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Application of ERP-systems for increase of efficiency organization of high-tech production

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Abstract. The specificity of ERP-systems application in the production of high-tech products is described. The approaches to implementation in science-intensive industrial enterprises are described. The use of ERP systems by Russian manufacturing enterprises has been expanding in the last decade. The article describes approaches to implementation in high-tech industrial enterprises of the Federal state unitary enterprise "Khrunichev state research center".

Keywords: high-tech products, enterprise, production, organization of production, ERP-systems.

Introduction

The process of manufacturing or upgrading high-tech products is a complex process that needs to be monitored in detail at each stage, and therefore, the aspect of planning production resources is very important. ERP systems (Enterprise Resource Planning) are used to solve this problem. An ERP system is a company's resource management system. Researchers are constantly studying the development of such systems [1], especially since their steady growth in the Russian economy has been observed in recent years – figure 1.

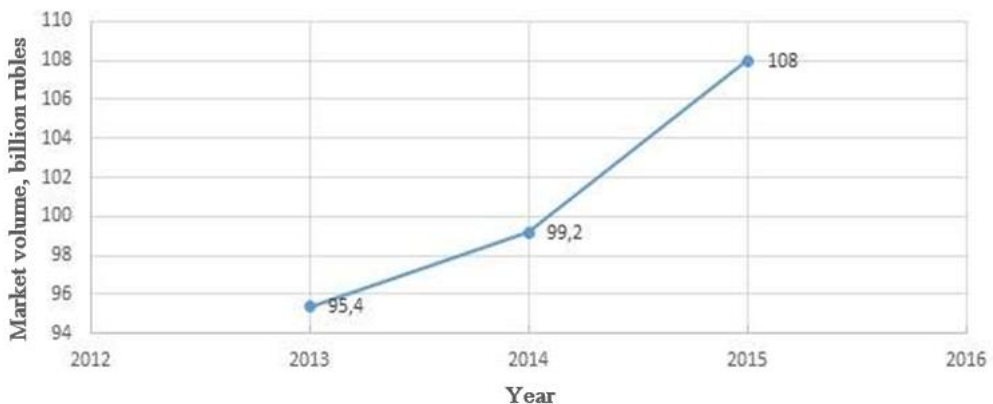


Fig. 1. Dynamics of the Russian ERP system market / Ksenia Arkhipova partner, Executive Director of The Audit and Consulting Group Delovoy Profil (GGI) Top 10 ways to fail an ERP system implementation project / Financial Director, September 12, 2017.

Methods and materials

Usually, such systems are implemented at large industrial enterprises with complex production, a large range of high-tech products, a long production cycle, an extensive network of branches, and an increased volume of warehouse operations. Their main advantage is that they combine a large number of tasks.

The systems allow, taking into account the company's strategy, to optimize the following directions:

- production management, planning optimization;
- cost management and cost price calculation;
- financial resource management, budget planning;
- managing customer relationships, interacting with partners and accounting of customer operations history;
- sales and purchases management;
- tax reporting, accounting, and transformation of reporting from Russian Accounting Standards to International Financial Reporting Standards;
- human resource management, wage calculation;
- asset management;
- analysis and monitoring of the enterprise's key performance indicators.

The above directions automate the main business processes of the production enterprise and are aimed at increasing its overall productivity.

According to research by ERP system integrators, the effect of implementation is reducing costs for material and production resources by an average of 17%, production costs by 19%, costs price by 9%, the volumes of the material and production reserves by 26%, reducing order execution times by 24%, reducing labor costs by 29% , and increasing profits by an average of 9%. The article [2] provides a detailed overview of the main suppliers of ERP systems, key features of the proposed software packages and their main purpose in terms of functionality. The article [3] presents the main approaches and strategies for implementing ERP systems in the production enterprise.

According to forecasts of the analytical Agency Allied Market Research (AMR) [4] the international market of ERP systems is growing annually by an average of 7.2% and will reach 41.69 billion US dollars by 2020. A significant number of solutions that take into account the specifics of production organizations are available on the market. Foreign experts have compiled a list of leading suppliers. When compiling this list, five key indicators were taken into account: market share, duration of implementation, cost of implementation, payback period, and functional efficiency assessment received from customers. According to Panorama Consulting Solutions [5] most often in the foreign market in 2018, ERP systems of the American vendor Oracle were implemented.

According to this study, the payback period of 50% of ERP implementations averaged 3 years, and 30-80% of companies managed to achieve their goals, mainly related to ensuring the availability (80%) and reliability (55%) of data, increasing the integration of processes (46%), productivity (44%), more competent decision-making (43%) and reducing costs (37%), 42% of respondents recognized the implementation of the ERP system as successful and 68% are satisfied with the interaction.

Results

On the Russian market, there is a quite wide range of Russian and foreign companies that develop and deliver ERP systems (including SAP, Oracle, BAAN, 1C ERP: enterprise management).

Over the past few years, the use of ERP systems by Russian manufacturing enterprises has been gradually expanding, which leads to resource management optimization, cost price reduction, and quality improvement, the functionality and business process transparency increase, and bottlenecks identification. However, the use of it is associated with a significant cost of ERP systems, high costs for the implementation, service and maintenance of systems, a significant shortage of highly qualified specialists in the production of high-tech products.

The decision to implement systems is based on the assessment of the need to structure business processes, optimize costs, control the profitability of high-tech products, receive timely and reliable reports, and monitor the economic efficiency of activities. The costs of implementing ERP systems differ significantly depending on the chosen integrator and implementation option.

Examples of implementing an ERP system for a high-tech enterprise include the "Khrunichev state research and production space center", a leading enterprise in the rocket and space industry, and JSC "ISS Reshetnev Company", a Russian developer and manufacturer of communication, broadcasting, navigation, and geodesy satellites.

The production of high-tech products in the company involves a significant investment of time and resources. That is why there is a need to implement ERP-systems for managing production resources, which, while maintaining high requirements for technical characteristics, safety and reliability, allow you to solve the main tasks-automate the main business processes, monitor key performance indicators of the enterprise, organize interaction between services and departments, coordinate the activities of production units, evaluate the efficiency of the enterprise, individual divisions and personnel.

Conclusion

Another important and poorly studied problem is the use of Big Data, blockchain, and machine learning ERP systems in enterprises when implementing and developing them. All this poses new challenges for both developers of such systems and representatives of enterprises. Bart Perkins believes that even groups that support ERP can get frustrated if the implementation team provides poor support or is perceived as rude or irresponsible. Disillusioned supporters can turn into angry critics when they feel they are being taken for granted and do not provide the required support [6].

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