УДК 338.504:51 https://doi.org/10.31520/ei.2023.25.4(89).134-141
JEL A12, Q26, Q32

received date: 2023-11-22, revised date: 2023-12-01, accepted date: 2023-12-10, published date: 2023-12-20

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ІННОВАЦІЙНІ ПІДХОДИ ДО ВИКОРИСТАННЯ ВОДНОЇ ІНФРАСТРУКТУРИ В КУРОРТНІЙ ЕКОНОМІЦІ

Актуальність. *Стаття присвячена аналізу існуючого міжнародного досвіду розвитку бізнес активності з використанням водної інфраструктури. Розглядається курортна економіка Ізраїлю в порівнянні з Україною (на прикладі міста Одеси) як тих, що споріднені за попитом на оздоровлення та враження та тих, що мають диспропорції у забезпеченні водною інфраструктурою.*

Мета та завдання. *Метою статті є аналіз та використання найкращих світових практик у курортній економіці для приєднання до глобальних трендів та конкурентного середовища. Завданнями статті є визначення інфраструктурної складової для водозабезпечення галузі курортної економіки, виявлення диспропорцій в системі водного господарства Одеської області та напрями їх подолання.*

Матеріали та методи. *Теоретична основа дослідження була сформована за допомогою методу аналізу та уточнення понять. Для виявлення основних диспропорцій в водній інфраструктурі, що забезпечує функціонування курортної економіки були використані статистичний та порівняльний методи.*

Результати. *В статті доведено, що забезпечення населення Одеської області питною водою є однією з найбільш важливих проблем, розв'язати яку необхідно для збереження здоров'я, поліпшення умов проживання та підвищення рівня життя населення регіону. Розвиток Одеської області як курортної території неможливе без забезпечення якісними послугами з постачання безпечної питної води та доступу до сучасних систем водовідведення. Ключовим аспектом вдосконалення управління водними ресурсами виступив досвід Ізраїлю щодо впровадження системи самофінансування водного сектору, яка охоплює не тільки постачання питної води для населення в містах, але й обслуговування всіх учасників водного циклу.*

Висновки. *Управління водними ресурсами виступає одним з ключових факторів у розвитку курортної економіки. Інноваційні рішення, такі як очищення стічних вод, процес опріснення та політика сталого*

використання водних ресурсів, дозволить задовольнити зростаючий попит на воду, при цьому зберігаючи обмежені природні ресурси. Шляхом поєднання інституційних реформ із механізмами ціноутворення, що базуються на повному відшкодуванні витрат, заохоченням до операційної ефективності та реалізації практичного державно-приватного партнерства, результатом чого прямі бюджетні субсидії в секторі курортної економіки поетапно можуть бути припинено та досягнуто самофінансування водного сектору.

Ключові слова: *курортна економіка, водна інфраструктура, рекреація.*

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INNOVATIVE APPROACHES TO UTILIZING WATER INFRASTRUCTURE IN RESORT ECONOMY

Topicality. *The article is dedicated to the analysis of existing international experience in developing business activities utilizing water infrastructure. It explores the resort economy of Israel in comparison with Ukraine, using the city of Odesa as an example. The focus is on the similarities in demand for recreation and experiences, as well as disparities in water infrastructure provision between the two.*

Aim and tasks. *The aim of the article is to analyze and incorporate the best world practices in resort economy to align with global trends and a competitive environment. The tasks of the article include identifying the infrastructure components for water supply in the resort economy, identifying disparities in the water management system of the Odessa region, and outlining strategies to overcome these disparities.*

Materials and Methods. *The theoretical framework of the research was formed through the method of analysis and clarification of concepts. To identify key disparities in the water infrastructure that supports the functioning of the resort economy, statistical and comparative methods were employed.*

Research results. *The article establishes that ensuring the population of the Odessa region with drinking water is one of the most crucial issues that must be addressed to preserve health, improve living conditions, and enhance the quality of life for the region's residents. The development of the Odessa region as a resort area is impossible without providing quality services for the supply of safe drinking water and access to modern wastewater systems. A key aspect of improving water resource management is the experience of Israel in implementing a self-financing system in the*

water sector, covering not only the supply of drinking water to urban populations but also servicing all participants in the water cycle.

Conclusion. *Water resource management is a key factor in the development of the resort economy. Innovative solutions such as wastewater treatment, desalination processes, and sustainable water management policies will enable meeting the growing demand for water while conserving limited natural resources. By combining institutional reforms with pricing mechanisms based on full cost recovery, promoting operational efficiency and implementing practical public-private partnerships, whereby direct budgetary subsidies in the resort economy sector can be phased out and self-financing of the water sector achieved.*

Keywords: *resort economy, water infrastructure, recreation.*

Problem statement and its connection with important scientific and practical tasks. Trends in the development of the resort economy highlight the necessity of developing water infrastructure for health and rehabilitation purposes. It is crucial to note that water in spa centers must adhere to high safety and quality standards, as it significantly impacts human health. Spa centers should maintain proper conditions to avoid any health risks to visitors. The average daily water consumption by resort economy enterprises is very high. For instance, per visitor, water consumption ranges from 450 to 800 liters, depending on the season and location (Cohen & Bodeker, 2008). These figures are calculated based on the expenses of spas, hotels, and restaurants. Therefore, the development and reliable operation of a critical infrastructure component, such as water supply and wastewater systems, become highly relevant. This aligns with one of the strategic development tasks for the Odessa region for 2021-2027, namely the Eco-Transformation of Odessa (Odesa Regional Council, 2020).

Analysis of recent publications on the problem. Resort tourism is a crucial sector in the tourism industry that contributes to economic growth and social development in countries. Water is an indispensable component of resorts and plays a significant role in the attractiveness and competitiveness of resort regions. Among the wide range of services offered by resorts, spa and wellness services have gained substantial importance in recent years, providing guests with a diverse range of therapeutic and cosmetic procedures. According to the World Travel & Tourism Council (World Travel & Tourism Council, 2023), tourism currently accounts for 1% of global water consumption. While this figure may seem insignificant compared to the agricultural sector, which consumes almost 70% of water, or the industrial sector, representing 19% of global water consumption, in some countries where tourism is a primary driver of economic development, water consumption exceeds 7%. The international research company 'Intelligent Spas,' specializing in the spa industry, defines spa centers as a 'business that offers spa procedures based on authentic water therapies performed by qualified staff in a professional and relaxing environment' (Intelligent Spas, n/d). This definition incorporates water as the foundation of spa center operations. To address these challenges, the recycling (reuse) of wastewater becomes a useful solution, solving the water scarcity issue in many countries worldwide (Bixio et al., 2006, Asano et al., 2007).

Thus, in the current context of limited water resources in many countries, coupled with population growth and climate change, the spa industry must operate within the framework of responsible and sustainable water resource management.

Allocation of previously unsolved parts of the general problem. The highlighted unsolved aspects of the general problem lie in the need to establish a comprehensive water resource management system, encompassing scientific research, technological innovations, legislative measures, and efficient water management in resort economy enterprises to attract investments in water infrastructure.

Formulation of research objectives (problem statement). The aim of the article is to analyze and incorporate the best world practices in resort economy to align with global trends and a competitive environment. The tasks of the article include identifying the infrastructure components for water supply in the resort economy, identifying disparities in the water management system of the Odessa region, and outlining strategies to overcome these disparities.

Materials and Methods. The theoretical framework of the research was formed through the method of analysis and clarification of concepts. To identify key disparities in the water infrastructure that supports the functioning of the resort economy, statistical and comparative methods were employed.

An outline of the main results and their justification. The increasing demand for spa and wellness services is driven by a growing interest in health and well-being, as well as a desire to relax and alleviate stress. It is worth noting that spa and wellness centers use valuable natural resources in their operations, such as therapeutic resources

(mud, ozokerite, oil, peloids), water resources (mineral and thermal waters, seawater), medicinal plants, etc.

In general, water resources are one of the most crucial and scarce assets for tourism activities, especially in resorts. Water resources (freshwater, beaches, coastlines, lakes, rivers, etc.) constitute a major attraction for tourists, and water consumption in the tourism industry is one of the significant contributors to the degradation of water resources. Israel's experience in addressing this issue holds a prominent position. This is because Israel is one of the countries in the world facing the most severe water resource shortage. According to UN FAO (FAO, n/d), Israel ranks 170th out of 179 countries in terms of renewable internal freshwater resources per capita (86.6 cubic meters per year), which is a very low indicator.

State entities in Israel, such as the Ministry of Energy and Infrastructure, the Water Authority, and the Water Utility Company "Mekorot" (table 1) play a crucial role in planning and regulating water usage. The national water utility company, "Mekorot" was established in 1937 and is currently one of the world's most advanced water utility companies, leading in water resource management. The company operates under the supervision of the Ministry of Energy and Water Resources and the Ministry of Finance, reporting to the Water Authority of Israel.

As of today, "Mekorot" delivers 95% of the region's drinking water resources to regional suppliers who distribute water to end-users (residential, industrial, agricultural). The water infrastructure of "Mekorot" comprises approximately 3,000 facilities and 12,000 kilometers of pipelines, controlled by 10 main command centers nationwide. The overall water loss in the transportation system is only 3% (Mekorot, 2016).

After the implementation of tariff reforms in water supply and wastewater in 2009, the national water utility company "Mekorot" has consistently achieved annual profits. In 2022, the total revenue reached 4.9 billion shekels (1.3 billion USD), and the net profit was 448.2 million shekels (121.1 million USD). The return on equity was 9.6%, and the financial independence coefficient was 23.6%. Annual investments in the development of water resources amount to approximately 1.6 billion shekels (432 million USD).

Table 1.

Institutions responsible for managing water resources in Israel

Institution	Level	Primary tasks
Ministry of Energy and Infrastructure	National	Development of energy supply policy and management of natural resources in the State of Israel.
Water Management Authority	National	Management, operation, conservation, and restoration of the country's water resources, as well as tariff regulation for all types of water use.
Water utility company "Mekorot"	National	Production and transportation of water: • Pumping water from aquifers and purifying drinking water from the Sea of Galilee. • Desalination of seawater and brackish water. • Operation of the national water supply and wastewater drainage network.
Municipal and Regional Water Utilities	Municipal/ regional	Distribution of drinking water to residential and industrial consumers, as well as the collection and treatment of wastewater.
Water Basin Management	Basin	Management of basins, aquifers, flash floods, and surface water.

Source: completed by the authors

One of the areas where water resource management has played a significant role is Israel's resort economy. The country's unique natural beauty attracts millions of tourists every year. However, the development of the resort industry has also put strain on the country's limited water resources.

To address this challenge, Israel has implemented a series of innovative solutions in water resource management, allowing the country to develop a thriving resort economy while conserving its scarce water resources.

To ensure a reliable water supply, Israel is gradually implementing a policy that combines institutional reforms and significant investments in infrastructure. This includes key elements such as:

- *Active management of water demand* to control withdrawals from aquifers (water permits, measurements), improving efficiency, reducing domestic consumption (drinking water per capita), and shifting water usage to cultivate more valuable irrigated crops.

The state tariff for drinking water and sanitation services is based on a two-tier block structure. In 2017, the unified average tariff was 8.92 shekels (approximately 2.4 USD) per cubic meter. The tariff for the first block, corresponding to consumption up to 3.5 cubic meters per capita per month (115 liters per day), is 6.56 shekels (1.8 USD) per cubic meter. The tariff for the second consumption block includes a 61% surcharge, totaling 10.56 shekels (2.85 USD) (Philippe et al, 2017). This tariff structure is designed to encourage demand management while ensuring population access to essential consumption levels at an affordable price. Approximately 75% of domestic consumption is billed at the lower tariff. The current average water consumption per capita is around 90 cubic meters per person per year.

- *Recycling of treated wastewater:* One of Israel's notable achievements in water resource management is its wastewater recycling program. Approximately 90% of wastewater in the country undergoes treatment and is reused for irrigation of agricultural lands, watering parks and gardens, as well as for industrial purposes. This practice helps conserve natural freshwater resources and reduces dependence on external water sources (Government of Israel Water Authority, 2015).

Israel has established national water quality standards for the reuse of treated wastewater. These standards consider crucial aspects such as public health, plant health, long-term soil health, and the sustainability of aquifers.

Since the 2000s, Israel has invested over 750 million dollars in a centralized water reclamation scheme with 67 large treatment facilities and a nationwide pipeline network, allowing the distribution of water surpluses as needed (Angelakis et Gikas, 2014). Wastewater recycling supports the country's economic growth and resilience to drought caused by climate change.

It is expected that by 2030, global water demand will exceed supply by approximately 40% if more efficient water management is not implemented, affecting the cost of food and global geopolitics. Israel has recognized the value of treated wastewater as a resource and has become a global leader in water reuse. The Long-term Master Plan for the Israeli Water Sector aims for 100% reuse of treated wastewater (Water Authority, 2012).

- *Development of extensive desalination of seawater and brackish water*: Another solution that has allowed the development of the resort industry while conserving water resources is desalination. Israel is one of the world leaders in water desalination technologies, with several large-scale desalination plants along the Mediterranean coast. These facilities annually produce millions of cubic meters of fresh water used for drinking, irrigation, and industrial purposes.

Desalination plants have helped reduce Israel's dependence on freshwater from natural sources such as the Sea of Galilee and the Jordan River. This not only allowed the country to meet the growing demand for water but also helped preserve the natural resources necessary for the ecological balance of the region.

While desalination accounted for a small percentage of total water production in 1995, it now contributes to over 35% of freshwater production (Tropp & Jägerskog, 2006).

This has enabled Israel to ensure the population's water security, with domestic drinking water supply becoming significantly less dependent on rainfall and withdrawals from aquifers. Today, due to the implementation of such solutions, Israel produces 20% more water than needed for the country's own requirements.

- *Development of the national transportation infrastructure* for large-scale water conveyance aims to optimize the utilization and distribution of water from various sources (aquifers, desalination, purification of water from the Sea of Galilee, recycled wastewater) based on local demand and hydrological conditions, including the transfer of excess water from one location to another (Philippe et al, 2017).
- *Utilization of aquifers as reservoirs* (in the absence of surface reservoirs and dams), replenishing aquifers with treated wastewater during low-demand months, capturing intermittent flash floods, and implementing comprehensive monitoring and control of aquifer levels.

In addition to these technological solutions, Israel has also implemented a range of policies aimed at promoting sustainable water use in the tourism sector. Some of these policies include:

- *Certification of Green Tourism:* The Green Tourism Certification (T-Mark) is an initiative by the Ministry of Tourism of Israel aimed at promoting sustainable tourism practices and recognizing businesses that demonstrate a commitment to environmental responsibility. To obtain the Green Tourism Certificate, various aspects of the tourism business are evaluated, taking into account ecological sustainability and

social responsibility. Certification criteria cover areas such as energy efficiency, water conservation, waste management, use of environmentally friendly materials, transportation, and staff training. If a business meets the required standards, it is awarded the T-Mark, indicating its commitment to sustainable tourism practices.

This program provides tourists with the opportunity to identify and support environmentally responsible businesses, serving as a tool for companies to improve their sustainable development methods and reduce their impact on the environment.

Public Awareness Campaigns: The Israeli government has launched public awareness campaigns to inform guests and hotel staff about the importance of water conservation. These campaigns encourage guests to reuse towels and bed linens, take shorter showers, and report leaks or other water-related issues to hotel staff.

A crucial element in the modernization of water resource management in Israel has been the transition to self-financing within the water sector—not only for domestic drinking water supply in cities but also for all users in the water cycle. This was achieved through a combination of institutional reforms along with pricing mechanisms based on full cost recovery, promoting operational efficiency and implementing practical public-private partnerships. As a result, direct budgetary subsidies in the sector were gradually phased out, ultimately achieving self-financing for the water management sector.

The resolution of infrastructure water supply issues in resort economy enterprises is already outlined in the low regulatory acts of Ukraine. This study is dedicated to analyzing Israel's experience and its translation into the development of the Odessa region, considered the most attractive in the field of resort economics.

Indeed, the Tourism and Resorts Development Program of the Odessa Region for 2021-2023 (Odesa Regional Council, 2021a) envisions addressing three main tasks, including:

1. *Regional development of tourist infrastructure and improvement of the quality of the tourist product.* This involves the implementation of 9 measures, including the creation (updating) of tourist routes, infrastructure development of recreational areas, and more.

2. *Marketing and advertising-information activities.* This includes the implementation of 10 measures, such as improving the mobile application for tourists "Odessa Tourist Guide," creating promotional videos, presenting the Odessa region at domestic and international tourism exhibitions, and so on.

3. *Promotion of the development of recreational and resort potential of the region.* This involves the implementation of 4 measures, namely: conducting activities to identify prospective resort areas for their designation as local (state) level resorts; implementing measures from the roadmap for the development of the investment potential of recreational zones in the Odessa region; supporting the development of rural and eco-tourism; and developing project-cost documentation for the construction of berths on the shore of the Dniester estuary in the villages of Shabo and Mayaki.

The funding for the implementation of the program's measures is envisaged through the allocation of funds from the regional budget (10.33 million UAH) and local budgets.

In 2021, funds were allocated for the financing of such initiatives as the improvement of the mobile application for tourists "Odessa Tourist Guide" (48.0 thousand UAH); the development, production, and acquisition of presentation and informational materials, souvenirs, advertising and printed products branded with information about the tourist and resort potential of the region (49.4 thousand UAH); and support for the identification of promising resort areas for designation as local (state) resorts, including the organization and conduct of relevant events (398.6 thousand UAH) (Department of International Cooperation and Protocol of Odesa Regional State Administration, 2021).

In 2021, the procedure for designating Sychavka as a local resort was initiated. This included conducting analyses and assessments of the resort and recreational potential of the natural territory of the village of Sychavka in the Southern municipal territorial community of the Odesa district, Odesa region. Additionally, preparations were made, and requests were submitted to the State Tourism Development Agency of Ukraine for the declaration of the natural territories of Sychavka as resorts.

Critical infrastructure is the most essential element of any territory's infrastructure, particularly in resort areas. The law of Ukraine "On Critical Infrastructure" (On critical infrastructure, 2022) defines a list of sectors of critical infrastructure, including the provision of essential public (administrative) services, energy supply, water supply and drainage, food supply, healthcare, etc. The reliable functioning of critical infrastructure objects is crucial for ensuring the uninterrupted operation of hotels, restaurants, shops, and other enterprises that are integral components of the economy of a resort city.

The development and reliable operation of a critical infrastructure component such as water supply and drainage system align with one of the strategic tasks for the development of the Odesa region for the period 2021-2027 (Odesa Regional Council, 2020), namely, *the Eco-Transformation of Odesa.*

In the Odesa region, there are 132 enterprises discharging wastewater into surface water bodies. The main polluters include companies in the housing and communal services sector, such as "Infox" LLC, a branch of "Infoxvodokanal", Municipal Enterprise "Chornomorskvodokanal", Municipal Enterprise "Vodokanal" in the city of Artsyz, "Podilsvodokanal" Communal Enterprise, Municipal Enterprise "Bilhorod-Dnistrovskyvodokanal", Zatoka Wastewater Treatment Plant, Municipal Enterprise "Baltavodokanal", Municipal Communal Enterprise "Teplodarvodokanal" (Odesa Regional Council, 2021b).

The discharge of wastewater into surface water bodies in 2021 from the operation of housing and communal services enterprises amounted to 95.0 million cubic meters, constituting 63.7% of the total discharge.

In the Odesa region, there are 212 sewage treatment complexes with a total design capacity of 1557.8 thousand cubic meters per day. 80 of them are located in recreation areas in Bilhorod-Dnistrovskyi, Kominternivskyi, and Ovidiopolskyi districts, particularly on recreation bases, in sanatoriums, and resorts. Approximately 30% of the total number of treatment facilities are in unsatisfactory sanitary and technical condition. One of the main reasons for this situation is that the treatment facilities and sewage networks were built in the 1970s-1980s, and currently they are outdated and do not meet modern requirements. Emergency situations in sewage network lines are not promptly eliminated, ongoing and capital repairs of treatment facilities are not conducted, and there is no constant monitoring of their operation. This leads to soil and groundwater pollution, and these facilities are transferred to the balance of rural councils that lack funds for repairs and proper maintenance.

As of 2021 in the Odessa region, the share of old and emergency networks in the total length of the water supply network was 3053.3 km (30%). During the year, only 9.3 km were replaced (0.3% of the need). The accident rate of the networks was 5.0 accidents per 1 km of the network (Ministry for Communities, Territories and Infrastructure Development of Ukraine, 2022).

The total length of the sewage network is almost 6 times less than the length of the water supply network. At the same time, the share of old and emergency networks in the total length of the sewage network was about half, namely 857.3 km (45.4%); during the year, only 1.3 km were replaced (0.2% of the need). The accident rate of the networks was 2.81 accidents per 1 km of the network.

Conclusions and perspectives of further research. Given the current situation in the region, it can be concluded that the Odessa region remains an area with high ecological risks. The main environmental problems in the region include inadequate water quality, low levels of water supply to the population, and a high level of wear and tear on water supply and sanitation facilities.

The conducted analysis demonstrates that ensuring access to drinking water for the population of the Odessa region is one of the most crucial issues. Resolving this problem is necessary for preserving health, improving living conditions, and enhancing the quality of life for the region's residents. The development of the Odessa region as a resort area is impossible without ensuring quality services for the supply of safe drinking water and access to modern wastewater systems. A key aspect of improving water resource management is the experience of Israel in implementing a self-financing system for the water sector, that covers not only the supply of drinking water to the population in cities but also serves all participants in the water cycle.

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