

Fresh drinking water as the necessary component of freight base of container line

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Abstract: Existence of reliable/safe freight or transportation base is a requirement for establishing maritime transportation company. Therefore, Georgia has to search for internal freight base necessary for container transportation which is highly and permanently demanded on a global market. Pure drinking water represents such product for Georgia.

According to UN, the world demand on the fresh water is increasing rapidly. The accessibility of it is decreasing day by day on our planet. It's proved by the macroeconomic researches that Georgia possesses the resources of the world importance in the form of the fresh drinking water.

The paper presents the methods of the transportation of fresh drinking water, calculation of the potential income received from the export and its role in the development of Georgian economy.

KEYWORDS: TRANSPORTATION OF CONTAINERS, MARITIME TRANSPORT, FRESH DRINKING WATER, CONTAINER, ECONOMICS.

1. Introduction

The history of the European-Asian trade development is inalienably related to the long trade roads. In the beginning these were inner land routes. Alongside to the appearance of marine fleet, which has the higher load capacity than the overland transport, the main cargo flow of Eurasia transferred from the land trade routes to the maritime transportation. Eurasian intercontinental trade routes through the central and lesser Asia, Caspian region, Russia and Eastern Europe has become empty. The cargo shifted to the south marine routes through the three oceans – Pacific, Indian and Atlantic. From the beginning it used to be the path around the Africa continent, while after the construction of the Suez Canal the shorter marine route has developed.

Georgia is situated in one of the most significant and geopolitically complex regions of the world - on the knot of the Silk Road, which historically played a vital role in the development of and communication between Europe and Asia. After the escape from the geopolitical captivity of the Soviet Union Georgia became a new geo-economical center between Europe and Asia, Russia and Near East due to its own geographical space, history, political significance and economical capacities. Correspondingly, an increasing interest toward Georgia, as the new geo-economical center, has evolved on the regional, as well as on the international arena.

2. Preconditions and means for resolving the problem

The trading-economical relationship between Georgia and its neighbor or remote countries has a long history. Old trading transit roads of Transcaucasia historically were a component part of the existing international systems of land, marine and inland waterway routes [1]. From the Bronze Age (III-II millenniums BC) the communication between the people from east world and European territories took place exactly through the Caucasus. The trade road which connected India to the Mediterranean countries in the beginning of Christian age was passing through Georgia [2]. In the III-II millenniums BC there was created the land and marine route system which connected quite remote cultures and civilizations in wider regions – from the lowland of Mesopotamia to the Indian fields, from the desert of Central Asia to the Arabian Sea. Later those routes conditioned the development of "Silk Road" routes [3]. The most significant road – "Silk Road", which is mentioned as transcontinental caravan route in the historical sources, was connecting the China to the European coasts of the Mediterranean Sea through the Black Sea. It has to be mentioned, that the "Silk Road" has promoted the political, economic and cultural rapprochement of the East and West worlds.

In the present, in the conditions of globalization, the role of independent Georgia as a significant connecting transit artery of the West and East, North and South, is becoming even more actual and appears to be in the geo-economic interest of such a huge countries as USA, EU countries, Russia, Turkey, Iran and China. This transit artery is also important for economic interests of Armenia, Azerbaijan and Central Asian countries. Therefore, Georgia appeared in the global interest fields due to its geo-economic

positioning [4]. The developed countries have actively begun cooperation with Georgia in order to maximally realize their preferential geo-economic significance.

Asian countries located on the coast of Pacific Ocean are connecting to the developed countries of the west Europe on the coasts of Atlantic Ocean using the five existing international transit corridors: 1. North marine corridor; 2. South marine corridor; 3. Trans-Cyberia railway transit corridor; 4. South land transportation corridor; 5. Multimodal, or mixed type, transit corridor of Silk Road, so called TRANCECA.

On the Figure 1 presents multimodal transit corridor of Silk Road, or TRANCECA, and the marine Eurasian routes of South and North.

Compared to the all other competing transit corridors of TRANCECA have its advantages and deficiencies: Advantages: a) shorter transit time; b) shortest distance; Deficiencies: a) Multimodal/mixed types of transportation; b) absence of common tariffs; c) operational complexity of transportation; d) absence of agreed common custom procedures; e) inappropriate level of technical/logistical support. Existence of reliable/safe freight or transportation base is a requirement for establishing maritime transportation company. Therefore, Georgia has to search for internal freight base necessary for container transportation which is highly and permanently demanded on a global market [5]. Pure drinking water represents such product for Georgia.

Authoritative ecologists and UN experts think that water will become more significant strategic resource in 21st century than oil and gas. In the hot climate conditions of Asian, African and Australian deserts the cost of 1 tone of pure water exceeds the cost of 1 tone of oil. The third of the world reserve of pure water is found in Latin America, primarily in Brazil. The least water reserves come to Middle East and tropical Africa, as well as on central Australia.

Figure 2 represents the distribution scheme of pure water in the world according to regions.

According to UN, the world demand on the fresh water is increasing rapidly. The accessibility of it is decreasing day by day on our planet. Only 1,5 billion people from 7,5 billion people living on the earth has an opportunity to use pure drinking water due to the poverty and low purchasing power. 2,4 million children die due to the diseases caused by the low-quality water. Approximately 2,5 billion people live in the regions with the disastrous deficit of water usage. It is expected that this number will increase to 5,5 billion by 2025 and constitutes two-third of the world population.

Georgia is rich with its water resources. The total annual flow of its rivers amounts to 65 800 million m³, while the total annual flow on the territory of Georgia is 56 500 million m³. There are 26,060 rivers in Georgia, the total length of which is 58 957 km. 99.4% of them are small rivers (the length shorter than 25 km). There are 555 rivers of the Black Sea basin and 528 rivers of Caspian Sea basin which are hydrologically studied [6].



Figure 1. Multimodal transit corridor of Silk Road, or TRANCECA, and the marine Eurasian routes of South and North.

Countries in sub-Saharan Africa face the greatest challenges in drinking water

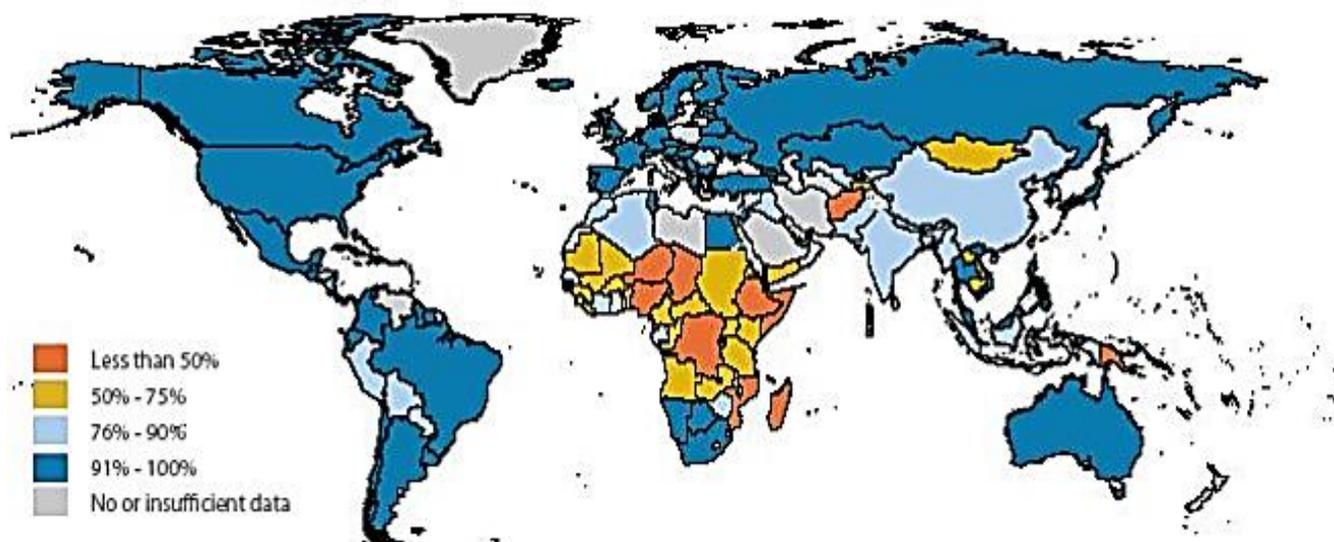


Figure 2. Pure water distribution scheme the world according to regions.

Table 1 presents the annual formation of the natural water resources on the territory of Georgia. Table 1

Total flow of rivers km ³	Water formation on the territory of Georgia; km ³	Transit flow; km ³	Water formation per 1 km ² on average; m ³	West Georgia		East Georgia	
				Relative share of water resources; %	Water per person; m ³	Relative share of water resources; %	Water per person; m ³
65,8	56,5	9,3	820 000	67	19 000	33	5 000

Pure groundwater is the most valuable recourse and the most reliably protected source of drinking, high quality water. It represents the primary requirement of human life after the air and that's why it is considered as unique resource, considering the amount of which Georgia is one of the richest countries.

The natural pure water stock of the country amounts to approximately 18 000 million m³. Total forecasted-exploitative stocks are approximately 10 600 million m³. The huge part of the natural resources of the groundwater – 95% - consists of drinking

waters – 571,7 m³/sec or 49,4 million m³/day, while permissible amount of water resources to exploit is 301 m³/sec (26 million m³/day), which is widely, but not equally spread on the whole territory of Georgia. 64,4% (362,5 m³/sec) of the water resources come to the west Georgia, 24,1% (137,9 m³/sec) to east Georgia and 12,5% (71,3 m³/sec) - to south Georgia. Significant part of these waters is characterized by the very low content of the mineral salts (200-300 mg/liter).

The table 2 shows the distribution of the natural stock of groundwater according to regions. Table 2

The natural stock underground pure water; Million m ³	Total forecast-exploitative stock; million m ³	Underground pure drinking waters; m ³ /sec	Permissible exploitation amount of pure drinking water; m ³ /sec	West Georgia		East Georgia		South Georgia	
				Relative share of water resources; %	Amount of drinking water; m ³ /sec	Relative share of water resources; %	Amount of drinking water; m ³ /sec	Relative share of water resources; %	Amount of drinking water; m ³ /sec
18 000	10 600	571,7	301	63,4	362,5	24,1	137,9	12,5	71,3

Considering the daily physiological norm for the human (2-2,5 liters), mentioned resources gives an ability to satisfy the world demand of the water – 17,5 billion liters of drinking water daily, in case of existing real opportunity of packaging and transportation without endangering its bio ecological environment.

If we conduct the calculations and assume that 1 person consumes 1,5 liter of water daily in average (V_1), number of consumers (L_{pe}) is 110 million – considering that there are 7,5 billion inhabitants on the earth but not all the countries are situated on the shores, not every person has an ability to purchase a bottle of water and the part of the market is taken by other companies. Then total annual consumption of the water will be:

$V = V_1 * L_{pe} * T_{day} = 1,5 * 110\,000\,000 * 365 = 60\,225\,000\,000$ liters, Where V – is the volume of the water purchased annually; V_1 is the volume of the water consumed by a person on a daily basis; T_{day} is number of days in one year.

Assume we are using the 19-liter volume bottles for the transportation of water. Then the number of bottles necessary to carry the water (S_b) is:

$S_b = V/19 = 60\,225\,000\,000 / 19 = 3\,169\,737\,000$ bottles.

Let's choose the 40-foot container, which fits 620 units of 19 liter near future.

The market for bottled water has been estimated for 90 billion US dollars in 2007. North America turned out to be on the first place according to the volume – almost 100 liters of bottled water per inhabitant annually, while the figure is 10 times less in Asian countries. The volume of bottled-packaged water sold increased sharply in 2011 and reached 214 billion liters, which is equivalent to the 30,5 liters per person in the world. The bigger part of this volume sold – 171 billion liters, was the pure non-carbonated water. The market of South-East Asia became the most rapidly increasing and largest scale market. It outstripped West Europe, which was absolute leader in terms of sales. Changes like this continue to happen: according to the estimations, the consumption of packaged water solely in India and China increased by more than 60% in 2010-2015.

The United States has actively got involved in the supply of clean drinking water to the countries of Asia. In order to exert influence on the market of water supply American companies are working on the projects, according to which the water will be supplied to the Arabic countries from American great lakes [7].

Thus the time of free water has ended. For example, 1 m³ of irrigation (not drinking) water costs 1,25 US dollars in Oman. In some countries the price of 1 liter of drinking water reaches 3 US dollars.

If we discuss the passed year 2019, the share of mineral and pure water trade in the foreign trade (export) of Georgia constituted 3,5% and takes 6th place in the production exported. This is quite low measure considering the existing resources, but it is quite real to increase those figures in case of active marketing campaign through the positioning of the health benefits of the Georgian water. In total, from the export of mineral and pure water Georgia received 133 570.7 million dollars in 2019, which is 21,2% higher than in 2018. Total US dollar volume of the exported mineral and pure water was 110 171,7 million in 2018. The largest amount of mineral and pure drinking water has been exported to Russia with the total volume of 95 605,5 tones, which amounts to 60 580,6 million US dollars.

bottles. Then the number of containers (S_{con}) which is necessary to carry annual volume of the water is:

$S_{con} = S_b / 620 = 3\,169\,737\,000 / 620 = 5\,112\,500$ container,

where S_{con} – is number of containers.

We choose container ship the volume of which is equivalent to 4 000 units of standard 40-foot containers. Annual number of trips for the ships is:

$S_{lin} = S_{con} / 4\,000 = 5\,112\,500 / 4\,000 = 1\,278$ trips,

where S_{lin} – is the number of trips necessary to carry the annual volume of the water.

The number of trips in a day is:

$S_d = S_{lin} / 365 = 1\,278 / 365 = 3,5$ trips.

So number of trips alters in the range of 3-4.

Therefore, there is a cargo base for forming the cargo container line of seaports of Georgia.

Thus, our country can make a real contribution to resolving the already escalated problem of provision of the products vital to life of the world population.

Nowadays 75-80% of population of the capital cities of developed countries use packaged water for drinking and it is highly probable that this approach will be spread throughout the world in a

3. Conclusion

Although Georgia is not rich with such natural resources as oil and natural gas, but it actually can get a name of mineral and drinking water producer country on the work map due to the characteristics of its water. The data ambiguously makes it clear that the sector has a potential, though using the water resources will bring more considerable benefits to the economy of Georgia if the pace of development will increase in the direction of export production, as well as building hydro powers.

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