

Transportation of Energy Resources in the Middle East and Central Asia

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ABSTRACT: The current paper intends to analyze both the current and the emerging trends of the transportation of energy resources in the regions of Middle East and Central Asia. The means of land and sea transportation are examined in the light of both the financial changes and the geopolitics. Oil and natural gas are separately assessed with reference to both the areas of production and consumption as well as the relevant methods of transportation. Furthermore, bilateral relations between energy consuming countries, energy producing countries and countries that act as hubs for the transportation of these resources are evaluated in order to determine their influence in the current and future transportation trends. Suez Canal, Straits of Hormuz and the Straits of Bosphorus and Dardanelles feature special characteristics that extend from the commercial field to politics and environmental. Statistical data are supplied to further comprehend the emerging market trends in these areas.

Keywords: Energy; Maritime Traffic, Pipelines; IMO; Energy Accounting

JEL Classifications: F13; L95; N75

1. Introduction

The global allocation of energy resources is quite unequal. There are certain geographic areas where the production of energy resources far exceeds the consumption and the opposite. Furthermore, in many cases, the oil and natural gas exporting countries are far from the consuming markets of these resources. This is particularly evident in the areas of Middle East and Central Asia where there is significant surplus in the production of such resources, compared to the great energy consuming markets of Europe, USA and Far East.

This unbalance in the energy market has to be further assessed in the light of the long distances between the oil- and natural gas-rich fields, the terminal stations where the resources are loaded mainly to ships and the subsequent shipping routes heading to the biggest markets. There are many factors affecting the composition of the trade flows. Apart from the economic perspective that forms the basis of evaluating the viability of extracting and transporting energy resources, we should also take into consideration the geopolitics. In many cases, alliances and political ties among countries are of high importance when it comes to exporting or importing such commodities.

Another important component in the transportation of these resources is the environmental threat that they impose to maritime traffic. Especially when intense shipping lines pass through narrow passages of great maritime importance one should not underestimate the potential hazards to both human life and environment. Thus, every effort aiming to fully clarify the market trends in the energy resources exported from the areas of Middle East and Central Asia has to adopt a wide range of criteria from different scientific areas.

2. Importing, Exporting and Hub Countries

In order to assess the market trends in the transportation of oil and natural gas it is necessary to focus on the countries that both import or export these products. The exporters affect the nature of the trade by choosing the exact fields of oil and natural gas reserves that are going to be exploited. Additionally, in collaboration with hub countries, such as Turkey, the export countries define the areas that pipelines cross. On the other hand, the importers, depending on their geography, can affect the means of transportation that will be used. Neighboring or easily accessed by land countries, such as China, tend to use pipelines in order to cover their needs (Lee, 2005). In contrast, far more distant destinations such as Japan can only make use of the maritime transportation.

2.1 Oil and natural gas exporting countries

Middle East and Central Asia form two separate groups of countries that present significant differences when it comes to their recent political history (Figure 1). These countries consist of the old countries of the Middle East that arose mainly after the collapse of the Ottoman, British and French Empires in the 20th century and the recently established countries of Central Asia that succeeded the collapse of the USSR in the 1990's.

The population of the combined areas of Middle East and Central Asia hardly exceeds 5% of the world population while their surface approximates 8% (The World Bank, 2013). Nevertheless, these countries currently contain the majority of the known reserves of both oil and natural gas in the world (Ozturk et al., 2009). Historically, oil was extracted from the area of Baku in Azerbaijan since the 19th century supplying a great part of the global market during this period of time.

Apart from realizing the vast reserves of energy resources in Middle East and Central Asia, we should also take into consideration that there is very high reserves-to-production ratio in these areas when compared to other parts of the planet (Balat, 2009). This means that there is great potential for further increase of the production in the future.

The combination of huge reserves, high reserves-to-production ratio and low domestic consumption, mainly due to the scarcity of the population, offer favorable export capabilities to the majority of the countries of these regions that have not yet been fully explored. As shown at Figure 2 and Figure 3, the contribution of these areas to the total volume of world exports is low in comparison to their weight when it comes to their confirmed reserves.

This is particularly evident in the case of natural gas, where the relevant fraction is just above 20%. It should be stated that one of the main reasons for the low percentage of the natural gas is that its production is dedicated to the local demand (Balat, 2006). Thus, the extensive investment in developing natural gas fields did not add much to the exports of this region.

2.2 Hub countries

Depending on the orientation of the export trade, it is frequently of vital importance to secure safe passage of these resources through another country that acts as a hub and receives transit fees. This is particularly evident in the case of the Azeri oil and natural gas where Turkey is a hub (Souleimanov and Kraus, 2012) or Russia (Goldwyn et al., 2000).

These countries are crucial in the transportation of the energy resources as they can regulate the flow of the trade. Such authority was exercised by Turkey starting in the mid 1990's, while trying to influence Azerbaijan's future oil policy, by imposing restrictions to the ships that passed through the Straits of Bosphorus and Dardanelles (Plant, 1996). It should be stated that Azerbaijan depends on the shipping lines that transit the Turkish waters in order to sell energy resources to the western markets.

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Figure 1. Political maps of Middle East and Central Asia (United Nations, 2011).



Figure 2. Proportion of Middle East and Central Asia in world's oil and natural gas reserves (BP, 2012).

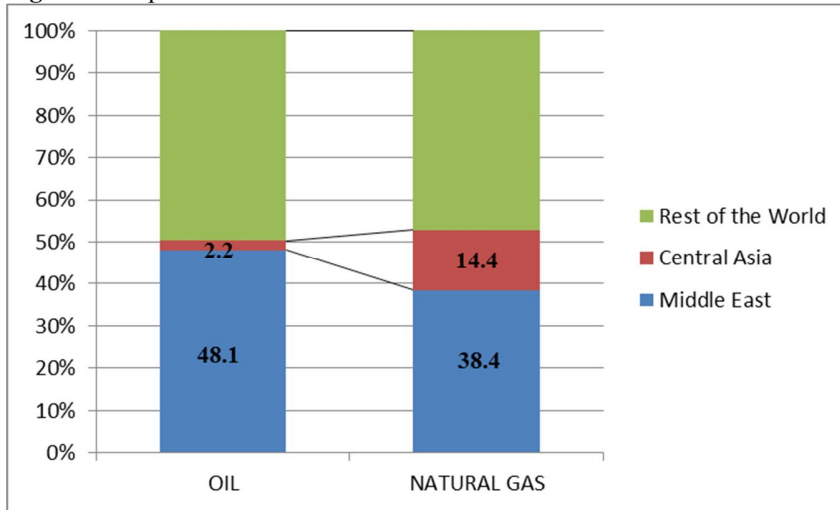
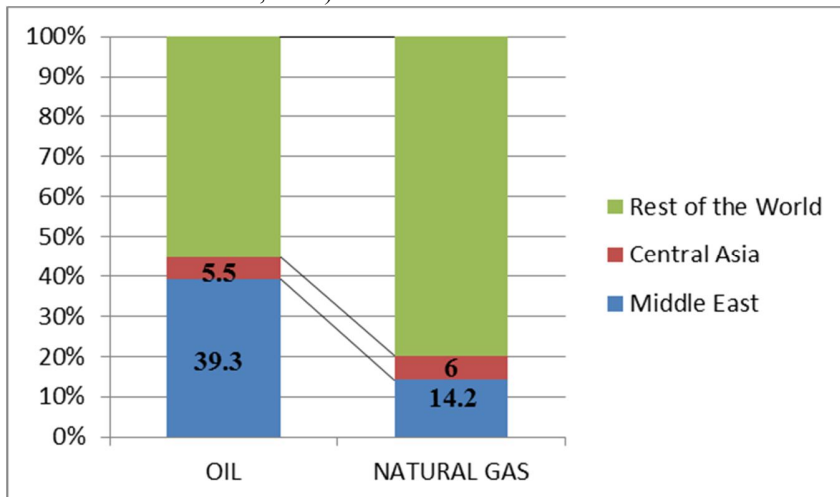


Figure 3. Proportion of Middle East and Central Asia in world's oil and natural gas exports (U.S. Energy Information Association, 2011).



2.3 Oil and natural gas importing countries

Another factor that affects the structure of the transportation in the energy resources market is the special characteristics of the importers. When the importer is a neighboring country, the most frequent method of transportation is the use of pipelines, regardless of the type of the cargo oil or natural gas. This is the case of the imports made by Iran in order to cover the energy needs of the heavily populated northern part of its territory by Turkmenistan (Souleimanov and Kraus, 2012). By this method, pipelines import natural gas to Iran, which consequently can free cargo of its own production for export purposes by ships through the Persian Gulf (swap).

The imports of Europe from Central Asia and Middle East are greatly influenced by the geographical consistency of Eurasia and from geopolitics too. Imports of natural gas from Azerbaijan are expected to direct to European markets via Georgia and ultimately the European borders of Turkey entirely through the TANAP pipeline (Cain, Ibrahimov, & Bilgin, 2012). It was of great importance in

terms of supply safety for both European countries and Azerbaijan¹ to avoid the Russian option for the transportation of Azeri natural gas to Europe. European countries strongly pursue the diversification of both the sources and the import routes of energy resources due to geopolitical reasons (Plant, 2000). We have to keep in mind that the European Union members depend on Russia for the 25% of their imports of oil and natural gas (Linden, 2007).

Similar is the approach of the USA regarding the safety of imports. Central Asia is seen as an alternative source of supply for oil and natural gas that could diminish the dependence on the countries of the Middle East (Tétreault, 2009). Furthermore, the need to isolate Russia and Iran is of significant importance when it comes to planning the shipping routes or the construction of pipelines (Goldwyn, Brill Olcott, Nanay, & Stauffer, 2000).

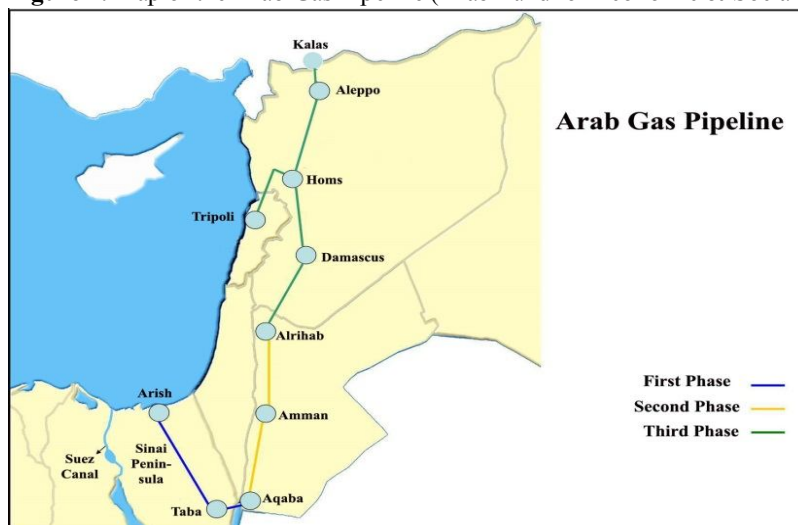
3. Transportation Chain

The need to bring energy resources from different areas to distant destinations has resulted in the creation of a complex transportation chain involving pipelines, ports and shipping routes.

3.1 Pipelines

Pipelines are necessary for the transportation of the energy resources to the refineries or the loading ports. For instance, the extraction of natural gas offshore the Israeli Mediterranean coast is supplemented by the Tamar Gas Pipeline (TGP), that directs the flow of natural gas to the port of Ashdod (Shaffer, 2011). Additionally, the use of pipelines is important in the case of countries that market their exports to neighboring or landlocked destinations. The case of the Arab Gas Pipeline stretching from Egypt to Israel, Jordan, Lebanon and Syria is a typical example of this category (Souleimanov and Kraus, 2012) (Figure 4). The Arab Gas Pipeline, when fully constructed, will reach the Syrian-Turkish border thus connecting Egypt to Turkey.

Figure 4. Map of the Arab Gas Pipeline (Arab Fund for Economic & Social Development, 2013)



¹ We should take into consideration that the Azeri government favored the westward corridor through Turkey with a selling price of \$320/tcm (thousand cubic meters), while at the same time they could achieve a much higher price of more than \$350/tcm from the Russian side. It appears that geopolitics and particularly the need to diversify their exports routes was the decisive factor that influenced their choice (Cain et al., 2012). *Linking the Caspian to Europe: Repercussions of the Trans-Anatolian Pipeline*. Paper, Rethink Institution, Washington D.C., p.5).

Another such case is the export of natural gas from Turkmenistan to China through the Central Asia-China Gas Pipeline via Uzbekistan and Kazakhstan (Lee, 2005). This is not only the shortest route in order to deliver natural gas to the landlocked territories of western China, but also the most economic.

Pipelines are widely used by the landlocked countries of Central Asia so as to overcome the burden of their geographic isolation in the centre of the Asian continent. It is imperative to build long pipelines in order either to sell their energy resources to the neighboring countries or merely reach an adjacent hub port for export purposes. The latter is the case of the Baku-Supsa pipeline transporting oil from Azerbaijan to the Georgian sea port of Supsa in the Black Sea. The oil is then loaded to ships that sail to foreign markets. Such is the case of the oil pipeline of Baku-Tbilisi-Ceyhan (BTC or CTC) connecting the oilfields of Azerbaijan with the Turkish sea port of Ceyhan in the eastern Mediterranean, after passing through Georgia, as well as the case of the oil pipeline of Baku-Novorossiysk pumping Azeri oil to the Russian Black Sea coast (Figure 5).

Figure 5. Map of the Trans-Caucasian pipelines originating in Baku-Azerbaijan (Natural Gas Europe, 2013).



3.2 Ports

When distant importers are involved or the geopolitical situation is not in favor of the pipelines, ports can facilitate transportation of energy resources. When combined to shipping routes they act both as a supplement and a substitute to the pipelines.

The port of Basra in Iraq is an example of a port that serves the export orientation of the country. It is the southern main export port for the Iraqi oil heading to the foreign markets through Persian Gulf, while the port of Ceyhan in the Turkish Mediterranean coast loads oil that is extracted from the northern part of Iraq through the Kirkuk-Ceyhan pipeline (Souleimanov and Kraus, 2012). Thus these two ports facilitate the access of the Iraqi oil to the overseas importers (figure 6).

Figure 6. Map of the Ceyhan port at the edge of the Kirkuk-Ceyhan oil pipeline (Upstream, 2012).



Ceyhan is also the terminal port of the Samsun-Ceyhan (Trans-Anatolian pipeline) oil pipeline (figure 7). It is of interest that both the discharging port of Samsun and the loading port of Ceyhan actually act as hub ports for the oil that is extracted in Kazakhstan that is a landlocked country of Central Asia, far away from the deep sea waters of the international maritime traffic. The difficulty in providing the oil to the foreign markets was surmounted by multinational cooperation. At the first phase, oil is transported to the Russian coast of the Black Sea through pipeline. Then, there is shipping connection with the Turkish port of Samsun in the Turkish Black Sea coast where the oil is pumped, through the Samsun-Ceyhan pipeline, to the ships that will deliver it to the more distant international markets. In this way, a crude oil transit route operates with the participation of two ports, one in the Black Sea and the other in the Mediterranean Sea (Souleimanov & Kraus, 2012).

Figure 7. Map of the ports of Samsun and Ceyhan at both ends of the Samsun-Ceyhan oil pipeline (Pipelines International, 2010).



One of the possibilities that arise when a pipeline connects two sea ports is the bypass of maritime areas of particular concern such as straits and canal. This is the case of the Israeli ports of Ashkelon (in the Mediterranean Sea) and Eilat (in the Red Sea) that are connected with the Trans-Israel Pipeline (Tipline or Eilat-Ashkelon Pipeline) (figure 8). These ports initially served the exports of Iranian oil from the Red Sea

to the Mediterranean Sea and to the western markets bypassing the Suez Canal (Bahgat, 2008). The obvious advantage was the avoidance of the cost and delay of passing through the Suez Canal, not to mention the geopolitical implications. Since the change of the regime in Iran in 1979, the ports continued to operate with Egyptian oil to cover the domestic demand of the Israeli economy. The situation changed in the 2000's when Russian oil, previously transported by ships and targeting distant Asian markets, is set to fill the two ports and the pipeline that connects them. This time the oil flows in both directions.

Figure 8. Map of the ports of Eilat and Ashkelon at both ends of the Trans-Israel Pipeline (Tipline or Eilat-Ashkelon Pipeline) (Eilat Ashkelon Pipeline Co. Ltd, 2013).



3.3 Shipping routes

The development of the shipping routes that surround the geographical areas of Middle East and Central Asia is strongly influenced by the trends in the trade patterns, the regulations that govern the passing of ships through the areas of maritime concern and of course the pursue of the national policies of both the countries that are enclosed in this part of the world and the more distant countries with regional or global geopolitical interests.

3.3.1 Trade patterns

The flow of oil and natural gas between the exporters and importers of these commodities influences the structure of the shipping routes. The declared will of the USA to differentiate the sources of energy resources in favor of Central Asia, so as to diminish the dependence from the politically risky Middle East, results in the relocation of the maritime traffic (Goldwyn et al., 2000). Part of the traffic of the ports that are around the Arabian Peninsula and the Persian Gulf might be directed to ports mainly in the Mediterranean that already see significant increase in their traffic (figure 9).

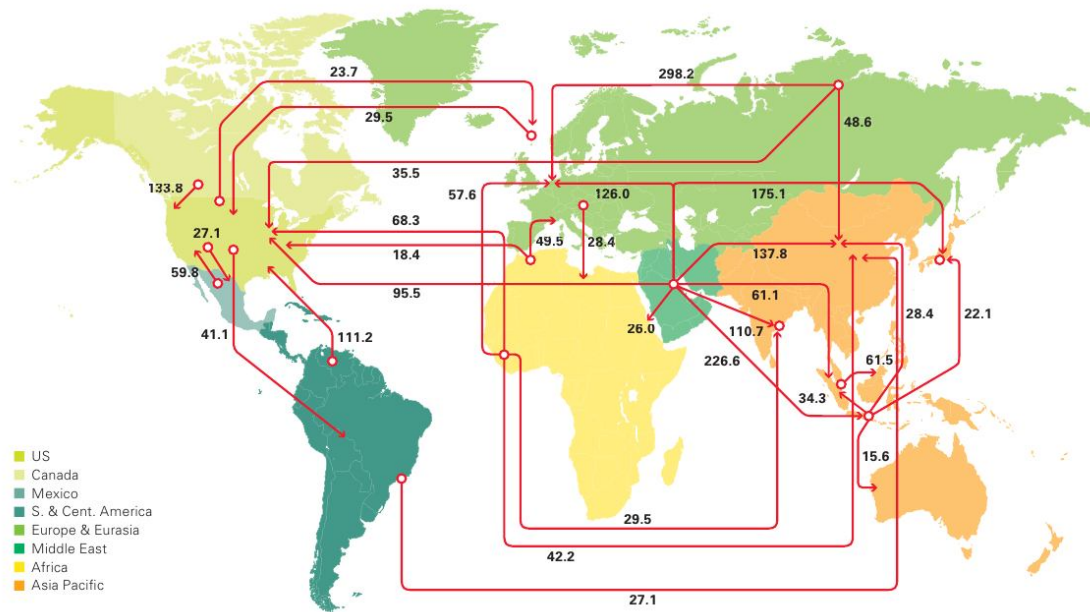
Additionally, the exploitation of new fields of natural gas in the basin of the Eastern Mediterranean offshore the Israeli coast will transform this country in net energy exporter (Shaffer, 2011). Israeli refineries in the Mediterranean Sea will also increase maritime traffic in the nearby ports. This time the flow of the trade is outbound and not inbound, reflecting the new emerging status of the Israeli State as a new player in the global energy market.

Another case that shows the dependence of the shipping routes by the trade patterns is the change in the mix of the exports of energy resources. Azerbaijan has recently experienced a decline in the exports of oil and placed its hopes for increasing the income in natural gas. This actually meant that new investment was to be placed in the creation of natural gas complex including the construction of new pipelines. The country that was chosen to operate as hub for the Azeri natural gas exports was Turkey via the TANAP natural gas pipeline (Cain et al., 2012) (figure 10). Subsequently, exports of Azeri oil via the

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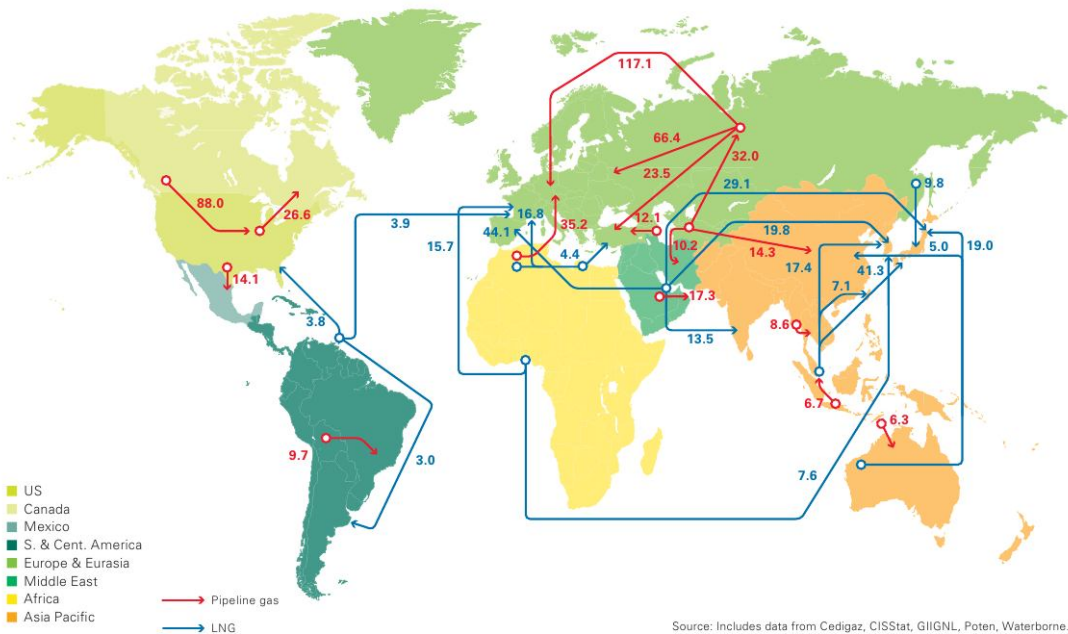
Russian port of Novorossiysk and the Georgian port of Supsa in the Black Sea are expected to suffer the negative impact of this change.

Figure 9. Trade movements of oil in 2011 (BP, 2012).



An assessment of the structure of the flow of the oil that is exported from the areas under examination to other parts of the world shows that over 50% of the exports target overseas markets. This means that there is actually no alternative to maritime transportation. Shipping routes are therefore of great importance for the continuous flow of this valuable commodity.

Figure 10. Trade movements of natural gas in 2011 (BP, 2012).



Source: Includes data from Cedigaz, CISStat, GIIGNL, Poten, Waterborne.

The fraction of natural gas exports that is transported to overseas destinations is over 55%. This reveals the dependence of the natural gas on the maritime transportation.

3.3.2 Regulations

Shipping routes that are of vital importance for the delivery of oil and natural gas to distant markets often have to pass through areas of particular maritime concern (figure 11). These areas include the Straits of Bosphorus and Dardanelles (connecting the Black Sea with the Mediterranean Sea), the Suez Canal (connecting the Mediterranean Sea with the Red Sea), the Straits of Bab-El-Mandeb (connecting the Red Sea with the Indian Ocean) and the Straits of Hormuz (connecting the Persian Gulf with the Indian Ocean).

Figure 11. Map of the maritime areas of significant concern (Modarress et al., 2012).



The Straits of Dardanelles and Bosphorus (or else called the Turkish Straits) are governed mainly by the international Montreux Convention in 1936 which in brief confirms the Turkish supremacy in this area with some restrictions though. In spite of the importance of the Straits to the international shipping industry, Turkey has been mobilized especially during the last two decades intending to further regulate the free passage of ships. The need to secure the nearby population along with the preservation of the environment (Köse, Başar, Demirci, Güneroğlu, & Erkebay, 2003) and the geopolitical ambitions of Turkey have encouraged the implementation of new domestic laws since the 1990's, exercising national control over the passage of ships through the Straits.

The Suez Canal is a vital commercial link of the global economy. It is estimated that 7.5% of the world trade passes through this artificial construction (Freyrer, 2009). After the nationalization by the Egyptian government in 1956 and the subsequent Suez Crisis and war that followed, the status of the canal is mainly governed by the Egyptian domestic law. The free passage of ships is generally preserved but the ultimate authority belongs to Egypt.

As far as it concerns the Straits of Bab-El-Mandeb and the Straits of Hormuz, the control exercised by the nearby countries is relatively loose. We should not underestimate though the phenomenon of piracy that is quite apparent in the area of the Straits of Bab-El-Mandeb, such as the Gulf of Aden (Kraska & Wilson, 2009). Commercial ships often navigate under the protection of navy ships of the international force that patrols these waters.

3.3.3. National Policies - Geopolitics

The area of the Middle East and Central Asia, being a huge energy resources exporter, is traditionally in the center of the foreign policy. Apart from the national goals of the countries that comprise this area, we should also take into consideration the balance of power in a more international level. The policy of the USA mainly focuses in securing the supply of abundant energy resources from various countries (Goldwyn, Brill Olcott, Nanay, & Stauffer, 2000). In this way, USA eliminates its

dependence in any particular geographic area. Of course the development of big energy projects in Central Asia adds in the fulfillment of this target, since it can substitute a significant part of cargos imported from the Middle Eastern countries, differentiating the sources of supply.

Part of this policy is the struggle to import energy resources both to the USA and to Europe that are not produced or controlled by Russia. Efforts have been carried out in order to pass both the Azeri and Kazakh oil and natural gas from countries other than Russia.

Additionally, the longstanding policy of isolating Iran cannot neglect the rich energy resources of Iran and its neighboring countries (Plant, 2000). The shortest and most cost efficient way to bring the oil and natural gas from landlocked countries of Central Asia to the markets is via pipelines crossing the Iranian territory. Nevertheless, no such pipelines have been constructed yet due to severe USA opposition.

Russia's policy on the other hand focuses on creating a strong bargaining position in supplying with energy resources various countries and especially Europe. It is not rare for Russian policy to take advantage of its energy might by using it as an economic or political weapon (Linden, 2007). While trying to achieve this target, Russia not only places the domestically produced oil and natural gas to the international markets, but also tends to buy the energy resources of the neighboring countries of Central Asia and then resell them to the final consumers. A means to realize this policy is the construction of pipelines and port facilities connecting the energy rich fields of the nearby countries with domestic transportation networks and finally the international markets.

European countries' energy policy is intensely oriented in the differentiation of supply sources. Apart from importing from other energy exporting areas, such as North Africa, there is a tendency to establish ties with the new energy exporting countries of Central Asia without the intervention of Russia (Linden, 2007). The construction of pipelines such as the TANAP (Azerbaijan-Turkey-Greece/Bulgaria) and Trans Adriatic Pipeline (Greece-Albania-Italy) is part of this policy.

Another factor that has evolved in the global energy market the last 20 years is the development of China. Since 1993 China is a net energy importer and its quest for energy resources spreads around globe. The fact that a potential tension in Chinese-American relations (for example because of Taiwan) might result in a US-backed blockade of Chinese energy imports from overseas destinations, such as Middle East and Africa, threatens the economic stability of China (Lee, 2005). For this reason, alternative sources are looked for in Russia and Central Asia. The construction of the Kazakhstan-China oil pipeline is a step towards this direction.

Turkey's ambitions originate from the need to cover the augmenting energy needs of the domestic market and the ambition to play a greater role as energy hub for the energy resources not only of the landlocked countries of Central Asia but of Middle East too. The construction of pipelines such as Baku-Tbilisi-Erzurum gas pipeline and ports such as Ceyhan serve this goal. An interesting instrument at the disposal of the Turkish authorities and its foreign allies in the energy sector is the level of the Turkish control upon the Straits of Bosphorus and Dardanelles (Linden, 2007).

4. Conclusions

The undisputable longstanding importance of the Middle East region to the energy markets is challenged by the growing participation of the newly established countries of Central Asia. Both the Middle East and Central Asia play a vital role in the global energy trade as net exporters. Their vast oil and natural gas reserves and high reserves-to-production ratio guarantee the continuity of their role as indispensable energy partners to other countries.

While assessing the means of transportation, we should also take into consideration the particular characteristics of the countries that import oil and natural gas. Countries that share common frontiers with these oil- and natural gas-rich countries tend to import via pipelines. A typical example of this situation is the pipeline that connects the natural gas fields of Turkmenistan with the energy consuming big cities of northern Iran. On the contrary, in the case of more distant foreign markets, such as the USA or Japan, maritime transportation appears to be the only feasible method. Another interesting link in the transportation chain is the role of the hub countries that assist neighboring net energy exporters to bring their oil and natural gas to the international market via pipelines and ports.

The participation of maritime transportation in the flow of oil and natural gas from Middle East and Central Asia to other destinations is imperative in most of the cases. Thus, shipping routes are of great importance for the economies of both the exporters and the importers. Due to the particular geographic characteristics of the Arabian Peninsula and Minor Asia, there are narrow areas with intense maritime traffic, not to mention the fact that Caspian Sea is actually a lake with connections to the open sea only by a complex of rivers and channels.

Apart from the economic viability of any given project concerning the production and transportation of energy resources, one should also take into account the national policies of the countries that influence the geopolitical status of this region. There is no reason to wonder why there is hardly any other area in the planet with so many conflicts since the 1990's, namely Kuwait, Iraq, Afghanistan, Gaza, Syria, Armenia-Azerbaijan and Lebanon, not to mention the general civil unrest in more countries of the region.

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