

Forming the management strategy for production capacities of the Russian iron and steel works

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The state and development of ferrous metallurgy largely determines the level of industrial development, which makes this industry strategically important for the country's economy in a whole. In order to improve the efficiency of the functioning of iron and steel works, it is necessary to work out the issue of managing their production capacities both at the state level and at the level of an individual enterprise. In 2014, the Government of the Russian Federation developed a strategy for the development of the Russian metallurgical complex and approved it with the help of a relevant regulatory document Order No. 839 of the Ministry of Industry and Trade of the Russian Federation. At the same time, implementation of this strategy at the level of iron and steel works has a number of unresolved issues that require scientific research and development. This article proposes an algorithm for developing a strategy for managing the production capacities of iron and steel works. The specified algorithm consists of several stages aimed on analyzing the factors of the external and internal environment, assessing the competitive position, coordinating with the overall strategy and linking with strategies in other functional areas of management, followed by a clear formulation and development of strategic alternatives. The final step in development of the strategy is to determine the mechanisms for its implementation and control over execution. The methods of analysis and synthesis, the principles of consistency and complexity make the theoretical and methodological basis of the study. The theoretical and practical significance of the study lies in the fact that a scientifically substantiated approach to development of the strategy for managing production capacities will allow Russian metallurgical enterprises to respond adequately to changes in the situation on the metal products market with simultaneous strengthening of their competitive positions.

Key words: iron and steel works, strategy, development, production capacities, algorithm, requirements, external environment, internal environment, competitive position, functional areas of management, strategic alternatives.

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Management of production capacities at metallurgical enterprises as the most important milestone at the state and plant levels

Metallurgy is one of the basic Russian industrial branches, it occupies the leading position at the global markets just behind China, Japan, USA and India [1]. Metallurgy has effect on development of the following industries: machine-building, shipbuilding, automotive industry, industrial building, as soon as it is a key supplier of initial materials for these industrial branches.

In order to rise efficiency of metallurgy, the Government of the Russian Federation developed a strategy of its development and approved it with the help of a relevant regulatory document Order No. 839 of the Ministry of Industry and Trade of the Russian Federation, dated May 5, 2014 and entitled “On approval of the development Strategy for the Russian iron and steel industry during 2014–2020 and prospectively until 2030 and the development Strategy for the Russian non-ferrous metallurgy during 2014–2020 and prospectively until 2030” [2]. The above-mentioned regulatory document includes analysis of this industry relating to the main metal products, determination of the main competitive advantages of the Russian metallurgy and its development tendencies, descrip-

tion of priority tasks and aims required for the Strategy implementation (Fig. 1). Especial attention is paid in the analyzed document to HR, financial and investing components of the Strategy, what is principally important to provide the principle of consistency in the process of its realization.

Solving of the above-formulated priority tasks of the Strategy for development of the Russian iron and steel industry (see Fig. 1) is planned via their consecutive realization at the level of separate metallurgical plants [3, 4]. Therefore, the following step should be presented by development of the strategy for development of metallurgical enterprises, which is connected with the general strategy (formulated at the state level).

At present time, the problem of corporate strategy development is partly worked out; however, it contains a number of methodical issues to be subjected to scientific research and examination. In particular, the problem of strategic managing on production capacities of metallurgical enterprises is not solved nowadays. Moreover, this strategy is apparently absent at the most Russian metallurgical works and sometimes is presented within strategic initiatives. It is clear in this case that just composition and structure of production capacities of the Russian metallurgical works will be principally important for assessment of their efficiency and competitiveness for the nearest prospect, on the



Fig. 1. Priority tasks for realization of the Strategy for the Russian iron and steel industry during 2014-2020 and prospectively until 2030

background of evident retard of the Russian industry in the international division of labour.

The problem of managing production capacities is rather actual in the foreign scientific researches [5-7]. This issue is even more actual for the Russian metallurgical works on the background of the crisis state of domestic machine-building. That fact allows to conclude about restricted possibilities of state intervention in the processes of modernization and maintenance of metallurgical equipment, because foreign companies are mostly manufacturers of this equipment. At present time domestic manufacture of machines and equipment is non-profitable, production capacities of the key Russian machine-building enterprises are physically worn and obsolete. It leads to outflow of investments aimed for simple and extended reproduction of capital assets of metallurgical works abroad within import of metallurgical equipment. The described processes additionally deteriorates the crisis state of domestic machine-building and leads to high dependence of development of the metallurgical complex on foreign suppliers of key equipment.

Thereby, managing the production capacities of metallurgical enterprises is a very important milestone both on the level of a state and a separate enterprise. It should be noted that development of the strategy for managing the production capacities at the level of an enterprise is characterized by a row of unsolved issues; their consideration is just the aim of the current research. Creation of the algorithm for development (forming) of the strategy for managing the production capacities of iron and steel works is the final aim of this research.

Methodical aspects of the strategy development for managing the production capacities of iron and steel works: the existing and suggested approaches

Analysis of scientific literature about the theme “Strategy of managing the production capacities” allowed to conclude that most of authors don’t formulate this determination apparently, but they try to explain it via the structural components or examples of partial strategies [8]. For further examination, we shall understand the strategy of managing the production capacities as previously planned reaction of an enterprise in relation to its

production capacities on variations of the external environment, which is directed on reaching the desired state from the point of view of the aims, tasks, mission and vision of this company.

The method of strategic alternatives can be used as the most widely distributed approach for forming the strategy of managing the production capacities at the iron and steel works [9]. In any cases this method is called as the pattern method. It means that possible variants of the company's strategic development, which were prepared via definite pattern, are collected within the framework of a metallurgical enterprise of a group of companies. Operation practice at domestic metallurgical works displays that implementation of this method can be realized using any moderators, such as consulting companies (e.g. Deloitte Consulting etc.). Such moderators unite different specialists of an enterprise in groups and formulate any aims and tasks for them, which are directed on development of strategic alternative from each group, with consequent its processing and efficiency analysis from the point of view of reaching the company's strategic aims. In most cases this work is organized as a brain storm with complete immersion of these groups in development of strategic alternatives. Then the obtained results (strategic alternatives) are collected together in one backlog of strategic alternatives and are analyzed by the leadership with participation of corresponding experts. Finally the obtained strategic alternatives are differentiated with their ranking and are assigned for execution taking into account the limit of financial budget. This approach is rather efficient, because it allows to solve the issues of strategic planning in creative mode and from different sides; however, it has its own deficiencies. In particular, the systematic features are absent, as soon as working groups during development of strategic alternatives very often don't assess adequately and completely prediction of possible variations in the external

environment and their influence on activity of the concrete metallurgical enterprise. They also can't completely realize the aims and vision of the company, its priorities and values. Adequate evaluation of self competitive position is rather complicated in this process and it needs separate tools and skills of an analytic. In addition, because a backlog of strategic alternatives is forming via their ranking with cutting off taking into account the limit of financial budget, it can be suggested that in any case they are absolutely independent processes, which are not connected with each other; however, it is contradiction with the principles of systematic approach.

In order to overcome these deficiencies of the method of strategic alternatives, it is proposed to add it by a row of other tools for strategic planning, such as analysis of the factors of external and internal environment, analysis of competition position etc. In other words, we suggest to reject self use of the method of strategic alternatives and to install it in the total development algorithm for managing strategy.

Let's consider the algorithm of forming the strategy for managing the production capacities with use of the method of strategic alternatives as one of the component of the above-mentioned algorithm (Fig. 2).

It can be seen from the Fig. 2 that analysis of the factors of the external and internal environment is suggested to be carried out during the first stage.

In order to analyze the external environment, it is necessary to analyze the factors that take place outside the enterprise and which can influence on the domestic (Russian) and global market of steel sales. These factors can be classified in the following directions [10]:

- overall economic development;
- technological development;

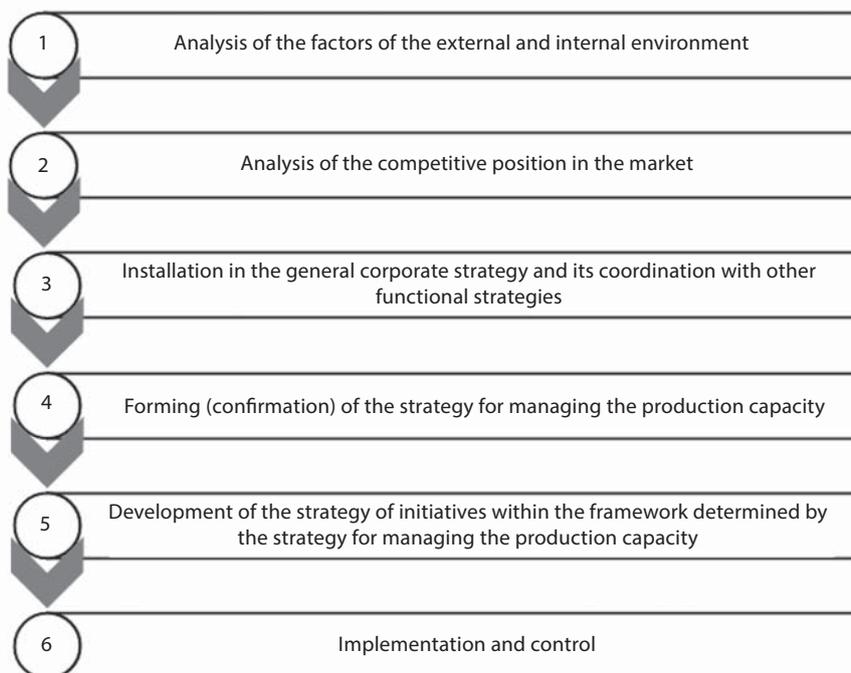


Fig. 2. Algorithm of forming the strategy for managing the production capacities

- legislative and policy environment;
- social and economic development.

Assessment of factors of the external environment applying to activity of the Russian metallurgical enterprises in enlarged scale is presented in the **Table**.

Analysis of the factors of the external environment, which are presented in the Table, allows to conclude about necessity of the milestone during development of the strategy for production capacities of an up-to-date metallurgical works, meaning orientation on manufacture of innovative steel grades with high level of added value, taking into account internal demand for metal products and increasing requirements for labour protection and cutting the emissions of CO₂ [16].

Internal analysis (analysis of internal encirclement factors) suggests evaluation of strong and weak parts of a metallurgical plant itself, as well as analysis of its possibilities and threats based on the results of external environment analysis. Within the framework of this analysis it is necessary to form the basic understanding of the strategy for managing the production capacities. The classic SWOT-analysis is an ideal tool for solving this problem.

Within the framework of the next stage it is necessary to carry out analysis of the competitive position of a metallurgical works in the market. Usually competitive advantage is reached due to market sales proposal of product which surmounts competitors by quality and/or by price. It is evident that strengthening of competitive positions of metallurgical enterprises follows consumer demand. Respectively, self resources and possibilities in the process of forming the strategy for managing the production capacities should be compared

with requirements of customers of metal products [12, 13]. Thereby analysis of competitive position is aimed on evaluation of coordination between production capacities at a metallurgical works and requirements of the key customers as well as possibilities of competitors for their satisfaction. The results of such analysis are important for taking the decisions on development of the existing production capacities. McKinsey/GE matrix [14] can be suggested as the basic tool for analysis of competitive positions “which allows to determine the methods for distribution the restricted resources between the enterprises of an industrial branch with use of criteria of industry attractiveness in general and potential possibilities of each processing unit in particular” [15]. It should be noted that mentioned analytical procedures are conducting after analysis of the internal and external environment.

Installation of the strategy for managing the production capacities in the general strategy of an enterprise development, with mandatory coordination with other functional strategies, is an important stage of development of this strategy. It is evident that strategic aim, which was formulated at the enterprise level in general, will have principal effect on content of the functional strategies, as soon as their main destination is to serve for reaching the general aim of the company.

Depending on the central strategic aim, there can be the following definitions of the strategy for managing the production capacities:

- increase of production capacities in order to maximize the effect of production scale (investments in the main capital are directed on rise of production volumes for conquering the market positions);

Assessment of factors of the external environment for development of the strategy for managing the production capacities of metallurgical works	
Factors of the external environment	Assessment of possible influence of the factors on production capacities of a metallurgical works
Overall economic development	<p>Analysis of the dynamics of global steel consumption and analysis of the final steel consumption per person allow to make a conclusion about lowering of steel consumption in the developed countries with simultaneous rise of its consumption in the developing countries [11]. The market of steel consumption for the developing countries is characterized by low paying capacity, what makes it less attractive for the Russian metallurgical companies.</p> <p>Similar tendencies are apparently written in the section “The main tendencies of development of ferrous metallurgy” in the Strategy of the development of the Russian iron and steel industry during 2014-2020 and prospectively until 2030.</p> <p>Demand from the paying-capable markets is forming for the innovative steel grades with high level of added value.</p> <p>The forecast of development of the Russian economy allows to expect high growth of the volumes in the domestic market of consumption of metal products, what testifies on expedience of getting production capacities oriented on the needs of national industry.</p>
Technological development	<p>Development of the new high-strength steel grades is carried out actively. For example, Magstrong (Magnitogorsk Iron and Steel Works), Severdom, Powerform, Severhard, Powerhard, Severweld, Powerweld (Severstal JSC) can be mentioned here.</p> <p>Development of the technologies for manufacture of fiberglass and metal plastic products, which replace steel grades of mass demand (e.g. commercial quality steels, structural and low-alloy steels) and decrease principally their consumption volumes.</p>
Legislative and policy environment	<p>Several countries started to introduce artificial restrictions for import of high-tech steel products from Russia in order to support their domestic producers and by other political causes (import taxes and duties, quotes etc.). These measures lead do decrease of export deliveries of Russian metal products. Increase of legislation pressure in the field of industrial ecology and labour protection also takes place.</p>
Social and economic development	<p>Care for the environment and orientation for decrease of the impact on the environment, reaching the aim of lowering CO₂ emissions are strictly required [16].</p> <p>Culture of manufacturing process: reaching zero rate of injuries (safe and high-quality production) are the milestones.</p>

- manufacture of products with high added value (a milestone for increase of number of metallurgical technological stages is expected in this case);
- conversion of production capacities (gradual rejection from manufacture of steel grades of mass demand, replacing them by metal plastics etc.);
- focus setting (specialization) of production capacities for definite steel grades of in the definite market segment;
- orientation of production capacities on the requirements of only domestic market (substantial decrease of the part of metal products export in total sales structure is suggested within the framework of this strategy during detailed examination of domestic market demand and consequent following its variations);
- forming the “flexible” structure of production capacities allowing maximal quick reaction on variations in demand of metal products customers.

The stage of forming of strategic alternatives in a passage, which is determined by the general strategy of managing the production capacities, is the following component of strategy development for managing these capacities. As it was mentioned before, the most part of large metallurgical enterprises at present time use actively the method of strategic alternatives for development of their strategy. However, the authors believe that use of this method can be efficient only on the condition of its incorporating in the general algorithm of building the concrete strategy, in particular the strategy for managing the production capacities. In the opposite case, the method of strategic alternatives can lead to non-compliance in relation to the general strategy, as well as to inconsistency with the main possibilities and resources of the concrete metallurgical enterprise. Their analysis should be done at the preliminary stage in order to determine the passage for construction of strategic alternatives.

The final stage of the strategy development for managing the production capacities includes its final definition, which is sufficient for transition to the operative managing level. Additionally, determination of the control mechanisms for strategy realization is principally important within the framework of the strategy development. However, the noted mechanisms are considered as another theme for investigation and require additional analysis and examination.

Conclusions

1. The problem of strategic planning at metallurgical enterprises is rather examined at present time; however, it contains a row of methodic problems which require scientific research and development. In particular, the problem of strategic management on production capacities of metallurgical enterprises is not solved nowadays.
2. In order to develop the efficient strategy for managing the production capacities, it is suggested to implement its consequent forming via several stages, which are directed on analysis of the factors of the external and internal environment; evaluation of competitive position, coordination with the general strategy and the strategies in other functional managing areas with distinct formulation and development of strategic alternatives are also included in this plan. Determination of the mechanisms of its realization and control on implemen-

tation are considered as the final stage of the strategy development. It was proposed to unite the above-mentioned stages in any algorithm of building the strategy for managing the production capacities of iron and steel works.

Practical testing of the suggested technique was partly carried out in the conditions of Magnitogorsk Iron and Steel Works (MMK). In 2020, the department of prospective development actualized the strategy of MMK sustainable development until 2025. When operating with strategic initiative, the employees of the department of prospective development used the principle of systematic approach for taking into account the influence of strategic initiatives on the state of production capacities, which was suggested by the authors of this paper. 

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