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Business model as a platform for the implementation of the process approach in the machine-building industry

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Abstract. Economic growth opportunities and the country's role in the global economy are directly dependent on the use of advanced technologies in industry. Mechanical engineering, and especially the reproduction equipment sector, is a basic industry that creates a wealthy nation and a country's influence in the international market. The leading economic powers have already entered the period of the sixth technological order related to the development of micromechanics, thermonuclear and renewable energy, membrane and quantum technologies, nanotechnologies and others. In Russia at the moment, despite the measures of state support, the engineering industry is in deep decline. Major shifts in state support are needed to close this technological gap. However, enterprises themselves need to strengthen their work to improve management efficiency. The most promising method is to use a process approach, while its implementation should not be limited to documenting procedures. After all, business modeling is just a way of displaying the current and projected processes of an enterprise to improve its performance. The platform for the successful implementation of the process approach should be called the development of a business model, which should include a comprehensive analysis of the enterprise's activities, market conditions, industry and technology development trends.

1. Introduction

The level of development of advanced technologies determines the opportunities for economic growth and the degree of influence of each country on the world economy. The leading economic powers have already entered the period of the sixth technological order related to the development of micromechanics, thermonuclear and renewable energy, membrane and quantum technologies, nanotechnologies and others.

2. World industry development

According to the International Federation of Robotics (figure 1) a significant proportion of production robotization falls on Asian countries, which allows this region to have a high industrial growth rate [1].



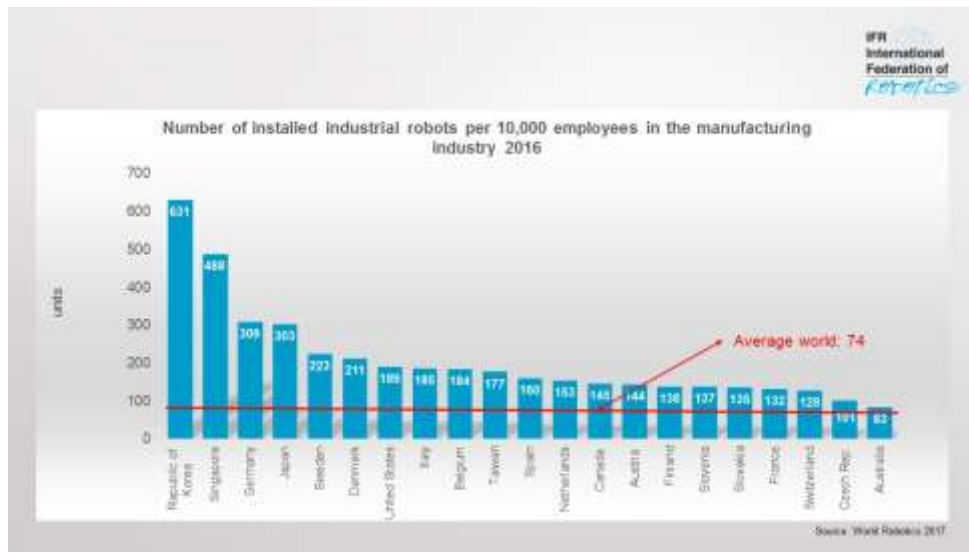


Figure 1. The degree of robotization of industry in different countries (The International Federation of Robotics. Research «World Robotics 2017»).

Advanced technology trends are being actively introduced into industrial cycles and new technologies are being developed (figure 2).

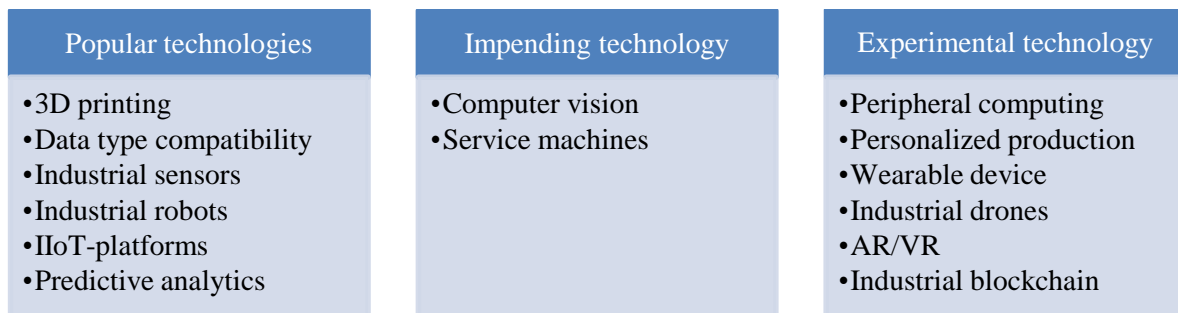


Figure 2. The main technological trends in the industry (CBInsights Research «Advanced Manufacturing Trends In 2019»[2]).

The introduction of IIoT and the transition to end-to-end automatic processes allows you to create a new type of engineering [3]:

- manufactured products become software-defined and modular;
- the equipment fleet is updated according to the model of constant modification (analogous to the DevOps model in the IT field) due to updating the software part of the products and replacing individual hardware modules;
- the manufacturer is responsible for the correct functioning of the product throughout the entire life cycle of the equipment due to the appearance of the possibility of a deep modification of the product at the stage of its after-sales operation;
- significant minimization of the human factor in production and operation (robotization, total automatic control of all production processes);
- monitoring performance indicators, modularity and software-defined design allows you to design and upgrade the product under the target market requirements;

- a shop model of production (job shop) at a new technical level with the possibility of total remote quality control of production, which allows you to organize an extremely effective "hybrid" model of capacity utilization.

3. Mechanical engineering in Russia

The engineering industry in Russia is in decline, despite a stable index of productivity:

- depreciation of fixed assets of more than 50%;
- the coefficient of renewal of fixed assets of 1.5%;
- the share of equipment older than 20 years is more than 40%;
- investments in fixed assets are insignificant, with 75% of the funds of the enterprises themselves, 25% of the funds raised and 5% of the budgets of all levels. This does not allow for a deep modernization of production. At the same time, lending to enterprises is difficult due to the long technological cycle under conditions of high cost of borrowed capital;
- low labor productivity;
- high administrative workload (30–40% of administrative staff, with a salary usually two to three times higher than the production staff);
- high tax burden;
- low profitability of engineering production (4.4% -12%, and in mining, 27.2%);
- low level of scientific research (in terms of value 0.5-0.8% of GDP, in the world up to 3.5% of GDP);
- the share of innovative products in mechanical engineering is 8-12%;
- lack of cooperation between manufacturers and scientific organizations;
- low level of diversification of production for civil needs;
- serious personnel problems, the lag of educational programs from the requirements of the industry.

The most relevant at the moment is to ensure the implementation of advanced research and development in production as soon as possible. Conducting applied research has an important role for the development of the industry, since it allows you to create a basis for technological breakthrough and the creation of new industries.

The historical features of the development of the machine-building sector in Russia have a negative role:

- deep specialization of production is a serious brake on development;
- lack of a market behavior management system;
- the lack of a clear system of enterprise performance management and independent strategic planning of its development.

A serious lag in the engineering industry creates all the conditions for the stagnation of the country's economy as a whole and the inability to exit from the role of a raw materials appendage in the global economy.

A significant change in the situation is possible only if there are effective support measures at the state level. In addition, machine-building enterprises need to pay attention to improving the quality of enterprise management and market behavior.

4. Management on the basis of process approach

Analysis of the work of large enterprises of the machine-building complex [4] shows that for the successful development of an enterprise, not only technologies and equipment, but also the efficiency

of management of market behavior are important. The most effective in the current situation will be the use of a process approach to management.

The main factors pushing the company's management to implement the process approach are increasing the efficiency of using key factors of production and resources, the need for effective management of the value chain and supply chains, the need for prompt obtaining accurate information about activities for managing the enterprise, significant growth of the enterprise by expanding areas activities and as a consequence of extensive cost increases, the need for improved product quality, decrease in competitiveness of a product, loss of a market share, decrease in rates of development of an enterprise and other crisis phenomena in the activity of an enterprise, introduction of ISO standards.

Despite the importance and complexity of the tasks solved when implementing process management, the practice of implementing a process approach in Russia shows [5] that in business modeling of current processes there is a shift in focus without the progressive development of an enterprise business model. In this case, at the enterprise, the documentation of procedures is increased many times, the knowledge of processes is increased, interfunctional interaction is simplified, and production management is improved. However, the cost of implementation does not cover this, because in a strategic sense, the effectiveness of the enterprise's activities in the market does not change significantly.

The main factor hindering the effective implementation of process management is the low competence of managers of enterprises and divisions in matters of market management and the low activity of marketing specialists in matters of strategic enterprise management. Thus, it turns out that the implementation of the process approach is not based on managing the value creation processes for customers, but on the position of production management, as in the past century [5-7].

5. Stages of implementation of the process approach

Since business modeling is only a way of displaying current and projected enterprise processes to improve business performance, the platform for successful implementation of the process approach should be called the development of a business model that should include a comprehensive analysis of the enterprise's activities. Thus, the general scheme of work on the implementation of the process approach as a project will consist of several stages (figure 3).

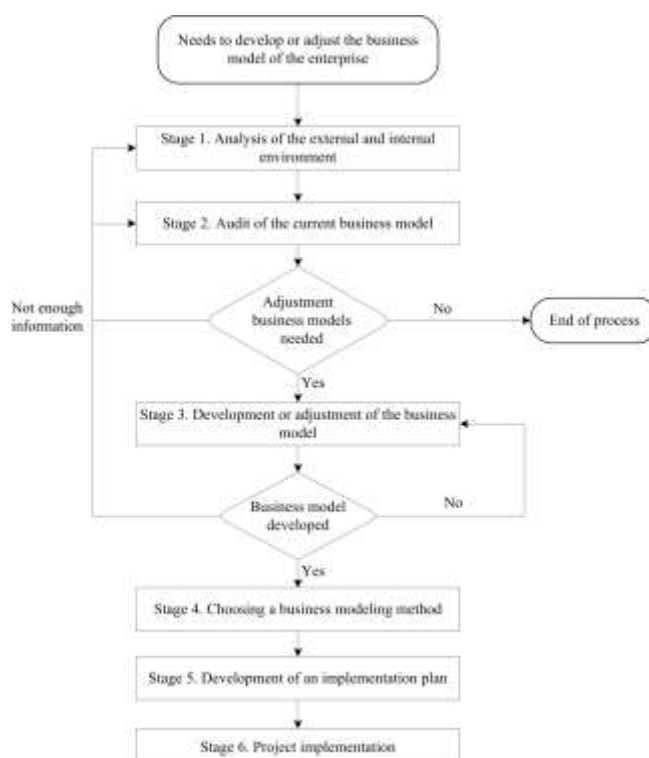


Figure 3. General scheme for the implementation of the process approach.

The resulting indicator of the development of a business model will be an increase in the efficiency of managing the market behavior of the enterprise and, as a result, sustainable livelihoods and the evolution of processes for creating value for consumers [8].

6. Conclusion

Thus, the business model is a platform for the successful implementation of the process approach. After all, business modeling is just a way of displaying the current and projected processes of an enterprise to improve its performance. The business model lays the strategic foundation for the operation of the enterprise. This allows for long-term sustainability and vector of enterprise development. Periodically conducted a comprehensive analysis of the activities of the enterprise leads to a reduction of negative impacts and structural changes. Updating the business model allows you to ensure compliance with the mission and objectives of the market, which is especially important for the engineering industry. After all, any changes in technology or equipment involve significant financial costs. Timely change of strategic goals will allow to avoid significant losses of enterprise resources.

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