Building of effective management structures based on the digital technologies in the mining industry. A case study of UC RUSAL

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Abstract. The most competitive in the current global market and defining the economy of the country persists products of extractive industries. According to this reason precisely this direction requires effective management, continuously connected with advanced technologies. Developing enterprises not only are able to impact the situation in the mining industry but to reform the economy situation in general. Changing external environment produces up-to-date demands on planning based on calculated predictive values, and creates the possibility of increasing the competitiveness of the organization. One can’t help underestimating the importance of integrating quality management system to any modern company, as it determines further ways of its prospects.

Keywords: mining industry; development trends; external environment; long-term tasks

1. Introduction

The beginning of the 90s was a very difficult time for the economy of the USSR. In connection with the collapse of the country, almost all industries have lost their former strength. One of the most promising industries was metallurgy, namely the aluminum industry. Its revival has been going on for more than 10 years and was extremely important for the entire infrastructure of the country. The role of aluminum is so great, and the application is so extensive that this metal is not without reason called the "metal of the 20th century." Currently one of the fastest growing and economical industries are minerals extraction and construction-mining functioning of the enterprise. There is not a single sector of the country's economy that would do without non-ferrous metals. The leader in the field of effective development and organization of mining and blasting operations are the companies Alrosa and Sibur, and in the Russian metallurgical sector NorNickel and RUSAL. Digital design of development organization is actively developing in RUSAL. In this work we want to identify the main characteristics of this company, the device, the goals, and the IT technologies that are used in it.
2. **Company review**

United Company RUSAL (UC Rusal) is one of the largest aluminum and alumina producers in the world and one of the largest private Russian companies. The company was established in 2007 as a result of the combination of RUSAL and SUAL with alumina assets of the Swiss Glencore. The capacity of the alumina refinery corporation is 12.3 million tons, and aluminum 4.4 million tons. The main consumer sectors are packaging, transport and construction, and the main sales markets are Russia, the CIS countries, Southeast Asia, Korea, Japan, Europe and North America. RUSAL itself (its assets) is located in 13 countries on five continents [1-5].

The fact that UC RUSAL is one of the largest companies in the world imposes additional responsibility on it. RUSAL survived more than one global economic crisis and intends to work on improving efficiency, expanding the range of products at the expense of value-added products and strengthening its position in key markets, primarily in Russia. In addition, customer needs are becoming a significant reference point for development. The corporation is always ready to work together with customers, jointly develop new technological solutions, invent new ways to create alloys and various materials. This approach contributes to the development of relations with Russian and foreign investors, suppliers and customers.

It is also necessary to note that RUSAL has its own engineering and technological base, which allows for full-scale research in the required areas and industrialize scientific ideas.

3. **The emergence and history of development**

The first company, called Russian Aluminum, appeared in 2000 through the merger of the assets of Sibneft and Sibirsky Aluminum. The share of this new company in global aluminum production was about 10%. In connection with the formation of RUSAL, the situation in the Russian aluminum industry began to change. Russian businessmen Oleg Deripaska and Roman Abramovich (the owners of the assets of RUSAL) began to unite Russian enterprises producing aluminum, thereby creating a platform for the subsequent modernization and strengthening of the aluminum industry. In addition, the corporation paid significant attention to the development of new methods for the production of aluminum, the development of the technological component. In 2002, the company laid the foundation for the development of scientific and technical base, namely, the Engineering and Technological Center was created, which begins to monitor the research and development and research and development work of the corporation [6-8]. A year later, RUSAL's specialists in record time were developing a new aluminum production method, the RA-300, which, to a large extent, allows for a reduction in electrical energy consumption and an increase in the operating time of the electrolyzers. In 2003, new electrolyzers come into operation at the Sayanogorsk Aluminum Smelter. The Krasnoyarsk and Nikolaev combines and the reconstructed ARMEINAL foil-rolling plant in Armenia, which was bought by RUSAL in early 2000, also underwent modernization.

It is necessary to note that this corporation throughout its existence led activities to increase its presence in Russia and abroad. In 2002, under the auspices of RUSAL, two Guinean enterprises became - the bauxite-alumina plant Friguia and the mining complex BCC. The company's production base is also expanding through the purchase of a controlling stake in the Novokuznetsk aluminum plant. Closer to 2004, the company's operations are gaining a transatlantic scale. RUSAL begins development of bauxite deposits in Latin America in the Guyana region. The government of Guyana and the management of the corporation create a new subsidiary, the Bauxite Company of Guyana. In addition to operations in Latin America, RUSAL has acquired a significant amount of assets around the world. The largest acquisitions include aluminum and cathode plants in China, Nigeria, Italy, and the Australian alumina refinery Queensland Alumina Limited (the second largest alumina enterprise in the world), the purchase of which contributed to an increase in the self-sufficiency of raw materials by almost 800 thousand tons per year. In the spring of 2007, the consolidation of Russian aluminum manufacturing enterprises was completed. At that time, in addition to RUSAL, there was another company that had a significant role in non-ferrous metallurgy, namely, the Siberian-Ural Aluminum Company. Shareholders of both corporations have decided to merge assets, as well as the purchase of
the Swiss commodity trader Glencore. The result of these actions was the emergence of RUSAL in the form in which it is known throughout the world today.

It is important to pay attention to the fact that RUSAL and its management, in order to achieve their goals, had to solve many problems and survive global financial crises. So 2009 was the year of the global economic crisis, which became one of the most difficult in the history of the combined company. The cost of aluminum and its demand fell to a record minimum, which could not but affect the financial support of the corporation and relations with creditors. But during the year, the company actively implemented a set of measures that was aimed at reducing costs, minimizing costs, optimizing production, and which eventually allowed to survive the crisis with minimal losses and lay the foundation for further development. This financial crisis has made significant changes in the development of global industry. After analyzing the situation on the global market, RUSAL developed a ten-year program to introduce new technological methods for aluminum production, optimize labor resources management, reduce inefficient capacities, and standardize business processes. In short, the program that will ultimately help strengthen the company's position in the global aluminum industry. The measures applied significantly contributed to the strengthening of the corporation in the international arena, and at the moment RUSAL is one of the most technically advanced companies producing primary aluminum and alumina with a huge raw material base and highly skilled ordinary employees and managers able to effectively manage the company and lead it along the way.

4. Analysis of the internal environment

The internal environment of the organization is part of the external environment. The internal environment of the organization includes many factors that from the inside affect the overall performance of the organization as a whole. In the internal organization of the organization there are many subsystems, among which the following take a special place:

- Marketing;
- Social;
- Financial;
- Organizational.

4.1. Marketing subsystem

Marketing takes an important place in the life of a corporation. RUSAL, being one of the largest companies in Russia and the world, is obliged to conduct high-quality and in-depth studies of the state of the world market. The marketing service in RUSAL works as a buffer between the external environment - the market and the internal environment - the company's resources. One of the main achievements of RUSAL in marketing is the creation of a favorable image of the company, the successful development of new markets and territories, a wide range of products, and relatively low prices. All of them contribute to strengthening the position of the corporation.

4.2. Social subsystem

Personnel policy of the enterprise according to many experts is the basis for the successful functioning of the entire organization. The same opinion is shared by RUSAL. People in the company create its product, are responsible for the internal climate, each employee has his own task, the execution of which affects various business processes. In this regard, the company's management regularly provides funding for this area.

4.3. Financial subsystem

Financial processes are a complex and responsible part of the company. Due to its size, hundreds of thousands of various financial transactions occur every month in an organization, an enterprise has billions of dollars that need to be managed and properly planned for their distribution. For controlling such powerful cash flows, RUSAL attracts highly qualified specialists and purchases the appropriate software.
4.4. Organizational system
For effective management of a transcontinental enterprise, it is necessary to have a developed management structure. RUSAL is actively modernizing its corporate governance system. The highest governing body and control is the General Meeting of Shareholders, which makes decisions on all important issues of the company. The quality of the activities of this body contributes to the attractiveness of the corporation to investors, and also gives additional guarantees to customers and partners in the reliability of the organization.

5. Analysis of the external environment
The external environment of any organization is a source of resources that are necessary for its functioning. The external environment, as well as the internal, includes many components and systems. It is customary to divide it into two large parts: the macroenvironment and the immediate environment of the enterprise.

The macroenvironment of RUSAL
- 1. The political and economic component. These factors can have an influence on all activities of the organization. RUSAL has always sought to maintain trusting relationships with the authorities and various administrative bodies, since they create the “climate” in a particular region. In addition, the growing pressure from the European Union and the United States, which, through sanctions, influences on the work of the organization. In addition, the management and various experts of the company have to constantly control the level of inflation, the level of employment, business lending rates, etc., as through careful analysis of these factors it is possible to turn the future threat to the organization into good and avoid unnecessary costs.
- 2. Social and cultural components. External sociocultural factors to a large extent influence the perception of employees of their company. Thus, RUSAL, like almost all enterprises in Russia and the CIS, developed an “individualistic” approach (as opposed to a “family-based” approach in the east), according to which the constant desire for career growth and frequent change of work is the norm of behavior. This approach has a rather negative impact, since there is a high probability of losing frames.
- 3. Scientific and technical progress. A scientific and technical environment, if properly analyzed and used, can provide excellent means for the modernization of all systems and processes occurring in an organization. It is worth noting that RUSAL devotes a large amount of time and resources to this factor. Procurement of various software, equipment is actively introduced, and research is being conducted to update the methods of producing aluminum and other substances [9-10].

RUSAL stakeholders
- 1. Competitors For effective development in the face of tough competition, the company constantly has to modernize and upgrade equipment, develop a marketing subsystem, monitor the situation in competing corporations, and analyze the market. Among the competitors countries in the world can be identified US, European Union, Australia, as well as dynamically developing China. Among competing enterprises, two organizations are worth noting, namely the Chinese Chalco and the British-Australian concern Rio Tinto.
- 2. Consumers RUSAL is in constant dialogue with its customers, takes into account their needs and wishes when releasing new alloys, and participates with them in creating products for the final consumer. The corporation also actively conducts various advertising campaigns. One of the key factors to increase customer base is the quality of the final product. The company's products meet the best international standards. A significant part of the plants of RUSAL is certified for compliance with the ISO: 9001
quality management system standard. Among the major consumer countries can be identified the United States and European countries, as these regions are highly developed industrially.

3. Suppliers
The importance of supplier organizations is due to the fact that such organizations are able to influence the activity of the company-buyer by changing the supply volumes, prices for raw materials, thereby creating the most dependence on resources. In this regard, RUSAL with great attention to the choice of suppliers and uses the following guidelines when choosing: quality, timeliness of supply, cost and efficiency. When working directly with partners, the corporation adheres to the principles of mutual trust and respect, and also monitors the improvement of technology and business processes.

4. Investors
Investors are private individuals or organizations who invest their own funds in projects for profit. In this regard, in order to ensure the stability of the investment cash flows, RUSAL maintains a policy of transparency and informational openness. The corporation seeks to publicize the investor community about the results of its operating and financial activities, as well as plans for further development.

6. Determination of the most significant tasks for the company and business processes
UC RUSAL is one of the most efficient aluminum producers in the world. For a corporation to be first means to be first in everything, and in this connection the company has set itself a number of long-term tasks, namely:

- Actively develop scientific and technical potential and develop new technologies in order to subsequently introduce them to enterprises.
- Demonstrate to the investment community the prospects of their enterprise and the ability to effectively use the corporation’s benefits and resources.
- Optimize all business processes occurring in the company and increase the speed of interaction between different subsystems, through the introduction of new software and attracting highly qualified specialists.
- Increasing the flexibility of the production process to quickly adapt to rapidly changing market conditions.
- Optimization of the personnel segment of the enterprise.
- Improved accounting and pricing process.
- To provide its customers with products of the highest quality, as well as in a timely manner.

According to many independent experts, the implementation of these very goals will affect the improvement of the quality of work and optimization of processes, as well as the reduction of various costs.

RUSAL builds a further development strategy based on building a tree of goals, identifying top priorities. After conducting this analysis, management decides to update one or another segment of the organization, the purchase of new equipment and software. In connection with the foregoing, in the next part of the analysis of RUSAL, we will discuss the company's IT solutions and the introduction of various software products that ultimately contributed to the achievement of the desired.

7. Analysis of IT-solutions in the corporation
The company RUSAL is a huge company with a rich history and highly developed infrastructure. Managing such a company, analyzing its various subsystems and parts, analyzing the processes occurring in it, is an extremely complex and costly task, requiring, in addition to highly qualified personnel, powerful software. Having set itself the goal of comprehensively improving and optimizing the work of the corporation, RUSAL throughout its history came to various IT solutions and the integration of various software products. Thus, in 2006, at the dawn of the emergence of the modern version of RUSAL, the question arose of a more efficient allocation of company resources, of operational control over the company's activities and the formation of a reliable base for making optimal and timely decisions at all levels of management. On this basis, the leadership of RUSAL made one of the most important decisions, namely, the decision to purchase the SAP ERP product,
which works according to the ERP system technology and allows to solve most of the issues and tasks faced by modern medium and large enterprises. The introduction of this software into the infrastructure of RUSAL was divided into several stages:

1. The first stage included the organizational documentation, namely the order to introduce the new system, the creation of a calendar plan, project charter and a risk management plan.
2. The second stage consisted in familiarizing consultants with the peculiarities of the corporate business processes, analyzing the internal structure and communicating directly with the company's employees.
3. The third phase is the implementation of conceptual design. The essence of this phase is to develop the rules according to which business processes and system configuration will be built.
4. The fourth and final stage was the implementation of the project (integration test and project start).

Three aluminum enterprises of RUSAL in Bratsk, Sayanogorsk and Novokuznetsk felt the impact of this software package. It should be noted that at the factories in Sayanogorsk and Novokuznetsk product introduction took a record short time - 3.5 months before pilot production and 5.5 months before disconnecting inherited systems.

As a result of the introduction of this software, the company has improved the quality of its management in the following number of indicators:

- Improved information management, organization managers began to monitor the processes in the company in real time.
- The quality of management of material and financial flows has increased.
- Updated project management.
- Improved quality of personnel management.

In general, RUSAL, thanks to this software product, has increased the overall efficiency of enterprises. 5 previously existing systems were replaced by a single integrated resource management system. This system allowed to make up to 350 thousand financial operations and up to 520 thousand logistic. In 2009, RUSAL acquired an updated version of this program.

It is worth paying attention to 2010. During this period, the company managed to implement the integration of 2 fundamentally new software packages in a relatively short time. The first was a program called PayDox. PayDox is an electronic document management and business process management system. This software product is a corporate portal that uses electronic document management as a base with a wide range of functions and opportunities for expansion and integration. RUSAL has managed to implement the strengths of this platform in its work and improve the performance of the following processes:

- Support geographically distributed workflow.
- Keeping the entire history of work with documents and projects.
- Management of documents responsible for payments, contract management, OSA.
- Coordination, approval and optimization of document control.
- Interaction with remote units.

The next software product in the queue was BOSS-KadroviK, which is an automated personnel management system that facilitates simpler and more effective human resource management. This software allows you to plan personnel policy, to conduct activities to structure the organization, recruiting new staff, managing internal processes of the personnel segment, etc. Thanks to this program, it was possible to optimize the work of management and ordinary employees, increase the speed of work between subordinates and improve material support.

Over the next 7 years of the organization’s life, only 3 significant software products were introduced, namely the Microsoft .NET Framework, Bpm’online and K2 Blackpearl. Of these, in my opinion, it is worth highlighting the Bpm’online program, since it was this product that brought the most noticeable changes to the company's activities. Bpm’online is a system for managing the entire...
sales cycle from the need analysis to the conclusion of a transaction, the control of payments and the execution of an order. This platform is designed to create flexible information systems that can adapt to the company's business processes. RUSAL Corporation, having introduced this software product into its infrastructure, gained the support of one of the most modern and powerful software packages on the CRM market.

This innovation significantly contributed to the optimization of the work processes related to sales and customer interactions. With the help of this system, the company has been able to better adjust the tactics of transactions, manage the sales funnel and track the "pulse of sales." In addition, it is worth noting the ease of use of this software product compared to others. Bpm’online presents a simple and flexible interface that allows you to place orders and create sales with just a few clicks. At each stage of working with the interface, only the information that is needed at the moment is shown, in addition, the speed of searching for the necessary data is increased. All of these factors contributed to reducing the cost of introducing this product and simplifying employee training [13-16].

8. IT solutions and software products which must be implemented

Up to this point, we conducted a descriptive analysis, studied the history, disassembled the device of the corporation, its various segments and embedded products. Now, on the basis of the data we have studied, we want to pay attention to the fact that despite all the efforts of the corporation, due to its size, it is constantly required to optimize the activities of the employees, improve the accounting work, and also facilitate the work of the staff. Based on the foregoing, we consider it appropriate to implement a specific software package, namely the “System for Automating Pricing Processes in an Enterprise” by Force [11-12].

This system is designed for the effective preparation of planned costing estimates of goods, assistance in the formation of various price offers, price lists and price lists. The introduction of a unified pricing system will help employees of the planning and economic and related departments to conduct a coherent and clear work. Using this platform, RUSAL will be able to form a unified methodology of costing, maintain a unified database of market and procurement prices, reduce the time for collecting baseline data, and also more easily monitor regulatory information (labor intensity, rates, composition of products, etc.). In addition, there are functions for maintaining a database of unstructured information and forming a database of directories of competing companies.

An approximate simplified schedule for the implementation of this product may be as follows:

- Install the solution on the server.
- Analysis of requirements.
- Approval of requirements by the customer.
- Customize the solution in accordance with the requirements.
- User training.
- Preparation of various documentation.
- Transfer to commercial operation.

The total implementation time depends on the size of the enterprise and takes from several months to a year; in the case of RUSAL, we think the process will take at least 6-7 months.

9. Conclusion

In this paper we analyzed the activities of the transatlantic corporation RUSAL, conducted a detailed analysis of most of the company's systems, its infrastructure, main goals and development trends. Indicated what innovations in the IT-sphere were made by the organization. Based on what we now know about this organization, we can say with confidence that this is a dynamically developing, gigantic, complex enterprise in its structure, which is able to overcome various difficulties, act in conditions of fierce competition and ultimately achieve its goals.
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