

The combination of three groups of factors in International logistics

Georgi Chankov

Abstract - *Logistics solves the problems of efficient management of exchange, combining conflicting requirements - technical, political, economical. The technical development usually changes the parameters and offers new solutions, with economic and political considerations following, but there is also a reverse scheme possible - the strong political will to change the geo-economic status can stimulate technical progress and draw up new logistics schemes. The different combination of the three groups of factors explains historically the rise and decline of major logistics centres located along and intersecting major trade routes. Neglecting a group of factors while planning strategic logistics projects can lead to costly failures.*

Keywords: *International logistics, technical, political, economical factors, trade roads*

JEL: R40

1. Definition of International Logistics

Logistics explores the organized movement of goods, services and sometimes people.[1] It originated in ancient Greece as a military concept covering the processes of overall maintenance and security of troops in combat operations - supply of food, weapons, other materials, incl. transportation and storage, construction and maintenance of communication and transport infrastructure. In modern times, logistics is mostly associated with trade and deals with the physical movement of goods between one or more actors in the supply chain.

When considering international logistics systems, a complex network of carriers, freight forwarders, bankers and insurers, telecoms and businesses, merchants, etc. is taken into account. These elements facilitate international transactions, trade and the movement of goods and services.

Global supply chain management refers to the complex integration of the processes, designed to manage the materials from their origin through production and delivery to final user (or beyond, in case of recycling). But this concept is too restrictive.

In more general terms, the systematic approach considers the international logistics as management of the internal exchange between the elements of the system of international economic relations. Thus, logistics solves problems, linked to the construction of the infrastructure where the exchange of energy, substance and information takes place. Logistics also solves the problems of efficient management of this exchange, combining sometimes conflicting requirements - large volumes and continuity of exchanges at high speed, undisturbed by external interference. The solution once found, that optimally combines these requirements does not remain constant, as the external and internal conditions in which the system operates do not remain permanent.

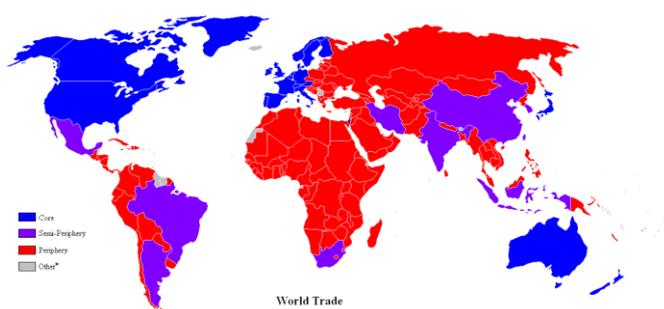
2. Logistics in the system of modern international economic relations

International logistics proposes these solutions in the "world system" or "world economy"[2] in the sense embedded in this concept by researchers such as Fernan Brodel, Immanuel Walerstein, Samir Amin, Giovanni Arigi, Andrey Fursov etc. In their works, the world economy consists of centers (super-cities, industrial clusters), secondary but well developed regions or whole economies (semi-periphery), and underdeveloped "periphery". Commercial roads and communications link the different regions and cultures into one macroeconomic space, but provided that there are logistical solutions that reconcile these requirements. In practice, because of the unsolved logistical problems until the 19th century (the "opium" wars against China, the violent "opening" of Japan), the term "world economy" seems not justified - apparently, there are still practically isolated relatively developed (or potentially developed) societies.

The most common version of the Bordel world system was developed by Immanuel Walerstein (1980). According to Walerstein, the modern world system was born in the so-called "long 16th century" (about 1450-1650) and the expansion of Europe since the beginning of the 20th century already covered the whole world. According to the classical concepts, a world economy (still) consists of:

- "core", including the most advanced countries of the West - currently the United States with the Anglosphere, Western Europe, Japan;
- "semi-periphery" - developed but not leading in all respects countries such as Eastern Europe, in the 20th and early 21st century, Russia, Brazil and Turkey in the early 21st century, the emerging countries of Southeast Asia at the end of 20th and early 21st century and others;
- "periphery" (the "Third World") - the geographic sector of the world economy producing low-quality but needed consumer goods and raw materials which make the sector a part of the whole international division of labor.[3] (Colonies, semi-colonies and dependent countries in Africa, Latin America and Asia in the 20th century).

Figure 1: Distribution of countries by economic status at the end of the 20th century, based on an analysis of the global system: center (blue), semi-peripheria (purple) and periphery (red). For the last 20 years there are considerable changes – China belongs no more to the semi-periphery, and parts of Eastern Europe (the Visegrad Four), Turkey and Russia are now in the semi-periphery.



Source: https://en.wikipedia.org/wiki/Periphery_countries,

The Modern World-System IV, Centrist Liberalism Triumphant, 1789–1914, by Immanuel Wallerstein, June 2011

Franz P. Lang's Theory of Commercial Roads describes the mechanism by which the center, the periphery and the periphery are shaped and changed in Europe.[4] According to this theory, two major trade axes or logistics chains - Novgorod-Santiago de Compostela (East-West) and London-Rome (North-South), permanently connect the individual parts of the continent over the last 1000 years and historically set the international division of labor.[5] Along the East – West axe a specialization is developing, where, due to the differences in

natural resources, the East is developing an extensive economy while the West specializes in manufacturing products with a higher degree of processing. In addition to these major commercial axes, there are other routes: the Mediterranean road linking southern Europe, North Africa and the Middle East, the Baltic Sea Road (around which the "Hansa" economic union emerges), the continuation of the Silk Road through the Southeast to Central Europe.

These "axes" set the direction of economic integration on the continent, but could be cut off for different periods of time, depending on fluctuations that make it easier or, on the contrary, complicate some logistical decisions. In the relatively closed national states of the first half of the 20th century there is a pronounced economic decline in their border areas.

However, with the gradual build-up of the EU, the border regions of Northern Italy, West Germany, East France, Belgium, the Netherlands, South England experience faster economic growth, compared with the new border areas of the community itself. Globally, these fluctuations can significantly change the weight of the individual regions in the global economy. At one point, Central Asia was comparatively highly developed economically between 800 and 1100 AD, it built in fact the center of the world [6] - today's Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan have been located along important trade routes linking East Asia with Europe, with rich "super-cities" (e.g. Balch) in which flourished science and arts. This bloom continued until the 14th century and ended with the empire of Tamerlane. Political instability implied frequent fluctuations within countries, and the turmoil at the end of the period substantially increased the logistic costs on the routes throughout Central Asia, while customs duties remain a major source of funds in the Treasury. The conquest of Constantinople in 1456 by the Turks, and the imposition of extremely high levies on trade between the East and the West ruined those countries and turned them into a kind of "economic black holes," a permanent part of the world's periphery. (They preserve this status till now, especially those deprived of energy sources, with a brief exception during the existence of the former USSR.) The attempt by the Turks to impose a trade monopoly forced merchants from the Atlantic coast of Europe - Portuguese, Spanish, then Dutch, British and, French, to seek alternative routes. This became possible with the appearance in the 14th c. of the carrack, the first three- or four-masted ocean-going sailing ship, allowing the transportation of heavy and expensive goods. The long land routes with intermediate stations, served by camel caravans were no more able to compete with the new kind of maritime transport - so began the time of the great "sea empires" - Spanish, Dutch, British, French, the USA.

The beginning of the 21st century gives the old trading hubs of Central Asia hopes for revival if China's One Belt One Road project succeeds, especially if the emerging new North-South trade route, with the economies of India and Russia as its end points, proves its potential. The intersection of these two trade routes in the Caspian Sea region should be expected to create an area of high concentration of capital, similar to the highly developed area in Europe north of the Alpine region. Such a development will be determined by the favourable confluence of three sets of factors that influence logistics.

3. Factors influencing modern international logistics

3.1. Technical factors

The mentioned example of the transition to maritime trade explains the importance of the technical factors. In the system of international relations, the main driver of change is scientific and technological progress: it constantly offers new solutions for the construction of the infrastructure (including permeability and speed), changes the volume and composition of the exchange of goods (services, etc.), creates and eliminates new threats to the security of this exchange.

Firstly, it changes the logistics scheme directly by introducing new vehicles - with greater capacity, speed and reliability, in fact offering the optimal ratio between these three qualities. Recently (since the 1970s), the importance of a relatively new requirement - that of environmental protection - has grown. In history there are several examples of smaller and larger transport revolutions after the introduction of sailing ships - the transition to steam (18th) and then to diesel engines (20th c.), the appearance of the railways in the 19th century, the rapid development after 1945 of land, transport, together with aviation and pipeline transport.

Together with the development of the vehicles developed also the communications, which increase the security and reliability of the deliveries - the introduction of telegraph and telephone (19th c.), the radio in the 20th c. and the modern digital satellite communications. Infrastructure also develops parallel with transport and communications – we witness building of high-capacity logistics centers such as ports, stations, airports and warehouses (including "Just in Time" technology), but also bridges, tunnels, lines, motorways, tunnels and other major transformations such as the Suez (1869) and Panama (1914) canals.

The introduction of port cranes and standard containers in the 1960s and 1970s created a whole new class of ships, altered the old harbors and created new ones, practically closing down the occupation of the dockyard. Technical progress consistently reduces the cost of carriage (tonne/kilometer), communications and reduces storage costs.

The above-described decline of the centers of Central Asia began with the conquest of Constantinople, but became a permanent trend lasting about 500 years because of the continued superiority of sea over land transport. It was only towards the end of the 19th century, with the development of railways, that overland transport began to regain its position: it is significant that the so-called Baghdad Railway, linking the Bosphorus with the Persian Gulf, became an important factor in international politics at the beginning of the 20th century, and tensions between Germany and Britain over this project contributed significantly to the outbreak of the First World War. 100 years later, trains loaded with 60 standard containers transport goods between China and Europe within 2 to 3 weeks.

The development of maritime transport at the same time peaked in the construction of container ships carrying 20,000 containers on the same route in up to 6 weeks. Started from scratch in 1905, air transport now uses cargo planes ferrying a payload of 140 tons between China and Europe in just 5 to 9 hours. (Table 1)

In all three directions, transport options are currently more limited by the available infrastructure: ports, canals, airports and railways. The development since 1885 of wheeled transport, which is the link between the three modes mentioned above and, with its ability to carry goods 'door to door', makes the megacities that exist today possible, should not be overlooked. The combination of the three modes of transport seems to be the most favourable. It explains the revival of Istanbul as major logistic and economic center in recent decades. Lang's observations nevertheless prove that the absence of one mode cannot prevent the other, provided that the other transport networks are sufficiently well developed. Wheeled transport is universal in this respect as it is the least sensitive to infrastructure - roads and warehouses.

3.2. Economic factors

Costs associated with international logistics are part of the cost of a commodity on the international market. This includes insurance, transport, warehousing, loading and unloading costs directly related to the technical factors (see above). Except for insurances, all other types of costs are technically conditioned. Indeed, the sharp reduction in technically conditioned costs is a major driver of globalization in the sense of merging the many local and regional

commodity markets into a global market where the local origin of a commodity is far from guaranteeing the former advantage of a short supply route.

This applies both to the first wave of globalization in the late 19th and early 20th centuries, and to the current wave that began in the 1990s. Different transport, storage and handling of freight technologies correspond to cost differences and facilitate the establishment of centers, semi-periphery and periphery (economic "black holes", see above) in the global economy. These differences also create relatively closed regional markets for logistic- sensitive commodities.

Due to lower shipping costs, the highest final delivery prices for a standard 20-foot container are typical for landlocked countries - \$ 10,650 in Tajikistan, \$ 9,285 in South Sudan, \$ 9,025 in Chad and others countries in Central Asia and Inner Africa. [7]

In markets open to all three modes of transport, shipments are allocated according to the type of goods: depending on the value/weight ratio of the shipment, the sensitivity to delivery time and the vulnerability to externalities in the shipment.

Table 1: Comparison of transport costs, in USD per container, and time, in days, for goods transported between China and Europe

| | Shanghai - Gdynia | | Chengdu - Warsaw | | Shanghai - Rotterdam | |
|-------|-------------------|------------|------------------|------------|----------------------|------------|
| | price | time | price | time | price | time |
| plane | 37,000 | 5–9 h. | 37,000 | 5–9 h. | 37,000 | 5–9 h. |
| train | 4,500 | 19 days | 5,000 | 15 days | 5,000 | 18 days |
| ship | 2,600 | 37–42 days | 4,500 | 43–50 days | 2,200 | 27–37 days |

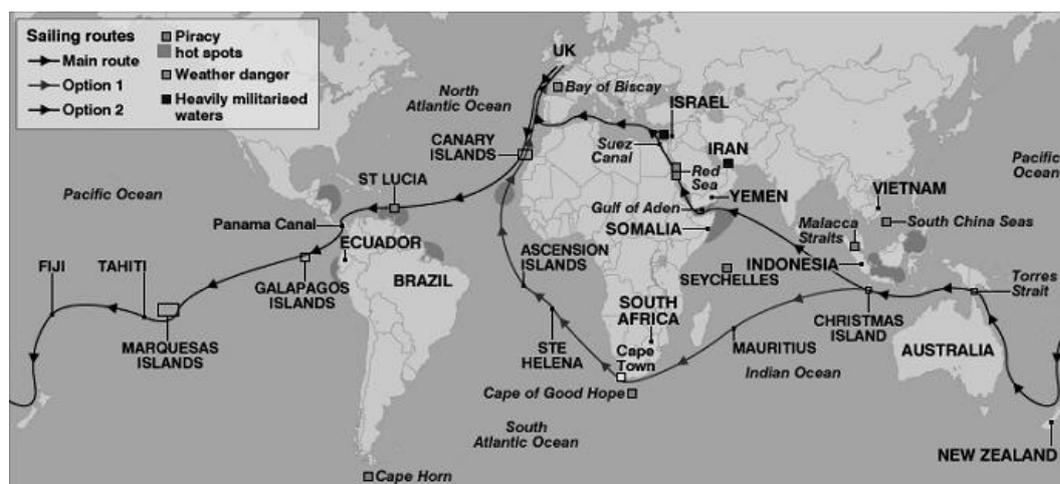
Source: Jakóbowski et al., 2018 [8]

It is clear that inert bulk cargoes are best suited for sea freight, while sensitive small-size goods with high unit value and short life cycle (e.g. smartphones) are also justified to be transported by air.

3.3. Political (administrative) factors

If only free trade is practiced, according to the theory of Adam Smith, David Ricardo, etc., logistic costs are determined only by the interaction of the two groups of factors mentioned above. However, political considerations always impose additional restrictions and these are most often related to security. Control over transport and communications infrastructure is imperative as far as enemy troops can move on the roads. Besides, commercial traffic is always attracting pirates. Nowadays they are still active, e.g. off the coast of Somalia and in the South China Sea.

Fig.2: Sea routes and hot spots



Source: <http://maritime-connector.com/wiki/piracy/>

Control involves military bases, escorts, inspections and technical constraints, and hence military assets that generally complicate logistics solutions and increase trade costs. Security considerations, however, have a wider dimension and are often at odds with free trade arguments. The review of historical events shows that these considerations are often weighing up. Dependence on external food supplies e.g. creates an unjustifiably high risk to national security. This is the case in the Roman Empire after ancient Egypt was incorporated and became a major supplier of grain to Italy. The placing of Egypt and these supplies under control became a preferred scheme for the usurpers of the imperial throne. Nowadays many countries in the Middle East, Sub-Saharan Africa, also Japan are vulnerable. This vulnerability may cause or intensify political crises in countries like Venezuela, Yemen and Qatar. If they can not develop their own production, such dependent countries often try to control imports with their own transport and infrastructure facilities. It should be added that vehicles are often of dual purpose - ships, airplanes, railways and trucks are used for the transport of troops and military materials if necessary, motorways are used as military airports, etc., which burdens further logistic schemes and chains.

Such considerations have long delayed the construction of the tunnel under the English Channel. Political decisions affect the free use of vehicles also in other cases, e.g. in order to promote domestic production of carriers, other related production and general promotion of economic development through state instruments.

In the 17th century the so-called Navigation acts (a ban on the use of foreign ships in trade and transport) lead to two wars between England and the Netherlands and set the stage for a protectionist policy that turned Britain into a leading maritime and commercial power, despite its technological backwardness at that time. Economic sanctions are currently forcing Russia to restore the production of civil aircrafts with long-term consequences for the industry and the country's overall economic situation. In addition, these politically motivated sanctions also boost the country's agriculture, which has won grain export markets in North Africa and the Middle East, due to short supply routes across the Black Sea, the Mediterranean and the Red Sea. Conversely, the convenience of this logistics scheme and the importance of these exports is expected to strengthen the region's importance for Russia also from a military point of view.

The aforementioned division of the world into center, semi-periphery and periphery is largely determined by logistical schemes and chains, but the same division is strongly influenced by political decisions - the "One Belt one Road" project includes in a complex way all groups of factors – technical, economic and political. And the interaction between factors is also not unambiguous. Typically, the technical development continually changes the

parameters and offers new solutions instead of the old ones, with economic and political considerations following, but there is also a reverse scheme possible - the strong political will to change the geo-economic status (from periphery to semi-periphery or center) can mobilize resources, stimulate technical progress and draw up new logistics schemes, such as the search for a sea route to India in the 15-16 c.

In addition: political risks are associated with irrational behaviour and cannot be foreseen, and their consequences can significantly alter economic parameters. E.g. the Islamic Revolution in Iran and the subsequent war with Iraq briefly doubled the price of oil, as half of the world market supply passed through the vulnerable Gulf. More recently, China's plans to build a new, wider canal through Nicaragua fits into the context of the U.S.-China standoff that began in 2016. The technical prerequisites are in place for the success of China's One Belt - One Road project, and estimates prove economic benefits - in 2011, the pilot Chongqing-Duisburg line ran one train a week, and in 2016 the service became daily.

However, unresolved conflicts in Eastern Europe and Central Asia, along with fear of facilitated Chinese competition, could halt the project despite its benefits. The East-West European trade route described by Franz Peter-Lang has been interrupted by wars on several occasions, despite the tremendous economic damage. Since 2014, there has been renewed political pressure to sever the important trade arteries between the largest industrial power, Germany, and its largest supplier of raw materials and energy, Russia.

Conclusion

Recent years have disproved the thesis of the primacy of economics over politics. Concrete, financially-backed plans to rebuild the energy sector by abandoning traditional energy sources in favour of alternative energy sources and suppliers are not technologically and economically sound, but are being put into practice. On the other hand, ignoring politics as a factor in planning strategic logistics projects can lead to costly failure, as the South Stream project in Bulgaria has shown. Integrated expertise, taking into account all three types of factors, is a must in any long-term decision-making. International logistics is both a determinant of international policy development and an outcome of that development.

References

- [1] Donald F. Wood, "International Logistics", Second Edition, American Management Association, New York, 2002
- [2] The notions of "world system" and "world economy" are given as they are used by Brodel and Valerstein.
- [3] Immanuel Wallerstein [1974] *The Modern World System: Capitalist Agriculture and the Origins of the European World Economy in the Sixteenth Century*. New York: Academic Press. p. 303
- [4] This theory is now gaining importance in view of the Chinese "One-Belt-One-Road" project, which has the ambition to set (at least part of) the infrastructure base of the new world economy.
- [5] Franz P. Lang, "Internationale Wirtschaftsbeziehungen", Teil 2: "Integration, Kapitalverkehr und Wechselkurse", Skript
- [6] Frederick Starr, "The Long Game on the Silk Road: US and EU Strategy for Central Asia and the Caucasus", Rowman & Littlefield Publishers, 2018

- [7] Most Expensive Countries To Receive Imports Into,
<https://www.worldatlas.com/articles/most-expensive-countries-to-receive-imports-into.html>
- [8] Jakóbowski et al., 2019, "Eu-China rail economic corridors and their role in trade in goods", VII International Symposium NEW HORIZONS 2019 of Transport and Communications