

## Working Out Social Guidelines for the Industry Development of Metallurgy



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**Abstract.** At present, traditional methods used in forecasting the development of economic sectors no longer provide acceptable results; thus it becomes relevant to work out new methods and approaches to industry forecasting. The paper proposes an approach to forecasting the development of industries under the influence of processes taking place in the social sphere. We consider major contradictions caused by the influence of metallurgical production on the formation of socio-economic conditions in Russia. We show that social factors played a significant role in making decisions on the establishment of metallurgical enterprises and the management of the metal market. We highlight major social functions performed by metallurgy. The study of the commodity market of metal products is supplemented by an analysis of changes in the positions of metallurgical enterprises in the capital market and the labor market. We note that social expenditures help metallurgical companies to gain public recognition of their performance results and change the level of their capitalization. This made it possible to develop a methodological approach to assessing the prospects of industry development with the use of guidelines for Russia's social development. We propose to use the following economic criterion: assessment of accumulation of funds invested in the development of production, preservation and growth of capital. We estimate social impact generated by development of metallurgical production under various scenarios of managing the decision-making system in Russia. We compare a business-oriented scenario, a scenario involving state paternalism, and a scenario of radical social transformations. We substantiate the conclusion about the

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advantages that the social variant of development of the state provides for creating a promising image of national metallurgy. This scenario will ensure high dynamics of metal production, growth of business capitalization and quality of life in Russia.

**Key words:** industry forecasting, metallurgy, metal market, social factors, social guidelines, development scenarios.

### Introduction

The traditional scheme of economic forecasting of industrial development processes increasingly leads to estimates that conflict with the phenomena, observed in practice. For instance, despite the 2.2-fold increase in global demand for metal in 2000–2020 (from 850 to 1878 million tons of steel), countries with developed metallurgy practically did not participate in its satisfaction. The contribution of the USA, the EU, Japan, and the Russian Federation to the increase in the output of cast iron and steel was negative and amounted to minus 8%<sup>1</sup>. No wonder that the improvement in metal prices is not accompanied by the expansion of its production, and the growth of corporate income does not contribute to the inflow of investments into the industry. For example, steel production in Russia turned out to be stable during 2012–2020 (about 71 million tons) with a 1.6-fold increase in world metal prices over this period. An increase in the companies' profit for 2017–2020 by about 1 trillion rubles led to investments growth in metallurgy by less than 200 billion rubles, and in comparable prices investments even decreased by 8.5%<sup>2</sup>. It is pointless to try to explain it from the standpoint of the theory of market equilibrium, competition, etc.

Currently, there is no clear generally accepted idea about what alternative business solutions may appear around, what resources are necessary to

develop metallurgy in modern conditions. It is obvious that the availability of mineral reserves, monetary funds and experience in metallurgical activities are no longer sufficient prerequisites for the successful development of metallurgy. And this is not only Russian practice. We should recall the success of Japan in the 1970s and the Republic of Korea in the 1990s. Another example is France, which is one of the ten largest countries in terms of reserves of iron ore raw materials and one of the twenty leading metal producers, but 90% meets the needs for metal products due to imports with a rich history of the development of metallurgical technologies and industries [1].

New countries and companies are emerging with developments that attract the global metallurgy. The leaders of coke-free metallurgy (direct reduction of iron) are Iran and Mexico. The growth of steel and rolled products based on the latest technologies is observed in the countries of the Middle East, Southeast Asia, and North Africa. Interesting developments in the production of metal products are demonstrated by Austria, Switzerland, and the Netherlands. *To understand what is happening on the metal market, it is necessary to investigate the motivation system for economic decisions and expand the set of factors, used in forecasting the industry development.*

A new logic of substantiation of management decisions is being formed, when actions that are not directly related to profit extraction are justified. It is advisable to consider many phenomena in the metal products market more broadly than is customary in economic analysis, primarily in the context of the

<sup>1</sup> Statistical reports. Worldsteel. Available at: <https://www.worldsteel.org/steel-by-topic/statistics/steel-statistical-yearbook.html> (accessed: June 16, 2021).

<sup>2</sup> Unified Interdepartmental Statistical Information System. Available at: <https://www.fedstat.ru/> (accessed: August 1, 2021).

Sustainable Development Goals [2]. From this point of view, assessments of the situation in metallurgy in the 2020s turn out to be contradictory and the results of the activities of leading companies are being criticized more and more often. The use of social drivers of competition has noticeably increased in the 2000s, especially in the confrontation between the “old” and “new” metallurgy (created in new industrial countries). In the EU and the USA, the conflict between the economic interests of business and the social tasks of the state has escalated. The main goals of protectionism include the survival of business and protection of workplaces (additional income does not cover the emerging social costs). Of the measures, introduced in 1995–2016 (a total of 1,051), 222 fall on the USA, 124 on the EU. Metallurgy products account for 5.1% of all notified non-tariff measures in trade (according to the WTO-I-TIP system). In the 2010s, there was a steady increase in the compensation measures (from 1.5 measures on average in the 2000s to 6.5 in 2010–2017), and anti-dumping measures (from less than 1 in the 2000s to 3 in 2010–2017) [3]. A new stage of confrontation in the metal market has adjusted the decision-making mechanism. In 2017–2019, the number of initiated investigations increased abruptly. Companies began taking on voluntary commitments to limit supplies and their conditions. The practice of concluding interstate supply agreements is expanding [1].

Along with the use of social factors in the competition, real problems cannot be ignored. There are numerous examples of the connection of metallurgy (24.4% of all emissions into the atmosphere in the Russian Federation) with the negative environmental situation in the regions where production is located. Difficult working conditions (over 70% are employed in harmful and dangerous conditions)<sup>3</sup> result in a low life

expectancy of workers. The presence of specific diseases in the locations of enterprises is pointed out in numerous Russian and foreign studies [4; 5]. Contradictions of transnational nature are growing in the world. Increasingly, the benefits of some countries and population groups are the result of the destruction of the environment and public health in other countries. This is a consequence of the action of economic mechanisms and the logic of industry development set by them in the conditions of the global market including the metal market. Economic ways to eliminate the existing contradictions (prices, investments, profitability) turned out to be ineffective [6].

Russia and many other states have not yet managed to avoid the growing negative social implications of industrial activity. The situation in Eastern European countries was quite typical, when metallurgical enterprises (with assets worth hundreds of millions of dollars) were sold for one dollar, but with the obligation of the new owner to eliminate the accumulated negative environmental effect [7]. In the now prosperous metallurgical Russian regions, it is advisable to avoid the fate of metallurgy in the Ruhr region, the Great American Lakes or the old industrial areas of the Urals<sup>4</sup>.

The positive development of metallurgy presupposes the restoration of the link between the state of the industry and living standards of citizens. Historically, steel production per capita has been the most important indicator of the economic development rate of the country [8]. Metal consumption per capita still characterizes the state's economy (*Tab. 1*). However, due to the global nature of modern economic development processes, everything is complicated, as it was in the 19th–20th century. The dynamics of metal production in many world countries, especially industrially developed ones, no longer has a direct connection

<sup>3</sup> Environmental protection in Russia. Statistical collections for 2006–2020. Available at: <https://rosstat.gov.ru/folder/210/document/13209> (accessed: August 07, 2021).

<sup>4</sup> Lyakishev N.P. et al. *Encyclopedic Dictionary of Metallurgy: Reference Edition in 2 Volumes*. Volume 1. Moscow: Internet Inzhiniring, 2000. 412 p.

Table 1. Parameters of economic development and metal consumption in the world

GDP per capita, thousand USDs	Steel consumption per capita, kg	Representative countries
Over 40	Over 300	USA, EU, Japan, Republic of Korea
From 20 to 40	200–300	RF, Turkey, Mexico
From 10 to 20	100–200	Brazil, Iran, UAE, RSA
Less than 10	Less than 100	India, African and Latin American countries

Source: Statistical reports. Worldsteel. Available at: <https://www.worldsteel.org/steel-by-topic/statistics/steel-statistical-yearbook.html> (accessed: June 16, 2021); World Bank Open Data. Available at: <https://data.worldbank.org/> (accessed: June 16, 2021).

with changes in living standards. Situations are multiplying (in countries with transformational economies) when population incomes decrease in order to improve the price competitiveness of production. The widespread technocratic opinion is also fair; it says that enterprises, created in the last century and based on the technological principles of the century before last, are difficult to recognize as the basis of the future welfare of the country [7].

Along with the negative assessments, typical of the journalism of the end of the 20th century, positive changes in views on the development of the world metallurgy are increasingly noted. They are based not on economic logic, but on technocratic and social approaches to assessing the formation of the future. Experts in the field of technological forecasting consider progress in materials and production methods as the most important directions of global changes and social transformation [9]. In the 2010s, the average annual increase in the production of metal-ceramic products using 3D technologies was estimated at about 17%, materials with nano-coating demonstrate an annual growth of 1.5–2<sup>5</sup> times. New directions are being formed to meet the needs associated with the use of metal (restoration technologies, surface protection, secondary use of resources, etc.). The logic of the transition from disposable products to long-term use of resources

<sup>5</sup> Forecasts of socio-economic development. *Ministry of Economic Development of the Russian Federation*. Available at: [https://www.economy.gov.ru/material/directions/makroec/prognozy\\_socialno\\_ekonomicheskogo\\_razvitiya/](https://www.economy.gov.ru/material/directions/makroec/prognozy_socialno_ekonomicheskogo_razvitiya/) (accessed: August 23, 2021).

is gradually receiving social support. The potential for maintaining products in operation has been formed after a period of wasteful consumption (an increase in service life by 5–10 years). Extending the service life of metal products for a year gives an effect equivalent to the additional production of 200–250 million tons of steel in the world.

Technological and price prerequisites are a secondary factor in the most likely scenarios of changes in metallurgy. The introduction of continuous steel casting, baked anodes in the production of aluminum and other world-proven developments stretched in Russia for decades. The analysis shows that the speed of propagation of technological waves after the acceleration stage (20th century) is noticeably reduced [5]. Many technologies become in demand only in proper social conditions [10; 11]. It is for this reason that in global practice it is customary to call a “miracle” the large-scale application of proven effective technologies (Japan, South Korea, Singapore, etc.).

Thus, two main facts determine the social aspect of metallurgy development in the country. *First, metal is necessary to create a comfortable environment that increases the citizens' well-being. Second, society bears the costs, associated with the negative impact of metallurgy on the environment*, with the consumption of public infrastructure resources and public resources (mineral resources, knowledge, and human capital) by metallurgy. We observe an ongoing universal trend in the global economy, consisting in the reduction of individual investments (owners) in business development with an increase

in the volume of borrowed funds and public resources including state and “priceless” ones [1; 12]. This is the most important prerequisite for the “socialization of production development solutions”, for the transition from management, based on the commercial effectiveness of the project, to the social effectiveness of business solutions.

#### **Accounting for the “new reality” in the estimates of metallurgy**

According to numerous estimates, system-wide changes are becoming the main factor influencing the role of individual economic industries. There are various methodological approaches to assess system-wide changes. Influenced by the research of J. Forrester and the report of the Club of Rome since the 1970s, doubts about the social effectiveness of economic growth have intensified, new approaches to assessing social development have emerged [13; 14]. They increased scientific interest, which is typical for making forecasts [15; 16].

In the history of mankind, social guidelines have repeatedly determined the processes of world development translating the social ideas to the microeconomic level. The production dynamics is increasingly influenced by behavioral and political factors. The influence of social processes on certain types of activities also has its own specifics, and it should be taken into account when forecasting the situation in metallurgy [17]. It is necessary to use a number of provisions that describe the system of interaction between society and individual [18]. According to these provisions, *the economy does not strive for market equilibrium; rather, it strives to achieve the established goals of social development*. It is necessary to take into account that the leverage resources (scientific, investment) in the industry is determined by its demand in multi-level economy [19].

The most significant social priorities for metallurgy, which are known from history [20; 21], are still relevant today.

We should remember that the most important public value is security, and metal played an important role in ensuring it. This defined metal production as the strategic output with limited access to this resource in many countries of the world. Currently, relatively small volumes of metal products (less than 3% of output) are used for defense needs, but they are of fundamental importance for ensuring the quality of economic growth. The military-industrial complex (MIC) demands high-quality materials (which account for over 60% of its consumption). By the share of special steels in the total metal output (less than 1%), Russia is significantly inferior to the world leaders (over 3.5% in the USA, Japan). Russia continues developing materials with special properties, which in the future can be manufactured for wide use, primarily to become the basis for increasing the competitiveness of civilian products [22]. If business does not ensure the “quality” of metal products, then this will be a problem not for business, but for the country as a whole.

Metallurgy has played and continues to play an important role in the industrial development of vast territories, associated with exploitation of deposits, creation of social and industrial infrastructure (railways), and formation of the country’s metallurgical potential [21]. Currently, on this basis, processes are underway in the Arctic and the Far East. New industrial regions continue to emerge in many countries of the world. In the 2000s, the world’s largest iron ore deposits were discovered in Afghanistan and Pakistan. Metallurgy centers are being formed in India, Iran, and Southeast Asian countries. The result of the growth in demand for ore and metal in the 2000s was a threefold increase in the transshipment of goods, destined for metallurgy, the expansion of maritime communications in Africa and Latin America.

Strengthening the state and increasing the requirements for economic returns from the resources under its control determine the specifics

of the organization of the metallurgical business. On this basis, various social tasks are solved. For many years, Australia, Canada, Norway, Sweden have been purposefully using the revenues of industries related to environmental management (metallurgy, fuel and energy complex) for carrying-out social programs. There is an example of Saudi Arabia and other Middle Eastern countries in addressing issues of raising living standards, based on natural rents, as well as the experience of the Netherlands (“Dutch disease”), the Caribbean countries and numerous examples of ineffective government policies, accompanied by the rejection of royalties, rental income [23].

The importance of government influence on production factors, used in metallurgy, pricing environment of global markets should be considered by their social implications. The success of metallurgy in South Korea, Japan and a number of other Southeast Asian countries was determined not by the companies’ income, but by social progress in these states, the creation of advanced metalworking industry, high-quality workplaces in the metal turnover system. Thus, both in the historical past and at the present time, the importance of social factors and state policy in relation to the metallurgical production of the leading world countries is no less important than scientific, technological or economic factors.

#### **Russian experience of social accents in the metallurgy development: back lessons**

The history tells us that ignoring the social aspect of production activities can be costly to business. In Russia, representatives of the metallurgical business should remember the fate of N. Demidov and many other entrepreneurs. Traditional economic leaders who derive income from nature (environmental costs that are shifted to the future) and people (social costs) may be limited by society in development, regardless of the production profitability rate. Russian metallurgy can distinguish three illustrative plots of the inconsistency of economic and social goals.

First, since the time of Peter I, the issue of the effectiveness of state-owned and private metallurgy has been discussed [21]. In his note, revelator Gerasim Rayevsky demanded to take away the metallurgical plants from the “exploiter”, to establish a state monopoly. “To determine the price for every iron of the national treasury and establish a sale of the treasury in the image of how salt is sold ... so that this multiple state interest is not stolen by peasant hands” [21, p. 458]. The source of income (“from which manufacturers get great wealth and self-interest”) was the resources, provided by the state to business (deposits, loans, “assigned villages”), with a low interest of business community in technological development. Stating the high economic efficiency of private business, about 300% profitability for key types of metal products (“two multiplying interests are stolen in vain”), the negative social consequences of the current situation on the metal market were indicated, primarily the damage to the achievement of state development goals for which metal was purchased. The high cost of the tool led to the problems in agriculture (“... no last bean can do without iron and especially on the above-described iron (*note – high-quality*) the greatest expense there, as people are low-money...” [21, p. 456], and eventually – to the problems with food. In one way or another, numerous state commissions came to similar conclusions regarding metallurgy and the metal market (on the problems of armaments in 1812, on the problems of infrastructure development during the Crimean War, the commission on the privatization of state-owned factories under the leadership of D.I. Mendeleev, etc.).

Second, F.E. Dzerzhinsky stated that during the transition to the system of state management of processes in the metal market of the 1920s, metallurgical companies, organized by the government (Convention (Prodamet), Uralmet, Yugostal and other syndicates), set prices for metal products 2–3 times higher than imported analogues, motivating this with economic objectives [24]. “The

issue of fuel and metal prices should be raised in its entirety as a priority issue of our economy. ... This (*note – convention*) is not a state authority of cheapening and increasing mass production, but the authority of inflating prices, ... has its logic – in the long term – the death of workers’ state” [24, p. 411]. He demanded a clear distinction between “public interests and the interests of state structures, designed to manage metallurgical production”. “The policy of our metal industry is to limit the sale of its products to population and impose them on the state, and thanks to this policy, the metal industry finds itself in a hopeless contradiction: population does not buy because it is too expensive, the state cannot order so much, as the population is too poor to give the state funds for this” [24, p. 406]. The relevance of the issues of the costs validity carried out by state-controlled enterprises and the pricing policy maintained throughout the planned economy. Numerous political and judicial decisions against the management of enterprises and authorized state bodies (the State Committee on Prices of the USSR, price departments of ministries) could not stop the price rising of metal products, affect the efficiency of production. The following thesis of 1923 is also relevant: “It is obvious that prices cannot be inflated further, but we spend time at scientific meetings in order to raise prices as a result” [24].

Third, the consequences of social phenomena are more significant for metallurgy than the results of economically sound management decisions. History shows that the creation of many metallurgical enterprises was considered economically unjustified. This applies to the development of the Kursk Magnetic Anomaly, metallurgy of Donbass, polar metallurgy. At the same time, economically sound solutions have not been implemented (the Far Eastern metallurgical base, the industry of intersectoral industries, etc.). There is a question about the reasons for stopping projects for the development of metallurgical bases in the USSR.

In the 1960s and 1970s, numerous projects were developed, there was an investment base, and unsatisfied demand for metal [25]. And suddenly a political decision to switch to intensive methods of economic development stops well-functioning model of sectoral development<sup>6</sup>. Undoubtedly, Russia’s modern metallurgy is the result of socio-political, and not “market” processes of the 1990s.

It is important to understand that economic actions determine the level of the company’s current profit (earned on the commodity market), and the social attitude to business determines its value (on the stock market). These are phenomena of fundamentally different scales. As illustrative examples, we can highlight the plots of recent years. V.V. Putin’s proposal to “send a doctor” (July 2008)<sup>7</sup>, A.R. Belousov’s reproaches (2018, 2021) led to a decrease in the capitalization of companies by billions of dollars. We emphasize that the resulting budget overspending in 2021 for metal purchases was 2.2 times lower than additional tax revenues from metallurgical companies<sup>8</sup>. Traditional economic arguments about the growth of profits and tax payments turned out to be less significant for the capital market than conditional social costs.

### **The social aspect of managing the processes of metallurgy development**

Positive growth, as a rule, is a consequence of social recognition of the results of metallurgy (regardless of the truth or falsity of the assessments of citizens and authorities). In the 1950s and 1960s, it was characteristic of the entire world economy, where metallurgy was considered as one of the drivers of successful industrial development

<sup>6</sup> On improving the quality of metal products and the efficiency of metal use: Resolution of the Central Committee of the CPSU and the USSR Council of Ministers. *Pravda*, June 8, 1980.

<sup>7</sup> The “doctors” are no longer afraid. RBC. Available at: <https://www.rbc.ru/newspaper/2013/04/01/56c1b1a09a7947406ea09e13> (accessed: August 24, 2021).

<sup>8</sup> The rise in steel prices cannot continue indefinitely. *Vedomosti*. Available at: <https://www.vedomosti.ru/business/characters/2021/06/06/873116-tsen-stal> (accessed: August 24, 2021).

Table 2. The most significant changes in the operating conditions of metallurgy

Type of social requirements	Probable business strategy	Current business activities
Climate and other obligations under interstate agreements	Increase in unproductive business expenses and their reflection in product prices	Investments in solving tasks, related to bringing production to established standards and monitoring their implementation
Environmental protection	Formation of a system of integrated waste disposal within the framework of the "zero waste" concept for the resources of state programs	Environmental protection costs of current and capital nature
Quality of workplaces	Bringing asset quality to the parameters of world leaders, labor productivity growth	Investments in the creation of the production apparatus, labor capital ratio
Social responsibility	Control over clusters with a dominant role of metallurgy. Social payments and business participation in the development of the region's infrastructure	Participation in the formation of public capital, non-production facilities
Source: own compilation.		

of the country [8]. In the 2000s, there is a process of replenishing basic social values with a new set of benefits. They move from a system of moral preferences to the rank of social requirements established by the international community, which acquire a global character [2; 11]. Climate, ecology, human rights, and qualitative changes in the ideas of decent living standards act as conditions for sectoral development<sup>9</sup>. Gradually, under the influence of world practice, system-wide changes acquire a specific form of impact on industries' development through the formation of special operating regimes, the introduction of tax and customs payments, and the use of sanctions restrictions. The established provisions have quite specific consequences for commodity markets and industries' development: first of all, the cost of attracting resources to develop production depends on the social conditions in the country (region) (*Tab. 2*). In fact, business is required to participate in the reproduction of public resources (rational attitude to those that costs nothing).

The paradox of modern construction of the global economy lies in the fact that with a relatively stable situation in the world with traditional factors

of production (capital, labor, production and management technologies), specific changes in economic conditions are observed in each country [1]. They are determined by the ratio of public and individual costs of doing business and the distribution of the results obtained for the reproduction of production and system-wide resources. As an example, the situation in Russia is indicative, when it is profitable to produce metal, but it is unprofitable to develop metallurgical production. Current (individual) production costs in Russia are significantly lower than abroad (primarily in terms of wages), which ensures high profitability of metal production. There are advantages in comparison with the working conditions of other industries. For instance, the tax burden on metal production in Russia is 2.5 times lower than in the field of metalworking. The situation with the availability of public resources for business organization is fundamentally different: compared to the EU and the USA, metallurgical companies in the Russian Federation have to invest 7–8 times more in the development of non-core assets and non-production sector when implementing investment projects. This is reflected in the expected return on capital and priorities of investments in business development. Business prefers to invest in those countries that have public resources (USA, EU countries, China, etc.).

<sup>9</sup> On the Agenda. The Davos Agenda 2021. *World Economic Forum*. Available at: <https://www.weforum.org/agenda/archive/davosagenda2021> (accessed: August 24, 2021).

Flows of labor resources and capital characterize the prospects for changing the situation in the country reflecting society's ideas about the value of certain types of economic activity [1]. The observed trends indicate the issues of metallurgy in the Russian Federation:

1. In the period from 2000 to 2020, which is estimated as favorable for metallurgy, more than 400 thousand workers left the industry (over 22%). The rate of employee retirement tends to increase. If in the 2000s the industry's restructuring led to reduction in non-core assets of enterprises and creation of new businesses based on them, then in the 2010s there was production modernization, accompanied by labor saving. The problem is that metallurgy could not offer new attractive workplaces.

2. The investments rate in metallurgy in the late 2010s was 1.5 times lower than in 2008<sup>10</sup>. The dramatic lack of growth in investments in seemingly highly profitable production adds to the accelerated growth of profits and depreciation charges at enterprises observed during this period (2012–2020). The increase in the own investment resource of metallurgical companies by more than 1 trillion rubles in 2017–2020 was used for investments in production development by less than 20%.

3. The situation for making decisions on development is aggravated by the social requirements of the state to the metallurgical business, their inconsistency in 1990–2000. To date, it is difficult to understand what the authorities mean, pointing to the need for socially responsible business behavior [26]. In most cases, it requires the business not to do what it does itself: do not be greedy, do not take money abroad, develop social infrastructure, etc. Gradually, the requirements of society to business are being concretized, in addition to the issues of earning income, questions

about their effective use in the country's interests are increasingly being raised [27; 28]. Public expectations also influence the authorities' actions forming a substantive social policy.

A modern entrepreneur realizes that social costs are not only expenses, but also a source of potential business income in the form of access to limited and preferential resources, a way to increase the company's capitalization. When assessing the effectiveness of investments made, especially non-production purposes, we should take into account that the owner of the metallurgical business has an economic interest in close relationship with the maintenance of social status [29; 30]. The socially oriented development of metallurgy can be judged by many phenomena of social life that are not directly related to metal production. The competition of metallurgical companies on sports grounds is no less acute than in the metal market. Business leaders take an active part in political and social movements, in the formation of civil society institutions. The restoration and strengthening of business ties with the scientific and educational sphere became especially noticeable in the 2010s. The formation of objects of "white" metallurgy, "intellectual production" is not just a stage of technological development, but a response to social challenges. Social expenditures are increasing (from 0.5% in 2005 to 2.5% in 2016), but their scale is significantly inferior to the expenditures rate of Western companies (over 15% of total costs).

The motives of behavior and the logic of their implementation play a key role in considering the social aspect of metallurgy development. The main ones for the foreseeable future remain the business targets, approved or rejected by the public, which is confirmed by the Russian and world practice of property redistribution in the 1990s–2000s [31]. The enterprises' owners face the task of preserving and multiplying property which determines their behavior. We emphasize that there are not so many ways to solve it. Within the framework of the

<sup>10</sup> Unified Interdepartmental Statistical Information System. Available at: <https://www.fedstat.ru/> (accessed: August 01, 2021).

traditional approach, the emphasis is on extracting profit and investing it through an investment mechanism. As known, the social approach condemns the exploitation of people and assumes an active struggle against “superprofits” [10; 11; 18]. Unlike the previous period, when the struggle between entrepreneurs was for the increase of individual incomes, in the future a struggle for access to public capital (social benefits and state funds) is expected. In practice, solutions are being implemented that are quite controversial from economic standpoint, but bring obvious benefits to business (there is the success of Zuckerberg’s “free” Facebook, and there is I. Mask’s unprofitable business, which gives an increase in capitalization). The capital market provides an assessment of the effectiveness of the company’s social development. There is a public recognition of the validity of investments and social expenditures.

#### Prospective tasks and guidelines

In the forecast period, changes in the company will also lead to changes in certain industries. It is clear that the solution of many social problems is seen as “take away and divide” or “borrow” postponing the decision for the future. Experience proves that for some reason it is impossible to

overcome poverty without metal, to raise living standards (people also lived in the Stone Age, but the progress was ensured by the Copper, Bronze and Iron Ages) [20]. The industry specifics and the capabilities of existing enterprises to adapt to the new requirements of society determine a set of tactical and strategic tasks, solved by metallurgy. Traditional social policy at the enterprise level addresses specific issues of employees and issues of providing production with labor resources. For the success of business in modern conditions, this is no longer enough. Advertising of new materials and training in their use become important factors in changing the structure of metal consumption.

Fundamental for the current stage of industry forecasting is the fact that previously social requirements determined the *product’s nature (useful – harmful)*, and in the 2020s and in the future they will determine the production nature of almost any product. There is a positive experience of the 20th century that shows the victory of social values over the economic benefits of business. Modern production has managed to adapt to the rejection of the exploitation of child labor, compliance with labor contracts, and environmental requirements.

Table 3. Social guidelines of industry development scenarios

Element of the social mechanism of sectoral development	Scenario 1 (business-oriented)	Scenario 2 (State-paternalistic)	Scenario 3 (radical social transformations)
Current task	Transformation of public costs into individual entrepreneurial income	Building up public resources by the state at the expense of funds, received from business	Formation of social environment based on the results obtained by business and population
Solution	Management based on general economic rules in the framework of business competition for public resources	Management of public resources based on the specialized institutions of social development	Management of the process of concentration of citizens’ capital and wealth at the regional level
Business participation in the country’s social development	Payments to the state and population within the framework of socio-fiscal burden on business	Active participation of business in the formation of public goods, transition from system of corporate resources to open access system within the regional social environment	Ensuring the efficient use of public resources when investing private funds
Indicators of development process	Business profit. Loss of public resources	State ownership scale. Business capitalization	Region’s wealth including public, human and private capital
Source: own compilation.			

In rapidly changing social conditions, it is quite difficult to assess possible medium-term economic benchmarks and formulate alternative options for the production and technological development of metallurgy. Taking into account the features of the formation of social guidelines by management entities and their impact on metallurgy, it is currently advisable to consider three vectors (scenarios) of sectoral development (*Tab. 3*).

1. *Business-oriented scenario* should be considered as negative for metallurgy. It assumes to preserve the current logic of the Russian economic growth [16; 32]. Threats to the economy of business, engaged in the active gratuitous appropriation of public resources, are extremely specific. The return on capital at new facilities is an order of magnitude lower than at the existing production (12 times in the 2000s and 17 times in the 2020s). Over the previous years, the public resources, required for the industry's development and used in metallurgy, have significantly declined. Mineral reserves were transferred to private companies for development, which began to bear the costs of their reproduction and involvement in operation. Metallurgical companies overcome the restrictions on transport infrastructure by actively participating in the construction of ports, the acquisition of a car fleet. In many cases, when creating new production facilities, companies are forced to create their own social infrastructure. This type of "semi-natural" development has obvious economic limitations that did not allow the Russian metallurgy to achieve output growth in exceptionally favorable environment in the global metal market of the 2000s–2020s. The idea that everyone can enrich themselves at the expense of public good is gradually losing appeal among the population [28; 29; 30].

As the resource base and effective areas of metal use decrease, the output of metal products will also decrease (by 10–15% by 2030). In metallurgy, the release of personnel will continue at an even higher rate than in the 1990s crisis (over 25%). Against

the background of increased labor productivity at metallurgical enterprises, public labor productivity in the region of their location will decline. Social problems will worsen in the areas where the city-forming metallurgical enterprises with limited public capital are located, primarily in the Urals and Siberia.

2. The intensification of economic activity of state authorities seems quite likely in the medium term [12; 16; 28]. The basis of the *forecast scenario (state-paternalistic)* is formed by the mechanism of economic development based on state management of resources, formation of a new logic of managerial decision-making (in the interests of strengthening the country). Such scenario has been successfully implemented in Japan, the countries of Southeast Asia during the implementation of projects for the integrated development of large regional systems in the USA, Canada, China, India and other countries. The difficulties and problems arising during its implementation are well known from the Russian practice of the 2000s–2020s. World experience shows that certain social conditions and strategic challenges are necessary for the successful implementation of the scenario [11; 12].

The growth of metal production by 2030 on the basis of increased government influence on the metal market may be about 5–10%. As possible result of state efforts, it is necessary to consider the creation of the Far Eastern metallurgical base, the expansion of activities for the production of the end metal products, reaching a new level of product quality using scientific and other public resources that Russia has [15]. The social effectiveness of this scenario has a deferred nature, as for its implementation period, the state, mobilizing resources, is forced to introduce special regimes for managing human resources and business behavior (capital).

3. System-wide changes in the global economy help to consider *radically new scenarios for the development* of not only metallurgy, but also

Russia as a whole. This scenario cannot be lowered “from above”, it is formed by the whole society in conditions of increasing contradictions of interests between the population, political and market authorities [15; 27; 32]. After the conflict between economic and social goals typical of the 20th century, there is a search for their coordination, which seems to be a difficult but solvable task. Despite the presence of certain prerequisites for changes on the part of the information environment, business is not going to cede its power over society. It needs a new motivation system.

Within the framework of social logic, businessmen, as well as other citizens, will be driven by ideas of self-realization, and this requires resources. Business uses its private resources to attract employees and public resources that are at the disposal of the state (fundamental developments, infrastructure, personnel training system, etc.). Fundamental changes are expected in the labor market [16; 28]. This is not only a consequence of the idea of basic income, new views on the reproduction of human capital, but also citizens’ motivations. Specially organized territories attract people no less than the current stability. The social package attracts a person no less than the level of remuneration. Supplementing wages with social benefits leads to the formation of a qualitatively new level of not just income, but also person’s living standards. This is not only the Soviet experience, but also global practice [17].

The forecasted output of metal products due to the growth of resources’ volume, involved in the industry, will grow slightly (by about 10% by 2030). The main focus will be on qualitative changes, an increase in the share of high-grade products in the industrial output (from 30 to 75–80% by 2030). Due to structural changes under the scenario of radical social transformations, the total volume of industrial production at comparable prices will increase by 3–4 times by 2030. If social criteria are given

priority in the country’s economic development system, then a situation of “unlimited demand” will arise in metallurgy, and business will face the task of effectively satisfying it. The experience shows that it is quite difficult to solve this problem [8; 34]. People will be needed, and their involvement in production will form a trend for positive social changes in the country, which will be the answer to social challenges.

Forecasts should provide answers to the issues facing the economy, and social challenges are currently the most urgent of them. There is no reason to believe that a few percent increase in GDP and creation of macroeconomic conditions will significantly change the situation in the social sphere.

Historical experience proves that as the production and consumption of metal increased in the country, society got rid of problems with poverty. Unfortunately, those authorized to fight poverty in Russia do not think about how much metal is required for this. In the current management system, even if the answer is known and there are appropriate resources, questions arise with the solution of social problems. The logic of modern economic development and forecasts, based on it, indicate a possible aggravation of social problems entailing additional restrictions in metallurgy development.

Metallurgy, including Russian one, is gradually losing its connection with social processes in the country. At a time when it is increasingly necessary to hear about the lack of prospects to develop metallurgical production, with references to the experience of the USA, the EU, we should understand that this is a consequence of certain economic conditions and the logic of decision-making, determined by them. People create conditions, and people are able to change them, which determines the possibilities of forming social development guidelines and mechanisms for achieving them.

Removing economic restrictions on management decisions, social guidelines help industries to fully realize their capabilities to meet the needs of society not only in goods, but also in the social conditions of development and realization of citizens' abilities [34].

The forecast, based on estimates of the relationship between public resources and individual business resources, indicates the attractiveness of the socially-oriented scenario in comparison with business-oriented or state-paternalistic scenarios. The socially-oriented scenario ensures high dynamics of metal production, growth of business capitalization and living standards in the country.

### Conclusion

The social success of metallurgical companies will lead to changing the industry's positions in the labor and capital markets. The involvement of public resources in the industry indicates its socio-political positions in the economy and is the result of rejection or approval of the activities of enterprises.

Russian metallurgy is undergoing socialization. After the stage of the 1990s, associated with "the dumping of social infrastructure from the balance sheet", significant funds are again invested in social projects. There is still a long way to go to the level achieved in the EU countries. Relative parity exists in terms of spending on social infrastructure, there is a noticeable lag in terms of wages by an order of magnitude, in terms of spending on retraining, improving the quality of jobs per employee – tens of times, hundreds of times – in terms of contacts with the scientific sphere. In the forecast period, the growth of requirements for changing social conditions in the country implies receiving an adequate response from business.

Economic processes in Russia are gradually acquiring social content, and social processes are gaining an economic basis. For current decisions in the industries, the parameters of social efficiency are important, provided that the business has an economic effect when working for the goals set by society.

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