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COMPREHENSIVE ASSESSMENT OF THE MANAGEMENT AND EFFICIENCY OF A SHIPPING COMPANY

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Abstract

The article proposes a methodology for a comprehensive assessment of the management efficiency and fleet operation of a shipping company, based on the threefold concept of "Fleet Operation - Fleet Financial Results – Resource Use." A comprehensive indicator of the shipping company efficiency is presented in the form of a goal function that strives for the maximum. Technical, economic and financial indicators that allow identifying reserves for increasing the shipping company efficiency are selected in accordance with the threefold concept to assess the efficiency. The "Fleet Operation" group includes 3 indicators: the efficiency of using calendar time, operational readiness of the fleet, tonnage-day in operation. The "Resource Use" group involves 9 indicators: overall labor productivity, average crew retention rate, capital productivity, rate of detected violations during vetting inspections, rate of detected violations during PSC inspections, incident frequency rate, average daily costs of the fleet operation, average hourly consumption fuel in the fleet, average hourly oil consumption in the fleet. The "Fleet Financial Results" group comprises 3 indicators: time charter equivalent, return on sales and operating profit per vessel. Fifteen private indicators are related by the goal function of the efficiency and weight coefficients computed by the ranking method. The system of private indicators is as close as possible to the procedure for recording fleet results of Russian shipping companies. The methodology is tested using data from a Russian shipping company. The given methodology allows revealing problem areas in the fleet management, developing and implementing optimization measures based on the obtained data.

Keywords: Management, shipping company, fleet management, fleet efficiency, assessment of efficiency

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1. Introduction

The maritime transport industry is a significant constituent of the country's economy as a whole. Its crucial element is shipping companies, which successful functioning depends on the state of the maritime transport industry. In turn, shipping companies are interested in high efficiency of their activities. The activity results of domestic shipping companies are influenced by a large number of factors that reduce profitability and increase costs due to the business specifics, high competition in the industry and historically low industry-average profitability.

One of these factors is constantly changing market conditions. It can be expressed both in the appearance of unplanned cargo flows, and in the refusal of cooperation of the vessel company-charterers after the cooperation agreement. In the first case, it is required to promptly resolve the issue of attracting an additional number of the fleet when supplementary cargo flows appear; in the second case - to strengthen the industry position, the image and reputation of the company. Poor predictability of changes in market conditions and the large impact of the actions of large ship owners on the level of freight rates negatively affect all indicators of efficiency.

2. Problem Statement

Under current conditions, shipping companies must provide a high level of customer satisfaction. This can be achieved by building internal business processes at a high quality level and its continuous improvement. Flexibility with customers and their needs is of great significance.

It should be noted that the specificity of tanker transportation of oil and oil products lies in the presence of particular barriers to entering markets with the participation of leading oil companies united within the framework of OCIMF (Oil Companies International Marine Forum). Compliance with OCIMF recommendations is a prerequisite for the company existence in the global tanker market.

The following conditions are required for successful work: high quality indicators of the vessel and fleet; absence of significant incidents and negative feedback from terminals and contractors; absence of essential remarks identified during the periodic inspections of the vessel, carried out due to the OCIMF standards; absence of substantial remarks identified in the course of the company periodic audits, namely, the manager of the vessel by the client; absence of crucial deficiencies revealed by classification societies.

In view of the above circumstances, shipping companies are forced to regularly take measures in order to neutralize the given factors and increase their efficiency. A precise fleet management system is needed for successful operation of a shipping company in the market. The issues of improving the efficiency and management of the shipping companies' fleet acquire special relevance.

3. Research Questions

A comprehensive assessment of the efficiency of fleet management and operation is a characteristic comprising the comprehensive study result of the aggregate of shipping company indicators. It is carried out with the aim of identifying problem areas in fleet management and revealing areas for optimizing shipping company activities.

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The works of scientists in the field of organizing management processes in maritime transport were studied when building a system of private indicators (Limonov, 2009; Lintsova, 2010; Prokofiev, 2017; Vinnikov, 2001). More modern methodological approaches to solving the issues of managing a shipping company and a fleet are contained in the works of such scientists as Zachesov (2017), Kitov (2017), Kapitanov (2017). Various approaches to a comprehensive assessment of the enterprises efficiency are considered in the scientific works of scientists (Gilyarovskaya et al., 2006; Grass, 2018; Makarova, 2015; Tonkikh, 2005; Vasilyeva, 2017).

The issues of a holistic system for assessing the efficiency of the operation and management of the shipping company fleet remain unsolved. Despite the fact that recently a large amount of educational and periodical literature has been published on the problem under consideration. Unfortunately, most of the literature is outdated and does not correspond to the contemporary reporting system of domestic shipping companies. Moreover, the lack of a generally accepted methodology for assessing the shipping company efficiency is the basis for further improvement of methods, technologies and estimation tools.

4. Purpose of the Study

The purpose of the paper is to develop a methodology for a comprehensive assessment of the efficiency of management and operation of the shipping company fleet, as well as to test its calculation according to the shipping company data.

5. Research Methods

Research methods are systemic and comparative analysis, analysis of cause-and-effect relationships, observation, comparison and grouping, as well as inductive and deductive methods of scientific knowledge.

6. Findings

Having studied the general approaches to assessing the efficiency and practical experience of shipping companies, the authors propose to analyze the system of the operation and management efficiency of the fleet in a shipping company based on the threefold concept of “Fleet Operation - Fleet Financial Results – Resource Use” (Figure 01).

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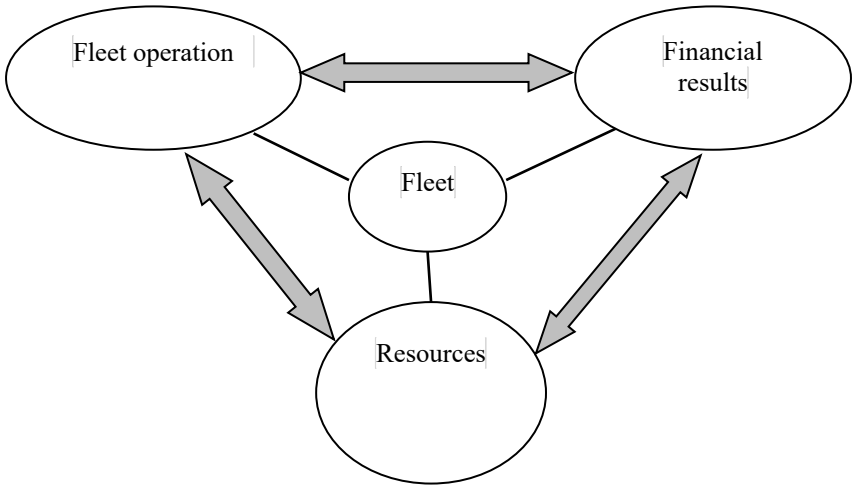

Figure 1. Scheme for assessing the operation and management efficiency of the fleet in a shipping company based on the threefold concept of "Fleet Operation - Fleet Financial Results – Resource Use"

The efficiency of a shipping company in the field of fleet management can be represented as a goal function of a number of private indicators determining the level and dynamics of the generalized efficiency indicator in accordance with the threefold concept of "Fleet Operation - Fleet Financial Results – Resource Use." The goal function of efficiency should strive for maximum in order to achieve the enterprise aims:

$$f_{ef}(x_{ij}) \rightarrow max, \quad (1)$$

where xij – private efficiency indicator.

Technical and economic indicators that allow revealing reserves for increasing the shipping company efficiency were selected in accordance with the threefold concept to assess the efficiency:

x_1 – efficient use of calendar time (%);

x_2 – fleet operational readiness (%);

x_3 – tonnage-day in operation (thous. tons);

x_4 – overall labor productivity (thous. rub/person);

x_5 – average retention rate of the vessel's crew, which is proposed to be calculated as the arithmetic mean of the three retention rates - senior command personnel, puisne command personnel and rank and file personnel (%);

x_6 – capital productivity (rub.);

x_7 – frequency rate of detected violations during vetting inspections (SIRE Vetting Rate);

x_8 – frequency rate of detected violations during PSC inspections (PSC Observations Rate);

x_9 – frequency rate of incidents (Incident Rate);

x_{10} – average daily costs of the fleet operation (thous. $/day);

x_{11} – average hourly consumption fuel in the fleet (l/h);

x_{12} – average hourly oil consumption in the fleet (l/h);

x_{13} – time charter equivalent (rub/day);

x_{14} – return on sales (%);

x_{15} – operating profit per vessel (thous. rub/unit).

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Most of the indicators are relative, since they allow obtaining an objective and informative picture of changes in efficiency indicators. The given system of assessing indicators is as close as possible to the existing procedure for recording the results of the fleet operation in domestic shipping companies. The first three indicators make it possible to assess the efficiency of the fleet's operational activities, the next nine indicators - the efficiency of used resources during the vessel operation, the last three indicators - the efficiency of financial and economic activities of the fleet and the shipping company (Figure 02).

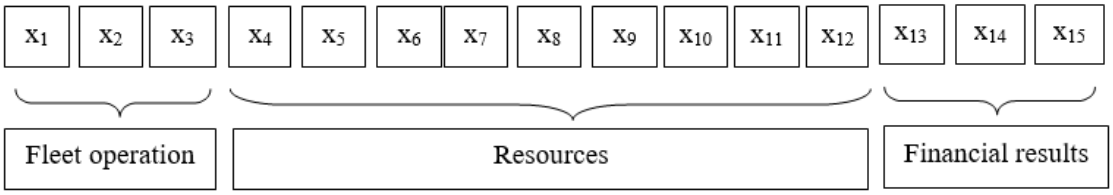

Figure 2. System of indicators for a comprehensive assessment of the operation and management efficiency of the fleet in a shipping company

Since every efficiency indicator of a shipping company differs in nature, one of the methods of complex comparative assessment should be applied to form them into a goal function, for example, the sum-of-place method. The method includes preliminary ranking of all studied objects according to individual indicators. A specific value of the *i-th* indicator *xij* corresponds to each object, which is an indicator of its place among others. The table of points is compiled on the basis of the matrix, and then the specific value of the generalized assessment is computed by the weight coefficients according to the formula (Vasilyeva, 2017):

$$R = \sum_{i=1}^{n} w_{ij} \cdot x_{ij}, i = 1,2,3 \ldots . n \quad (2)$$

where xij – actual values of the *i-th* indicator at the *j-th* object;

wij – weight coefficient of the *i-th* indicator.

Thus, the goal function of the efficiency of a shipping company and fleet management takes on the following form:

$$f_{ef}(x_{ij}) = \sum_{i=1}^{n} w_{ij} \cdot x_{ij} \rightarrow max \quad (3)$$

The results of calculating this function can be presented in the form of a graph if the comparison is carried out over several years.

It is advisable to apply the ranking method to calculate the weight coefficients. Its advantage is computational simplicity. The backbone of the method is that a group of n experts, specialists in the field under study, speaks out about the significance of m private indicators. The most important indicator corresponds to the rank m, the next - (m - 1), etc. A rank equal to 1 has the least important indicator. The expert survey outcomes are summarized in a table of a particular form, the last line is filled in with the sum of ranks set by the experts. Weight coefficients are determined by the formula (Makarova, 2015):

$$w_j = \frac{r_j}{\sum_{i=1}^{n} r_{ij}}, \quad (4)$$

where rj – ranks of indicators;

$\sum_{i=1}^{n} r_{ij}$ – sum of the points given by all experts.

Determination of the indicator ranks is carried out in accordance with Table 01.

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Table 1. Determination of the indicator ranks in the ranking method

Expert	Indicators			
	x_1	x_2	…	x_m
1	r_{11}	r_{12}	…	r_{1m}
2	r_{21}	r_{22}	…	r_{2m}
…	…	…	…	…
N	r_{n1}	r_{n2}	…	r_{nm}
$r_j = \sum_{i=1}^{n} r_{ij}$	r_1	r_2	…	r_m

Assessments for each of the 15 private indicators of the shipping company efficiency are set by 5 experts in the range from 1 to 15 points in order to compute weight coefficients. The highest point is assigned to the indicator with the highest value, the lowest - to the indicator of little significance due to the expert's opinion. Thus, every expert distributes 120 points between the indicators. The leading specialists and experienced managers of the shipping company should act as experts. Table 02 presents a conditional example of the distribution of points between the selected indicators and the calculation of the significance weight in the efficiency integral indicator.

Table 2. Weight coefficients of the operation and management efficiency of the fleet in a shipping company determined by the ranking method

Indicators	Experts					Sum of points assigned to every indicator	Indicator weight
	1	2	3	4	5		
x_1	5	3	3	4	3	18	0,030
x_2	11	12	8	8	10	49	0,082
x_3	4	4	4	5	4	21	0,035
x_4	10	9	9	9	8	45	0,075
x_5	7	8	10	10	9	44	0,073
x_6	9	10	11	12	11	53	0,088
x_7	6	6	7	6	6	31	0,052
x_8	1	1	1	2	2	7	0,012
x_9	2	2	2	1	1	8	0,013
x_{10}	13	13	12	14	13	65	0,108
x_{11}	8	7	6	7	7	35	0,058
x_{12}	3	5	5	3	5	21	0,035
x_{13}	12	11	13	11	12	59	0,098
x_{14}	14	15	15	13	14	71	0,118
x_{15}	15	14	14	15	15	73	0,122
Total	120	120	120	120	120	600	1,000

The goal function of the operation and management efficiency of the fleet in a shipping company is the result of conducted calculations:

$$f_{ef}(x_{ij}) = 0{,}030x_1 + 0{,}082x_2 + 0{,}035x_3 + 0{,}075x_4 + 0{,}073x_5 + 0{,}088x_6 + 0{,}052x_7 + 0{,}012x_8 + 0{,}013x_9 + 0{,}108x_{10} + 0{,}058x_{11} + 0{,}035x_{12} + 0{,}098x_{13} + 0{,}118x_{14} + 0{,}122x_{15} \rightarrow max \quad (5)$$

Approbation of the methodology is carried out by the shipping company data of PJSC "Novoship" in Table 03.

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Table 3. Comprehensive assessment of the operation and management efficiency of the fleet in "Novoship" Group for 2018-2020

Indicator	Indicator values			Value x_{ij} (assigned points)			Weight coefficients w_{ij}	$\sum_{i=1}^{n} w_{ij} \cdot x_{ij}$		
	2018	2019	2020	2018	2019	2020		2018	2019	2020
Efficient use of calendar time, % (x_1)	97,7	97,5	96,8	3	2	1	0,030	0,090	0,060	0,030
Fleet operational readiness, % (x_2)	99,63	99,76	99,58	2	3	1	0,082	0,163	0,245	0,082
Tonnage-day in operation, thous. tons (x_3)	1655051	1533355	1417997	3	2	1	0,035	0,105	0,070	0,035
Overall labor productivity, thous. rub/person (x_4)	11949	14125	17635	1	2	3	0,075	0,075	0,150	0,225
Average retention rate of the vessel's crew (x_5)	96,3	91,3	94,7	3	1	2	0,073	0,220	0,073	0,147
Capital productivity, rub. (x_6)	0,18	0,16	0,19	2	1	3	0,088	0,177	0,088	0,265
Frequency rate of detected violations during vetting inspections (x_7)	2,37	2,56	2,58	3	2	1	0,052	0,155	0,103	0,052
Frequency rate of detected violations during PSC inspections (x_8)	0,3	0,47	0,62	3	2	1	0,012	0,035	0,023	0,012
Frequency rate of incidents (x_9)	0,19	0,3	0,26	3	1	2	0,013	0,040	0,013	0,027
Average daily costs of the fleet operation, thous. $/day. ($x_{10}$)	7,8	7,3	7,4	1	3	2	0,108	0,108	0,325	0,217
Average hourly consumption fuel in the fleet, l/h (x_{11})	2,05	2,02	1,9	1	2	3	0,058	0,058	0,117	0,175
Average hourly oil consumption in the fleet, l/h (x_{12})	11,93	11,84	10,56	1	2	3	0,035	0,035	0,070	0,105
Time charter equivalent, rub/day (x_{13})	805346	767469	1044465	2	1	3	0,098	0,197	0,098	0,295
Return on sales, % (x_{14})	26,6	22,1	35,8	2	1	3	0,118	0,237	0,118	0,355
Operating profit per vessel, thous. rub/unit (x_{15})	125299	109802	200889	2	1	3	0,122	0,243	0,122	0,365
Total	-	-	-	-	-	-	1,000	1,168	1,152	1,090

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Since the growth trend is not positive for all efficiency indicators, the assignment of points is performed in the following order: the best indicator value for a three-year period - 3 points, an average indicator value for a three-year period - 2 points, the worst indicator value for a three-year period - 1 point.

The goal function values of the shipping company efficiency and fleet management of "Novoship" Group are:

– in 2018: $f_{ef}(x_{ij}) = 1{,}168$;

– in 2019: $f_{ef}(x_{ij}) = 1{,}152$;

– in 2020: $f_{ef}(x_{ij}) = 1{,}090$.

The calculation shows that the maximum value of the goal function reaches 1.168 in 2018, then a decrease in the efficiency of operation and fleet management of "Novoship" Group occurs in the next two periods. The corresponding indicators are 1.152 in 2019 and 1.090 in 2020, that is, minimization of the goal function takes place, while maximization is a condition for increasing the shipping company efficiency.

The calculation results for the individual constituents of the given goal function of the efficiency should be presented in the form of a graph (Figure 03).

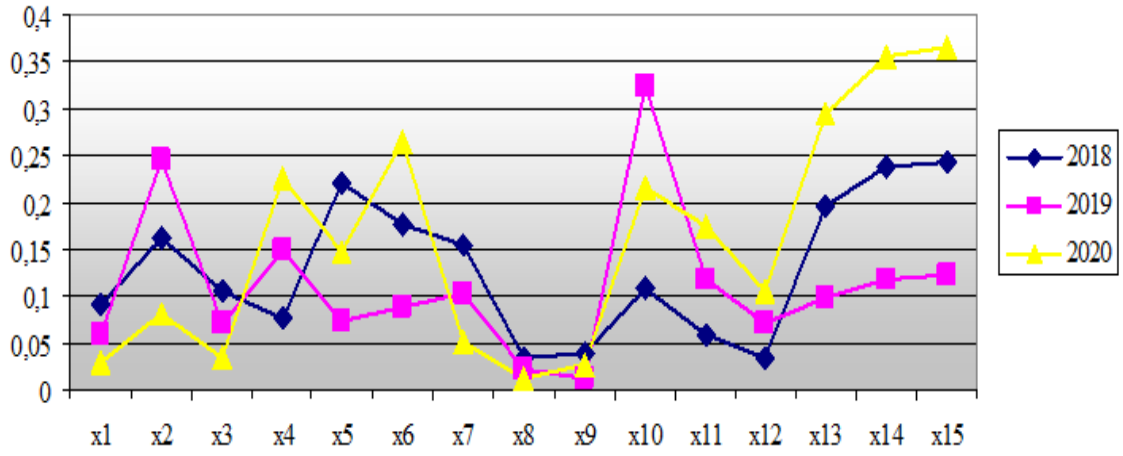

Figure 3. Changes in private indicators of the assessment of the operation and management efficiency of the fleet in "Novoship" Group for 2018-2020

In 2020, the following indicators are the least: efficient use of calendar time (x_1); fleet operational readiness (x_2); tonnage-day in operation (x_3); frequency rate of detected violations during vetting inspections (x_7); frequency rate of detected violations during PSC inspections (x_8). These are problem areas in the fleet management of the "Novoship" Group shipping company, which require optimization measures.

The system of proposed measures to improve the efficiency of operation and fleet management of the "Novoship" Group, considering the identified problem areas, provides for three main directions:

1. Enhancement of calendar and operational time application of vessels and unplanned losses reduction.

2. Increase in technical performance indicators of vessels and fleet production capacity.

3. Improvement of control over the technical condition of vessels and professional skills of ship crews.

The most relevant activities are proposed for each of the optimization areas.

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Enhancement of calendar and operational time application of vessels and unplanned losses reduction can be implemented through the following activities:

- optimization of voyage planning and fleet management;
- analysis and optimization of individual transport operations;
- optimization of a suitable vessel choice for the voyage;
- continuous accounting of operational information regarding tracking conditions;
- reduction of repair time.
- Increase in technical performance indicators of vessels and fleet production capacity is possible through:
- optimization of the vessel repair management and docking;
- maintaining a certain number of vessels in operation;
- entry into operation of new vessels;
- automation of information collection and its processing on the executed movement of vessels;
- expansion of the fleet.
- Improvement of control over the technical condition of vessels and professional skills of ship crews is carried out through the through the implementation of the following activities:
- decrease in the average age of vessels and gradual renewal of the fleet;
- innovative fleet development;
- development of staff skills;
- work in the field of technical and energy safety of navigation, implementation of effective control tools;
- modernization of vessel equipment.

Consider the proposed improvement measures of the operation and management efficiency of the fleet in “Novoship” Group.

Optimization of voyage planning and fleet management is necessary to ensure longer service life and high operational readiness of the “Novoship” Group vessels. It is achieved through the following measures (Kitov, 2017):

1. Implementation of systems for operational collection of information to coordinate and control the actions of the vessel crew. There are many systems that allow determining the position of vessels in space based on automatic identification systems (AIS), but coverage areas do not extend to all regions of navigation.

2. Automation of safety management systems (SMS), which are often overwhelmed by a large amount of paperwork in a tanker shipping company, which does not allow vessel crews to pay sufficient attention to issues of navigation and commercial work.

3. Implementation of programs and systems for complex automation of transportation operational management (the bulk of corporate systems are aimed at fixing completed voyages and monitoring money transfers). The composition of such a system should include input and output data that meets modern market conditions, namely, business planning. Input data, in addition to operational data, should include (Zachesov, 2017):

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- correspondence of freight flows, including contractual and operational (tramp) flows, which are predicted by navigation periods or accounted in an operative mode, depending on the planning tasks to be solved;
- fleet information, including technical data on the vessels of each project, as well as individual characteristics of every vessel (specialization in cargo, condition of the hull, engine and propeller, cost parameters);
- characteristics of waterways, divided into elementary sections with the same navigation conditions (path depth, speed losses and gains, etc.);
- wages fund by type of vessels, standards for all types of additional payments and deductions, standards for payment of foreign currency instead of money for business trips abroad;
- predicted or updated data on the price of fuel and lubricants by region of navigation and foreign ports;
- rates of port and canal dues, fees for the passage of inland waterways;
- rates of the vessel insurance, other fees, taxes and payments attributed to the cost;
- cost of scheduled repair and some other data.
- Output data of various plans should contain information intended for the application by both the leadership of the shipping company and managers and performers in structural units.

In recent years, cyber planning systems have been gaining ground. An example of a cybernetic scheme of shipping management is the implementation of machine programs for optimization of plans and calculations by individual companies in their ASIS. Foremost, this applies to stable operating large shipping companies that use cognitive systems for business management: SHIPNET, F-MIS, and DANAOS. Less known company BESTIKON LLC is in the same row. The cybernetic systems of the given companies belong to the highest level of the hierarchy and are built on the principle of ERM/P-systems, which provide planning and management of all enterprise resources. However, the means of optimizing management decisions in the above and other systems of maritime business are not applied to the management of production activities, but to related tasks, such as technical management of vessel operations, maintenance and repair of vessels, chartering, investment management, etc. (Prokofiev, 2017).

It is advisable to analyze supplementary services in the “Novoship” Group in order to optimize individual transport operations. For instance, what will contribute to an increase in the share of the productive part of the operational period when voyaging vessels.

The next issue requiring attention is the selection of a suitable vessel when planning a voyage. Consideration should be given to the suitability of a particular type of the vessel for the transportation of a certain cargo. In this matter, it is recommended to follow the relevant regulatory documents adjusting the transportation of cargo by water transport, and take into account the fleet age characteristics, which does not allow ships to be sent on certain voyages for safety reasons or due to the lack of charterers consent or port authorities for cargo processing of the vessel. It is advisable to assess the possibilities of fulfilling the signed contracts for transportation, planned economic indicators for the fleet use and the absence of technical problems associated with the fleet state. Lack of automation of the indicated processes can lead to errors (Kitov, 2017).

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Continuous accounting of operative information related to tracking conditions contributes towards reducing unplanned losses of operating time. Such information can be obtained from the websites of the Inland Waterway Basin Administrations. However, the prompt receipt of all the required information on this part is impossible without systems for transmitting information in real time and automated systems for collecting, processing and analyzing information.

The implementation of the following measures is significant to reduce the time for vessel repairs and optimize the management of repairs and docking of vessels in a shipping company:

- optimization of work plans and control of repairs production;
- requirement from the shipyards to apply appropriate technological solutions for each individual project;
- increasing the accuracy of the vessel assessment when it is put on a ship repair enterprise;
- presence of a surveyor's opinion on the vessel technical condition and its mechanisms, the absence of hidden defects, which are difficult to determine in operation, but must be planned according to the class requirements;
- high-quality preparation of repair lists, calculated tenders, considering all open defects of the vessel.

Another direction in the development of the operational management practice of the fleet work is the automation of the information collection and its processing on the executed movement of vessels. The relevance of this direction is due to the rich nature of the management personnel work. Previously, it was possible to plan the processes associated with the repair, fleet entry into operation, the implementation of voyages in the presence of specific cargo flows for the shipping company fleet before the start of navigation. Currently, planning issues must be resolved at the stage of operational planning and regulation in real time.

It is essential to implement comprehensive measures to improve control over the technical condition of vessels and professional skills of vessel crews in order to improve the coefficients characterizing the frequency of violations detected during vetting inspections and PSC inspections, as well as to reduce the incident rates in the "Novoship" Group.

Besides, it is indispensable to consider the availability of an appropriate list of the required documents, and the list of such documents, for example, date of sailing, is of great significance. If any member of the vessel (mainly the command staff) does not have the required document, then there will be a need to quickly resolve this issue. For instance, it is possible to take a specialist on board who has necessary documents.

Gradual renewal of the "Novoship" Group's fleet is a priority measure to reduce the average age of vessels. It is carried out by decommissioning old vessels and building new ones that meet all contemporary requirements.

It is advisable to carry out innovative development of the "Novoship" Group's fleet by participating in projects initiated by PJSC "Sovcomflot" aimed at meeting future convention requirements, and optimizing shipping costs.

Interaction with maritime universities and training centers is a considerable measure for the development of personnel skills: the employees of the shipping company participate in training and consulting programs, in the state attestation commission at final exams and defense of diplomas; captains

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and mechanics-instructors consult the teaching staff. Moreover, holding seminars to improve the safety culture of maritime transport is an essential measure in this area: Safety Culture improvement seminars - for captains and senior officers; Safety Culture improvement seminars - for the rank and file.

The following measures for the vessel equipment modernization of the "Novoship" Group are of primary importance: installation and commissioning of modern ballast water treatment systems (BWTS); replacement of low-quality radio navigation equipment. More than 68% of failures are attributed to JRC equipment, 16% from FURUNO, 10% from Kelvin Hughes and 6% from Sperry, according to company data. Therefore, it is required to optimize the composition of radio navigation equipment and modernize the fleet, excluding manufacturers with low-quality indicators, primarily, JRC.

Work in the field of technical and energy safety of shipping (Fuel Efficiency & Energy Savings) is of great concern for the "Novoship" Group. The existing software of the shipping company - AMOS and its DDR I and DDR II modules - does not provide enough tools in the field of reliable organization of energy retention and efficient use of fuel. Therefore, it is necessary to introduce additional tools for monitoring and analyzing work, in particular, SHIP PERFORMANCE REPORT. It is expedient to introduce KSP (Kyma Ship Performance, 2021) systems on A-class vessels. It is a system for measuring the performance of the marine fleet, the data of which allows ship owners to determine the precise fuel consumption and the amount of possible emissions to the environment. Another innovation in energy efficiency in shipping is Jotun's Hull Performance Solutions, based on modern technologies of the vessel hull coating (System Hull Performance Solutions, 2021).

7. Conclusion

The given methodology for assessing the efficiency of operation and fleet management in a shipping company is adapted to modern conditions and corresponds to the specifics of accounting in domestic shipping companies. The calculated integral indicator of efficiency allows conducting comparative assessment of the efficiency of operation and fleet management with the previous periods' data. The practical significance lies in the fact that the proposed recommendations can be used in Russian shipping companies when assessing the efficiency of their work and fleet management, reveal problem areas, and develop and implement optimization measures on the basis of the obtained data.

References

Gilyarovskaya, L. T., Lysenko, D. V., & Endovitskii, D. A. (2006). *Kompleksnyi ekonomicheskii analiz khozyaistvennoi deyatel'nosti* [Complex economic analysis of economic activity]. Velbi Publ.

Grass, E. Yu. (2018). Complex assessment of the efficiency of the use of production resources of an enterprise based on the use of the method of reference dynamics of indicators. *Management issues, 3*(52), 155-161.

Kapitanov, V. P. (2017). *Business processes in a shipping company and the management process*. Odessa. https://sworld.com.ua/files/content_kongr/bpskpu.pdf

Kitov, A. G. (2017). Problems of operational management and planning of the fleet in modern shipping companies. *Transport business in Russia, 3,* 86-87.

Kyma Ship Performance. (2021). https://kyma.no/ship-performance/

Limonov, E. L. (2009). *Foreign trade operations of sea transport and multimodal transportation.* Module.

Lintsova, Yu. A. (2010). *Managing the work of the fleet.* Novorossiysk.

Makarova, I. L. (2015). Analysis of methods for determining weight coefficients in the integral indicator of public health. *International scientific journal "Symbol of Science", 7,* 87-94.

Prokofiev, V. A. (2017). Substantiation of the application of the cognitive approach to the management of maritime navigation. *Bulletin of the State University of Marine and River Fleet named after Admiral S.O. Makarov, 9*(3), 516-523.

System Hull Performance Solutions. (2021). https://www.jotun.com/

Tonkikh, A. S. (2005). Formation of the reference dynamics of development as a basis for identifying weaknesses in the financial activity of an enterprise. *Finance and Credit,* 21(189), 46-54.

Vasilyeva, L. (2017). Analysis of methodological approaches to the construction of integral economic indicators. *Economic research and development, 12,* 8-18. http://edrj.ru/wp-content/uploads/2017/12/Vasilyeva -L.V.pdf

Vinnikov, V. V. (2001). *Economics of the enterprise of sea transport (economics of sea transportation):* A textbook for universities of water transport. Latstar.

Zachesov, V. P. (2017). Current and operational planning of the fleet in market conditions. *Transport business in Russia, 1,* 143-144.