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## INTERNATIONAL TRANSPORT LOGISTICS AS AN ADVANCED GROWTH VECTOR OF NATIONAL ECONOMIES

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### ABSTRACT

This study is topical because of the problem of rising performance of the international logistics under the modern recession. The article aims to explore the peculiarities of the traffic system of the Islamic Republic Iran exemplified by its oil and gas industry whose logistics is global. The general and special scientific method applied to this study allowed to reveal the historic, political and economic determinants of the Iran's logistics, to single out the stages of development of its oil and gas business, to describe the functions of the country's transport logistics and to assess the level of its development in Iran. The article may be useful for the future international transport logistic studies aimed to build efficient supply chains and use competitive material, informational and financial flow management technologies to analyse the influence of the peculiarity of a national economy on formation of new trans-logistic platforms.

### INTRODUCTION

The high dynamics of the modern economy transactions boosting the transformation of the world space has set the priorities to be followed by

companies, sectors and the economy in order to end the long financial and economic recession.

B.A. Anikin (2010), D.J. Bowersox (2008), A.M. Gadzhinsky (2013), Герами, В.Д. (2014), V.V. Dybskaya (2011), D.J. Closs, V.I. Sergeyev (2014), A.N. Rodnikov, Yu.I. Ryzhikov developed the logistics theory. M. Christopher, D.M. Lambert (2000), J.R. Stock, B.N. Mastobayev (2011), V.F. Lukinykh (2011), L.B. Mirotin (2003), I.A. Plastuniak, N.G. Pletniova studied specific properties of the transport logistics. The scientific works of J. Korpela and M. Tuominen are devoted to the transport logistics strategic management. [10]

Most of the industry-makers think their economic growth inseparable from the seamless integration of material, financial, employment and information flows into complex and multi-level supply chains connecting thousands of producers, intermediaries, carriers etc. L. Loredana and C. Caruntu studied the role and significance of the international logistics pointing out that logistic companies are necessary to manage international transportation and that effective logistic systems bring down the negative impacts of transportation creating conditions for sustainable development. [12]

International transport logistics is becoming the main line of advanced growth of national economies. The current data reveal, that multinational companies are searching for places with adequate transportation and logistics to house their branches' cross-border production. [3] Despite the common traits shaping the modern transport logistics (such as the more intensive competition within the sector, IT implementation reducing costs, transportation efficiency focus, integration of transportation with production, optimisation of international supply chains, common business goals etc.), at the national level, the need for the complicated logistic schemes to manage big projects paying attention to their industrial and regional traits is growing fast.

Such peculiarities of national transport systems as diversification of goods and passengers traffic channels, technical level and performance of the means of transport, logistics, combination ability, logistics speed and complexity, management, values, internal logistic infrastructure etc. not only appeared under influence of the overall economic processes but were inherited from the previous branch structure of the economy.

For most of the developed countries taking an active part in the international trade, logistics is important not only because it maximises profits and reduces costs, but since it provides competitive advantages improving production, rising productivity and diversifying the output. [1] Despite the new impetus received lately, the logistics has problems to be solved in the oil and gas sector, especially.

## **MATERIALS AND METHODS**

Oil and gas industry is the main exporting sector of many countries. Its logistics is global, and the income of oil and gas companies fills the budgets. Therefore, this industry determines the national security, oil fields and markets are the places

where the interests of market players confront. The recent sanctions have also influenced national logistic systems.

To reveal the main problems of the international transport logistics and assess the efficiency of national transport systems, one should explore the situation of the main oil powers, which was done by this study with analysis and synthesis, induction and deduction, generalisation and graphical method.

The challenges and hindrances of the competition are most evident by the income of the greatest oil powers, such as the USA, Russia, Mexico, China and the Middle East countries (see Table 1).

**Table 1** – Budget Losses of Oil Exporting Countries, \$ bln

Country	2011	2012	2013	2014	2015
Russia	205	59	-185	-151	-480
Mexico	-344	-388	-399	-495	-384
Saudi Arabia	2634	3017	1437	-833	-4344
Canada	-1954	-1625	-1418	-825	-731
Iran	17	-25	-46	-58	-146
Nigeria	11	7	-71	-65	-106
Malaysia	-371	-400	-462	-402	-354
Columbia	-145	6	-69	-139	-179
UAE	2588	4632	4473	2140	-1935
Algeria	-24	-288	-22	-396	-595
Iraq	277	274	-406	-346	-1086
Venezuela	-1187	-1666	-1053	-1013	-1038
Kazakhstan	671	545	682	227	-351

The decline of budget revenues from oil and gas business was due to the simultaneous international market price fall, introduction of the new hydrocarbons exploration and extraction technologies, increased supply of slate, bituminous and heavy oil, contraband oil sold underpriced, development of the oil and gas business in Libya, substantial growth of hydrocarbons production in Iran. Iran being the 5th of the world's producers next to Saudi Arabia, USA, Russia and Iraq (see Picture 1) is especially interesting to explore for peculiarities of transport logistics of the biggest oil and gas exporters. In 2016, it gave 4.9% and in 2014 – 4.3% of the world production of oil. [19] This interest is stirred by the analysis of the world oil producers' logistics presented by O. Hilmola mentioning Iran among the countries with the greatest developmental potential. [9]

The infrastructure of Iran's transport logistics has historical, political and economic roots.

The significant events in Iran's political life and economic reforms allowed to phase the development of the oil and gas business and describe it (see Picture 1).

Phases	Description
1 – before 1919 New gas fields explored and developed; national oil industry established	<p>The parliamentary monarchy issued oil exploration concessions to private British businessmen (1912, 1901). First concessionary syndicate of private and corporate British investors receives exploration and production monopoly in 1904.</p> <p>First exploration completed by Berma Oil (UK). First oil field Masjede Soleyman discovered to yield over 300 million tons (1908).</p> <p>Oil production becomes the independent sector (1908). Railway construction contract signed with Russia.</p> <p>Iran wholly depends on UK, Russia and other developed countries in its development. Oil and gas resources of Iran are captured while the hydrocarbons are supplied abroad.</p>
2 – 1919–1978 Oil industry development	<p>New oil and gas fields Heftgel and Gechsaran (1920) and Agajari and Pazenan (1932) discovered.</p> <p>Reserves explored estimated at 1.5 billion tons of oil and 160 billion cubic metres of gas at Gechsaran field (1928).</p> <p>Safe gas wastes utilisation technologies introduced in 1950.</p> <p>International oil-development consortium established in 1953. The oil fields are developed by international corporations with exclusive rights for oil, gas and other mineral resources.</p> <p>Iran becomes a member of OPEC in 1960.</p> <p>The law on Attraction and Protection of Foreign Investments adopted in 1965.</p> <p>Oil refineries built in Teheran, Tebriz, Arak and Abadan.</p> <p>The highest production volumes reached: 51 billion cubic metres of gas (1976) and 5,000 thousand barrels of oil (middle of 1970s) a day.</p> <p>South-western provinces adjacent to the Gulf of Persia are explored.</p> <p>The English and Iranian Oil Company nationalised. Iranian oil products boycotted by UK and USA.</p>
3 – 1979–2000 Oil industry crisis	<p>The Islamic Republic of Iran proclaimed in 1979 changing the monarchy for the “religious democracy”.</p> <p>Access of foreign investors to the oil and gas industry is restricted by the Constitution (1979).</p> <p>The War between Iran and Iraq (1979 – 1985).</p> <p>The Persian Gulf War (1990 – 1991).</p> <p>The oil industry nationalised with the National Iranian Oil Company and National Iranian Gas Company established.</p> <p>The Law on Oil adopted in 1987.</p> <p>More than a half of the oil and gas wastes are utilised.</p>

	<p>Hydrocarbons production decreased by 2 times to the pre-revolutionary level.</p> <p>New US sanctions against Iranian business introduced.</p> <p>Iran is isolated financially. No systemic interaction between banking and insurance organisations.</p>
4 – 2001–present Oil industry revival	<p>The Programme of Strategic Development of Iran until 2025 adopted to determine the course of innovation in the oil and gas sector (2005).</p> <p>The UNO prohibits import of technologies and equipment to Iran (2006).</p> <p>New sanctions affecting the Iranian economy (2011).</p> <p>The Law on Encouragement and Protection of Foreign Investments adopted to involve investments and new technologies into the sector (2002).</p> <p>International contracts concluded to export gas to Iraq, Oman and Tajikistan.</p> <p>New large oil and gas reserves discovered ad Azadegan, Southern Pars, Northern Pars, Yadrahan, Shangule, Azar and Anaran, Kish, Tabnak, Forous and Kangan.</p> <p>Economic sanctions lifted in 2016.</p> <p>Free economic zones created to develop industry and raise investment.</p> <p>Existing facilities are upgraded and new ones built.</p> <p>International contracts for cooperation in oil and gas business concluded with Russia, China, Armenia, Iraq and Turkey.</p> <p>Oil and gas business is state, corporate and private at the time.</p>

**Picture 1** – Oil Business Development in Iran by Phases

Each phase of the oil and gas business development shown in Picture 1 has specific features of the national transport logistics. The modern one includes the sea, railway, river, air and pipeline transportation of materials and goods. Irrespective of the kind of transport, transport logistics is a chain of the organizational, economic, transportation and service functions.

## FINDINGS

The organizational function of the country's transport logistics is based upon the normative base regulating contracting, shipping documentation, safe storage, transportation, marking and inspection of goods.

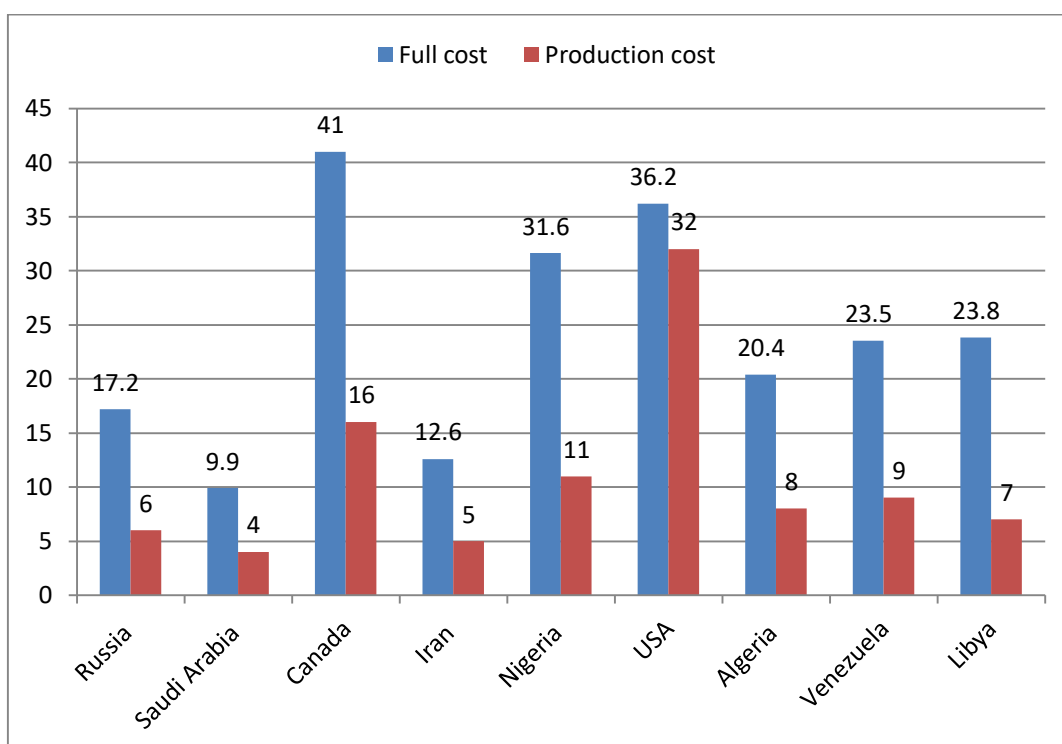
Export and import operation in Iran requires a license – the so called “trading chart” – and additional permission called “sabt-e sefaresh”.

Extraction, processing and sales of hydrocarbons and their products in the free economic zones are subject to regulations. There are tax, customs, financial and administrative privileges. [21]

Insurance is peculiar in the country, because the Law on the Rules of Export and Import Operation provides for insurance by exclusively Iranian companies.

The economic function is visible through the assessment of transportation efficiency (comparison of transportation costs with the cost of the product, proportion of permanent and variable costs, optimization of transportation costs, assessment of commercial risks etc.).

In respect of the cost of production, Iranian oil and gas sector has a competitive edge, because this cost depends on the depth of occurrence, performance of the equipment and technologies, distance from traffic routs, places of storage, main consumers, climate etc. Given that oil and gas fields are at the coast of the Gulf of Persia and the continental shelf, the cost of oil produced in Iran and Saudi Arabia is the lowest in the world (see Picture 2).



**Picture 2** – Full Cost against Production Cost of Oil in 2014 (USD per barrel of PC)

Effective performance of the transport logistic's economic function depends on the method of financial calculation, banking infrastructure, speed of transactions, flexibility of counting instruments and integration of the national banking system into the world payment environment. It is worth noting, that Iranian banking system has a branched network in the country and abroad, which makes payments under contracts much easier. Havala clearing system is specific to performance of the economic function as well. This payment tool allows to transact with Turkish and UAE banks. However, the big Iranian exporters use to open their accounts abroad – in Iraq, Taiwan, Turkey, UAE – since transactions within the Havala

system are made at free exchange rates with up to 2% charged for banking services per transaction. Transfer amounts are restricted here as well.

Transportation function is carried out through the choice of transport, terms of shipment, carrier and optimal route.

In choosing the best logistic route, besides the proximity of suppliers and consumers, the following are of the utmost importance:

- stable and long-term ties with producers and consumers;
- supply to schedules agreed between the sender and receiver;
- using special means of transport making handling of finished products lossless;
- full mechanization of handling with their sufficient scope created by efficient distribution of storage facilities and access routes;
- unified transportation technology, where the railway station servicing a plant informs it of the rolling stock movements beforehand and plans them jointly with the plant's management;
- most efficient use of territorial wholesale warehouses to supply materials etc. to the plant;
- products shall be delivered with only complete trains only where it is expedient and technically feasible. [3, 4]

As the international sea transport of hydrocarbons developed, container shipment took lead in Iran since they were available to the big oil and gas companies and private businessmen alike due to their low cost and free access to other countries' ports. Shipping in tank containers ensures safety, forwarding and control of goods, which are insured mandatorily bringing the logistic risks down. Transporting companies control movements of hydrocarbons at the transportation phase. Most popular are the routs by the Caspian Sea, Volga-to-Don Channel and the Black Sea to Russia, Turkey, Azerbaijan and Europe.

Railway transport is also widely used to carry oil and gas in Iran because of its speed, all-seasonal nature, long distances and optimal throughput, as well as the possibility to manage rolled stock movements remotely. Present railway facilities are not sufficient for the growing needs of the country's developing economy, which is why the following new railways have been built and launched: Uzen – Bereket – Gorgan (Kazakhstan, Iran and Turkmenistan) of the international North-to-South transportation corridor; Tegeran – Hamadan to support the domestic logistic operation.

For Iranian transport logistics, one of the most important task is to build new and upgrade old railways that would solve many load and passenger traffic problems and decrease the cost of domestic consumption of hydrocarbons as well as the harmful emissions to the environment.

To move gas and oil products across the country, there are also pipelines pumping produced and refined oil over considerable distances abroad. Trunk lines are represented by the branched oil pipeline network Aga-Jari – Genava, Gechseran –

Genava, Naftshakh – Kermanshakh etc., and gas pipeline network Bid-Boland – Astara, Bid-Boland – Shiraz etc.

However, transport logistics is not always optimised by Iranian carriers using intermodal transportation with several means of transport. Most actively used is the international corridor Kazakhstan – Iran – Uzbekistan – Kyrgyzstan – Tajikistan – Turkmenistan comprising railways in Kazakhstan, sea transport in Iran, motor transport in the rest of the chain. During intermodal transportation, transportation risks are assumed by one of the carriers or distributed between them all in proportion to the amount of services provided. This method of transportation is used because:

- new oil and gas fields are being developed making access roads considerably longer;
- proximity of the production sites to the Gulf of Persia allows to pump oil and gas through pipelines to fill tank containers.

Motor and river transport is more useful in Iran for internal transportation. It is not often used internationally. Moreover, according to expert estimates, delivery with motor transport is more expensive than railway delivery by 40% with much smaller volumes of goods carried.

Cargo delivery scheme is specific to Iranian transport logistics' transportation function. This method means transportation and custom broker services provided by one and the same carrying company. However, it often involves excessive logistic losses for clients, because the method is dependent on compliance with a number of conditions, such as:

- High professionalism of the service provider;
- feasible route and means of transport to mean the cost optimisation criterion;
- insurance of goods against commercial risks.

It is worth noting, that the hydrocarbons logistics of Iran uses various channels and sales models sending oil and gas products by:

- straight channels (manufacturer to consumer), where the manufacturers are big production companies exporting their products and controlling the whole process independently, such as the National Iranian Oil Refining & Distribution Company (NIORDC), National Iranian Gas Company (NIGS);
- Indirect channels (sender to export agent), which are the most widely used ones.

Given, that for a long time (to the economic sanctions) Iran re-exported heavily, the indirect method of hydrocarbon sales is deeply rooted in the country's logistics. Export agents, wholesalers and regional dealers connect producers with enormous number of service companies. Such export- and import-intermediating agents are trading companies with sufficient administrative and financial resources, having professional employees and developed schemes of dealing with all the participants of an international trade transaction. Trading companies raise high requirements to their counterparties ensuring fast and cost-effective promotion of oil and gas products with minimal environmental impact.



Oil products exports in Iran are regulated by INCOTERMS 2017 to include EXW, FCA, FAS, FOB, CFR, CIF, CPT, CIP, DAT, DAP, DDP (see Table 2).

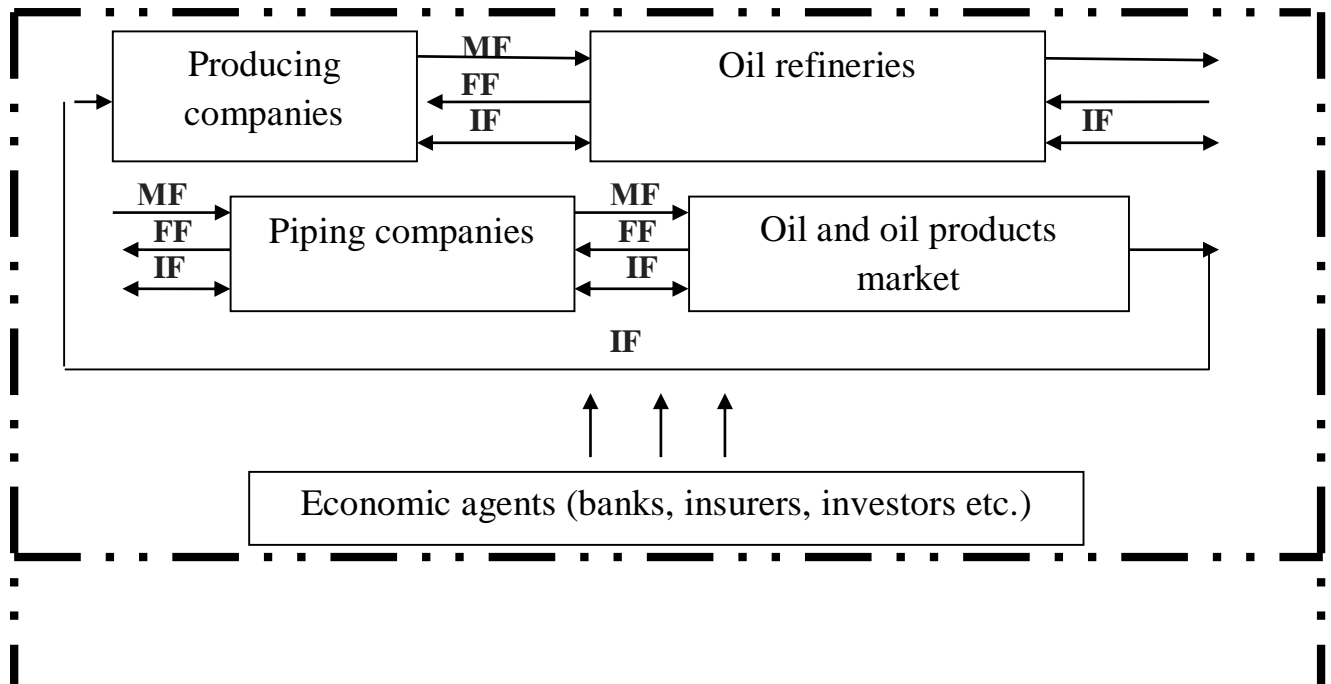
**Table 2** – Sales Channels and Models in Iran According to INCOTERMS 2017 [22]

Oil and gas products sales channels	Standard terms	Contract payment peculiarities
1. Direct (producer – consumer)	CFR, CIF, CPT, CIP	Pays to the exporter's account in the buying country (Russia, UAE)
2. Intermediated		
2.1. Wholesaler intermediary	DAT, DAP, DDP	Pays to the exporter's account in the buying country (UAE)
2.2. Trader intermediary	EXW, FCA, FAS, FOB	Pays to the exporter's account in the buying country (Russia)
2.3. Regional dealers	DDP	Pays to the exporter's account in Iran only

Service function includes production services (recycling of multiple-use containers, tanks etc.), monitoring transported goods, custom clearance, insurance and cargo protection, making advertisements and other informational materials etc.

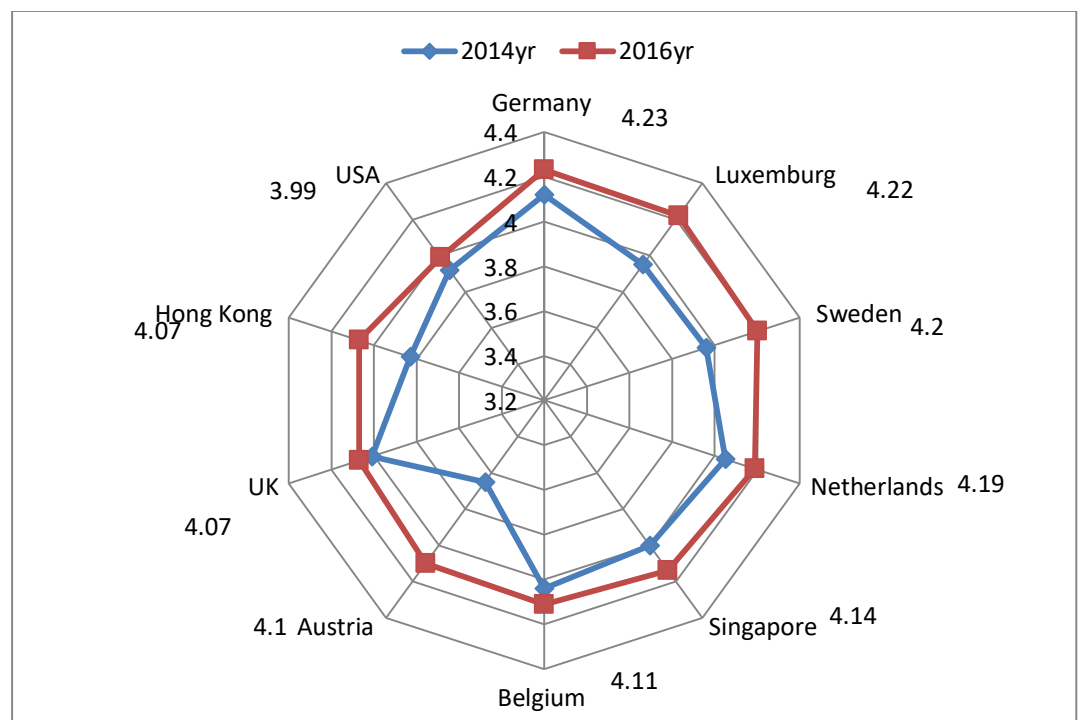
This function may be performed in Iran by service centres, freight forwarders, territorial dealers and distributors. It is aimed to promoting oil and gas products to the international market and material flow consumers, such as manufacturers, distributors and end users. Information for participants of the foreign trade is published in sectoral catalogues and on the internet.

On the whole, the transport logistics of Iran is an open system requiring close engagement of all components of the logistic system (see Picture 3).

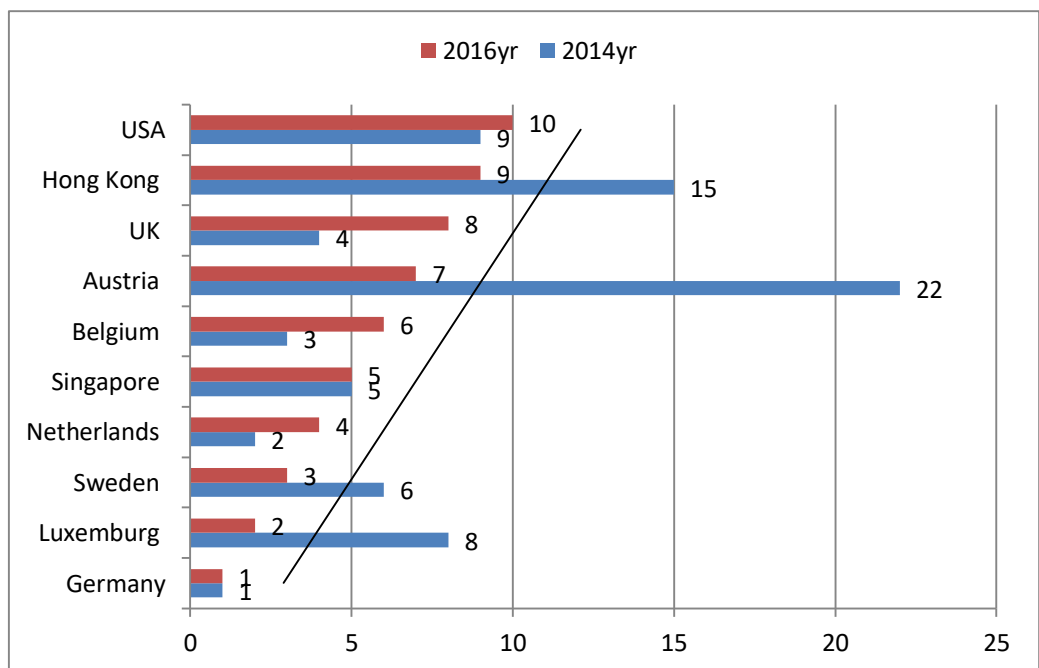


**Picture 3** – Iranian Oil and Gas Sector Transport Logistics  
 MF – material flows, FF – financial flows, IF-information flows

Assessing the performance of transport logistics of Iran it is pertinent to refer to the Logistics Performance Index (LPI 2016) of the World Bank. [22] This index based upon expert evaluations of efficacy, quality, competency, timeliness, simplicity and control over business processes shows, that Iran belongs to a group of countries with about 50% of the index maximum including Russia, Nigeria, Comoro Islands, Bosnia and Herzegovina. Despite the low rate, Iranian transport logistics is gaining new positions in the global logistic network fast creating and upgrading transportation corridors, introducing IT, concluding international agreements for most favored treatment, alleviating tax burden in free economic areas etc. However, the lag behind the top 10 countries on the list is still considerable (see Pictures 4, 5).



**Picture 4** – Top 10 LPIs in the World Bank's Rating



**Picture 5** – Logistics Performance Index's Top 10

## DISCUSSION

The efficient transport logistics of Iran should not be based on the international logistics' current transformation functional features only but address the existing state of the national oil and gas sector. The following changes should be made at the governmental level:

- 1) Introduction of economically feasible custom duties and tariffs not to interfere with the development of the international trade. The state is to introduce uniform procedures of setting proportions between the domestic and international prices for products of exporting companies as required by the UN Standard International Trade Classification.
- 2) Iranian oil and gas companies should apply standards allowing to use efficient, safe and environmentally friendly innovative technologies in logistics. It will bring domestic requirements in compliance with those of the ISO, organise information of the sectoral catalogues and web sites conveniently in a form understandable by foreign partners.
- 3) As use of Havala clearing system increases illegal financial flows in the country, the national financial and credit system should be integrated with SWIFT providing services to banks using standard transactions.
- 4) Cargo delivery scheme used by the carriers involves excessive logistic losses for their clients. In view of the global trends, most developed countries develop trans-logistic platforms or hubs. For Iran, they can be based in the free economic zones with their receptive logistic markets and good accessibility.
- 5) The existing customs insurance method should be put in compliance with INCOTERMS 2017. Presently, goods are insured at the customs border with no foreign policies recognised.

All the functions of Iranian transport logistics may be made efficient by trans-logistic platforms and international corridors only with the network interaction management technologies bringing down transaction costs in logistic chains and generating synergies.

In view of the above as well as of the peculiarity of transport logistics of Iran today, we propose the following measures to improve it.

1. It is expedient to change the approach to the efficient transport logistic, which must be based upon the main reproductive processes in the economy – the principles and mechanisms of logistic chains in intermodal transportation. It is reasonable to consider efficient transport logistic of a country as a condition of the organizational and economic convergence with global economic community.
2. Methodologic approach to solving organizational and technical problems of interactions between railways, motor and sea transport should be changed as well. The existing transport system of Iran does not comply with the modern international transportation requirements blocking innovation potential transport logistic making transportation services less reliable and raising the need for diversification of logistic chains, which is why the present transportation system and infrastructure should be corrected. The need for new logistic relationships is also due to the growing prices for energy resources and transportation services which may be caused by geopolitical risks.
3. Transport logistics should be fair and optimisable to ensure good economic performance of all the participants of logistic processes. Otherwise, the economic goals of the transport logistics functions cannot be reached. Following the principles of fairness and optimisability will enable its functions in G2B, B2B and B2G sectors.

The modern transport logistics of Iran is ineffective not only due to the contradictions of the banking and insurance legislation of the country with international norms revealed above, but also to traditional informal methods of interaction existing alongside the market reforms, such as the state support of logistic businesses, network cooperation and unlimited interaction between all participants of logistic processes.

## CONCLUSION

From the above materials the following conclusions may be drawn. The international transport logistics is developing rapidly in all countries of the world to include the Islamic Republic of Iran. The LPI components point to the fact, that Iranian transport logistic is far behind the world level making the country's economy, industries and businesses considerably less competitive. However, the high resource potential of the country can ensure competitiveness of its transport logistic sector by maximal convergence of domestic financial and customs regulations with norms of the international law.

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