

# *Priority directions of development of enterprises of the shipbuilding complex of the Astrakhan region as a potential to improve the competitiveness of the region*

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**Abstract** — Astrakhan region is a strategically important territory in the South of Russia, being one of the most dynamically developing in economic terms region. The development of a competitive shipbuilding complex in the Astrakhan region will improve the competitiveness and economic stability of Russia and implement major investment and innovative projects to create high-tech shipbuilding products, to ensure the production of new competitive products in the military and civil shipbuilding. The choice of priority directions of development of the shipbuilding complex of the Astrakhan region presented in the article is based on the presence of the enterprises of the accumulated experience, the corresponding production capacities, shipbuilding technologies, opportunities for expansion of production areas. The implementation of these areas will increase the competitiveness of the shipbuilding complex, the development of shipbuilding enterprises, increase production, expansion of the range of products, which will inevitably contribute to the strengthening of competitive positions, both in the region and the country as a whole.

**Keywords** — market segments, offshore shipbuilding, civil shipbuilding, inland water transport, fishing fleet

## I. INTRODUCTION

For Russia, the presence in the strategically important region of the Caspian Sea is associated with the presence of significant industrial potential in shipbuilding and ship repair. The primary role in this positioning belongs to the Astrakhan region, which has a huge potential in shipbuilding, ship repair,

technical operation of the fleet, training for the fleet, in comparison with other Caspian states. At the present stage of economic development, the shipbuilding enterprises of the Astrakhan region are positioned as a developed, technologically advanced complex capable of performing large-scale projects of the Russian and international level due to the long-term increase in production capacity, accumulation of shipbuilding technologies, accumulated experience, expansion of production facilities.

In the context of global challenges for the development of the Russian shipbuilding industry, the task of reorientation to the production of civil shipbuilding is set, which allows to realize the potential of the shipbuilding industry with maximum efficiency. That is why the leading shipbuilding companies of the Astrakhan region need to build their development exclusively on competitive areas of activity, provided with cost-effective support conditions to improve competitiveness, not only through the deep modernization of existing production facilities, but also the creation of fundamentally new high-tech facilities.

## II. MATERIALS AND METHODS (MODEL)

The basis of the study was the concepts, approaches, methods presented by domestic and foreign scientists and economists in the field of the theory of formation and implementation of cluster policy, the theory of network and integrated organizations, the creation and functioning of integrated business groups in the market.

The legal framework of the study was made up of legislative, regulatory and legal acts of the President, the Government of the Russian Federation, as well as the authorities and management of the Astrakhan region.

The information and empirical basis of the study is the data of the Federal State Statistics Service, programs and strategies for the development of the shipbuilding industry of the Russian Federation, socio-economic development of the Russian Federation and the Astrakhan region, the development of the shipbuilding cluster of the Astrakhan region, and other materials.

### III. RESULTS AND DISCUSSION

#### A. Monitoring of the development of enterprises of the shipbuilding complex of the Astrakhan region

Currently, shipbuilding and ship repair enterprises of the Astrakhan region in mechanical engineering occupy about 70%, in the long term, the share of shipbuilding in the GRP of the region is projected to 10-15%. In 2018, the index of industrial production for the entire list of enterprises of the Astrakhan region reached 116.2% (table I) [1].

TABLE I. DYNAMICS OF THE INDEX OF INDUSTRIAL PRODUCTION

| Indicators  | Years |       |       |       |
|---|-------|-------|-------|-------|
|   | 2015  | 2016  | 2017  | 2018  |
| On all list of the enterprises of the Astrakhan region, % | 109.6 | 108.6 | 137.2 | 116.2 |
| in mining mineral resource                                | 117.3 | 117.9 | 165.5 | 122.5 |
| in the production of electricity, gas and water           | 102.6 | 100.5 | 97.5  | 98.2  |
| in processing industries                                  | 98.9  | 104.3 | 99.9  | 99.9  |
| in the production of vehicles and equipment               | 130.6 | 113.4 | 117.1 | 107.4 |

Despite the unstable dynamics of the index of industrial production in the manufacturing industry, and its decline in 2018 to 99.9%, in the production of vehicles and equipment there was an increase to 107.4%, compared to the same period last year. The main volume of production for this type of economic activity is produced by shipbuilding enterprises.

This dynamics of growth is provided by the active implementation of shipbuilding projects for the construction of offshore facilities, as part of the development of the field. Filanovsky, which allowed the industry in 2012 to reach a new level of development [1].

The shipbuilding complex of the Astrakhan region is represented by 10 enterprises, including: JSC "Astrakhan Shipbuilding Production Association» (ASPO), JSC "Shipyard "LOTOS", JSC "Shipbuilding and Ship Repair Yard named after III International», JSC "Akhtubinsky Shipyard", LLC "Galaktika-M", LLC "Marine Shipyard - 2", Astrakhan Ship Repair Plant - branch of JSC CS "Zvezdochka", JSC "Volga-Caspian Shipyard", JSC "Pervomaisky Ship Repair yard", JSC "SSP named after Lenin".

These are large and medium-sized enterprises capable of building ships for various purposes, perform ship repair work

in the dock or on the slipway on ships weighing up to 6 thousand tons.

The shipbuilding industry of Russia receives significant state support. For the Astrakhan region, this has found its expression in the arrival in the region of JSC "United Shipbuilding Corporation" (JSC "USC"), in the revitalization and support of the formation of a shipbuilding cluster in the region, in the creation of a special economic zone (SEZ), in the placement of state orders, the implementation of financial schemes for investing shipbuilding projects, which involve state structures [2].

In the field of civil shipbuilding of the society, the USC Group in 2017 transferred a total of 11 civil facilities with a total displacement of 41293 tons with a total cost of 33897.8 million rubles, according to table 2 [3], [4].

TABLE II. PRODUCTS OF CIVIL SHIPBUILDING COMPANIES OF THE GROUP OF USC IN 2017

| Type of product                         | Number of units |
|---|-----------------|
| Multifunctional ice-class supply vessel | 1               |
| Ice class support vessel                | 2               |
| Cargo pontoon 7514                      | 1               |
| Oil tanker RST27M                       | 3               |
| Oil tanker RST27                        | 1               |
| Chemical tanker RST27                   | 2               |
| Launch complex LSP-1F                   | 1               |

The enterprises of the Astrakhan region included in JSC «USC» and their activities are reflected in table 3 [5].

TABLE III. THE MAIN SUBSIDIARIES OF OSK IN THE ASTRAKHAN REGION

| Enterprise  | Type of activity  |
|---|---|
| JSC "Shipyard "LOTOS"   | construction of ships, vessels and marine equipment   |
| JSC "ASPO"  | construction of ships, vessels and marine equipment, repair of underwater and surface ships and vessels, supply and installation of ship structures, equipment and engineering products                               |
| JSC "ASPO" site No. 3 (JSC "Shipbuilding and Ship Repair Yard named after III International") | construction of ships, vessels and marine equipment, repair of underwater and surface ships and vessels, supply and installation of ship structures, equipment and engineering products                               |
| JSC "CS "Zvezdochka" - branch "Astrakhan shipyard"  | construction of ships, vessels and marine equipment, repair of underwater and surface ships and vessels, service and warranty service, supply and installation of ship structures, equipment and engineering products |
| JSC "YCSSL"   | corporate center  |

The main orders completed by the enterprises in 2017 and delivered to the customers are reflected in table 4 [5].

**TABLE IV. REALISED PROJECTS IN 2017**

| Name of the company                              | Implemented project   |
|--|---|
| JSC "Shipyard "LOTOS"                            | - construction of two passenger cruise paddle-wheel ships, project PCS 180 "Golden ring";<br>- construction of a multi-purpose dry cargo vessel of the RSD49 project;   |
| JSC "ASPO"                                       | - construction of cargo pontoon 7514 completed;<br>- delivered to the customer the support base of the block conductor for the Yu. Korchagin field;<br>- the ice-resistant fixed platform (LSP-1) for the V. Filanovsky field is handed over.   |
| JSC "CS "Zvezdochka" branch "Astrakhan shipyard" | - construction of rescue and towing vessels of project 22870;<br>- signed the act of acceptance of the rescue and towing vessel of the project 22870 "SB-739";<br>- signed the consolidated act of acceptance to the state contract on repair of a rocket ship "Stupinets";<br>- the consolidated act of acceptance to the State contract on repair of the rocket boat "Tatarstan" is signed. |

Production indicators of the enterprises of the Astrakhan region included in the USC for 2017 are shown in table 5 [4].

**TABLE V. THE NUMBER OF SHIPS BUILT BY ENTERPRISES OF THE ASTRAKHAN REGION, MEMBERS OF JSC «USC» IN 2017**

| Product  | Type of activity                                    | Number, ed. |
|----------|---|-------------|
| Military | Construction of ships, vessels and marine equipment | 1           |
|          | Service and warranty service                        | 75          |
| Civil    | Construction of ships, vessels and marine equipment | 3           |

The order book for 2018 of the enterprises of the Astrakhan region is reflected in table 6 [5].

**TABLE VI. THE ORDER BOOK FOR 2018**

| Enterprise  | Object of construction   |
|---|--|
| JSC "CS "Zvezdochka"- branch "Astrakhan shipyard" | Military products<br>- construction of a rescue and towing ships of project 22870;<br>- construction of a Harbor tugs project 7056 m.      |
|   | Civil production<br>- construction of two chemical tankers of the RST 25 project;<br>- construction of dry cargo vessel of RSD 49 project. |
| JSC "Shipyard "LOTOS"                             |  |

As part of the development of the shipbuilding cluster in the region, steps are being taken to establish close cooperation with design, educational and scientific structures aimed at the arrival of the latest technologies in the shipbuilding industry of the Astrakhan region. Relationships with design organizations, first of all, such as JSC "Astramarin", CMT "Shelf" and LLC "Caspian Engineering Bureau", having engineering and scientific capabilities of design of vessels, drilling platforms, equipment, support of design works, maintenance of scientific and technical documentation are strengthened [2].

Since the 2000s, the shipbuilding industry in Astrakhan has been implementing a process of technological modernization aimed at upgrading production facilities and bringing them up to world standards. Production capacities of the shipbuilding industry of the Astrakhan region have a large amount of resources, meet the requirements of the modern market for the construction of ships for various purposes. The inter-plant cooperation operating in the industry allows enterprises to fulfill orders for the construction of ships of various purposes in a short time, in accordance with the requirements of international standards.

In the world market of shipbuilding Russia in General, and Astrakhan region in particular, inevitably under pressure from competitors who surpass our enterprises in a number of indicators – the price, terms of construction of vessels, quality of the offered production, modern technologies.

The rise in the cost of Russian shipbuilding orders is influenced by:

- insufficient loading of shipyards, simple production facilities, the need for their maintenance;
- low productivity in shipbuilding;
- not the effectiveness of state financial, tax, credit mechanisms of regulation of the shipbuilding industry;
- the need to purchase imported equipment to equip ships and bring them to readiness, which carries a burden of taxation and customs duties in addition to the price;
- long term construction of ships, which leads to a rise in the cost of borrowed money.

It should also be noted the obsolescence of technological solutions, depreciation of fixed assets, the lack of specialization of the regions on the implementation of certain shipbuilding orders, the general decline in the qualification of engineering, design, management personnel in shipbuilding and other factors that also negatively affect the cost of construction of Russian shipbuilding [7], [8].

Astrakhan shipbuilding industry is not an exception to the all-Russian picture. All the negative factors affecting pricing in the Russian shipbuilding industry are fully present in the application to Astrakhan enterprises. This is primarily due to the fact that most pricing factors in shipbuilding are regulated at the state level.

#### *B. Research of prospects of development in the civil shipbuilding market*

In the Russian market, some stability was provided by state orders, the volume of which has not changed – military vessels, icebreakers, research, specialized vessels. However, most of the orders are for dedicated Russian shipbuilding centers. This market will grow in the long term, but it can be severely limited by the arrival of large multinational companies. Several world leaders have already announced such intentions. For the Astrakhan region, this segment of the large orders market is limited to the territory of the Caspian Sea, so it is necessary to find new market niches with minimal market risks.

According to the state Program of the Russian Federation "Development of shipbuilding for 2013 - 2030" the main perspective direction of development of the Russian shipbuilding, including the Astrakhan region, is the internal market of civil shipbuilding in which foreign competitors occupy rather low shares [6].

In general, foreign shipbuilders are not interested in the domestic water transport segment, so the Astrakhan shipbuilding cluster has obvious advantages in the absence of competition. The high level of serial construction, the availability of standard solutions will reduce costs, through the introduction of effective technologies in construction and the organization of effective inter-plant cooperation for the manufacture of spare parts and components [7].

The most promising segment for the development of shipbuilding enterprises in Astrakhan is the implementation of large projects ordered by the fuel and energy complex related to the development of offshore oil fields in the Caspian Sea.

Astrakhan shipbuilding enterprises have already gained experience of participation in offshore shipbuilding as part of the construction of facilities for the development of V. Filanovsky and Yu. Korchagin oilfields. The potential load in the segment of offshore shipbuilding for Astrakhan enterprises can be provided by the further implementation of the program for the integrated development of the Caspian shelf of PJSC LUKOIL, which includes the following facilities, presented in table 7 [9], [10].

TABLE VII. THE NORTH CASPIAN SEA FIELD'S INFRASTRUCTURE, COMPANY "LUKOIL"

| Name of construction objects       | Year of commissioning |
|------------------------------------|-----------------------|
| the V. Filanovsky field            |                       |
| Drilling column (3 complex)        | 2019                  |
| the field "170 km"                 |                       |
| Ice-resistant fixed platform       | 2021                  |
| Living platform                    | 2021                  |
| the Rakushechnoe field             |                       |
| Ice-resistant fixed platform No. 1 | 2024                  |
| Ice-resistant fixed platform No. 2 | 2024                  |
| Drilling column № 1                | 2024                  |
| Drilling column № 2                | 2024                  |
| Drilling column № 3                | 2024                  |

In addition, Astrakhan shipbuilders in the future can participate in the construction of special vessels to perform marine operations for the construction of facilities for the development of the V. Filanovsky field, the approximate number of which is presented in table 8 [10].

TABLE VIII. THE FIELD CONSTRUCTION FACILITIES THEY. V. FILANOVSKY

| Name of technical means      | Number, pcs |
|------------------------------|-------------|
| AHTS, type "Svetly"          | 3           |
| AHTS, type "Tsarevsky"       | 2           |
| Tugboat, type "OT-2400"      | 3           |
| Seagoing tug, type "MB-1400" | 1           |
| TMB, type "Yuri Kuvykin"     | 1           |
| TB, project 16801            | 2           |
| Diving vessel                | 1           |
| Vessels "Rosmorport"         | 2           |

Thus, the potential demand for shipbuilding enterprises of the Astrakhan region is formed by industrial, mining, fuel and energy, oil companies engaged in the development of the Caspian shelf, interested in the production of offshore shipbuilding.

Among other segments of the civil shipbuilding of the Astrakhan region can be called the construction of inland navigation vessels of various types and purposes – bulk carriers, tankers, vessels of the auxiliary fleet.

Realization and development of potential of the enterprises of the shipbuilding complex of the Astrakhan region on advance of production and in other markets of Russia is perspective. The presence of high wear and tear (80%) on the fishing fleet of the subjects of the Russian Federation expands the niche for the construction of fishing vessels and ship repair works.

Experts of the Ministry of Industry and Trade of the Russian Federation predict that the objective market demand for fishing vessels for the period up to 2030 includes large and medium-sized vessels for various purposes (180 units) and small vessels (220 units), the total cost of which is more than 170 billion rubles. [6].

Russian shipbuilding organizations can almost completely satisfy the domestic demand for medium and small vessels, and for large ocean-going vessels up to 90% (table 9) [11].

TABLE IX. PROMISING SEGMENTS OF THE RUSSIAN SHIPBUILDING MARKET

| Types of vessels                     | Number, pcs | The complexity of construction, thousand man-hour |
|--------------------------------------|-------------|---|
| Fishery                              | 334         | 83950   |
| Sea and river transport              | 792         | 147330  |
| Icebreakers                          | 14          | 64500   |
| Floating nuclear power plant         | 7           | 17000   |
| Development of the continental shelf | 121         | 330720  |
| Subtotal                             | 1268        | 660615  |

The ratio of the volume of demand and supply of vessels for the fishing fleet of the Russian Federation for 2017-2030 is given in table 10 [11].

TABLE X. THE RATIO OF THE VOLUME OF SUPPLY AND DEMAND OF VESSELS IN THE FISHING FLEET OF THE RUSSIAN FEDERATION, YEARS 2017-2030

| Types of vessels                | Number of vessels, pcs |                    |  |                                |
|---------------------------------|------------------------|--------------------|--|--------------------------------|
|                                 | General need           | Proposal JSC "USC" | Shipbuilding cluster of Astrakhan region |                                |
|                                 |                        |                    | Total                                    | including JSC Shipyard "LOTOS" |
| Large-capacity (more than 65 m) | 89                     | 50                 | -  | -                              |
| Medium-tonnage (30-60 m)        | 140                    | 130                | 18                                       | 18                             |
| Low-tonnage (up to 30 m)        | 133                    | 26                 | 42                                       | 26                             |
| Total                           | 362                    | 206                | 68                                       | 44                             |

Domestic shipbuilding enterprises do not actually build large and medium-sized fishing vessels, small vessels are built only in very small quantities. The most critical situation is to meet the demand in the small-tonnage fishing fleet, which is widely used in coastal fishing, the bulk of which is represented by ships that have exhausted their resources, built in the Soviet period.

To meet the need of domestic enterprises for low-tonnage vessels of all classes, currently the shipbuilding industry can fully, and for medium-tonnage transport vessels only partially, due to the lack of existing capacity. According to the assessment of experts, it is possible to build 3-4 large-tonnage vessels or 6-8 medium-tonnage vessels at two shipyards of JSC «USC» in a year, in addition, 9-12 medium-tonnage vessels can be built at three shipyards of this Corporation, in accordance with table 11 [12].

TABLE XI. THE POTENTIAL FOR THE CONSTRUCTION OF FISHING VESSELS OF JSC «USC»

| Enterprise                | Types of vessels   |
|---------------------------|--|
| PSZ "Yantar"              | large fishing vessels – 2 units or medium vessels – 3-4 units per year       |
| Vyborg Shipyard           | large fishing vessels – 2 units or medium vessels – 3-4 units per year       |
| Khabarovsk Shipyard       | medium or small fishing vessels - 3-4 units per year                         |
| Shipyard "LOTOS"          | medium or small fishing vessels - 3-4 units per year                         |
| CS "Zvezdochka"           | medium or small fishing vessels - 3-4 units per year                         |
| Arctech Helsinki Shipyard | large fishing vessels – 2 units in cooperation with Vyborg Shipyard per year |

As an additional incentive for the construction of modern fishing vessels, domestic enterprises served as the decisions adopted in October 2015 at the State Council of the Russian Federation, according to which the enterprises ordering the vessel at Russian shipyards will be allocated additional quotas [13].

The Corporation of JSC «USC» has done a lot of work, selecting the most attractive options of vessels, in order to unify them. The list of proposed options was presented to the Federal Agency for Fishery and considered in an expanded meeting with fishing companies. According to the results of the review, pre-contract work was carried out, which made it possible to conclude the first contracts for the construction of fishing vessels in 2016.

The Federal Agency for Fishery has developed a mechanism to stimulate the placement of orders for the construction of fishing vessels at domestic shipbuilding enterprises, the basis of which is to provide financial support for the construction of medium-sized and small-tonnage vessels of the fishing fleet, using quotas for investment purposes. This mechanism complements the set of measures included in the legal acts of the Government of the Russian Federation on the distribution of investment quotas [14].

Taking into account the procedure of reception and selection of applications serial construction could begin in late 2019 – early 2020, the Volume of construction for the Azov-

black sea basin, estimated to be 30 to 35 ships of several dimensions, to the Caspian Sea in 5-7 vessels. According to the forecast, the volume of investments within 5 years can reach 10 billion rubles [14].

#### IV. CONCLUSION

Further implementation of measures of state support of the Russian shipbuilding, development of SEZs in the Astrakhan region, strengthening of cooperation and cooperation within the shipbuilding cluster will help Astrakhan shipbuilding enterprises to strengthen competitive positions in the country and the Caspian basin.

The implementation of the above-mentioned directions of development will lead to an increase in the investment attractiveness of the region, its competitiveness, and as a result, to the use of Astrakhan shipbuilding enterprises as the main production sites, both for the construction of facilities for the construction of oil and gas fields of the Caspian Sea, and for the renovation of cargo, fishing and passenger fleets of Russia and the Caspian states.

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