Optimization of maritime transportation based on marketing technologies

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Abstract. The paper deals with actual questions, related to development of maritime transport communications based on marketing approach. Usage of marketing tools (formation and adjustment of key expectations and needs for the target audience) enables more integrated approach to maritime transport operation and realization of it’s potential more systematically. The article presents expectations and needs of the key shipping route operators based on three-dimensional matrix (consumers-feature of needs-technology) ‘know how’ to cover needs), the most important factors development are analyzed with reference to local specific features to cover needs and preferences of shippers in highly competitive maritime transport market. On this basis, the author’s point of view on future perspectives of maritime transport communications development and it’s competitive growth is proposed. In order to attract operators’ attention to maritime route activities and fully involve it’s transport potential in economic turnover it’s necessary to create and develop of coastal infrastructure, the functioning of monitoring systems, and measures implementation to ensure navigation safety. The intensification of shipping and freight traffic growth will create effective maritime transport direction and stimulate business activity.

1 Introduction

The role and importance of transport in the development of modern society are great and significant, the growth of social production, increasing its efficiency largely depends on the quality of transport. Transport is an extensive and complex production system, the formation of which is determined primarily by the needs of the national economy, transport is a condition of production, moving various types of products between producers (suppliers) and consumers. Transport is the «circulatory system» of the economy and largely determines the socio-economic development of the country, accordingly, the problem of balanced development of transport becomes especially urgent.

The specificity of the development of the Russian transport system stems from the spatial integration of territory and water area, the presence of direct access to the seas, in connection with which the importance of maritime transport increases.

In the context of strategic and geopolitical Russia’s interest, complex and integrated
The importance transport artery is mainly attributable to economic needs and a crucial factor in ensuring the country’s economic security.

As the process of economic development expands and deepens, there is an increasing need for strategic analysis and foresight of maritime transportation development. A number of authors note: “at present there has been a transition to the principle of economic efficiency, which requires the creation of a modern cost-effective transport system with the possibility of constant growth of domestic and import-export freight transport.” [1].

This requires an analysis of the provision of maritime transport services aimed at improving the functioning and enhancing competitiveness, but the whole range of problems in today’s geopolitical environment and difficult economic situation requires complex, systemic and rational decisions.

2 Materials and method

It is becoming increasingly clear that the realization of the potential of maritime transport requires the application of modern technologies and management techniques based on a strategic vision of long- and medium-term objectives and perspectives, planning and coordination of the interaction of stakeholders in the maritime transport market. In this context, the application of a marketing approach to solving multi-level problems seems promising. This provides a clearer vision of the strategic directions of development, which makes it possible to build mutually beneficial relationships and to understand the capacities of the actors concerned, and understanding their capabilities and interests.

The main task of marketing is to attract and retain consumers by building a system of relationships based on multipurpose consumer value, satisfying the needs and requirements of target groups, which will allow carriers to provide services, which directly correlates with the clients needs.

The development and updating of the needs user groups and the development of proposals to meet them will create favourable prospects for increasing the use of maritime transport communication. Non-acceptance to take customer interests into account not only leads to a failure of consumer functions, but also misses the economic benefits that can generate a substantial income.

A three-dimensional matrix that takes into account three interrelated components is useful for studies of the needs and preferences of key actors in the marine highway: consumers – a function of needs (consumer needs) – a technology for covering needs (a set of consumer benefits). (see Fig. 1)

The application of a three-dimensional matrix makes it possible to determine the most significant characteristics of a maritime route to meet identified consumer needs. In this way, it is possible to better evaluate the process of demand creation, to give a clearer idea of the forecasting and planning of the rational use of resources, to identify the key causes of competition and to develop effective strategic solutions.
3 Results

1. Marine communication consumer enterprises producing, processing and transporting natural resources, mining and metallurgical and mining-chemical complex (mining of gold, non-ferrous and rare metals), oil and gas enterprises, as well as transportation of cargo «northern import» to northern Russian regions (about 15% of northern imports are shipped by sea and more than 85% by river).

Most of the goods transported are domestic cargoes, mostly export and short-sea cargoes. On the part of international carriers, the consignors may be European and Asian countries as shippers for transit transport. According to a number of authors China and India have a special role in the development of transit traffic. China has shown great interest in the use of the Northern Sea Transport and Communications Corridor and is pursuing an active policy aimed at ensuring a steady supply of energy.

2. A function of needs (analysis of the consumer needs of user groups) In the market for transport services in the sphere of consumer behaviour, the main requirements of shippers are to improve the reliability of supply chains, the main ones being the delivery of goods within a given period of time and the preservation of the cargo, as well as ways of organizing the interaction of all elements of logistics. Any even minor disruption in the transportation process increases costs. The needs function can be defined by describing the consumer value in the context of supply chain security. Identification of the needs and preferences of the north shipping routes user groups that are of great importance is presented in Figure 2.
Fig. 2. Needs and demand from user groups:

- Delivery time / delivery of cargo within specified times
- Cost of services / operating costs of shipowners
- Tariffication, transit charges, insurance charges
- Procedure for responding to a request / authorization process / standards for the passage of vessels
- Time in transit / speed of a particular vessel
- Icebreaker services / icebreaker offers
- Level of port infrastructure services / handling
- Safety of navigation / full navigational and hydrographic support
- Establishment of coastal supply bases / list and quality of ship repair services
- Provide necessary route information

Demand is the consumer’s desire and ability to buy a product or service.
Table 1. Product (northern shipping services) features to meet the needs and requirements of users

<table>
<thead>
<tr>
<th>Product features</th>
<th>Constitutive elements and criteria product</th>
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<tr>
<td><strong>Environmental conditions</strong></td>
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<td></td>
<td> Extreme natural and climatic conditions (low temperatures, ice sheet parameter, ice direction and speed, wind force, icebergs, probability of storms, rapid glaciation) pose an increased risk to navigation, threats of ice compression and damage to ships due to difficult ice conditions, which can lead to downtime and additional insurance costs.</td>
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<td> Seasonal limitations of navigation: The season of navigation without icebreakers lasts only 3-4 months a year, in winter, a mandatory icebreaker escort is required.</td>
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<td> The spread (surface) of ice cover, ice movement characteristics, increased frequency of storms and speed of drift of ice fields of rose and speed of winds influence the speed of movement of vessels (± 5 knots in winter, 9-12 knots in summer and ± 15 knots [6], if open water is assumed), which results in longer voyages.</td>
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<td> As a result of the warming in recent years, the melting and discharge of ice masses from the glaciers of the Arctic Islands into the sea has increased, creating more icebergs in number and weight, increased storm (and wave) activity, high spatial and temporal variability of ice conditions and phenomena combined with the complexity of their reliable forecasting, resulting in an increased probability of sudden encounter with icebergs.</td>
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<td><strong>Geographical nature</strong></td>
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<td> Capacity limitations for large ships due to shallow depths on traditional routes near coasts where there is less ice. It is necessary to lay new high-latitude deep-water routes north of the Novosibirsk Islands, where the ice situation is difficult and therefore icebreaking is necessary.</td>
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<td> There may be a difference of up to 1,000 nautical miles along or away from the coast, resulting in increased cost of transport.</td>
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<td> Long polar night (the region lies beyond the Arctic Circle), distance from inhabited regions and, as a consequence, the complexity of navigational navigation and rescue operations in case of unforeseen situations.</td>
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<td><strong>Geopolitical and geo-economic relations</strong></td>
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<td><strong>State of the consumer market</strong></td>
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<td><strong>Status of port and transport infrastructure</strong></td>
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<tr>
<td><strong>Presence and condition of merchant and icebreaker fleets</strong></td>
<td> Ice-class vessels are necessary for the course, and the conformity of the vessel’s ice class is necessary for the vessel’s ability to withstand ice phenomena of both a water and atmospheric nature to ensure the safety of navigation and to maintain its operational and technical characteristics.</td>
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<td> In order to navigate in area, vessels require ice-breaking escorts because of the state of the ice situation and the characteristics of the ice sheet.</td>
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<td> To meet shippers’ needs, atomic, diesel-electric and multifunctional icebreakers are needed to ensure the passage of ship convoys and a full range of icebreaking services.</td>
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<td> At present there are not enough icebreakers, which can lead to a long wait for ice breakers, in addition, the Russian icebreaking fleet does not have the capacity to build a 60 metre-wide navigable canal for the passage of modern 70,000 tons of tankers and gas carriers. This reduces the profitability of commercial traffic.</td>
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4 Discussion

Institutional and economic environment

- Unstable shipping times due to heavy dependence on weather conditions, complex ice-breaking system and navigation component.
- Advance notice (3 months to 2 weeks) and of basic ship specifications, inspection by surveyors is required (inspectors of foreign classification societies for technical supervision of ships), environmental liability insurance.

Shipping costs

- Increase in transportation operating costs due to mandatory provision of ice-breaking and pilotage on routes, increase in premium rate.

Environmental restrictions

- Sensitivity of the natural environment to anthropogenic and man-made impacts (emissions, accidents and spills of hydrocarbons) that threaten the integrity of the natural environment (impacts on the atmosphere, the marine environment, flora and fauna) and human activities, which leads to increased requirements to ensure the environmental safety of navigation.

The presented analysis on the basis of a three-dimensional matrix diagnostic, which represents a set of interrelated and interdependent elements, it can be said to have several advantages for potential users of the north maritime transport communications:

- Reduced voyage time, resulting in savings in fuel and ship charter costs [7,8], reduced travel and fuel consumption has significant environmental impact due to reduced carbon dioxide emissions.

However, in addition to the advantages, there are a number of restrictions to navigation in this direction. Traffic on the northern routes has to deal with complex navigational issues that depend on natural conditions, first of all, the state of the ice and the characteristics of the ice sheet (cohesion, thickness, compression and other), in addition to the high-latitude circumpolar position of the Arctic, are leading to harsh natural and climatic conditions (low air temperatures, strong winds, frequent snowfalls, snowstorms, landscapes with solid and dense low clouds, fogs and a prolonged polar night) [9,10,11]. These circumstances complicate the work of water transport and present significant risks and costs compared to navigation in temperate latitudes.

The operating costs of shipowners are increased by the cost of icebreakers and pilotage. This is due to the fact that the conditions of navigation on the track require enormous material costs, which are associated with the establishment and maintenance of a complex system comprising a logistics base, ice-breakers, pilots, meteorology and many other types of support.

The features of the north seaway are that vessels with an ice class are allowed to sail, which is the main safety requirement, and the routing of non-net vessels requires the mandatory escort of an icebreaker, designed to ensure that vessels can navigate under ice conditions. Ice-swimming tactics are based on the use of a leading traditional icebreaker, laying a channel in ice for caravanized navigation of ships. Accordingly, sufficient numbers of icebreakers are required to meet the needs of users.

The operation of the north maritime transport communications is directly dependent on the ice-breaking fleet to ensure the transhipment of ships. In fact, it is the ice-breaker fleet that makes it possible to assess current opportunities and prospects for the growth of freight traffic.

An important factor in improving the level of maritime transport services by meeting the needs of a modern shipper is the balance of all components of the maritime transport system — the condition of shore bases and seaports along the route, navigation and hydrographic and hydrometeorological services, and the availability of communication infrastructure systems.

The Russian authorities have recently taken a number of steps: work has been completed on the establishment of four Arctic emergency rescue team sites, and transhipment terminals are being reconstructed and established, Tankers and dry cargo vessels of ice plan and universal nuclear-powered icebreakers.

However, there is a lack of functioning infrastructure and search and rescue assets that impede rapid response to emergencies. It should be added that...
there are operational limitations for large- tonnage ships due to too small sections along the north shipping routes and insufficient numbers of deep-sea ports for high-tonnage vessels. There is also a lack of ports equipped with container terminals that could serve as high-efficiency transhipment and logistics centers.

The next, and not least, is the ecological vulnerability of the region, the need to preserve ecological balance, which makes transportation highly risky. The protection of the marine environment from pollution plays a very important role in transport, and there are many examples to illustrate this. Incidents involving pollution of the marine environment as a result of insufficient careful design of the projects, attract close attention of the world public (accident of the tanker «Exxon Valdis» in Alaska, accident of the tanker «Exxon Mobil» cost the parent company $5 billion.) and are liable to heavy fines, which can lead to large financial losses. [13,14].

Reducing the environmental load can be achieved through the application of appropriate equipment, innovative technologies, engineering methods and the application of preventive measures. It is impossible to eliminate the risk by remaining only within traditional engineering methods (since it is virtually impossible to make the technical risk zero), so it is necessary not to avoid the risk but to be able to analyze, assess and manage the risk. In order to reduce transport risks, in practice, a system of transport insurance that includes: vessel insurance, cargo insurance, carrier liability insurance.

Taking into account all these circumstances, according to the author, in order to meet the needs of user groups, it is necessary to form a structure of maritime activities based on ensuring the smooth and safe operation of the maritime route and its attractiveness will depend on the good condition of all of the maritime transport system.

5 Conclusion

To summarize the study, the author proceeds from the fact that in modern conditions modern integrated approaches should be used, based on strategic analysis and planning, achievements of transport logistics, proper assessment of production factors and, on a clear interaction between transport producers and consumers. Accordingly, in order to develop a transport system that meets consumer demand with modern requirements, it is necessary to:

- Restoration, development and maintenance of Arctic communications in infrastructure, logistics, pilotage, icebreakers and other support;
- Modernization of existing ports to accommodate large tonnage vessels of various modifications and to provide a full range of transport services;
- Establishment of service facilities along the whole route and the waters: new specialized terminals, with maximum automated handling of cargo, ports, logistics and communication centers;
- Adoption of measures to ensure navigational safety along the entire route;
- Innovation and expansion of the ice-breakers and merchant ships fleet;
- Modernization of the system for monitoring and forecasting the occurrence and development of dangerous geophysical, meteorological, hydrological, environmental events and processes;
- Implementation of safety of navigation measures, control and coordination of rescue operations.

In conclusion, summarizing the above, the objective of transport policy is to create a competitive transport system that satisfies demand reliably and efficiently.
communications system, and to develop a competitive transport and logistics system that is reliable and efficient in meeting demand, taking into account the requirements (economic, ecological, political and others).

References


4. V. A. Kryukov, One way is one master? Is a single operator of the Northern Sea Route necessary, ECO: All-Russian Economic j., 5, 5–17


