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EVOLUTION OF BUSINESS MODEL FOR THE DRINKING WATER MARKET IN UKRAINE AND ITS APPLICATION UNDER THE NEW EUROPEAN CONCEPT OF THE BLUE ECONOMY

Purpose. *This article is devoted to a comprehensive study of the transformations taking place in the business models of the drinking water market, to the study of their compliance with global trends, and to the assessment of the expediency of applying Ukrainian experience in the context of sustainable development of the Mediterranean region.*

Methodology / approach. *Our research uses a qualitative analysis approach that carefully analyzes the international and Ukrainian practice of extraction and distribution of drinking and mineral water. It is based on a repository of best practices and principles adopted by world leaders in the modeling of distribution networks in the sector.*

Results. *The main focus of the study is to highlight the primary importance of drinking and mineral water consumption, especially in light of external factors such as climate change, population growth and constant changes in consumption patterns. Combining international and Ukrainian experience, the study not only highlights the problems, but also offers effective strategies for the sustainable development of the drinking and mineral water industry. Perhaps the most important of our results is the potential reproduction of a unique pattern of water distribution in Ukraine. This model, developed in war-affected regions, offers valuable information to address water supply challenges in war-prone areas. This knowledge can guide efforts to achieve the goals of the blue economy and global sustainability.*

Originality / scientific novelty. *This study is one of the first scientific studies to offer a comprehensive synthesis of international and Ukrainian experience based on the drinking water market. It not only describes changes in business models, but also reveals the complex process of their adaptation to the changing landscape of global dynamics.*

Practical value / implications. *The findings of this research have profound practical implications that are reflected in the development of policy, corporate strategy, and community initiatives. They stand as a call to action for the imperative of sustainable water management, heralding an era in which innovation in drinking water becomes the unassailable norm. In addition, the study draws attention to promising investment prospects that reflect the resonance of population growth, aging infrastructure, pollution, climate disruption and the onslaught of digital technologies.*

Key words: *blue economy, water market, drinking water, business models, sustainable development, climate change, population growth, innovation, investment, water distribution model.*

Introduction and review of literature. Nowadays, the critical issue of water accessibility, quality, and usage is widely discussed. Water is a critical component of ecosystem functioning and plays a key role in maintaining human well-being (Falkenmark, 2004). Uneven distribution and an ambiguous impact on the global

economy and human well-being prevent the valuation of water. A recent United Nations (UN) report suggests that by 2030, the world could face a 40 % gap in water supply. At the same time, the availability of water is crucial for food security, as agriculture is responsible for 70 % of freshwater abstraction worldwide. 80 % of wastewater is returned to the environment without treatment or reuse. This can have irreversible consequences for aquatic organisms of coastal habitats (eg. loss of biodiversity). A clear example is the change in the natural environment of the Mar Menor area in Spain. Climate change will intensify these problems as it will change the structure of precipitation. Ukraine and most European countries belong to the region with a vast reserve of water that can deteriorate the understanding of the real value of this resource. The quantity and quality of freshwater flows and supply of hydroelectric power plants is closely related to the management of the territory. Vegetation cover, land use, and climate play a critical role in the partition of rainfall into green and blue water flows (Zhang et al., 2001; Calder et al., 2003). At the same time, meeting the growing global demand for drinking water became one of the most significant problems for human beings. More than 1.2 billion people live in areas with high water scarcity. Besides, pollution decreases water resources, making them unsuitable for consumption and use. The shortage of supply and the rising value of natural resources drive innovation in the drinking water industry. Most companies in the world are investing considerable resources in researching methods, materials, and technologies to solve these issues. According to experts, the global demand in the market for bottled water will reach 528.2 billion liters, and the profit of producers of bottled water will increase to USD 307.2 billion in 2024 (EFBW, 2022). According to forecasts of the International Water Association, the total volume of the drinking water market will reach 1 trillion US dollars by 2025 (IWA, 2022). The rapid development of the water market at the level 10 % per year, the introduction of digital technologies, and modern business practices are among the factors that force the Ukrainian manufacturer to adapt to international standards. The research on the economics of the water industry, logistics, and the marketing of finished products has received considerable attention from well-known practitioners, scientists, world researchers, and public organizations for several decades including European Bottled Water Federation (EFBW), International Water Association IWA, SAM Study (Wild et al., 2015), Chong & Sunding (2008), Kucher et al. (2023), Paeza et al. (2014), Shumilova et al. (2023). However, the evolution of the water industry and its impact on global economic growth require more profound and detailed research. In addition to all this, the world is increasingly engulfed in war and, as the Ukrainian experience shows, the availability of water resources can not affect the supply of water to the population. The decades-old model of water distribution has proved ineffective. Instead, the regions of Ukraine, where this model was already used before the beginning of intensive hostilities, were able to provide the population with water. In this context, the article aims to explore core trends in the water market and reveal investment opportunities that may emerge from such factors as population growth, deterioration and aging of water supply infrastructure, pollution affecting water quality, climate change, and new

digital technologies.

The main focus of this article is to address several critical research questions and test hypotheses related to the water market and its impact on the development of the Mediterranean blue economy. It is crucial to elucidate the essential aspects of the water market and determine its effects on the region's sustainable development. The following are the primary research questions and hypotheses:

Research Questions:

- How does the availability, quality, and usage of water resources contribute to contemporary global challenges, including sustainable development?
- What are the implications of uneven water distribution and its impact on the global economy and human well-being?
- What are the potential consequences of a projected 40 % gap in water supply by 2030, particularly in terms of food security and aquatic biodiversity?
- How does climate change affect precipitation patterns and, consequently, the management of water resources in regions like Ukraine?
- What challenges arise from meeting the growing global demand for drinking water, especially in areas with high water scarcity and pollution?
- How is the drinking water industry responding to these challenges, and what are the market projections for bottled water and the overall drinking water industry?

Hypotheses:

- The uneven distribution of water resources and their vulnerability to climate change will pose significant challenges to water availability and quality, impacting human well-being and ecosystem health.
- The projected 40 % gap in water supply by 2030 underscores the urgency of addressing water scarcity issues and implementing sustainable water management practices.
- Pollution and water quality degradation will continue to diminish water resources, necessitating innovative solutions in the drinking water industry.
- The rapid growth of the water market, driven by factors such as population growth, aging infrastructure, pollution, climate change, and digital technologies, presents investment opportunities for stakeholders.
- The Ukrainian model of water distribution, which has proven its effectiveness in the context of hostilities, can serve as a valuable case study for addressing water supply challenges in conflict-prone regions.
- The development of the Mediterranean blue economy can benefit from insights gained through the analysis of the water market and investment opportunities.

A comprehensive literature review synthesizes existing knowledge and research findings related to the drinking water market, highlighting key trends, challenges, and emerging paradigms. This section also explores the critical role of water consumption in the evolution of environmental and demographic dynamics.

The blue economy is a recent economic development paradigm, being promoted worldwide as a way to deliver sustainable ocean development in the context of the sustainable development goals (Midlen et al., 2021).

Bennett (2018) draws attention to concerns regarding social justice and inclusion in the development of the oceans and highlights ten consequent risks for the ocean economy: dispossession, displacement, and ocean grabbing; environmental justice concerns from pollution and waste; environmental degradation and reduction of ecosystem services; livelihood impacts for small-scale fishers; lost access to marine resources needed for food security and wellbeing; inequitable distribution of economic benefits; social and cultural impacts; marginalization of women; human and Indigenous rights abuses; exclusion from governance (Bennett et al., 2021).

For Campling and Colás (2018), the oceans are a space of "terraqueous territoriality" in which socio-natural power relations effected through capitalism actively shape the spaces of the ocean.

Over the past two decades, the blue economy has slowly but steadily evolved as a term and concept to encompass a variety of economic opportunities, associated with the ocean, while simultaneously recognizing, accounting for and – in some cases – elimination of relevant threats of climate change, overfishing, pollution or habitat destruction (Voyer et al., 2018).

Today, the blue economy is basically an evolution of the notion of sustainable economies used to denote an increase in the economic wealth derived from oceans and coastal areas to maintain or improve natural systems on which economic systems depend. Thus, the very essence of the blue economy includes a shared understanding of sustainable development to meet the needs of the present without compromising the ability of future generations to meet their own needs. In essence, this shares the idea that economic activity/growth does not contradict environmental protection and sustainability, but rather complements or even reinforces (Boonstra et al., 2018).

Voyer et al. (2018) highlighted, that the concept of the blue economy unfolds in a complex manner, offering both promising avenues for growth and development, as well as regions facing imminent threats and vulnerabilities that demand protective measures. This dichotomy underscores the need for innovative solutions that can harness the opportunities inherent in the oceanic economy while proactively addressing the associated risks. In the blue economy, the United Nations Sustainable Development Goals (SDGs) take center stage, emphasizing the need to promote economic growth that is inclusive and environmentally responsible. This underscores the critical importance of striking an equilibrium between the economic, societal, and ecological facets of sustainable ocean development, as articulated by Griggs et al. (2013).

Without a doubt, the stability of Earth's ecosystems is the foundation upon which prosperous societies and sustainable progress are built. In Europe, significant research efforts have supported initiatives such as Marine Investment for the Blue Economy and H2Ocean. These initiatives have embarked on a mission to promote universal platforms and implement innovative production methodologies in a variety of sectors, from aquaculture to marine renewable energy, tourism, recreation and maritime transport. Notably, Ireland has been a pioneer in these achievements, taking advantage of its active participation in the EU's blue economy support scheme. China also recognizes the necessity of transitioning production systems onshore and has entrusted the East

China Sea Fisheries Research Institute with leading the charge in coastal aquaculture. Similarly, New Zealand and Chile have embarked on their own coastal aquaculture endeavors, aligned with the overarching principles of the blue economy, as documented by FAO (2018) and Potts et al. (2016).

Against this backdrop, the United Nations has formally declared the decade from 2021 to 2030 as the "Decade of Ocean Science for Sustainable Development". This proclamation signals a resolute commitment to reversing the ongoing decline in oceanic health and rallying global stakeholders behind a common framework. This framework is designed to ensure that oceanic research fully empowers nations to create a conducive environment for the sustainable development of oceanic resources. In the context of oceans, the World Bank underscores the critical importance of 'balancing the triple bottom lines of sustainable development' as a central pillar of the blue economy, as elucidated in the World Bank's report (2017, p. 4).

However, achieving this delicate equilibrium in practice presents formidable challenges, given the significant degradation of oceanic conditions resulting from a multitude of human and industrial activities. These multifaceted challenges encompass cover a wide range of conflicting goals, ranging from environmental pollution to unsustainable fishing practices and ecological degradation, as emphasized by the United Nations (2018). In this complex landscape, it is imperative that society and policymakers remain steadfast in their commitment to sustainable ocean development, forging a path that safeguards both the prosperity of nations and the health of our precious oceans.

The paradox of the green economy is that production structures receive environmental rewards for reducing emissions, even if they continue to pollute. It's time to move to a competitive business model that allows manufacturers to offer better products at lower prices while innovating in ways that not only increase profits, but also benefit the environment. This economic philosophy is called the "blue economy" (Pauli et al., 2009; 2010).

It should be noted that the basis of the blue economy should be technology and industries that cannot harm the oceans (Buono et al., 2021). That is, the main focus of the blue economy is on the world's oceans, seas, and everything connected with them (Rao et al., 2020). The blue economy offers an alternative to traditional industrial processes, shifting the focus from the use of extractive resources to simpler and greener technologies. Its principles involve entrepreneurs in innovative business projects that can bring economic benefits, successfully competing with traditional approaches in the economy (Hotaling et al., 2021).

Social innovation is the process of developing effective concepts, strategies, solutions, or other ideas that can help solve challenging societal and/or environmental problems via collaborative action by a group of actors. Social innovation can result in changing behavior across institutions, markets or the public sector, and can enhance creativity and responsible action towards a synthesis of social, economic and environmental goals (Eikeset et al., 2018).

Ukrainian research on the principles of the blue economy remains insufficiently

explored at present; however, there are already certain scientific works focusing on the implementation of circular economy principles in the practices of territorial communities in Ukraine. These studies highlight active efforts towards the incorporation of circular principles, including the concept of the "blue economy". They also reveal opportunities for optimizing resource use and support the idea that the principles of the blue economy can serve as a crucial tool in achieving the goals of circular economy practices within the context of modern territorial communities. Such research forms the foundation for further scientific exploration and the implementation of innovative approaches to sustainable and effective economic development models in Ukraine (Dmytryshyn et al., 2023)

The case of the recent self-sufficiency of the Hierro Island in the Canarias Islands (Spain) opens a new horizon towards understanding the Government, Company and Consumers and a common water-energy management business has been created in order to supply drinking water to the population through a self-sufficient system based on wind generation and energy storage by pumping. This case exemplifies a sustainable approach to supplying drinking water to the population, aligning with the principles of the blue economy.

The literature review points to the evolution of the blue economy as a paradigm for sustainable ocean development. It outlines the challenges and risks associated with oceanic economic activities while highlighting the importance of the SDGs in fostering inclusive and environmentally responsible economic growth.

The purpose of the article. The research is aimed at exploring the potential of implementing the Ukrainian approach to water purification and providing it to the population within the framework of the development of the blue economy in the Mediterranean region.

Methodology. This section explains the research approach in more detail, describing the analytical framework used for assessing international and Ukrainian experiences within the drinking and mineral water industry. It provides a transparent account of the criteria used to model both bottled and non-bottled water businesses.

Structural-and-logical scheme of the subject-object approach in the methodology of the research of the problem is presented in Figure 1.

The research centers its attention on the analyzed infrastructure and business model tailored to address the populace's water and environmental requirements while considering their influence on the blue economy development strategy. In parallel, the research focuses on meeting the population's needs in water and the environmental aspect, all in the broader context of forming a strategy for the development of the blue economy. The research focuses on the framework for policy change and reforms to create sufficient water production, and rules for its usage and trade. Applying the methodology of formalizing the models of production and marketing of water in different markets, the universal principles of the water industry functioning were developed. The method of the comparative analysis showed the specificity of the development of local and international companies operating in the water industry in Ukraine. Analysis of the work of the industry in the conditions of military events and

crises in Ukraine in the context of providing the population with water was provided.

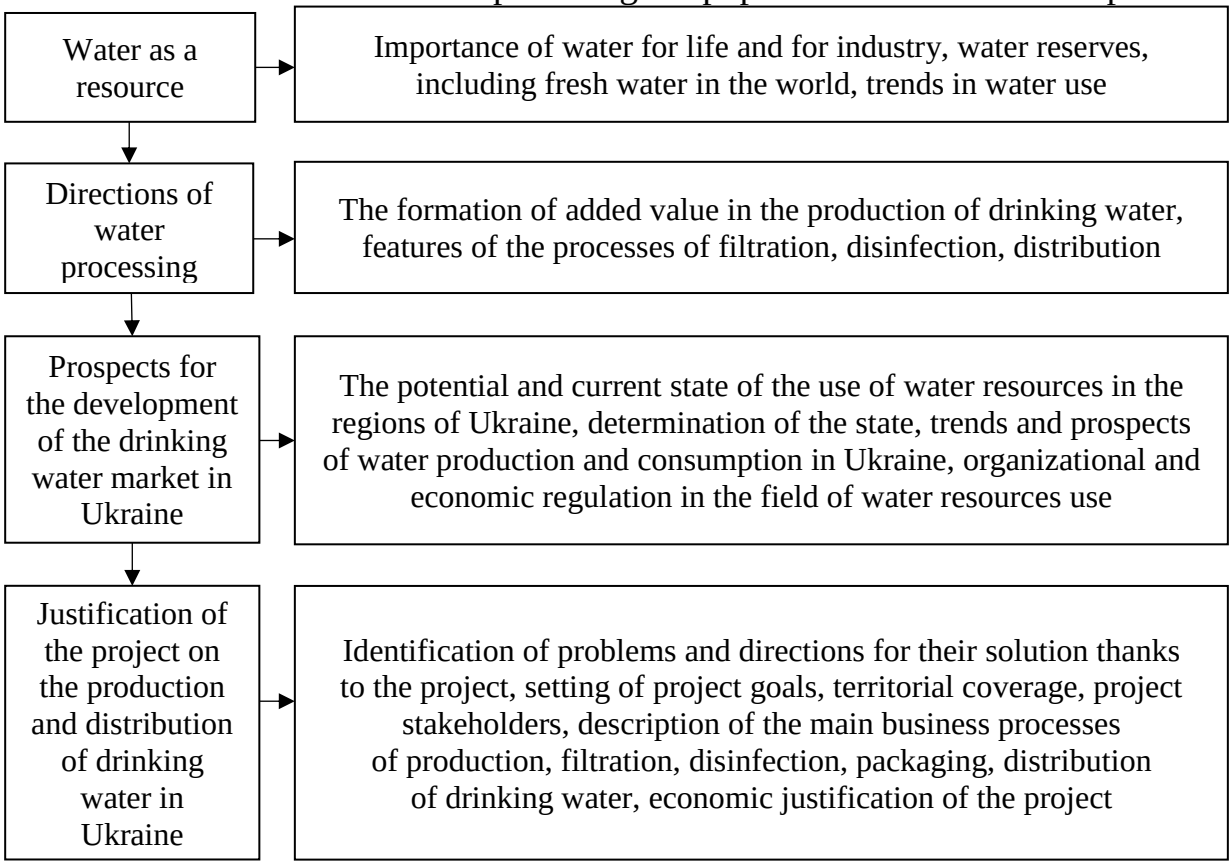

Figure 1. Structural-and-logical scheme of the subject-object approach in the methodology of researching the problems of production and distribution of drinking water

Source: systematized by the authors.

The method of scientific abstraction made it possible to form the model distribution of water in an urban environment. In the framework of this model, water is primarily considered as a resource for life support, while, in order to transform water into a finished product, it must undergo a stage of filtration and disinfection.

With the help of the induction method, the focus of the study was shifted from the general global problem of drinking water use to the problems of the Ukrainian region. It has been proven that these problems are exacerbated by hostilities in Ukraine. The reserves and extraction of ground water in Ukraine were studied, the regions of Ukraine with excess needs for drinking water were determined. Using the method of analysis and synthesis, the main trends and trends in the development of mineral water production in Ukraine were revealed. The graphic method made it possible to analyze the structure of the bottled water market, as well as to build the chain of formation of additional value by producers of packaged water. The project on the production and distribution of drinking water in Ukraine was substantiated with the help of the modeling method.

Results and discussion. This key section presents and dissects the research findings, showcasing insights gained from global industry leaders' best practices and their applicability in diverse contexts. It also offers a comprehensive analysis of the

Ukrainian water distribution model, highlighting its resilience and adaptability.

The threat of water shortages for humanity reflects the importance and complexity of the issue of water supply management. The literature on the blue economy contains some important aspects in the field of academic research. The analysis of business development strategies within the concept of the blue economy is not enough to assess the perfection of different business models, as the concept itself is quite new. One of the goals of the blue economy development model is to move resources from scarcity to abundance and start solving problems causing environmental problems. Inefficient use of water resources is the reason for the suspension of sustainable development programs in other areas of the economy. Most management research on the blue economy is based on a sustainable development perspective. Nowadays, about 3.6 billion people live in regions that lack water for a month or longer. Holding the current population growth rate and maintaining the existing agricultural methods and principles, about 5 billion of the world's population will suffer from water scarcity in 2050 (IWA, 2022).

Consequently, increasing competition for natural resources, including water, might lead to adverse side effects, such a social unrest and military conflicts in the nearest future. Apart from consumption, water is a valuable resource for economic activity, and agriculture is the largest consumer and user of water resources. Water resources are also used in manufacturing and servicing sectors, individual households, and for environmental protection. At the same time, 97 % of all water on the planet is seawater. Two-thirds of freshwater is concentrated in glaciers and polar ice caps, and the rest is groundwater or air substance. Although fresh water is a renewable resource, global groundwater supplies are steadily declining. The main reason for the depletion of freshwater is the increase in the human population and water requirement that drives the development of agriculture and water consumption. Water supply and drainage require significant investment. According to research and estimates conducted by the Organization for Economic Cooperation and Development (OECD, 2004), more than USD 200 billion is needed annually to restore infrastructure and provide water to consumers. In addition to these investments, there is a need to develop infrastructure in countries where the population has water access. The most complex business model is the provision and distribution of drinking water in an urban environment. The structure of business models of water distribution for urban areas in most countries with developed water supply infrastructure has some common features (Figure 2). However, such negative factors as outdated infrastructure, financial constraints, and rapid urbanization prevent the provision of the required quality and volume of drinking water in developing countries.

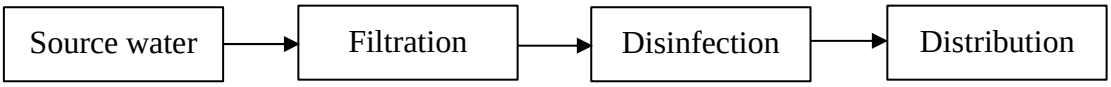

Figure 2. Model of management of distribution of water in an urban environment

Source: systematized by the authors.

Accordingly, there are some alternative channels of available water supply. Ukraine as a large holder of groundwater reserves used its potential for water extracting and manufacturing to a limited extent (Figure 3).

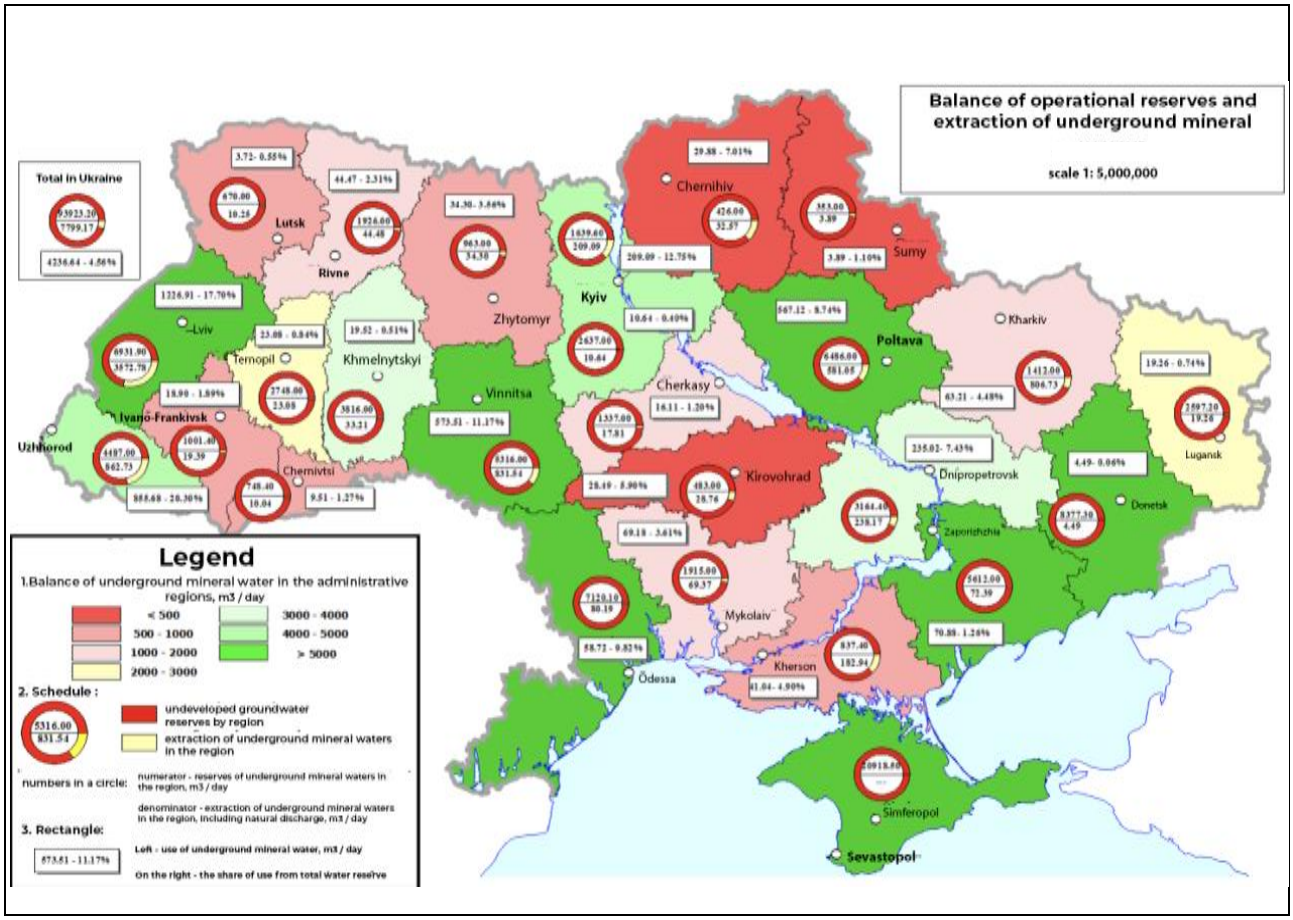

Figure 3. Groundwater reserves and production in Ukraine as of 01.01.2020

Source: Ministry of Ecology and Natural Resources of Ukraine.

The map indicates the balance between the reserves of water resources and water production in each region of the country and Ukraine as a whole. As it can be seen from the red circle in the upper left corner – Ukraine mines only 4.56 % of its reserves. The most developed regions in production are the Transcarpathian region (more than 26 %) and the Lviv region (more than 17 %). Thus, Ukraine's supply of mineral drinking water is among the highest in Europe. For example, in the EU the level of groundwater use ranges from 50 to 90 % of its reserves (Water Europe, 2022). The country currently lacks a comprehensive understanding of how to use the available water bodies, as well as the status of the water bodies, consequently, several challenges in restoring EU water quality to an acceptable level appear and it is complicated to manage them. With the growing effects of climate change, such as floods and droughts with significant geographical differences on the European continent.

The dynamics of change in the Ukrainian bottled water market have fluctuations, but the economy and profitability of the business are significant. It lags behind European markets due to economic and political factors (Figure 4).

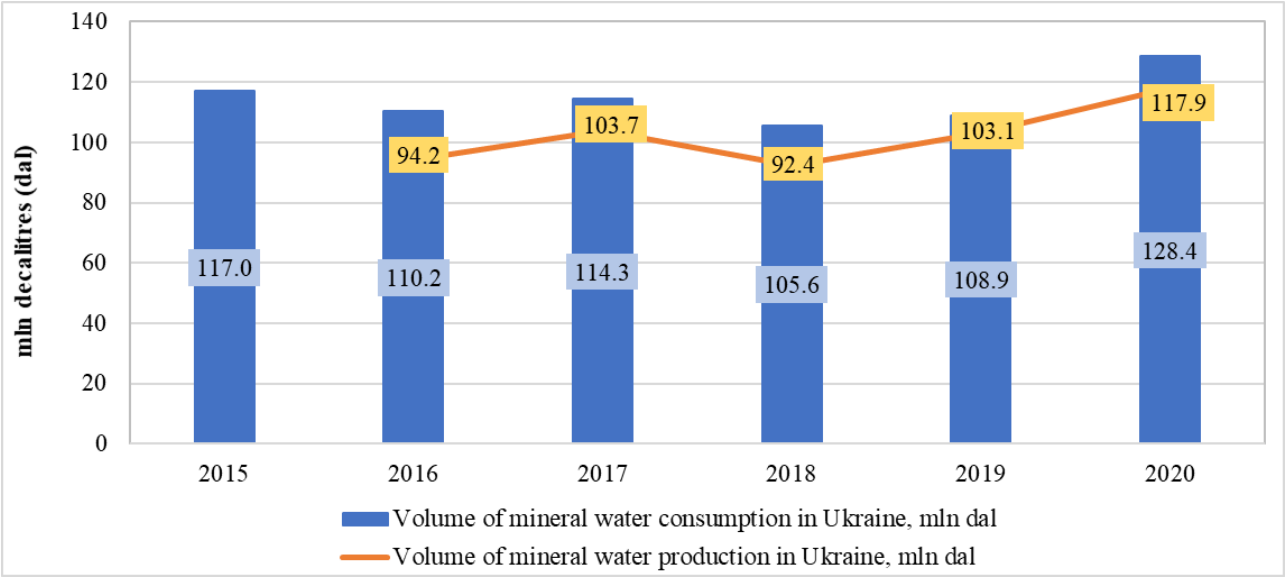

Figure 4. Mineral water production in Ukraine, 2015–2020

Source: developed and systematized by the authors based on Ponomarenko (2018); Faivishenko (2020); The State Service of Geology (n.d.).

In 2022, the structure of the bottled water market in Ukraine was distributed as follows (Figure 5).

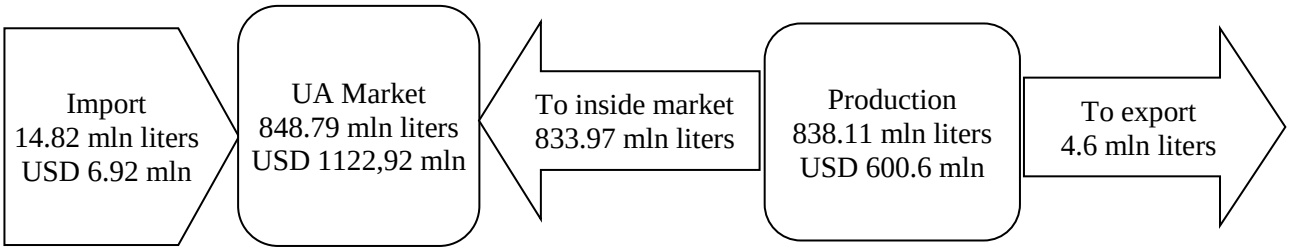

Figure 5. The scheme of formation of the market of bottled drinking water in Ukraine, 2022

Source: developed and systematized by the authors based on State Statistics Service of Ukraine.

With the onset of russia's invasion of Ukraine in 2022, the water market underwent dramatic changes. Local producers now account for 98.2 % of the market, with imports making up only 1.8 %. After the start of the war in 2014, the consumption market significantly decreased due to the absence of statistics from regions that fell under occupation. Migration of the population from Ukraine to safer countries also impacted consumption. Furthermore, with the onset of full-scale invasion, consumption decreased even further. However, by 2023, it had essentially recovered, despite over 7 million people leaving the country.

The Ukrainian bottled water market is witnessing an increased demand in 2023, as consumers prefer safe and convenient hydration options. It is projected that the market will experience an annual growth rate of 1.81 % (CAGR 2023–2027). According to estimates, by 2027, 17 % of expenditures and 5 % of consumption volume in the bottled water market will be attributed to out-of-home consumption, such as in bars and restaurants. The market volume of bottled water is expected to reach 1329.00 million liters by 2027, signifying a practical recovery of the market. The

average volume of the bottled water market per capita is expected to be 34.86 liters in 2023, aligning with European Union standards (Figure 6).

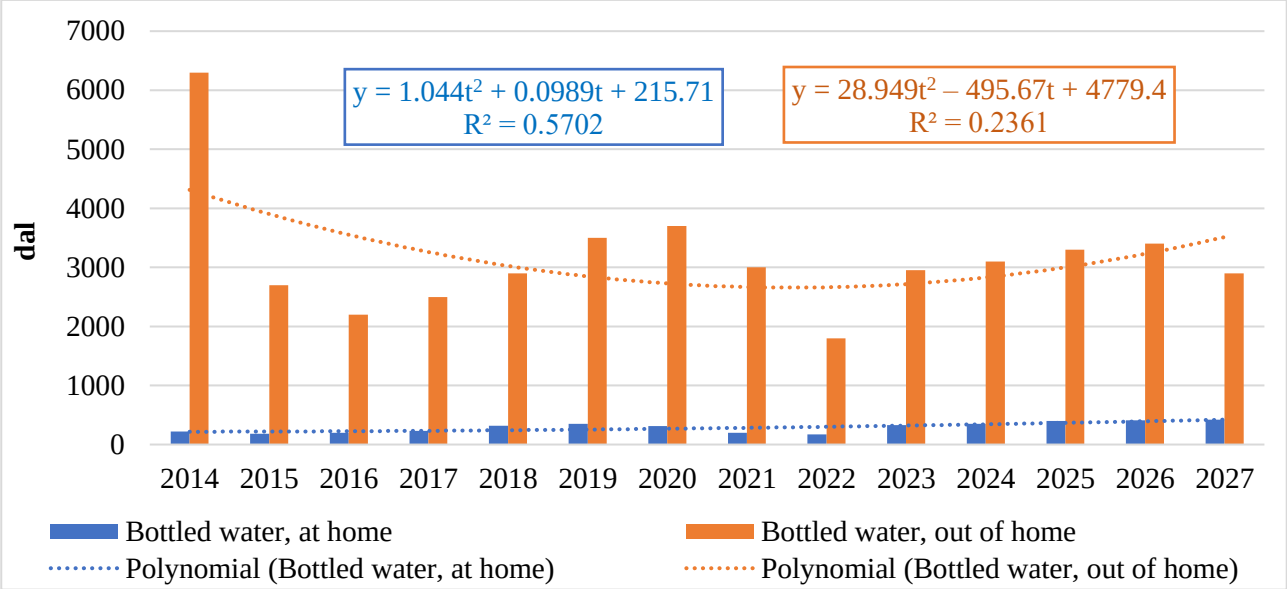

Figure 6. Water consumption pattern in Ukraine in natural units, 2014–2027

Source: developed by the authors based on Statista Market Insights (2023).

In Ukraine, the market for bottled drinking water is expected to stabilize in the upcoming years, returning to its previous benchmarks. However, it is noteworthy that the strategies implemented by private companies lack innovation and flexibility (Figure 7).

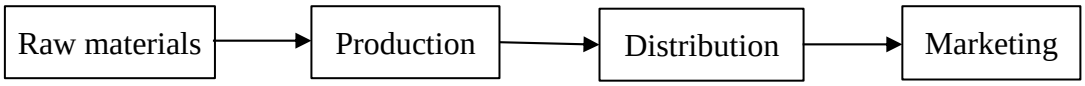

Figure 7. The chain of formation of additional value by producers of packaged water

Source: systematized by authors.

World governments are at the heart of the Water-to-Home slogan, which is to ensure the delivery of quality drinking water from the source to the end-user shortly and cheaply. Some governments are investing in infrastructure projects that should provide the population with quality water. For example, in Ukraine, there was an attempt to implement a national project "Quality Water", for a total of UAH 3 billion (USD 300 million), aimed at providing 15 cities in the country, where there are no sources of quality water and high levels of surface water pollution, for the quality drinking water. The project implementation tool was the installation of over 23 thsd points for the delivery of artesian natural water (Figure 8). In China, the government has allocated USD 110 billion, which is 1–2 % of the country's GDP, to ensure sewage treatment and environmental protection, and pollution control. China is expected to allocate twice as much to solve the water problem. The California state government (this is an alarming area) has adopted a package of measures that involves repairing old and building new networks and developing infrastructure for the next 25 years with a budget of USD 500 billion.

The world's water business model is shaped by key features (Wild et al., 2015): (i) demand is steadily increasing, but the ability to meet this demand is limited; (ii) many

countries are unable to provide themselves with sufficient water of acceptable quality.

In this perspective, given the specific features, it is necessary to divide demand growth into the following categories: (i) home use (accounting for 8 % of all water in the world); (ii) agriculture (70 % of all water); (iii) industry (22 % of all water).

The business model for the drinking water market, which was developed in Ukraine from the very beginning, aimed at a slightly different strategy of regional development, which aimed not only to provide the population with quality water. One of the goals in the development of the vending machine network was to create additional jobs and small and medium-sized businesses in the regions. The Ukrainian project of water supply to the end-user may be of interest to the Mediterranean market, in those areas where quality water is not available or delivery is possible in a way that makes this product quite expensive or requires subsidies from the state. Right now, when Ukraine is invaded and about 50 % of the country's cities and important infrastructure have been destroyed by the aggressor, this project has shown its viability. The essence of the logistics of this project was in the following chain (Figure 8):

- extraction and primary treatment and groundwater treatment;
- transportation of water to points of sale;
- water supply through vending machines.

Project implementation conditions, and initial data for basic understanding. This project will solve such water supply problems as:

- deterioration of water resources due to the deterioration of man-made and environmental components, which requires the use of more efficient water treatment technologies;

- the use of metal pipes for plumbing systems leads to their corrosion. As a result – constant repairs, disruptions in water supply, and water consumption due to emergencies;

- high wear of water supply systems leads to the creation of microflora, which reduces water quality. This problem makes it impossible to carry out deep modernization of existing water treatment facilities;

- in the case of bottled water, there are problems with its delivery. Restrictions such as store hours, distance, and price are affected.

Clean water is a vital resource. Every year its deficiency becomes more acute. Consumption of poor-quality water leads to the development of several diseases: infectious, gastrological, and oncological. Within the framework of the national project "Quality Water" a solution is proposed, which is based on the idea of selling purified tap water using filters of general use.

Project goal:

- creation of a network of automatic filters for collective water (hereinafter AFCW) for purification and sale of drinking water;

- systematic solution of the problem/provision of the population with high-quality and inexpensive drinking water near the place of residence;

- creating favorable investment conditions that stimulate project implementation by attracting private capital.

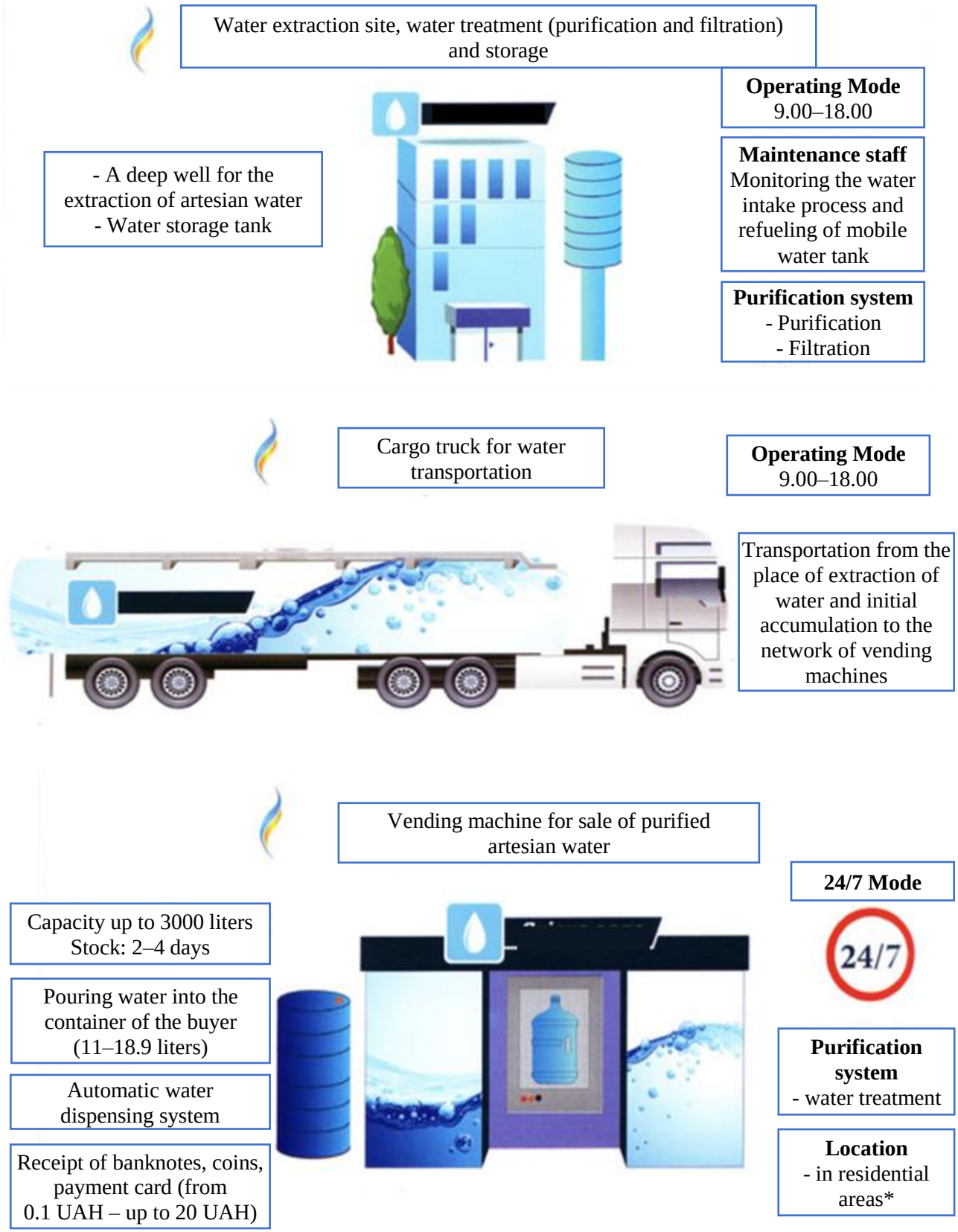

Figure 8. Structure of the business model of water distribution in Ukraine

Note. *Placement in shopping areas, supermarkets, food and industrial markets, recreation areas, food establishments, industrial complexes, scientific and educational institutions, etc.

Source: developed by the authors based on enterprise's data within the framework of the national project "Quality Water".

Project objectives:

(i) social sphere:

- clean water should be in every house;
- clean water should be affordable for all social groups;
- clean water should be consumed not only for drinking but also for cooking;
- improving people's health. Improving the quality of life;
- use of the most effective methods of water purification.

(ii) economic sphere:

- innovative filtration systems are used;
- minimization of costs for the manufacture and disposal of containers for bottled water;
- creation of new jobs;
- additional revenues to the budget through the creation of new companies;
- saving resources and energy, which is possible through the use of modern equipment.

Project concept:

- it is very expensive and impractical to supply all 100 % of water as drinking water nationwide;
- it is necessary to separate water into household and drinking.

Solution: convert domestic water into drinking water and sell it separately.

According to the Preliminary feasibility study National project "Quality Water", the expected results are characterized by the following indicators: the total amount of investments required for the project implementation for 5 years is EUR 365.2 mln (Table 1); the total number of new points of sale of drinking water for 5 years is 23,125 points (Table 2).

Table 1

The required amount of investment by years

Indicator	1st year	2nd year	3rd year	4th year	5th year	Total for 5 years
Total investment, EUR	33,014,216	51,754,225	101,638,505	132,719,425	46,099,900	365,226,271
Attracted funds from investors, EUR	33,014,216	48,754,225	46,638,505	0	0	128,406,946
Reinvested profit, EUR	0	3,000,000	55,000,000	132,719,425	46,099,900	236,819,325

Source: systematized by the authors.

The project is implemented at the expense of loans and borrowings raised under a state guarantee. When choosing an investor, preference is given to a foreign investor, all other things being equal.

Table 2

The total number of new points of sale of drinking water by years

Indicator	1st year	2nd year	3rd year	4th year	5th year
New point of sales	730	3456	7273	8736	2930
Total points of sales	730	4,186	11,459	20,195	23,125

Source: systematized by the authors.

The studied project is characterized by the following indicators of economic

efficiency:

- the internal rate of return of the project – 43.8 %;
- net present value NPV (discount rate 18 %) – 386,450,223 EUR;
- the simple payback period is 19 months;
- the discounted payback period is 23 months (at the rate discounting 18 %).

It is obvious that the main impact on the water price for the final consumer is packaging and logistics. This project aimed at providing the population with quality water in regions with underdeveloped or outdated engineering networks and skip the stage of expensive plastic and glass containers.

The main stages of the business model for the drinking water market:

1. The first stage is mining and filtration. The water treatment itself requires a small technological process and therefore can be used in any area with sufficient explored groundwater reserves.

2. The second stage is transportation. It is carried out at the expense of bulk transport – tanks with full control of quality and quantity. This is the most difficult stage of the whole process, which requires calculations on the radius of coverage of the area where the vending machines for water sales are installed, as well as many calculations on the choice of water supply route. Routes can change constantly depending on the season and consumption.

3. The third stage is the sale or delivery of water in its container through vending machines with full control of quality, quantity, and other important indicators. Thanks to the latest information technologies, vending machines can provide several financial services. Therefore, the cost of the water itself can be minimal. Thus, local governments can implement various social projects in cooperation with companies.

This innovative solution may be interesting from the point of view of the sustainability of the blue economy, as the basis for development is the creation of jobs for small and medium businesses, information technology to control water quality in real sales, and additional financial services through vending modules. It is also important that thanks to this water distribution model, local governments can carry out and implement various social projects, since this chain of water supply and use in the vending module for the provision of various financial services makes the cost of water relatively low.

The implementation of budget projects in countries with non-transparent control over the use of budget funds, which includes Ukraine, always has a number of significant drawbacks. Apart from the corruption component, such projects in Ukraine are not flexible in responding to changing market conditions and competitive challenges. It is for this reason that most government-funded investment projects have failed.

Another component of the development of alternative sources of water supply and sale to the public is the motivation to buy and the profits of this activity. The development of a network of water point installations has many risks and a low motivational component. At the same time, this project can play an important role in the conservation of ecology, namely the recycling of plastic bottles, which is primarily used by bottled water producers. The essence of innovation lies in the integrated

production of points of the pump room together with a container for recycling plastic bottles that can be disposed of directly by the consumer in a payment-based installation point, which can sell a certain amount of water in exchange for a recycling plastic container. Thus, the consumer may receive a certain amount of water in exchange for recycled plastic packaging. Paying for water for recycled plastic packaging is a fairly high motivation for the population to protect the environment and receive a surcharge in the form of water.

Water abstraction is now 4,500 m^3 per year (Wild et al., 2015), while domestic use accounts for only about 450 m^3 per year. The main volume of water use falls on agriculture and industry. This trend is not permanent and depends on the region. In developed countries, the share of industry reaches 50 %. And in developing countries, agriculture accounts for up to 80 % of all water consumption. The overall global upward trend in the next 10 years will remain at around 10 % annually.

According to the World Classification, water for consumption is as follows:

1. In the European Union, according to Regulations for bottled water (European Commission, 2022), water is divided into mineral water, spring water, and drinking water.

2. In the USA, the category awards Standards of Identity for bottled water and divides water into:

- artesian,
- ground,
- fluoridated,
- mineral,
- purified,
- sparkling,
- spring,
- sterile water (FDA Rules and Regulations, 2020).

3. In Ukraine, water for consumption is divided into:

- natural spring water, untreated,
- purified water,
- dining water, mineralization up to 1 g/dm cube,
- sparkling water,
- medical dining, mineralization from 1 to 8 g/dm cube,
- medicinal water, mineralization above 8 g/dm cube.

Concerning bottled water, some world trends in the standards of market development of such waters and their distribution have already been formed today:

- the global trend of market share distribution is as follows: 60 % local producers, 20 % national producers, and 20 % international producers;

- the following trend has been observed in Ukraine for the past 10 years: 30–40 % during this time was occupied by one of the national producers, 20–25 % – by international manufacturers, and the other 35–50 % were occupied by local producers. But there is a tendency toward alignment with world standards.

Although in the world there is propaganda for environmental protection and

replacement of plastic packaging, replacement of bottled water is not yet available for other packaging. That is why the biggest trends for today are the investment in digital technologies for control over water-supply networks, technologies, and robotics in the field of water supply engineering. Depreciation of municipal water supply systems in Ukraine ranges from 60 to 90 % depending on the region and city. Up to 40 % of bottled water is consumed in the big cities of Ukraine, which indicates a very high level of dissatisfaction with the quality of water supplied by public utilities. Therefore, there is no alternative to utilities today – water utilities must use digital technologies.

Already, many utilities have begun the transformation of what is known as Digital Water in the world (International Water Association…, 2019), starting with the control and management of distribution and the control of water supply and sewerage engineering networks.

A radical change in the approach to urban governance will significantly affect the paradigm of urban water supply and sanitation management. The digital development program of this sector will allow the integration of completely different system configurations so far: groundwater, surface water, and wastewater are considered sources for the development of innovative solutions. The development of this area will allow the development of wastewater reclamation, restoration of it for reuse in other sectors of the economy, the allocation of useful elements and additional energy, and will also promote the mixed-use of groundwater and surface water for the population: the combination of different types of water, their different assessment for various uses, reclamation and wastewater reuse, and digital management of the entire process to help integrate, optimize and regulate all processes at the same time and provide information in the "single cloud" information portal for management decisions a higher level of urban management.

The accumulation of information and the analysis of data that can be collected through the introduction of digital technologies will help in solving most of the key problems of water supply:

- effective management and efficient planning of watershed use, optimization of water supplies,
- end-user service, water protection, and quality,
- capital construction and infrastructure development,
- control, maintenance, and repair of the existing network.

This project is being developed and implemented within the framework of the national target program "Drinking Water of Ukraine". A key element of the program and the project is to provide the population of Ukraine with quality drinking water, to improve the living standards of the population of Ukraine and to guarantee the rights enshrined in the Constitution.

Thus, the development of the project through a loan under state guarantees is more attractive and can be considered as one of the possible forms of economic development of the Blue Economy program in the Mediterranean area, as it covers such important areas as social and economic sphere.

The research findings presented in this study highlight the critical importance of

addressing water supply management challenges, particularly in the context of contemporary global issues related to water resources and sustainable development. The practical significance of these results is that they can guide policymakers, businesses and communities in addressing pressing water-related challenges. Here are some practical implications and recommendations derived from the research:

1. Addressing water scarcity and quality: the study underscores the urgency of addressing water scarcity issues, as a projected 40 % gap in water supply by 2030 could have far-reaching consequences. Policymakers and governments should prioritize investments in infrastructure and technologies aimed at improving water quality and accessibility.

2. Sustainable water management: to combat the adverse effects of water scarcity, it is crucial to adopt sustainable water management practices. This includes efficient use of water resources, investment in modern water treatment technologies, and the promotion of responsible water consumption.

3. Innovation in the drinking water industry: the research highlights the need for innovation in the drinking water industry. Businesses should invest in researching methods, materials, and technologies to address water quality and supply challenges. This could include the development of new filtration methods and packaging solutions.

4. Investment opportunities: the study identifies investment opportunities in the water market, driven by factors such as population growth, aging infrastructure, pollution, climate change, and digital technologies. Investors and entrepreneurs should explore these opportunities to contribute to the sustainable development of the water industry.

5. The Ukrainian water distribution model: the Ukrainian model, which has proven to be effective in conflict-prone regions, offers valuable lessons for water supply in similar contexts. Policymakers in regions facing water supply challenges due to conflict or infrastructure issues should consider adopting similar models.

6. Environmental conservation: the research emphasizes the importance of environmental conservation, including recycling plastic bottles used in the bottled water industry. Initiatives that promote recycling and responsible disposal of packaging materials can contribute to a more sustainable water market.

7. Digital water management: digital technologies are crucial for improving water supply and sanitation management. Utilities and governments should invest in digital water management solutions to optimize water distribution, reduce losses, and enhance service quality.

8. Integrated water supply and use: the study advocates for the integration of different water sources, such as groundwater and surface water, to meet diverse water needs. This approach can improve water resource management and reduce the environmental impact of water extraction.

9. Policy support: governments should play a central role in supporting initiatives related to water supply and quality. This includes providing financial support, setting regulations, and promoting sustainable practices in the water industry.

10. International collaboration: collaboration between countries and regions can

facilitate knowledge sharing and best practices in water management. International organizations and partnerships should work together to address global water challenges.

In conclusion, the research findings offer valuable insights into the complex dynamics of the water market and its significance in the context of sustainable development. By implementing the practical recommendations derived from this study, stakeholders can contribute to more efficient water management, environmental conservation, and improved access to clean drinking water, ultimately fostering the goals of the blue economy and ensuring a better future for all.

The Mediterranean coastal tourism cluster covers the areas of activity (Figure 9), where the application of the described business model is required.

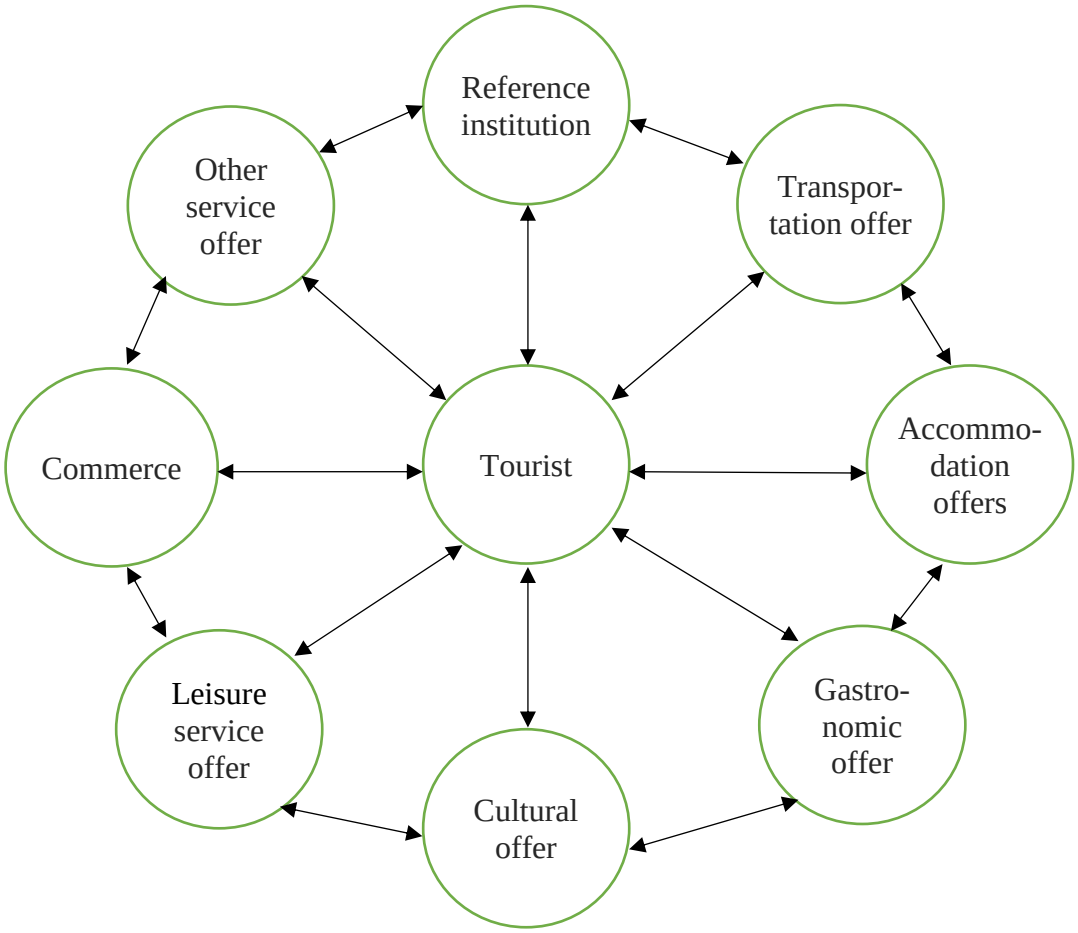

Figure 9. Model of the urban perspective of the economic activity of the tourist cluster (efficiency and effectiveness) of the blue economy

Source: systematized by the authors.

Discussion. The findings of this study shed light on several crucial aspects of the drinking water market and its potential implications for the sustainable development of the Mediterranean region. In this discussion, will compare our results with the existing knowledge (Chong & Sunding, 2008; Falkenmark, 2004; Faivishenko, 2020; Kucher et al., 2023; Paeza et al., 2014; Ponomarenko, 2018; Shumilova et al., 2023), emphasizing their novelty, commonalities, and distinctions.

Comparing global trends (Chong & Sunding, 2008) and the Ukrainian experience

(Faivishenko, 2020; Ponomarenko, 2018), our analysis reveals that the global drinking water market is undergoing significant changes in response to various factors, including climate change, population growth, and evolving consumption patterns. It is noteworthy that our research aligns with international trends, emphasizing the critical importance of drinking and mineral water in the context of contemporary challenges.

However, the Ukrainian experience provides a unique perspective. The model of water distribution developed in Ukraine, which has demonstrated resilience even in conflict-ridden regions, stands out as an innovative approach to addressing water supply challenges. This experience can serve as a valuable case study for regions facing similar difficulties due to hostilities or infrastructure destruction.

The evolution of business models within the drinking water market in Ukraine, as explored in this study, holds significant implications for the broader context of sustainable development, particularly in the Mediterranean region. The purposeful analysis of global trends and the alignment of Ukraine's experiences with these trends offer valuable insights into the adaptive strategies needed to address challenges posed by climate change, population growth, and evolving consumption patterns.

The qualitative analysis approach used in this research allows for a detailed study of international and Ukrainian practices in the production and distribution of drinking and mineral water. Based on best practices and principles from global leaders in water distribution networks, the study provides a comprehensive understanding of the current landscape.

The study's focus on the paramount significance of drinking and mineral water consumption is timely, given the external forces shaping the industry. Climate change, population growth, and changing consumption patterns require a rethinking of business models. The research not only highlights these challenges but also introduces an innovative methodology for modeling both bottled and non-bottled water businesses. This contribution adds a layer of practical applicability to theoretical discussions on business model evolution.

The scientific novelty of this research lies in its synthesis of international and Ukrainian experiences within the drinking water market. Beyond documenting alterations in business models, the study delves into the intricate process of adapting these models to the dynamic global landscape. The practical value of the findings extends to various fields, including policymaking, corporate strategy, and community initiatives. The study serves as a clarion call for the imperative of sustainable water management, advocating innovation within the drinking water industry as a norm rather than an exception. The identified investment prospects align with the challenges of population growth, aging infrastructure, pollution, climate disruption and the pervasive impact of digital technologies.

One of the most important results of this study pertains to the potential replication of Ukraine's distinctive water distribution model. Developed in regions affected by conflict, this model offers valuable insights for addressing water supply challenges in areas prone to hostilities. The application of these insights aligns with the goals of the blue economy and global sustainability, showcasing the adaptability and resilience of

business models in the face of adversity.

In conclusion, this research significantly contributes to the ongoing discourse on the evolution of business models in the drinking water market. Combining international and Ukrainian experience, the study not only highlights challenges, but also offers effective strategies for sustainable development, making it a valuable resource for academia, industry professionals, and policymakers. The uneven distribution of water resources globally, exacerbated by climate change, presents a substantial challenge to water availability and quality. This has direct implications for human well-being and ecosystem health. The projected 40 % gap in water supply by 2030 underscores the urgency of addressing water scarcity issues and implementing sustainable water management practices. This is particularly crucial as water scarcity not only impacts human consumption but also affects agriculture, a sector responsible for 70 % of freshwater abstraction globally.

Pollution and water quality degradation are identified as ongoing threats that continue to diminish water resources. The untreated discharge of wastewater into the environment poses irreversible consequences for aquatic ecosystems, leading to biodiversity loss, as exemplified by the changing natural environment of the Mar Menor area in Spain. Climate change further intensifies these problems by altering precipitation patterns.

The rapid growth of the water market, driven by factors such as population growth, aging infrastructure, pollution, climate change, and digital technologies, is highlighted as an opportunity for stakeholders. The global demand for bottled water is projected to reach significant volumes, and the drinking water industry is expected to become a trillion-dollar market by 2025. This growth, coupled with the integration of digital technologies, necessitates adaptation by Ukrainian manufacturers to international standards.

The Ukrainian model of water distribution, particularly effective in conflict zones, emerges as a valuable case study. The study proposes that the insights gained from this model can guide efforts to address water supply challenges in conflict-prone regions, aligning with the goals of the blue economy and global sustainability. This model not only meets urgent water supply needs, but also demonstrates adaptability in difficult conditions.

The development of the Mediterranean blue economy is believed to benefit from insights gained through the analysis of the water market and investment opportunities. This study points to the significant potential of implementing the Ukrainian water purification system, particularly in conflict-affected regions, within the broader context of fostering the development of the Mediterranean blue economy. This aligns with the principles of the blue economy, emphasizing sustainable development to meet current needs without compromising future generations' ability to meet their own needs.

This study also touches upon the concept of the green economy and introduces the blue economy as an alternative that shifts the focus from extractive resources to greener technologies. The emphasis on technology and industries that cannot harm the oceans underscores the need for environmentally responsible economic practices.

Social innovation is introduced as a process that can contribute to solving societal and environmental problems, aligning with the principles of the blue economy. The insufficient exploration of Ukrainian research on the blue economy is acknowledged, but existing studies on the implementation of circular economy principles in territorial communities suggest potential avenues for incorporating blue economy principles.

Conclusions. In the concluding segment, the study synthesizes the key findings and their implications for sustainable development in the Mediterranean region and beyond. It underscores the potential of applying Ukraine's experience to address pressing water-related challenges, offering insights into future development strategies for the water market in the context of the blue economy and global sustainability goals.

The following conclusions can be drawn from the above. The provision of quality water to the population has three main areas: bottled water, water supply by utilities, and alternative distribution channels aimed at motivating the population to conserve the environment. As it was described above, the development of bottled water has obtained and is receiving enough investment that consumers can provide, but the price of this water will rise significantly as the world requires changes to packaging, quality, and safety. This trend is steadily growing both in Ukraine and in the world. The latest concept of development of the blue economy indicates the elaboration of those business models that are primarily aimed at preserving the environment. The redistribution of markets will be negligible given the world leaders and market trends. The direction of municipal supply is undergoing significant changes. In advanced industrial economies, the construction of water supply and sewerage networks began in the early 20th century. The lifetime of such networks in the world is on average 60–80 years. This means that most of the water supply and sewerage networks have already served their term and are in most emergencies and unsuitable for quality water supply in Ukraine. The third direction is quite promising, as it is aimed not only at providing the population with water through the points of sale of water in their containers, but also at motivating the population to collect and dispose of plastic containers at the same points.

Undoubtedly, the development of utility networks is the cheapest for the population, but large investments are needed to replace and repair existing networks. According to some estimates, the capital city of Kyiv alone needs from 2 to 5 billion euros a year to repair and replace water supply and sewerage networks. But the investment cannot be fulfilled without replacing the maintenance standards with these outdated networks. In some cities of Ukraine, such as Lviv, water supply losses are as high as 50 % due to the deterioration of systems and outdated service standards that use outdated materials and technologies. The next step is water quality standards that need revision and change. Quality assessment and distribution of the use of different water quality requires a detailed approach.

The following steps may become the roadmap for further research and development:

- elaboration of the concept of building Digital Water in Ukraine;
- development of a comprehensive digital strategy for water supply management,

considering the activity and design of bottled water, municipal projects, development of innovative world technologies;

- building an innovative culture around the project: involving stakeholders, creating presentations, training courses for employees, investors, and new staff, calculating the necessary technical means;
- formalization of goals, objectives;
- development and implementation of small pilot projects;
- development of a unified architecture of the project of providing water to the population and drainage with its further high-quality processing.

The water business model, which was developed in Ukraine from the very beginning, aimed at a slightly different regional development strategy, which consisted not only in providing the population with quality water. One of the goals of the development of the vending machine network was to create additional jobs and small and medium-sized businesses in the regions. The using of business model generates new business opportunities for some blue economy sectors. It helps establish more sustainable costal business practices, reduce waste, create jobs, and gain competitive advantages for Europe. The coastal tourism sector continues to make a significant contribution to the development of the EU's blue economy. And it is in this sector that the application of the proposed model can make a significant contribution to its development. However, the sector has been hit hard by the COVID-19 crisis. The innovations of the proposed model can ensure the sustainable development of small businesses. The fact of reducing the use of plastic packaging provided by this model is significant.

The experience gained by Ukraine during the war can be valuable for coastal countries in the Mediterranean region in the drinking water supply market for several reasons:

Water distribution model in conflict: Ukraine has developed effective water distribution models in conflict-affected regions. These models can provide crucial insights for Mediterranean countries on optimal water supply in conditions of unrest or conflict.

Innovations under constraints: war conditions may necessitate the implementation of innovative solutions in water supply to ensure population needs. These innovations can serve as examples for other countries facing similar challenges and seeking effective strategies under limited resources.

Adaptability to challenges: Ukraine has learned to adapt to extreme situations and ensure water supply under uncertainty. This experience can be used by Mediterranean coastal countries to prepare for potential extreme scenarios.

Business modeling in crisis: Ukrainian experience can assist in developing business models for water supply that are effective in crisis and instability conditions.

Overall, Ukraine's experience in water supply during war can serve as a valuable resource for Mediterranean coastal countries seeking ways to ensure sustainable and reliable water supply amid challenges and constraints.

As we know, the EU is the world's second largest producer of plastic packaging. It is estimated that 150–500 thsd tons of microplastics waste enter the oceans every year and

70–130 thsd tons of microplastics are thrown away annually in the EU. That is why the proposed model should be a priority in promoting the idea of preserving the environment.

The authors are developing a blue economy strategy that covers all sea-dependent economic activities. the various sectors that make up the clusters of blue economy are interdependent (fisheries, aquaculture and marine biotechnology, tourism, navigation and maritime transport, among others), as they are based on common infrastructure (ports, logistics networks and electricity distribution, transport) and sustainable use of marine resources. Systematic management of the development of any business model involves the study and formation of the following aspects, such as strategic vision, operational manual to influence business efficiency, consideration of urban planning in the business is growing, social responsibility and sustainable business growth management.

Research Limitations:

1. Data Accessibility. One of the limitations is the limited access to data and information, particularly internal statistics of companies and governmental bodies. Some sources of information may be restricted or unavailable to researchers.

2. Temporal Constraints. The study predominantly relies on data and information available up to 2021. Therefore, the findings may not account for recent changes in the water supply and bottled water market beyond this period.

3. Geographical Scope. The research predominantly focuses on the Ukrainian experience and data pertaining to the water supply sector in Ukraine. While many aspects are relevant to other countries, the results may not be directly applicable to the specific conditions of other regions.

4. Methodological Limitations. The study uses qualitative data analysis and comparative analysis methodologies. Incorporating quantitative research methods could provide additional numerical insights.

5. Source Dependency. The information and data used in the research are based on available sources and may contain informational constraints or biases.

Research Prospects:

1. Further Country Contextualization. Researchers have the opportunity to expand the research scope by including more countries and regions to understand how different geographical and economic conditions influence the development of the bottled water and water supply market.

2. Quantitative Analysis. Researchers can conduct additional quantitative analysis to obtain specific numerical data and indicators that would enhance the study.

3. Study of Social Impact. Additional research can focus on the social and geopolitical consequences of inadequate access to clean water and potential responses to these challenges.

4. Technological Impact. Investigating the impact of new technologies, such as water purification and distribution innovations, on the bottled water and water supply sector can be a valuable area for future research.

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