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CONFIGURATION OF LOGISTICS SUPPLY CHAINS IN OIL AND GAS INDUSTRY IN RUSSIA

Borisova Vera Viktorovna (a)*, Tasueva Tamila Suleymanovna (b),
Budyakov Andrey Nikolaevich (c)
*Corresponding author

(a) Saint-Petersburg State University of Economics, 21, Sadovaya Street, Saint-Petersburg, Russia,
verabrsv@yandex.ru

(b) Grozny State Oil Technical University named after Academician M.D. Millionshchikov, 100, Kh. Isaev Avenue,
Grozny, Russia, tamila7575@mail.ru

(c) Grozny State Oil Technical University named after Academician M.D. Millionshchikov, 100, Kh. Isaev Avenue,
Grozny, Russia, budyakov.an@gazprom-neft.ru

Abstract

The article studies the possibilities of the use of logistic tools in the design of modern distribution systems in oil and gas industry. The prospects of the adaption of the scientific and practical aspects of the supply chain management concept to current trends in the development of the Russian oil and gas industry are examined, and the prospects for their application in the framework of the Russian oil and gas company Gazprom Neft are evaluated. It is shown that there is a connection between the existing configuration forms of logistics flows due to the emergence of digital-type logistics systems. The new digital format of logistics systems is a combination of communication links between partners within the framework of platforms with diverse, overlapping and simultaneously coexisting equal elements. They had no analogues in the context of the internal heterogeneity, volume and complexity of the interconnections of elements in the previous experience in the creation of logistics systems. The priority in logistics activities is acceleration, mobility and flexibility of product distribution, the possibility of end-to-end management of the entire value chain and the monitoring of controlled performance indicators online. It is concluded that the configuration of logistics systems in oil and gas industry is aimed at the intensification of the integration interactions of partners in the supply chain. The hypothesis is confirmed that the stability of geographically fragmented elements of the links of the digital logistics system is limited by the strength of its weakest link.

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1. Introduction

In the theory and practice of logistics, standard forms of the creation of distribution schemes integrated by the logistics flow have already been developed. Among them, the most well-established are logistic ones: channels, chains, networks, webs. The creation of logistic organizational forms of goods distribution of any level of complexity is associated with the concept of “configuration”. This term is used to identify the spatial location of logistics facilities in the socio-economic environment. It characterizes the structure and form of the organization of logistics flows (Afanasenko & Borisova, 2013). The article considers the topological (geometric) forms of logistics flows in oil and gas industry of Russia, the possibilities of rationalizing the location of objects within the logistics system and the nature of the interaction between them. The features of the application of the supply chain management system in oil and gas industry of Russia are revealed. The examples of the integration of business processes in the supply chain of enterprises in oil and gas industry are given. The proposals on the introduction of the institute of system logistic integrators in the activities of enterprises of oil and gas industry in Russia are formulated. It is noted that, despite the interest of specialists in the concept of Supply Chain Management (SCM), the issues related to the adaptation of this concept to the Russian oil and gas industry have still not been fully studied. This state of affairs determines the relevance of the study of this problem and purpose – the development of scientific and practical recommendations on the configuration and management of the supply chain in oil and gas industry.

2. Problem Statement

In our study, we proceed from the fact that the concept of logistics and supply chain management has already been formed expressing a unified methodological concept aimed at the study of the flow-based form of organization and management of economic matter within the framework of logistics systems of different complexity levels (channel, chain, network, etc.). The sequence of bifurcation points that form the configuration of the supply system and the shape of logistic flow determine the properties that they must correspond to: optimality, flexibility, maneuverability, progressiveness, stability. These properties do not equally express themselves in different organizational forms. As a rule, the emphasis is placed on the structural stability of the weakest link in the system. Since this property determines the level of balance and integration of system elements, providing focus on strong structural elements and implementing the principle of proportional development of the system.

The scientific community has developed the understanding of the need to justify new concepts of sustainability of logistic organizational forms and their methodological base, which allow developing theories of dynamic chaos and flexible managerial influences on logistics systems (Afanasenko & Borisova, 2013; Smirnova, 2014).

Understanding the instability, unpredictability of the behavior of logistics system is based on the theory of dynamic chaos. There are systems in which unstable points are almost ubiquitous. For example, developed turbulence, a bubbling stream that draws the system into the unknown (Borisova, 2019). Synergetics offers a toolkit for the description of such systems, the methodology of which is based on the principles of self-organization, self-disorganization and self-management of complex systems.

This methodological approach is already used in logistics practice during the design of highly complex systems.

The philosophical concept of levels using the ratio of lower and higher is applicable to the flow form of the organization of economic matter. During the configuration of logistics supply systems in oil and gas industry, it is advisable to take into account a number of provisions of this concept: the shape of the logistics flow and its content form a unity in difference. The more complex the content of the stream, the more complex it is reflected (Afanasenko & Borisova, 2019).

The increasing complexity of the organization of logistics flows is characteristic of modern oil and gas market, and the reformatting of the substantive state of flows is reasoned by the trends of economic globalization. The transition from linear logistic ties to the unification of chains and the construction of highly complex structures, gave rise to the phenomenon of “system of systems”. In such systems, during the creation of consumer value, the desire of its participants to use the consolidated assets and competencies of all partners to implement a customer-oriented approach is applied. In logistics systems, a joint information base of scientific and technical data (knowledge) is being formed, a common resource base is being created, centers for developing human resources are united, including standards for labor protection and safety, a common environmental and resource-saving policy is being developed (Bowersox & Kloss, 2010). The main component of the system is the information stream (digital stream). In the digital environment, we are dealing with the constant generation, transformation and disappearance of information flows that create conditions of instability of logistics system. The enhancement of such a property of the system as ergodicity occurs when at the macro level its stability increases with the instability of elements at the micro level. Our studies show that modern logistics systems are chaotic, unpredictable and entropic at the micro level, but quite predictable and manageable at the macro level.

3. Research Questions

Oil and gas industry of Russia plays a leading role in its economy. It is called the strategic outpost of the state: it is both the basis for ensuring the stability of the country and the basis for the development of its economy. Gas and oil complexes are closely related to other sectors of economy. The commodity pattern of national and international trade includes gas and oil products. Fossils are significantly ahead of other export and import items. Russia's commercial energy balance largely depends on oil and natural gas production. In terms of oil reserves, Russia is second only to 5 states and about a third of all world natural gas reserves are in Russia. A significant part of natural resources is concentrated in the eastern part of the country (84 %). This fact actualizes the problems of the formation and development of modern transport and logistics infrastructure. Oil is transported by a network of oil pipelines, and gas supply combines compressor units, gas pipelines, gas storages and its fields.

The development of the Russian oil and gas industry is significantly influenced by new Supply Chain Management (SCM) models that incorporate digital economy tools such as artificial intelligence, industrial Internet, robotics, Big data, etc. The digital transformation of oil and gas industry includes projects, aimed at the increase of labor productivity and efficiency: “Intelligent deposits”, “Smart contracts and technological efficiency”, “Maintenance and repair of labor pipelines”, “Robotization of business processes”, etc. (Borisova, 2019).

The assessment of the development prospects of the Russian oil and gas industry indicates the need for the development of logistic integration of business partners. Global practice shows that logistic integration expands the scope of managerial activity in the supply chain to the level of the product life cycle and created customer value. Cooperation and collaboration of participants in consumer value chain create additional requirements for logistics management.

The motivation for the development of strong integration ties in the supply chain is to increase the overall competitiveness of collaborative partners at the following stages: search and exploration, production and processing, sales and marketing. Regardless of the aggregation or disaggregation of logistics functions, it is obvious that participants in the supply chain seek to maximize their efforts to integrate the management of logistics flows at all the stages of distribution. Management of logistics flows occurs throughout the organizational and technological chain from exploration, production, to the supply of petroleum products and gas to consumers in order to satisfy consumers in the optimization of costs. The efforts of logistics management should be aimed at the creation of additional value for consumers. That is, logistics operations are justified only to the extent that they contribute to the increase in use value.

The management of the supply chain includes the following: production logistics, which is responsible for the deployment and optimization of production and technological cycle; procurement logistics, solving the problems of interaction with suppliers and coordinating the logistics of production schedule; sales logistics, providing optimization of distribution channels and distribution schemes. Functional areas of logistics include operations-activities: transportation, warehousing, inventory management.

Nowadays, the supply logistics of oil and gas companies is centralized, integrating applications from geographically fragmented enterprises. The logistics management of oil and gas industry is making efforts to robotize supply processes that optimize costs in this functionality. The analysis of logistics costs in supply functionality showed the presence in supply practice of a multitude of irrational transactions and the accompanying transaction costs in the interaction with suppliers, documents processing and organization of tenders.

Significant reserves of savings are also in the functionality of sales logistics. In order to mobilize them, it is necessary to intensify the cross-functional integration of logistics and marketing, apply modern technologies for the design of distribution channels and transportation. One of the most expensive assets in consumer value chain is stocks. The share of stocks of material resources, progressing and finished products reaches about 40 % in invested capital. The costs of oil and gas enterprises due to stocks lead to the immobilization of financial resources and generate additional costs for the maintenance of storage facilities. Therefore, the adoption of optimal decisions in stock logistics requires taking into account a number of factors of a system-wide nature and a compromise between the local interests of participants in supply chain.

4. Purpose of the Study

The practical significance of the study is determined by the targeted orientation of proposals for the rationalization of commodity distribution schemes and introduction of the concept of supply chain

management in the activities of Russian oil and gas companies. Along with this, researchers pay attention to the need to solve problems caused by the loss of oil and oil products along the entire path of their movement (Shcherbanin, 2016). Logistic tools allow full control over all parts of the supply chain to minimize losses of oil and gas resources.

The toolkit of information and digital logistics is becoming relevant. A new embodiment of digital stream is observed, as a bunch of information in cloud forms. According to expert assessments, the cloud industry market is growing so fast that it is difficult to predict the pace of its development.

The analysts of Canalis note an intensive growth in the market of services used for cloud infrastructure. According to their reports, in 2018 its growth amounted to more than 45 % and reached \$ 80 billion. Among the largest providers of services for cloud infrastructure, there are: Amazon – a market share of 34 %; Microsoft – 15 %; Google – 7 %; IBM – 7 %; Alibaba- 5 % (Tasueva & Borodin, 2019).

5. Research Methods

With the increasing cost of transactions in oil and gas industry, the role of financial logistics is increasing. The unity of material information and service flows indicates integration processes within the economic flow itself. The parameters of the financial flow significantly affect the speed, intensity, flexibility and maneuverability of economic flow as a whole.

The advantages of logistics integration are reinforced by well-established information technologies and models. Among them we distinguish: SCM – Supply-chain management; MRP – Materials resource planning; DRP – Distribution requirement planning; ERP – Enterprise resource planning (planning and distribution of resources in production, distribution and an integrated management system); QR – Quick Response Code (coding and quick response system); JIT – Just-in-Time and JIS-Just-in Sequence (“just-in-time” and “just in a certain sequence” delivery systems); DTD – Door-to-Door (door-to-door delivery); ECR – Effective customer response (effective response to customer requests); VMI – Vendor Management Inventory (supplier inventory management system), etc.” (Borisova, Taymashanov, & Tasueva, 2019).

The instrumental capabilities of these technologies are expanding in the digital economy. The main assistants in the operational and high-quality processing of great arrays of information are cloud technologies and artificial intelligence. The use of these technologies opens up significant opportunities for the reduction of capital and secondary costs associated with the transformation of information flows, increases the intensity and traffic flow of logistics channels; increases the transparency and flexibility of the entire system.

Cloud infrastructure deals with an enormous amount of constantly changing information and the role of “Big data” and tools for processing structured and unstructured data from various independent sources (www.tadviser.ru/index.php/) are growing. At the same time, the share of unstructured data is constantly increasing, which, since 2014, exceeds the amount of data in a structured form. According to expert assessments, by 2025, humanity will generate 163 zettabytes, or 163 trillion gigabytes of data, including duplication. That is, the volume of data is growing rapidly, which requires their adequate structure in the framework of the logistics system (Tasueva & Borodin, 2019).

6. Findings

The results of scientific research consist in the improvement of scientific and methodological approaches to the design of integrated supply chain management systems in the Russian oil and gas industry.

Oil and gas industry of Russia in the context of digital transformations implements the following tasks: rational consumption of existing mineral reserves, expanded use of the raw material base of oil and gas industry, development of energy-saving structure, rational transportation and conservation of resources, maximum use of all useful components in oil and gas processing, the construction of new mining centers. A comprehensive solution to these problems is facilitated by logistic integration and the introduction of a supply chain management concept in oil and gas industry (Shcherbanin, 2016).

At the moment, oil and gas industry of Russia is a powerful conglomerate that spreads its influence not only in the state, but also far beyond its borders. However even being a fairly developed structure, oil and gas industry of Russia requires development and investment. Recently, the market has undergone significant changes: the capacity of mining has grown, companies have adapted to the ever-changing technology of oil and gas processing and the quality of the original products has become higher. All the producers of oil and gas industry have advanced significantly in the production of equipment due to the ever-growing demands of consumers. All these factors led to positive changes in the Russian oil and gas industry.

“Oil and gas industry is connected with the global supply chain, including national and international delivery, warehouse management and inventory management, processing of raw materials, import-export relations and information relations. That is, a supplier / shipper and oil and gas company are closely interconnected, from the moment of placing the order until the date of its unloading and transfer to the deck of offshore drilling rigs or production facilities. In this regard, the role of key (strategic) suppliers is increasing. Strategic delivery brings together suppliers who constantly demonstrate good ability in the process of fulfilling a contract (order) in order to achieve a better position in the market. Therefore, one way to improve the supply chain is to select reliable suppliers as a strategic partner”.

Strategic delivery involves not only the implementation of the principles of “just-in-time” and “just in a certain sequence”, but also comprehensive work to comply with international standards, including the implementation of environmental measures. For example, oil and gas company Gazprom Neft operates on the basis of “international standard ISO 50001, which controls the processes of systemic energy efficiency management. The company has formed an integrated energy management system in accordance with the requirements of the standard. The introduction of modern production management tools gives Gazprom Neft the opportunity to use effectively the best world and national practices of the management of the consumption of fuel and energy resources. The company plays a significant role in the development of the territories of its presence, being a major taxpayer and employer.

Gazprom Neft has adopted the Hometown social investment program aimed at the development of urban environment and social infrastructure of the territories of operation. The costs of the implementation of the Hometowns program in 2016 amounted to 4.1 billion rubles. A responsible attitude to the environment is Gazprom Neft's strategic priority. The company is aware of the responsibility to

society, objectively evaluates and seeks to minimize environmental risks and increases investments in environmental programs. The investment of the company in environmental protection amounted to about 6 billion rubles (GazpromNeft, 2018).

7. Conclusion

The main trends in the development of logistics integration in oil and gas industry are the focus of the supply chain participants on the optimization of time and material costs. To conclude with, we note that the development trends of logistics integration in oil and gas industry in Russia are characterized by the expansion of the range of measures aimed at the cooperation of partners within the supply chain and increase of confidence in the implementation of strategic decisions. Logistic integration is associated with the complication of the configuration of commodity flows in supply system, which increases flexibility and expands the possibilities of the combinations of cooperation between partners. The development of logistics integration in oil and gas industry will allow participants in the supply chain to standardize diverse business processes, structure partner relationships within these processes, develop standard metrics to measure their effectiveness, integrate into the system in accordance with a given business strategy.

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