Assessment and modeling of Georgia’s pipeline infrastructure with Geographic Information System

Abstract

In the 1990’s between Azerbaijan and Georgia Early, Oil Project was issued and later it transferred to Baku-Tbilisi-Ceyhan (BTC) project. Through the years South Caucasus pipeline (SCP), North-South Main Gas Pipeline (NSMGP) and Western Route Transport Pipeline (WREP) were added. These show that the number and space of actors have been increased which leads to an increase in importance on pipeline transport as general. The aim and novelty of the article are analyses of Georgian pipeline infrastructure, which covers the following objectives and issues: analyze existed modern literature around Georgian pipeline, find and explain the causes and consequences of the development compare current trends with past and setting the perspectives. Examining Georgian pipeline infrastructure will be a good example of understanding Caucasian infrastructure for an international transport corridor. Being part of international infrastructural systems is key to Georgia’s geo-economical location. The study of pipeline infrastructure will give information for its work and future spatial arrangement of Georgian nodes.

Keywords: Pipeline transport, Transport Nodes, Caucasus Transport, Georgian Transport, Oil and Gas Pipelines ICHGS-2019.
Introduction

In the 21st century, the worldwide globalization process has radically changed the global picture and embraced almost every condition of social life - economic, civil, bureaucratic, cultural sphere. In the face of globalization processes, the world is increasingly seeking economic integration (Kvinikadze, 2017). Consequently, the face of the international system changes, the importance of political and military strength is replaced by economic and financial strength (Kvinikadze, 2017). Economic strength is the source of effective marketing and promotion of the product market, establishing favorable trade relations between the countries. There are links to the development of these factors that are unimaginable without the quality of transport infrastructure.

In current society, an impressive transportation complex plays a crucial role in ensuring the country's economic well-being, providing a fundamental sense in the development of the foreign and domestic market. Transport plays a main role in socio-economic development in Georgia. We can attach it to strategic sectors group of the Georgia’s economy. (Kvinikadze, Challenges of the 21st Century 2017). The development of transport in Georgia during the Soviet period has played an main role in enhanced economic growth of the country, enrichment of its fossil wealth, expansion of economic-geographical relations with other districts, further development of urban centers, etc. (Kvinikadze, Challenges of the 21st Century 2017). The difficult situation created in the transport sector for the objective and subjective reasons arising in the period after the collapse of the Soviet Union and the transition to market economy. To overcome this situation, pipeline infrastructure will have an important role in developing foreign trade-economic relations and integrating the economy of Georgia with the world economy.

As we know, pumping oil with pipeline is 3 times cheaper than using other railway and cheaper than water transport, but the speed of delivery is less than the speed of the shipment. However, in spite of this, the pipeline is a highly fledged type of transport-to-transport liquid cargo of large masses. As for our time, there is a lack of pipeline transport in the world because of the fact that it is not possible to pull it out of any geographical landscape. (Pipelines 101, 2016).

The first pipelines were short and basic, to get oil from drill holes to nearby tanks or refineries. From the first days of picket trenches and picket barrels, the pipeline trade has grownup and utilized the newest technology in pipeline operations. Today, the trade uses refined controls and pc systems, advanced pipe materials, and corrosion interference techniques. (Waldman, July 6, 2017).

Doing a research of pipeline infrastructure in Georgia is actual, important, because of territorial special role for country’s development, for more East-West side, and less North South. In this paper, we will describe a Georgian pipeline infrastructure history and actual situation, how and why pipeline transport is effects of developing Georgia and role in international level, using Geographic Information Systems.

Georgia is in a strategic location in that it serves as an entry gate to the Caucasus, Middle East and Central Asia.
Methodology

In the development of methodology that may assist the decision-making method, the good thing about victimisation Geographic data Systems (GIS) in enhancing the reliableness of information is so important. Other positive features could be used to enhance analyses and to prepare information in support of decision-making. These embody visualisation of research results, improved communication with decision-makers, new analytical tools for testing transport technology innovations and investigation travel behavior. The role of GIS is highlighted in terms of enhancing the reliableness of information. Finally, results of chosen eventualities square measure bestowed.

The systems approach is used as a research methodology. The transport sector is considered as a unified system with internal and external factors, complex and dynamic - continuous in time and space. The presented work is based on a desk research and analysis of secondary data. Literary and secondary data were collected using manual search and electronic search systems and scientific electronic databases (JSTOR, EBSCO).

A brief history of pipeline tracks in Georgia

The first pipeline was pushed to Georgia in the 20th century (Baku-Batumi). Major gas pipelines started in 1958. It should be noted that the pipeline route was "monopolized" mainly by the oil and gas industry, but as MEDCs experience demonstrates, this type of transport is prospective for other sectors as well.

The use of pipeline systems began at the end of the 1910s. Its large portion was small diameter and its main purpose was to ship oil from the deposits with processing points. It is noteworthy that the first pipeline constructions had a very strong resistance with other oil companies. While Soviet Union this type of transport is represented in Georgia as a pipeline (Baku-Batumi) and gas pipeline Orjonikidze-Tbilisi (Georgian Oil and Gas Corporation.2019). In the later period, the construction of the widest part of the oil pipelines started in the USA. This particular type of transport was developed in 1945 after special injections.

Gas and oil transit through Georgia is carried out through the following pipelines:

- South Caucasus pipeline (SCP)
- North-South Main Gas Pipeline (NSMGP)
- Baku-Tbilisi-Ceyhan (BTC)
- Western Route Transport Pipeline (WREP).
- Trans-Caspian Gas Pipeline’ (TCP)
- The Trans-Anatolian Natural Gas Pipeline (TANAP)

Georgia as a Caspian Sea Transport Partner was recognized in 1995, when Azerbaijan and West Petroleum companies appointed the pipeline route from Baku to Supsa to the Azeri oil
market. All this led to the emergence of Georgia as a player in Caspian oil, all this led to the Baku-Tbilisi-Ceyhan pipeline, as well as the withdrawal of Shahdeniz-Tbilisi Erzurum gas pipeline. Increasing partnership with Western countries and world energy companies, Georgia has become a target of Russia. After the collapse of the Soviet Union, Russia is continuously trying to gain control of Georgia, and in most cases it is trying to manipulate the occupied territories.

The volume of Georgia’s domestic market is not enough to load ports and work on regional cargoes of the South Caucasus and Central Asia. One of the directions of development of Georgia is development of transit function. Transit function is a guarantee of sustainable development of the country in the global economic sphere. The world community contributes to the development of this function. The EU is actively involved in promoting regional policies through the provision of transport systems (Dolbaia, 2011).

Figure 1. Pipeline map of Georgia, Source: created by authors in GIS program, 2019

Under the Order of the Minister of Economic Development of Georgia, in March 2006 „Georgian Oil and Gas Corporation“(GOGC) was founded. The corporation was incorporated into JSC "Georgian International Oil Corporation, JSC" Georgian Gas Corporation and JSC "Saknavtobi" 100% of shares owned by the state. In September 2011, the corporation changed the legal form and transferred from limited accountability into joint-stock companies. The company's activities include exploitation of existing gas pipelines and oil pipelines in Georgia and improvement. In addition, the company is responsible for creating, developing and operating the convenient infrastructure. In addition, the company's
competence covers the Caspian Sea Basin, as well as other origin oil and gas transportation projects on mainland pipelines in Georgia. Moreover, most importantly, long-term and sustainable amount of the natural gas market for establish Georgia's energy security (Georgian Oil and Gas Corporation.2019, n.d.)

GOGC mainly focuses its activities on natural gas import and transit of oil and gas through the main pipeline system; also, design and construction of new main gas and oil pipelines; creation, development and operation of adequate infrastructure.

Oil and gas production is governed by the Law of Georgia "On Oil and Gas" and bylaws issued based on it. GOGC represents the owner of sectoral state property (wells, special equipment, railway dead-end, oil-accumulation system, warehouses etc.) and has a right to transfer it into the ownership of respective license-holder Investors (Georgian Oil and Gas Corporation.2019, n.d.)

Changes in Georgia’s oil and gas pipelines

It is planned to create the SCPX pipeline largely within the same pipeline passageway through Georgia that has been utilized by the BTC pipeline and therefore the SCP gas pipeline. SCPX can run some parallel to the WREP pipeline as so much as KP20 wherever the WREP pipeline diverges to pass north of Tiflis. on abundant of the SCPX pipeline route the soil has been disturbed by previous pipeline comes, and plenty of political action committee residents ar probably to possess bigger awareness and former expertise of the visual impact. Noise and dirt that pipeline construction entails. These activities are usually restricted to ROW erosion management, bio restoration as well as periodic reseeding, and installation of extra watercourse crossing erosion control/reinforcement measures.

However, it’s expected that maintenance activities associated with the prevailing pipelines are going to be restricted and are unlikely to extend the magnitude of effects known for the SCPX Project alone. SCPX compressor station CSG1 will be collocated with the BTC pump station PSG1. The baseline noise and air quality monitoring has captured the noise and air emissions from the existing facilities and the noise and air quality modelling results take account of existing and new collocated process equipment. GPC is planning to replace and route certain sections of the WREP pipeline originally constructed in the Soviet era and in proximity to landslides and replace two new block valves and three river crossings. By extending the period in which pipeline planning is carried out in Georgia, the two projects could have cumulative social benefits in terms of employment and incomes (SCP Expansion Project, Georgia Environmental and Social Impact Assessment, 2019).
Results and discussion

There are two main directions of discussion one, which supports increase of gas pipelines, and second one supporting of oil. Social, economic, political and environmental situation in Armenia, Azerbaijan, Turkey, Russia and Georgia creates new opportunities for Georgia to use its territory as a node for infrastructure. Both, gas and oil pipelines will have huge demand, new actors such EU, Middle East and Central Asia are attracted to use existing infrastructure and join the transportation.

In general, the working on the Georgian pipeline infrastructure gives the following scientific value:

1. Be a research analytical document on the role of pipeline infrastructure as a part of the Georgian transport;
2. For the importance and development of the South Caucasus as an international transit-transport corridor for the assessment of its role (the importance of the Middle East and Eastern European neighbors);
3. Display the priorities and challenges of the field. Consequently, define the strategy to overcome real problems in order to become more competitive and comparable to other types of competitive transportation (e.g. what potential / what chances it has to do) is not necessarily the most competitive, but the ability to properly determine Georgian Railways);
4. Determine the maximum opportunities for the development of the sector at all levels and give an insight analysis;
5. Be a research based real-time document for future strategic development of Georgia's pipeline transport;

Assessment of gas and oil pipelines is resulted in following:

- Since 1990s, after collapse of Soviet Union, the pipeline infrastructure started development;
- Georgia has become infrastructural node for North-South and East-West directions of pipelines.
- Number of pipelines will be increased, as all main actors are interested, such are Russia, Azerbaijan, Turkey, EU, Armenia, Central Asian and Middle East countries.
- Mapping pipeline infrastructure makes it easier to analyze current and projected situation;
- The only threat for infrastructural development is Russian creeping occupation and Karabakh conflict.
Conclusion

In conclusion, we tend to found that GOGC owns strategic infrastructure facilitating Georgia’s integral role as key transport passageway in international energy trade, however is usually not liable for maintenance and operational prices (David Oniani, Omar Ogbaidze 2019). Turkmenistan occupies the eighth position in the world of natural gas producing countries. The share of natural gas produced by Turkmenistan is 2.5% of the world’s natural gas. It should be note that also three countries Uzbekistan, Kazakhstan, and - Azerbaijan have important stock of oil and gas resources. Consequently, each country seeks to export its products to the world market and gain profits. The far-off market of the central market forces the countries of Central Asia to seek alternate routes for import-export. Under such conditions, favorable conditions for Georgia are to be fulfilled; which is a bridge connecting Asia and Europe.

As late as 2000, western, Russian, and Iranian analysts alike may still be caught on record dispute that the possibilities of the pipeline being designed were on the point of a cipher. In spite of the dire predictions, BTC was designed to a big extent owing to Associate in Nursing’s often-neglected factor: it had been the strategic call of the Azerbaijani government to export its energy assets through a western pipeline. This, in reference to the Turkish straits issue, strong U.S. government support, and therefore the lack of alternative choices with each economic and political viability, ensured that BTC emerged because of the sole possible choice for the export of Azerbaijani major oil. The realization of the BTC pipeline carries major implications for the development and strengthening of Azerbaijan’s statehood and independence, as well as for its relations with the Euro-Atlantic community.

First, BTC ensures that Azerbaijan’s major economic assets are not in the hands of regional powers that would be inclined to use this asset to influence or control Azerbaijan’s foreign and domestic affairs. Nevertheless, beyond this, BTC will help Azerbaijan to emerge as a player on the world stage. As a new significant non-OPEC source of oil, Azerbaijan will become a significant contributor to Europe’s energy security, a desperately needed asset given Russia’s dominance in the European energy market. Domestically, the income generated by oil exported through BTC constitutes a tremendous opportunity for Azerbaijan to find a short cut in its economic transition and in the building of a modern, wealthy and diversified economy. Situated in a strategic location and surrounded by great powers, Azerbaijan’s small population and size would tend to doom it to the role of a minor power under the influence of larger states. Indeed, most states in the Caucasus and Central Asia have often found themselves either under the dominant influence of one larger power, or forced to play off regional powers against one another to maximize their own independence and freedom of action. This exercise consumes substantial energies and impedes the development and implementation of long-term strategic foreign policy goals. Moreover, it makes the state dependent on the shifts in policy and attention of one or several regional power.

Indeed, Armenia is heavily dependent on continued Russian commitment, just as Georgia depends on America’s attention. Thanks to its energy resources, Azerbaijan stands a chance to fulfill its leadership’s long-standing goal to emerge as a regional player in its own right. This feat, which Azerbaijan shares only with Kazakhstan and Uzbekistan in the wider region,
would have been impossible without BTC. Of course, BTC is not a panacea for the solution to Azerbaijan’s entire objection. Indeed, its effect on the country’s political development are unclear, as it poses both an opportunity for political reforms and carries simultaneous risks for a slowdown of reforms. Likewise, BTC could significantly strengthen Azerbaijan is negotiating position with Armenia, and thereby help it achieve a negotiated solution; but it could also increase the risk of renewed hostilities. In the end, BTC provides great opportunities for Azerbaijan’s development in political, economic, as well as strategic terms. The extent to which the numerous expectations that are tied to BTC will be realized will depend on the government’s ability to capitalize on these opportunities.

We may concluded that number and space of actors have been increased which leads to increase of importance on pipeline transport as general. As well as being part of international infrastructural systems is key to Georgia’s geo-economical location.

References


