



**Andrzej S. Grzelakowski**

*Faculty of Entrepreneurship and Quality Science, Gdynia Maritime University, Poland*

## TRANSPORT CONDITIONS OF THE GLOBAL ECONOMY

### Abstract

The subject of research is the global economy perceived through the prism of its conditions and transport challenges that its development is currently generating. The author justifies the hypothesis that transport being a lever of globalization processes and a stimulator of the development of the global economy requires improvement, and in all dimensions of its activity on an international scale. For this purpose, basic barriers and threats of transport and logistics that are or may appear in the global economy in the near future were identified. The potential effects resulting from this reason for the global economy and its selected sectors, mainly trade were also indicated. It also identifies actions that should be taken to eliminate or reduce existing transport barriers, including mainly infrastructure barriers, which should lead to an increase in the efficiency and effectiveness of the transport sector on a global scale. The publication uses the studies and reports of international organizations such as the WTO, WB, WEF regarding the subject under study. The obtained research results allowed to formulate conclusions that, firstly, the transport infrastructure and low quality of transport services are still a significant barrier to the development of many economies – including the world's leading ones – and, secondly, that it is necessary to undertake coherent, internationally coordinated stimulating activities for transport development on a global scale. Transport is becoming a factor determining further growth of competitiveness and ensuring the expected level of facilitation in world trade and the required efficiency of functioning of global supply chains.

**Keywords:** global economy, global supply chains, global transport challenges, global logistics performance, transport and logistics indices

## Introduction

The development of the global economy, stimulated by the dynamics of globalization processes and the liberalization of all kinds of markets, and above all goods and capital, and the implementation of a new paradigm of stable and sustainable development of the regulatory model for this mega economic system, generates a number of transport and logistics challenges. They have a different character and distribution in time and their sources lie in both the real and regulatory sphere of the global economy, whose development directly affects the global transport sector, while shaping the global TSL sector. There are no full, in-depth research of this issue, and available studies, in addition to reports from international organizations such as the WTO, OECD, IMF, WEF, WB, etc., are partial, making it impossible to cover the subject in a comprehensive manner. For this reason, this article attempts – to the extent that is possible in this type of study – to identify these challenges, treating them both in terms of opportunities, as well as barriers and threats of a transport nature. At the same time, the effects that arise or potentially may arise from this for the global economy as well as its leading sectors, which transport supports, including mainly trade, limiting the efficiency of functioning and the effectiveness of its development are indicated. The categories of efficiency and effectiveness of the global economy, based on the transport standard, were determined on the basis of indicators determining the competitiveness of economies and the degree of trade facilitation in international relations. For this purpose, studies and reports of international organizations such as WTO, WB, WEF were used.

In addition to such a defined objective, it was also undertaken to define activities of a regulatory and organizational nature, as well as investment and infrastructure in this area of the global economy, necessary to gradually remove existing gaps and development disproportions in the area of infrastructure and eliminate solutions with discriminatory features. There was formulated the hypothesis that transport, which is an important component of the global TSL sector, constitutes a lever of globalization processes and a stimulus for the development of the global economy, needs improvement – and in all dimensions of its activity on an international scale. The implementation of the adopted objective and verification of the hypothesis required presentation of basic features as well as factors and directions of development of the contemporary global economy and also defining the place and role of transport in the process of its development. The factors were identified and the reasons for the increase in the transport capacity of the world economy were determined.

The results of the research and the conclusions drawn based on them were included in the conclusion, highlighting those that particularly emphasize the role of transport as a factor not only able to provide the required level of facilitation in world trade and high efficiency of the global logistics space, but also with a strong impact on the growth of competitiveness of economies operating in the sphere of international division of labor. In addition, it was pointed out that transport should have more influence than currently has on the creation of logistic and economic order in the global economic space.

## 1. The development of the global economy and its impact on the transport sector

The global economy is a system of production, technological, commercial, financial and institutional relations existing between national economies of individual countries at different levels of socio-economic development, including them in the global process of production and exchange. This peculiar mega economic system has the ability to function as one, relatively coherent system in real time. The lever of its development is globalization, which leads to a gradual reduction of barriers between countries and the strengthening of trade relations and other economic ties between them. It is stimulated by various factors, among which growing international trade, development of multinational corporations, progressive internationalization of the finance sphere and application in all these areas and spheres of new information and communication technologies, especially computer (ICT) are of fundamental importance<sup>1</sup>.

The processes of globalization, which in the system of the world economy take place with different dynamics, affect with greater or lesser force not only the sphere of trade in goods, but also the remaining spheres. In addition to global trade, one of them, the most affected by this impact, is transport that supports global trade. The two most internationalized, operating in the intercontinental scale transport branches, i.e. air and sea transport, play a special role in the transport of world trade commodity mass in terms of value. The share of both of these transport branches in servicing global trade, measured in monetary units (15.5 bn US \$ in 2016) was 76% and 12.5% respectively<sup>2</sup>.

Sea transport – due to its technical and operational properties (mainly mass) and economic characteristics (cheapness) – also plays a special role in servicing the dynamically growing volume of world trade, ensuring efficient, effective and safe transport of successively increasing commodity mass in oceanic transports. In the years 1974–2014, the average annual growth rate of transport in sea trade was 3.0%, and in 2015–2016 2.2%. In subsequent years, i.e. in 2017–2022, a further increase in transport by sea is assumed, an average of 3.2% annually<sup>3</sup>.

Global transport of cargo by sea in 2014 exceeded 10 billion tons for the first time in the history of sea transport development, reaching in 2016 the level of 10.3 billion tons, which means that about 81% of the volume of world trade was displaced by sea (the so-called sea trade). With an average transport distance of 1 ton of 5.000 Mm sea transport, if you measure its involvement in transport units (ton-mils), it therefore serves about 92% of world trade in goods<sup>4</sup>. Mutual relations between the growth of global and sea trade, as well as global GDP and industrial production, analyzed over the last 40 years, indicate that there is a clear correlation between the development

<sup>1</sup> S. Chopra, P. Meidel, *Supply chain management. Strategy, planning and*, fourth ed., Pearson, New York, p. 67–69 and 117.

<sup>2</sup> *International Trade Statistics*, World Trade Organization, Geneva 2017.

<sup>3</sup> *Review of maritime transport 2017. Report by the UNCTAD Secretariat*, Geneva 2017, p. 3.

<sup>4</sup> A.S. Grzelakowski, *Globalizacja i jej wpływ na gospodarkę światową i sektor transportu morskiego. Jej implikacje dla Polski i polskich portów morskich*, Bulletin of the Polish Chamber of Forwarding and Logistics 2015, 10–12; *Review of maritime transport 2017...*, p. 3–4.

of trade and maritime transport on a global scale and the rate of economic growth measured by the dynamics of GDP growth<sup>5</sup>. These relationships, defined in the long period of time, provide the basis for stating that marine transport markets (freight markets) are also strongly integrated with global commodity markets spread in the system of developing global chains and supply networks<sup>6</sup>.

The analyzed trends and phenomena occurring in the global economy, affecting the global trade and transport sectors, as well as the sphere of functioning and development of global logistics chains and supply networks, were affected by many different factors. The most important of them include<sup>7</sup>:

- dynamic growth of world trade, as a result of liberalization and deregulation of economies and markets, which encounters barriers in the efficiency of handling successively growing streams of goods, characterized by a high degree of spatial concentration;
- extension of the assortment structure of both investment and consumption goods, being a manifestation of changes in the size and structure of global demand and the growing ability to satisfy it on a global scale, including in the transport and logistics sector;
- declining share of mass goods (cargoes), with a low relative unit value in total world trade turnover and growing highly processed goods, with a higher unit value (new products, product innovations);
- price reduction in the long-term – mainly highly processed goods, which is the result of globalization (effects of production scale and increasing openness of markets, etc.), while shortening the life cycle of products;
- intensification of the phenomenon of outsourcing and offshoring on a global scale, which dynamically strongly increases the demand for transport services and, consequently, also forwarding and logistics, while leading to a significant increase in transport intensity;
- significant dynamics of transport markets as markets secondary to commodity markets, which are first subjected to cyclical pressures and structural fluctuations in demand for goods being exchanged on a global scale;
- horizontal and vertical and conglomerate concentration processes with high dynamics in the layout of global transport markets, as a result of strong fluctuations in demand for transport and logistics services;
- pressure to minimize stocks and improve the flow of goods on a global scale, which generates new logistical challenges, involving the need to simplify network structures and reduce transport costs and other components of logistics costs<sup>8</sup>;
- the relatively faster growing value of transported products than their quantity, which makes the so-called transport cost sensitivity index of on a global scale; transport costs do not increase in proportion to the increase in the volume

<sup>5</sup> *Ibidem*.

<sup>6</sup> A.S. Grzelakowski, *Container shipping operators as integrators of global logistics supply chains*, Logistics and Transport 2014, 1, p. 49.

<sup>7</sup> A.E. Branch, *Global supply chain management and international logistics*, Routledge Taylor and Francis Group, New York and London 2010, p. 96–98.

<sup>8</sup> J. Mangan, Ch. Lalwani, T. Butcher, *Global logistics and supply chain management*, John Wiley & Sons Ltd., New York 2009, p. 11–12.

- of transport, their share in value and, as a result, in the prices of transported goods (transport cost penalty) does not increase;
- increase in efficiency and productivity in transport as a result of product, organizational and marketing-market innovations; these innovations, leading to an increase in productivity in the sphere of transport, affect the sensitivity of transport costs, which triggers the processes of their optimization in the global supply chain;
  - (de)regulation of the transport sector on a global scale, which generates not only a number of positive phenomena, such as: increased security and reliability of its operation, reorientation towards sustainable development and reduction of external costs and implementation of innovative solutions corresponding to the challenges of the fourth industrial revolution (automation, digitization), but also serious problems in ensuring the efficiency of world trade flows, as required by global logistics operators.

The factors presented in points 1–11 with varying strength affect the global transport sector, shaping both directly and indirectly both its real and regulatory sphere<sup>9</sup>. The basic processes, trends and phenomena that occur in this area of the global economy should therefore be analyzed and evaluated in the context of changes taking place in its structure and within the global logistic space.

## **2. Transport as a factor shaping the functioning efficiency and dynamics of the countries' development – research methods and international rankings**

The development and effectiveness of the functioning of national economies participating in the international division of labour, including their competitiveness, as well as the efficiency of handling global trade, are determined by many factors. Among them, the factors of transport and logistics are becoming more and more important. The lack of appropriate transport infrastructure, including the network capacity necessary to meet transport needs and its required in terms of current global standards supply chains technical and operational cohesion, as well as low quality of network and transport and logistics services make the economies of countries that are struggling with this type of transport problems, they do not achieve potentially possible economic effects due to their involvement in the sphere of international cooperation. As a result, if transport barriers of this nature occur in countries that are among the leaders in world trade, at the same time affecting the state of the economy and the dynamics of global economy growth, they are becoming serious threats to its development.

This problem is noticed by many countries and global economic organizations such as: World Trade Organization (WTO), World Economic Forum (WEF), World Bank (WB – IBRD) and International Monetary Fund (IMF) and numerous regional groups, including: the European Union, ASEAN and industry associations. Based on the analysis of periodic reports of these organizations, containing precisely

<sup>9</sup> *Transport. Nowe wyzwania*, eds. K. Wojewódzka-Król, E. Załoga, PWN, Warsaw 2016, p. 319–321.

defined sets of measures used to assess the efficiency and effectiveness of the functioning of most countries in the global space and sets of indicators calculated on their basis, it is possible to identify basic factors – including those from transport and logistics groups influencing the studied relations and estimate the strength of their impact on particular spheres of international activity of each of the countries covered by the research.

The most important measures of this type, characterizing both the efficiency and effectiveness of countries in the global economy system, treated as a set of national economies with varying degrees of international connections, include:

- Global Competitiveness Index (GCI), developed by WEF as part of the prepared report (*The Global Competitiveness Report*)<sup>10</sup>;
- Enabling Trade Index (ETI), developed by the Associated with the World Economic Forum Supply Chain & Transport Industry Partnership as part of the prepared report (*The Global Enabling Trade Report*)<sup>11</sup>;
- Logistics Performance Index (LPI), developed by the World Bank<sup>12</sup>.

On the basis of these three measures and indicators calculated on this basis, i.e. numerically defined measures of their value, one can assess the level of efficiency and transport and logistics efficiency of each of the countries operating in the global economy system, based on quality standards of infrastructure and transport services. WEF defines competitiveness as an external effect of joint operation of a set of institutional, political and economic factors based on the productivity of economy resources, management efficiency, as well as innovation and efficiency of business operations. The annual reports of WEF on the competitiveness of economies contain a list of synthetic indicators of competitiveness, which are a statistical aggregate calculated on the basis of 114 specific indicators, reflecting the levels of values for each measure, referring to a set of factors (there are a total of 114) determining competitiveness of economies<sup>13</sup>. The level of country's competitiveness is determined by a set of 12 main factors (pillars of competitiveness), among which the pillar: infrastructure is the second most important. In this category of factors collection, the basic importance is attributed to the technical infrastructure of transport and telecommunications and communications. It is stated that they form the main transport and logistics base in each country, determining the level of competitiveness of the economy on a global scale. On the basis of this criterion, the economies of individual countries are ranked, classifying them according to the level of competitiveness of their transport systems.

Transport infrastructure networks and the quality of transport and logistics services affect not only the level of competitiveness of economies, but also the efficient flow of commodity flows on a global scale, which co-determines this competitiveness. The transport infrastructure may facilitate the flow of goods or constitute a significant barrier in their logistics service. Therefore, it determines

<sup>10</sup> *The Global Competitiveness Report 2016–2017. Insight Report*, ed. K. Schwab, The World Economic Forum, Geneva 2017, p. 25; The World Economic Forum and the Global Alliance for Trade Facilitation, Geneva 2017.

<sup>11</sup> *The Global Enabling Trade Report 2016. Insight Report*, The World Economic Forum, Geneva 2017, p. 6–9.

<sup>12</sup> *Trade Logistics in the Global Economy. Logistics performance Index and its Indicators. Connecting to Compete*, The World Bank – IBRD, Washington 2017, p. 7–9.

<sup>13</sup> *The Global Competitiveness Report 2016–2017. Insight Report...*, p. 17.

the efficiency of trade in countries on a global scale. The WTO and WEF reports indicate the basic factors determining the level of benefits that individual countries can derive from participation in the global division of labour. In these reports, using the developed index (ETI), allowing to determine the level of the synthetic index of facilitation in the implementation of international exchange in each country, based on the WTO and WTF standards, which is calculated based on the weighting of individual sub-indices, reflecting the different types of facilitations, also an indicator defining the quality of transport infrastructure. High importance is assigned for determining the synthetic index, recognizing that transport accessibility, the quality of infrastructure and logistics networks in individual countries are more important in creating facilitation and shaping replacement costs than customs tariffs<sup>14</sup>.

The indicator defining the level of facilitation in the scope of handling trade in goods from the perspective of transport and logistics conditions consists of a set of 19 balanced partial indicators. They define three main dimensions of the transport factor perceived in the report, i.e. the availability and quality of transport infrastructure (7 partial indexes), availability and quality of transport services, measured by the level of logistics and transport companies competences and timeliness and delivery costs (6 indexes), and the availability and the possibility of using information and telecommunications technologies (ICT – the level of digitization in transport) and the quality of these services (7 indexes).

On the basis of the three above-mentioned indicators, apart from the synthetic ETI index, the ranking of countries is being developed in terms of their transport and logistics efficiency, perceived in terms of its impact on the efficiency of stream of goods service.

In the international system, quantitative and qualitative standards of transport and logistics space of individual countries, which are treated as an important factor affecting the functioning of their economies and indirectly the global economy as well as international trade service, is also assessed using a measure of logistics efficiency (LPI). This measure, which can be expressed in numerical form (index) is a weighted average of the obtained results of the assessment of this efficiency in each country. These results refer to six areas – factors that determine this efficiency, and among them the transport infrastructure and the quality of logistic services are prominent. These include: efficiency (speed, simplicity, predictability) of implementation of border procedures, quality of transport infrastructure essential for servicing international trade, scope of freedom in negotiating and setting competitive prices, quality of logistic services including transport and competences of forms providing these services, and the ability to track shipments in real time, as well as timeliness of deliveries in accordance with the planned or expected date<sup>15</sup>.

<sup>14</sup> *The Global Enabling Trade Report 2016. Insight Report...*, p. 12–13.

<sup>15</sup> *Trade Logistics in the Global Economy...*, p. 17.

### 3. Transport barriers to the increase in the effectiveness of the functioning of national economies and the development of the global economy

Transport infrastructure and quality of transport services as well as the advanced stage of development of modern information and telecommunications technologies in the transport sector – the achieved level of its digitalization, directly defining the digitization of supply chains, as factors shaping the quality of logistics macrosystems are of particular importance for countries with the largest share in world trade. These countries, included in the category of global economy leaders, which thanks to the technologically advanced and innovative economies, gain significant benefits from participation in the international division of labour, do not always have adequate capacity for their position in world trade efficiency and efficiency of their transport and logistics macrosystems. The existing differences in this area and sometimes even a deep asymmetry are perceived by comparing on the basis of the ranking developed by the WTO the position of a particular country in global trade – its share in global exports and imports with the place it obtains in transport efficiency rankings – infrastructure quality transport and network and transport services, as well as broadly understood logistics performance. Such a comparison presenting both the strengths and weaknesses of transport and logistics systems of individual leaders of the global economy, defining also the challenges facing them in this respect, is presented in Table 1.

Table 1. Ranking of countries – the main global engines of global economy growth in terms of their competitiveness as well as transport efficiency and logistics efficiency

Country	HG	GCI	GCI-Inf.	ETI	ETI-Inf.	ETI-JDI	LPI	LPI-Inf.
China	1	28	>50	>50	36	16	28	9
The USA	2	3	11	15	8	8	9	4
Germany	3	5	7	10	6	5	1	1
Japan	4	6	6	13	5	7	10	5
The Netherlands	5	8	4	3	3	9	2	3
France	6	23	8	21	9	4	13	7
South Korea	7	26	17	30	8	7	21	8
Great Britain	8	9	10	6	4	10	4	6
Hong Kong	9	7	1	2	2	3	15	7
Singapore	14	1	2	1	1	2	5	2

Interpretation: HG – global trade position, GCI – Global Competitiveness Index, ETI – Enabling Trade Index, LPI – Logistics Performance Index; GCI-Inf. – assessment of the level of infrastructure development in terms of its impact on the country's competitiveness, ETI-Inf. – condition of transport infrastructure, as a factor determining the level of trade facilitation index, ETI-JDI – quality of transport infrastructure services, LPI-Inf. – transport infrastructure, as a factor determining the level of logistics performance/efficiency of the country.

Source: prepared on the basis of reports: WTO, WEF, WB, UNCTAD, OECD, 2015



Analysis of data contained in Table 1 clearly indicates the disproportions between countries existing on the global scale. These disproportions are particularly visible in the case of China and, to a lesser extent, in South Korea and France. They point to transport barriers real in these countries and, as a consequence, also logistic, which limit the scale of benefits that these countries could potentially benefit from the development of trade and full participation in the international division of labour. As a result, this is reflected in the level of competitiveness of the economies of these countries on global markets.

The Singapore is the absolute, undisputed leader in facilitating trade and the development of high-performance transport and logistics services. Relatively balanced relations in the studied areas occur in Germany, the Netherlands, Hong Kong, Great Britain, Japan and the USA. These countries, with well-developed transport and logistics systems and markets integrated with the commodity market system, not only achieve significant competitive advantages, but also gain the necessary potential to take over the full financial and economic effects of participating in the international division of labour. The elimination of transport barriers, being a long-term process and difficult to implement due to the high capital intensity of such activities and the inability to fully coordinate them on a global scale, is therefore in the interest of every country and the global economy as open, creating greater opportunities for the development of the economic system.

## **Conclusions**

The development of globalization stimulated by the processes of deregulation of economies and the progressive liberalization of commodity and transport markets created new challenges both for domestic transport systems and for the global transport space. This space, in the conditions of popularization of logistic standards for stream of goods flows and the development of global chains and supply networks, was strongly embedded in the logistics macro system of every country and what is particularly important in an open, global logistic space. As a result, real integration of the TSL sector is being carried out, based on the formula of merging its markets with commodity markets. In practice, it significantly facilitates and improves global trade transport services, implemented on the basis of the logistic standards of the flow of commodity flows on a global scale.

These processes, however, do not run smoothly and without collision, because the standards of transport service of the growing world trade flows are still very diverse on a global scale. There are many transport barriers inherent in transport systems in most countries of the world, both in terms of infrastructure, as well as organizational, operational and regulatory, which limit the growth of efficiency and effectiveness of transport operations on a global scale and, consequently, also of the global economy. This is confirmed by the research results obtained.

These results allowed to formulate conclusions that: firstly, transport infrastructure and low quality of transport services are still an important barrier to the development of many economies – including leading countries on a global scale and thus a barrier to global economy development, and secondly, at the current

stage of global economy development. In the era of progressing digitization, it is necessary to undertake coherent, coordinated at the international level investment and regulatory activities stimulating the development of transport on a global scale. Only in this way can you create the basis for building transport order and, consequently, also for logistics in the global economic space.

## References

- Branch A.E., *Global supply chain management and international logistics*, Routledge Taylor and Francis Group, New York and London 2009.
- Chopra S., Meindl P., *Supply Chain Management. Strategy, Planning, and Operation*, fourth ed., Pearson, New York 2010.
- Grzelakowski A.S., *Container shipping operators as integrators of global logistics supply chains*, *Logistics and Transport* 2014, 21(1).
- Grzelakowski A.S., *Globalizacja i jej wpływ na gospodarkę światową i sektor transportu morskiego. Jej implikacje dla Polski i polskich portów morskich*, *Bulletin of the Polish Chamber of Forwarding and Logistics* 2015, 10–12.
- International Trade Statistics*, World Trade Organization, Geneva 2017.
- Mangan J., Lalwani Ch., Butcher T., *Global Logistics and Supply Chain Management*, John Wiley & Sons Ltd., New York 2009.
- Review of maritime transport 2017. Report by the UNCTAD Secretariat*, Geneva 2017.
- The Global Competitiveness Report 2016–2017. Insight Report*, ed. K. Schwab, The World Economic Forum, Geneva 2017.
- The Global Enabling Trade Report 2016. Insight Report*, Geneva 2016.
- The World Economic Forum and the Global Alliance for Trade Facilitation, Geneva 2017.
- Trade Logistics in the Global Economy. Logistics Performance Index and Its Indicators. Connecting to Compete*, The World Bank – IBRD, Washington 2017.
- Transport. Nowe wyzwania*, eds. K. Wojewódzka-Król, E. Załoga, PWN, Warsaw 2016.

## Corresponding author

Andrzej S. Grzelakowski can be contacted at: [a.grzelakowski@wpit.umg.edu.pl](mailto:a.grzelakowski@wpit.umg.edu.pl)