3%) and production, distribution and supply of electric energy (6.1%). However, it is not enough, which requires corresponding changes in the legislation on public-private partnership to Ukraine

Among the main advantages of public private partnerships, it is worth noting the possibility of obtaining a synergistic effect, which is manifested in increasing labor productivity, improving the quality, economy, effectiveness and efficiency of the

provided infrastructure services due to the economic leverage of the state (using incentive and support mechanisms) and realizing private business opportunities (the latest technology and innovation). In the process of managing public-private partnership projects, it is necessary to observe the principles of purposefulness, consistency, comprehensiveness, synergy, rationality in the distribution of powers, and the presence of feedback, consistency in the interests of participants, resources, performers and timing. At the same time, regulatory, economic and organizational methods of project management are used. The regulatory methods include regulating the relations of participants, ensuring equal rights for investors, providing legal guarantees to minimize investment risks, creating an effective mechanism for attracting and concentrating financial resources, including municipal loans. The economic methods are aimed at improving tax policy, providing tax benefits, expanding the list of attractive financial instruments. The organizational methods consist in monitoring and systematizing information about potential and current investors, creating investment funds, developing infrastructure for servicing the investment activities of financial and credit organizations, insurance companies, consulting, audit and appraisal firms. In the process of developing public-private partnership projects, risks are also assessed (legislative, financial, economic, technical, technological, social and environmental) and the possibilities for managing them are determined by identifying the causes of their decision-making on their elimination.

In the process of implementing projects on the basis of an integrated approach, the most important condition is the management of resources. The resource management in the process of project implementation is carried out by substantiating and making appropriate decisions. The formation and adoption of decisions is aimed at controlling the movement of material flows, which are objects of labor, means of labor and labor itself, as well as information flows reflecting this movement through the implementation of management functions: accounting and control, analysis and evaluation, planning and regulation.

Management decisions must meet the requirements of comprehensiveness, scientific validity, timeliness and multidimensionality. The fig. 1 presents the result of structuring the process of decision making and implementation. It includes four stages and the composition of the procedures necessary for the implementation of the target settings of each stage.

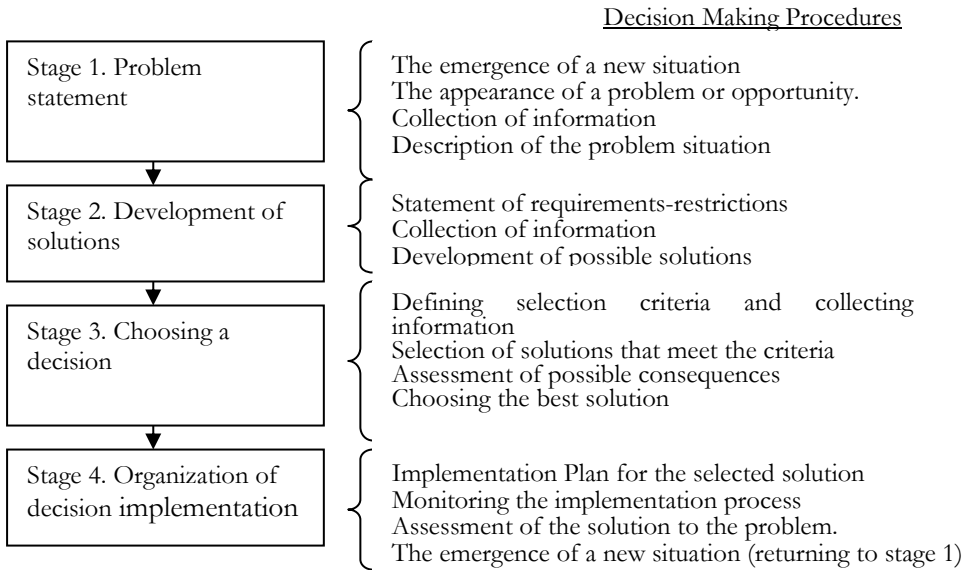


Fig. 1 Steps and procedures of the decision-making process

Taking into account the indicated stages, an enlarged scheme for the formation, justification and implementation of decisions on project resource management should have the configuration shown in Fig. 2

The coordination unit’s action consists in maneuvering and distributing resources between the participants, taking into account their interests, which helps to maintain the predominance of the constituent components of the potential over the destructive ones and contributes to the self-preservation of the project as a holistic organizational and economic system.

The resource and communication model (Melnikova 2017), which is the core of the coordination unit ( $E_0$ ) and combines the production and organizational components in the investment process.

The combination of production (management of material, labor and financial resources) and organizational (formation of conditions for organizing activities based on the establishment of communication links) components contributes not only to the achievement of the goals and objectives of the project, but also to support the integrity of the management system.

The project contains many components (participants)  $m$ , the action of which is coordinated in the coordination unit ( $E_j, j = 1..m$ ). Available for the operation of the project is a combination of resources ( $Q_j, j = 1..m$ ).

The function of the coordination unit is the control mechanism. Its components are:

- 1) Formation of a common task  $z_0$  and its distribution in the form of separate tasks  $z_i$  between participants:

$$z_0 = g(\{z_i\}_{i=1..n})y; \quad \text{[formula 1]}$$



2) distribution of available resources between participants:

$$Q = Q\left(\{E_i\}_{i=1..n}, \{Q_i\}_{i=1..m}\right) = (q_{ij})_{i=1..n, j=1..m}, \quad [\text{formula 2}]$$

or in tabular form

$\begin{matrix} Q \\ E \end{matrix}$	$Q_1$	$Q_2$	...	$Q_m$
$E_1$	$q_{11}$	$q_{12}$	...	$q_{1m}$
...	...	...	...	...
$E_n$	$q_{n1}$	$q_{n2}$	...	$q_{nm}$

where  $q_{ij}$  is amount of resource provided to solve a particular problem  $z_i$  participant  $E_i$ . In this case, the system of inequalities should be satisfied:

$$\forall j: j = 1..m: \sum_{i=1}^n q_{ij} \leq Q_j. \quad [\text{formula 3}]$$

Using the results  $(R_i, i = 1..n)$ , obtained in the process of solving all tasks by the participants to achieve the goal:

$$R_0 = g\left(\{R_i\}_{i=1..n}\right). \quad [\text{formula 4}]$$

Moreover, the results of solving individual problems by each of the participants are described by a system of functions:

$$\forall i: i = 1..n: R_i = f_i\left(z_i, \{q_{ij}\}_{j=1..m}\right). \quad [\text{formula 5}]$$

Distribution of results obtained in solving the general problem:

$$\forall i: i = 1..n: \{P_i\} = v(P_0). \quad [\text{formula 6}]$$

The proposed scheme (Fig. 1) allows the model to formulate decisions aimed at implementing two main functions of the control mechanism: providing (attracting resources, distributing them between tasks to achieve the goal) and regulatory (supporting self-preservation parameters through the use of appropriate procedures that ensure the predominance of the conservation potential over the potential for destruction).

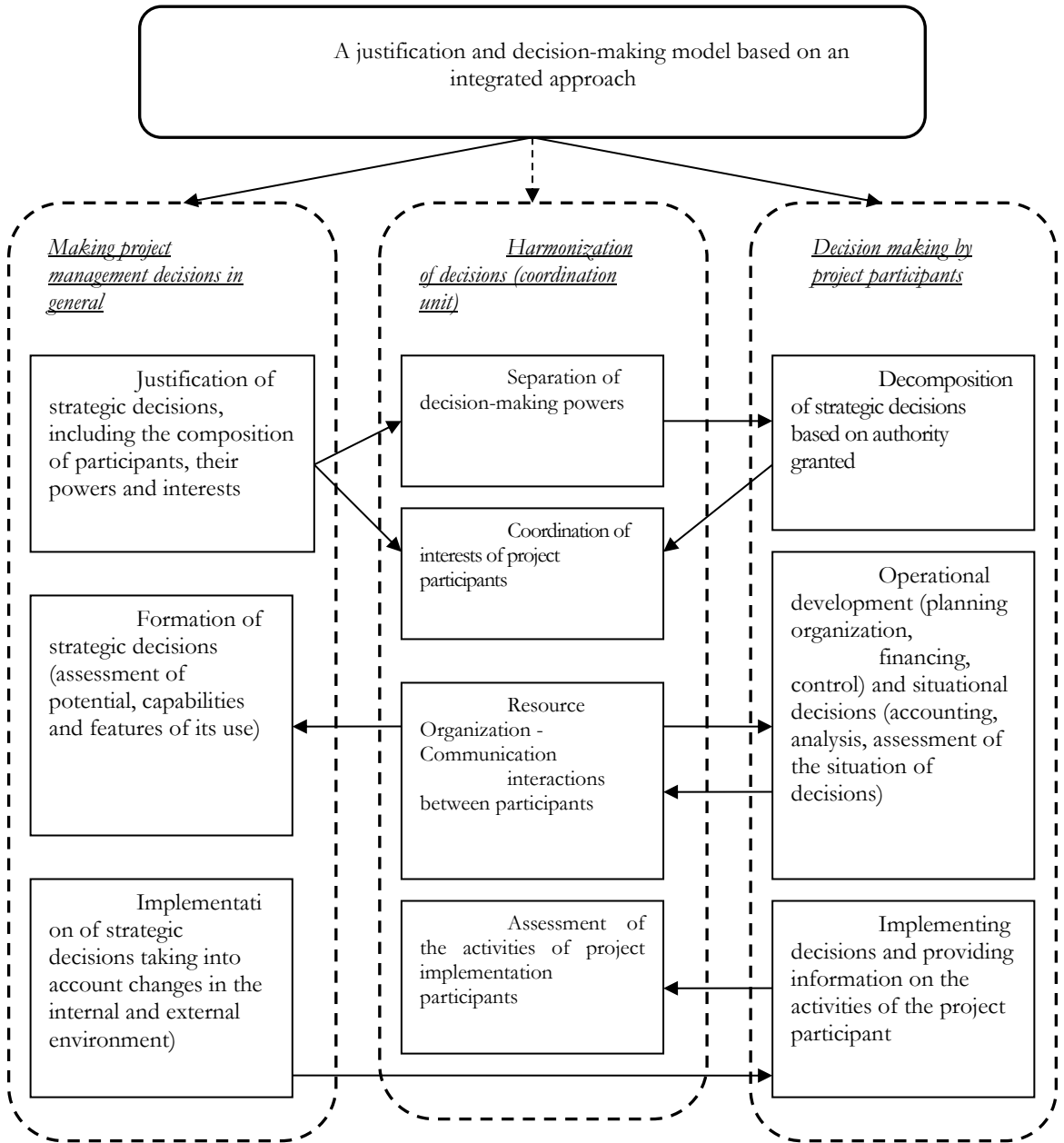


Fig. 2. Decision-making scheme for resource management of the project for the modernization of communal infrastructure and hospitality based on an integrated approach

The tool for the formation and implementation of decisions is an information management system. The principles of building an information system to support

decision-making are: identifiability of processes and phenomena, controllability of resources, reliable functioning of the model itself, real-time operation. The decision support information system is a hardware-software complex consisting of computers, software and information support, communication tools, information retrieval sensors, office equipment.

## 5. Conclusions and recommendations

The comprehensive modernization of certain spheres of the city's economy (in particular, public infrastructure and hospitality) is a factor in sustainable development to the extent that through the implementation of modernization measures a positive economic, environmental or social effect is achieved or negative impact on the environment is reduced, the level is reduced economic risk or social tension. It can be achieved through the implementation of priority areas, taking into account the experience of sustainable European cities. These spheres are currently: the introduction of resource-saving technologies, the use of alternative energy sources, expanding the barrier-free environment. It is also possible to reduce the negative impact of public infrastructure and hospitality on the environment by expanding the network of eco-hotels and creating ecological spaces in the city, as well as stimulating eco-entrepreneurship and eco-cooperation. The comprehensive modernization for the purposes of sustainable development of the city can be carried out both horizontally (for enterprises of related industries) and vertically (for enterprises of the same industry at the stages of the technological process). An example of vertical modernization is the project "Processing of solid waste into fuel (gas) for heat supply enterprises". At the same time, a comprehensive modernization of enterprises for the processing of municipal solid waste into fuel and heat supply enterprises that will use fuel is necessary.

The implementation of comprehensive modernization projects is possible not only in the field of hospitality and public infrastructure, but in other interconnected (related) sectors of the urban economy. In particular, there are public infrastructure and information and communication services, hospitality and transport services, healthcare and waste management; spheres of education and the formation of eco-zones.

An integrated approach to modernization is also determined by the technical, technological, institutional and financial features of the public infrastructure and the hospitality sector of cities in Ukraine. Technical and technological features are due to the fact that the municipal infrastructure is associated to a greater or lesser extent with all sectors of the urban economy, including the hospitality sector, especially in matters of water supply and sanitation. The activities of public infrastructure are aimed more at satisfying the needs of the population, and to a lesser extent at visitors to the city. The activities of hospitality enterprises are mainly aimed at visitors to the city. The financial features are that the activities of the hospitality industry are related to the revenue of the local budget (it is replenished by taxes and fees, the activities of the public infrastructure are financed from the local budget. Institutional features are that the strategies, programs and projects of sustainable development of the city, including the modernization of public infrastructure, according to the laws in Ukraine, local governments are developing and implementing them, which is due to the fact that the public infrastructure and its

enterprises are publicly owned. The hospitality industry in general, and the hotel industry, in particular, are mostly private, therefore their activities are regulated by the relevant legal acts, while strategies and programs play an indicative role, therefore, modernization projects are developed and implemented, including public-private partnerships. The implementation of projects on the principles of public-private partnership requires the improvement of the regulatory framework. In the process of implementing modernization projects, it is necessary to ensure effective resource management. It is achieved through the use of an appropriate decision-making scheme. The structure of the scheme includes a resource and communication unit that allows for organizational and economic sustainability of the project due to the rational distribution of resources.

An important issue in ensuring the modernization process is ensuring investment attractiveness. For this, various tools are used, including information transparency, a deferred tax payment mechanism, and investment loyalty of local governments. Information transparency is facilitated by the use of geographic information technologies. They allow you to accurately localize the investment object and monitor the implementation of the project in real time.

It should be noted that modernization projects significantly affect the quality of life of the population, which requires public consultations with the public to make decisions, as well as the use of participatory budgeting. The participatory budgeting using European experience is currently more than 50 cities in Ukraine and this process continues. However, both participatory budgeting and local initiatives require legislative consolidation, which is consistent with the objectives of the decentralization reform of power, which continues in Ukraine

Thus, further research needs financial support for the implementation of projects for the comprehensive modernization of public infrastructure and hospitality for sustainable development of the city.

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