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THE INVESTMENT IN INNOVATIVE LOGISTIC TECHNOLOGIES

ABSTRACT

The problems of investment in the development of supply chains are considered. The trends that are characteristic of investment processes in the industry are investigated, and problems of investing in the supply chain are highlighted, namely, the lack of a well-coordinated partnership between the state and private business, underestimation of projects due to incomplete information about the characteristics of investment projects and underdeveloped investment assessment methodology. The authors confirmed the thesis that the development of investment in innovative solutions for supply chains is ensured by more active participation of stakeholders in the investment process.

KEY WORDS rhetorical analysis, innovation process, supply chain, globalization, logistics, transportation, transport and logistics, logistics costs, investment process.

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The maintaining and improving the competitiveness of the economy through the development of transport infrastructure are discussed as an effective way to overcome the crisis trends in the context of globalization and strengthening of the competitive environment due to the new factor of production, which becomes the ability to innovations. A number of countries, for example in the USA, make concerns about the lack of the necessary infrastructure to compete with the growing economies of China and India. According to the compliance of transport infrastructure with the general rate of international growth, the share of exports and imports from the gross domestic product (GDP) of developed countries has increased its rate 2 times over the past decade in developed countries [McCloskey D., 2012]. Logistical corporations are concerned about the rise in logistical costs (from 8.6% in 2013 to 9.9% of GDP in 2016) [McCloskey D., 2012]. The economic consequences of these trends are assessed as very significant ones, it is necessary to assess the conditions for the transportation and financing of infrastructure maintenance and improvement of their efficiency. The object of the research is the development of supply chains; the subject of the research is the role and importance of investments in the development of supply chains. It is necessary to identify the role, trends and problems of investment processes for the development of supply chains. Local and state authorities, private firms operating in the transport and logistics industry can use the proposals to enhance investment in the development of supply chains.

Rhetorical analysis by D. McCloskey, scientific analysis and synthesis, mathematical and statistical analysis, graphical

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method and generalization are chosen as the research methods. The well-known scientist and methodologist of economics Deirdre McCloskey [McCloskey D., 2012] defined the capitalism as a stage of transition to a new way of life, namely 'market-tested improvements and supplies'. Further in-depth analysis of the investment perspective shows that innovation processes in various sectors of the economy are characterized by a common fundamental concept of innovation as an initial impulse of economic growth, both in national-scale and in various sectors of the economy (according to D. McCloskey, the dominant idea of innovation is the understanding of the social value of innovation in industry, services and supply chains). Thus, the results of the fundamental provisions' research of the investing process into innovation can be extended to the sphere of logistical technologies. The main cause of supply chain inefficiency is the lack of investment in transport infrastructure. Recent studies have shown that logistics has great potential for development, both on a microeconomic and macroeconomic scale. Technological advances in the field of information and data processing contributed to the development of logistics, reducing its costs and coordinating transportation costs. The development of logistics technologies has become possible due to the active implementation of information technologies, which allow processing of large amounts of data and opening up the prospects for the use of information and analytical centers of logistics providers. The investments in logistics technologies has become the main factor in the development of supply chains. Such investment provides not only the economic benefits of supply by various modes of transport, but can also give a significant impetus to the development of the economy. According to analysts of the consulting group KPMG, a 10% increase in the efficiency of the transport sector will lead to a 0.8% increase in GDP [Review, 2017]. In accordance with the dominant viewpoint within the economic mainstream, an increase in infrastructure investments (particularly in transport) in the public sector improves the efficiency and profitability of the business sector, and such an increase encourages business investment in private capital [Aschauer D.A., 1989a, b; Banister D., Berechman J., 2000]. Since the 2000s the investments in transport infrastructure of China were planned from the premise that their annual increase of 15–18% would ensure the growth of the Chinese economy by 8% [Ansar A., Flyvbjerg B., Budzier A. et al., 2016]. Theoretically, the investments into the country's transport infrastructure are tied to a reduction in direct transportation costs and operating expenses of companies, which positively affects the improvement of the entire supply chain [Ansar A., Flyvbjerg B., Budzier A. et al., 2016]. As a rule, the traditional economic theory considers infrastructure investments as a reasonable investment in technology aimed at reducing costs in the economy through the factor of transportation costs [Krugman P., 1991; Holtz-Eakin, D., Lovely, E. E., 1996; Glaeser E. L., Kohlhase J. E., 2004]. The research of infrastructure investments results in infrastructure projects showed that it requires a detailed assessment of the full costs of a specific project, which demands appropriate qualified management (representatives of this direction confront the mainstream, developing a scientific approach to microeconomic assessment of infrastructure projects [Flyvbjerg B., Bruzelius N., Rothengatter W., 2003; Flyvbjerg B., Garbuio M., Lovallo D., 2009; Rogoff K., Reinhart C., 2010; Flyvbjerg B., Holm MKS, Buhl

SL, 2005]. Investing into the supply chain at the state level implies an estimate in investment decisions in respect of transport infrastructure, an evaluation of specific investments in infrastructure (for example, the profit of \$100 million investments), as well as the definition of an investment framework (transport companies, infrastructure).

The scope of investment objects in the supply chain may cover individual objects of the transport and logistics industry. The investments into infrastructure development will enable to use the advantage of new transport routes by logistics companies, also to modernize logistics processes and supply chains, improve service quality and reduce costs. The investment decisions in the transport and logistics industry affect the structure of value added in the global supply chain [Blahman L. S., Zyabrikov V. V., 2015; A. Dmitriev, 2017].

Transnational companies coordinate the global supply chains, for which they build a complex set of relationships with suppliers. These relationships significantly affect the distribution of economic benefits from investing in the development of global supply chains and its long-term consequences.

The investing in the development of supply chains allows expanding the opportunity of infrastructure, using new types of transportation, creating information and analytical centers for managing logistics and transportation over long distances. The minimization of transport and logistics costs is achieved through the introduction of new logistics technologies, which makes international supply chains economically viable and serves as a source of additional profits for all participants in the logistics network. Thus, the investing in the development of supply chains and logistics infrastructure leads to positive results for participants in the transport and logistics industry.

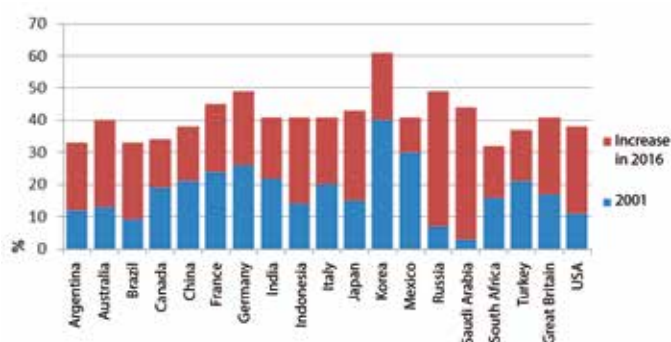
The state, involved in supply chain investments, is a major participant in the development of the logistics industry. Currently, the main driver for the development of transport infrastructure in Russia is precisely capital investments within various target programs. However, it is necessary to attract private investment for the successful development of transport infrastructure. According to a World Bank study, total infrastructure spending in Russia is 1% of GDP [Review, 2017]. Among the BRICS countries, Brazil and India have lower rates of total infrastructure spending, but also have a large private investment [Statistics database, [s.a.]].

Profits from trade flows within the global supply chain increased by 106% (at current prices) in 2005–2016 [World, 2016]. A significant part of the profit is redistributed among all participants in the supply chain.

The share of developing countries in global value added exports increased from 21% in 2005 to 34% in 2016 [McCloskey D., 2012] (for example, in China 6 times, in India – 5 times, in Brazil almost 3 times more than the average [Statistics database, [sa]]). It happened due to the low level of development and very small investments in the transport and logistics infrastructure.

According to the dynamics of the participation index in global supply chains in 2001 and 2016, we can observe how, many countries of the world increasingly rely on the development of international trade with the creating of the global supply chain (Fig. 1).

Fig. 1. World participation index of countries in global supply chains in 2001 and 2016 [Statistics, [s.a.]]



The expanding the activities of small and medium-sized enterprises of the transport and logistics industry through direct investment was the main driver for the growth of supply chains (Fig. 2). With increasing investment in the transport and logistics industry, more and more companies are participating in international supply chains. The investments made in the development of supply chains vary considerably in areas, structure of investments in the development of supply chains [World, 2016].

Fig. 2. Correlation between the volume of investment in logistics technologies and the number of companies participating in international supply chains [Statistics, [s.a.]]

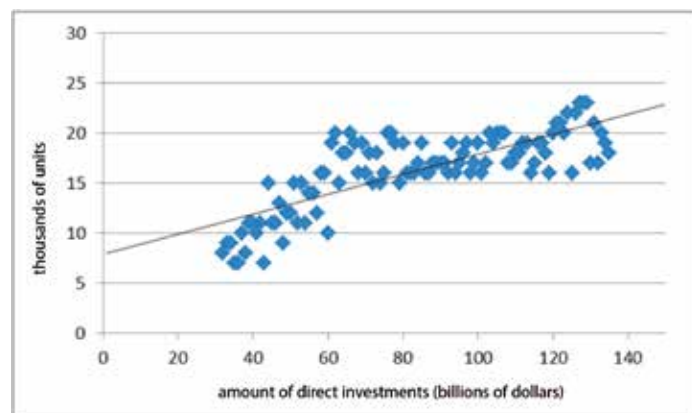
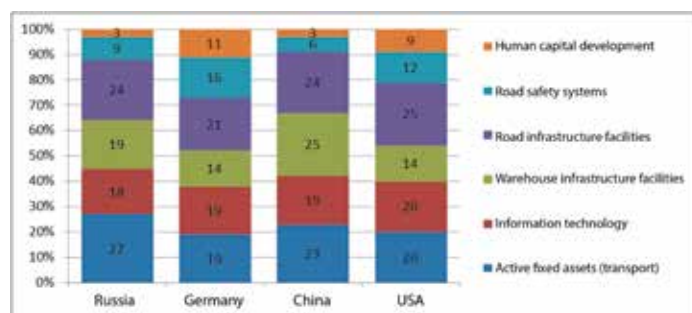


Fig. 3. Structure of investments in the development of the transport and logistics industry according to the beginning of 2016 [L. Simonova, [bg]; World, 2016]



Let us consider six positions for comparing investments in the development of the transport and logistics infrastructure of Russia, Germany, China and the USA (Fig. 3). Russia, Germany, China and the United States have different priorities for investment in the development of supply chains. In Russia, the transport facilities take the 1st place (27% of the total investment in

the industry), the road infrastructure facilities take the 2nd place (except warehouses) (24%). In Germany, the road infrastructure facilities (except for warehouses) (21%) take the 1st place, the transport facilities (19%) and information technologies (19%) take the 2nd place. In China, the warehouse infrastructure facilities (25 take the 1st place, other road infrastructure facilities (24%) take the 2nd place. In the USA, the road infrastructure facilities take the 1st place (27%). In many ways, this distribution is due to existing problems. In Russia, the obsolescence and high depreciation of the fixed assets of transport organizations are very relevant [Review, 2017], the replacement of vehicles requires costs. A significant share of investment in vehicles in the total investment in the transport and logistics industry is due to the growth of international transportation and the active participation of Russian transport enterprises in them. The development of warehouse infrastructure in China is such that its capacity does not correspond to the scale of the country's trade turnover [Kocheriagina N.V., Ryzhova O.A., 2015, p. 47]. The predominance of investment in warehouse infrastructure shows that China has begun to improve logistics technologies. Other countries have a similar relationship between the problems of the transport and logistics sector and the structure of investment in the industry.

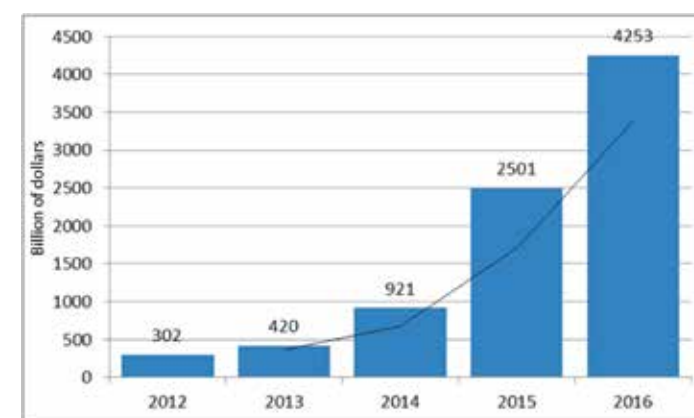
A rather large share of investments in the development of information technologies in the field of supply chain development corresponds to the global trend: investments in information systems and technologies used in logistics and supply chain management are growing.

This trend is because the supply processes are constantly becoming more complex and more dynamic within the global and national supply chains. Reliable modern information technologies that are oriented towards the needs of the transport and logistics industry are necessary to complete control over the processes in the supply chain. Supply chain participants are interested in introducing information tools that can provide visibility, transparency, and accounting for operations throughout the supply chain. Cloud solutions are very popular [Valeeva A.N., Semicheva O.S., Valeeva D.N., 2017, p. 129]. They allows receiving information and sharing it throughout the supply chain in real time. As a result, the competitiveness of carriers in the logistics market and the degree of control over the delivery process by the cargo owners are increased. Automation of logistics and cloud technologies allows reducing the costs associated with attracting labor resources, optimizing supply processes, searching for partners and customers, participating in electronic trading and carry out online monitoring of the cargo. It can be assumed that the share of investments in the development of information technologies in logistics will increase in the future.

The availability of technology in the form of specific technical know-how has had a significant impact on the development of supply chains at the international level, and has contributed to increasing the mobility of the logistics business. Investments in human capital are also significant for the development of supply chains; they have a low share in the total investment (Fig. 4).

It is necessary to highlight the main common problems of investing in the development of supply chains. The main problem is the low awareness of the authorities about the possibilities and obstacles to development for the transport and logistics industry. Many cargo services are multimodal, which reflects

Fig. 4. Dynamics of investments in innovations in the field of logistics and supply chain management (in the development of information systems and management technologies) [Simonova L.]



the characteristics of infrastructure development of this type of services compared to the development of passenger traffic, which are targeted by government bodies in many countries [Blahman, LS, Zyabrikov, VV, 2015, p. 31].

The second problem is the complex procedure for evaluating infrastructure projects that affect the interests not only of companies involved in construction and state authorities, but also of the population. The interests of the population are considered from the point of the positive social effect of investments in infrastructure development and the implementation of logistics innovations. The assessment is complicated by the fact that there are many types of logistical costs, benefits, and stakeholders (innovators, construction companies, logistic intermediaries of various levels, public authorities and the population. Thus, for example, infrastructure projects can be considered from several sides:

- the impact on the environment;
- the safety and security benefits;
- the government operating and capital costs;
- the direct costs and benefits of consumers and carriers;
- the direct benefits of shippers: the access to national and international terminals, the use of new transportation technologies, time and costs saving;
- the general economic effect (employment, positive dynamics of the industry and market growth);
- the improving the efficiency of the supply chain;
- the international economic benefits (due to the support of international trade) [A. Dmitriev, 2017, c. 379].

Usually, government officials consider only a few items from this list when evaluating investment projects related to supply chains. The environmental impacts of the project, safety, public, operating and capital expenditures of the budget, as well as the benefits of carriers and shippers are mostly taken into account. The economic effect, such as a job creation or a growth in the logistics market, is sometimes taken into account, especially for large-scale investments. However, the advantages of the supply chain development and international trade are most often ignored. As a result, of the benefits of implementing the infrastructure investment project are not fully appreciated.

The analysis of positive effects also leave something to be desired. Thus, an increase in the efficiency of the supply chain is assessed using economic parameters regarding the relation-

ship between reduced transport costs and supply chain benefits for the national industry. The advantages of supply development are based on reducing direct costs and saving other expenses; they both vary depending on the industry and product relations in the region. The main consequences of improving the efficiency of the supply chain include:

- the reducing of logistics costs;
- the increase in the speed of delivery of goods, which contributes to a reduction in the cost of working capital for all participants in the supply chain due to the increased reliability of the supply chain;
- the increase in revenues from the introduction of new business models of supply and the establishment of new business relations [Kocheryagina N.V., Ryzhova O.A., 2015, p. 146].

It is necessary to evaluate the project and consider various parameters for a comprehensive assessment of investments in innovative logistics technologies at the level of a specific company, as a participant in investment processes in the development of supply chains, before making investment decisions:

- the scale of investment, taking into account the magnitude of the investment risk into innovation in the development of supply chains;
- the cooperation, areas of cooperation for the project;
- the costs required for the project implementation, and additional efforts, which are necessary to create conditions for its successful implementation;
- the payback on investment in innovation (profits will be made in the short or long term).

The lack of a clear methodology for evaluating investment projects that the authorities could use is the problem of the development of investment processes in the field of innovative logistics technologies in supply chains. A full assessment of investment characteristics, improvement of the assessment methods by government agencies responsible for investment decisions in the field of transport and logistics are necessary to take into account the assessments of all the benefits of supply chain development. Innovative approaches to project evaluation involve the development of methodological support for the distribution of costs and economic benefits between participants in the supply chains at the local, federal, and international levels.

Other stakeholders should be involved in investing in the development of supply chains. Carriers and shippers, for example, should use industry associations that could inform the government, which determines the overall economic policy in general, about the prioritization of supply chain participants. In perspective, it can be used during considering a public-private partnership.

Investing into innovative technologies can serve security, especially because the international trade and transport system is still vulnerable in terms of security. Any group of participants in the supply chain has the ability to control to the full the huge number of participants and operations included in the global supply chain. At the same time, governments and companies can significantly improve the security of international trade and transport by improving regulatory measures in the field of innovation in supply chains through cooperation.

As part of the issue of investments in the development of the supply chain security system, one should take into account a

steady trend – environmental protection [Review, 2017]. Many environmental safety requirements in logistics are already enshrined in legislation [Federal Law, 1998]. For example, in 2017, in Russia, Russian Railways as a whole invested about 5 billion rubles on priority environmental issues [N. Loginov, 2018]. In 2016–2030, the investments for 8.6 trillion rubles are envisaged for the development of railway transport. It is planned to accelerate the movement of goods between Europe, Russia, the CIS countries and the Asia-Pacific region on the basis of end-to-end logistic technologies [Resolution 2008]. With regard to the transport industry, it is assumed that environmental standards, regulation of transport emissions, and the adoption of standards for corporate social responsibility of the carrier are taken into account. The participants in the logistics chain seek to cooperate with suppliers offering not only reliable but also environmentally friendly solutions [L. Simonova].

The economic benefits of security investments in supply chain development should be designed at balancing the interests of the government in increasing security and the interest of the private sector in improving the efficiency of business processes within supply chains. Security of transport and logistics processes should be ensured in compliance with the principles of rationality, the optimal balance between income and expenses, as well as consistency. At the same time, an approach to ensuring security in the field of supply chain development allows Russian participants in the supply chain to penetrate international trade systems, and the firms can quickly ensure security throughout the supply chain. Thus, the balanced measures in the field of security of supply chains will reduce the risks of investors, after which there will be reason to expect an increase in investment.

Thus, the innovation process allows realizing the benefits of accelerated delivery, increase customer focus by meeting the growing needs of customers, as well as the growth of related industries. The development of supply chains directly depends on the structure and volume of investments. These indicators vary considerably and are largely due to the problems of the logistics industry in specific countries and their transport specificity. The main directions of development of investment activities in the field of logistics innovations are: enhancing public-private partnerships, the development of investment evaluation methodology for infrastructure and transport projects, the development of the regulatory framework of logistics innovations.

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