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QUALITY SUPPORT OF AN INNOVATION-ORIENTED ENTERPRISE

Volodimir Davydenko, Irina Suvorova. «*Quality support of an innovation-oriented enterprise*». The article is devoted to the quality support of innovation-oriented enterprises. The article describes theoretical and practical aspects of the development of innovation-oriented enterprises. The classical approaches to the management of innovation-oriented enterprises are highlighted. The methods of managing innovation-oriented enterprises are analyzed. Extended explanations of the methods of managing innovation-oriented enterprises are provided. The main reasons that lead to resource losses are considered. An analysis of the basic tools and methods that can be used in the implementation of quality management of innovation-oriented enterprises is carried out. The possibilities of obtaining benefits from the introduction of new and advanced quality assurance technologies that work to increase competitiveness are considered. The tools based on the innovative type of development of industrial enterprises are considered. The main areas of improvement in the management system of innovation-oriented enterprises are identified. Critical aspects in the management system of innovation-oriented enterprises have been identified. The possibilities of using modern methods of management of innovation-oriented enterprises are analyzed. The classical models of management of innovation-oriented enterprises are specified. The main advantages of using the methods of management of innovation-oriented enterprises are proposed. Recommendations for further research in the field of management of innovation-oriented enterprises have been provided.

Keywords: innovative development, innovation-oriented enterprises, quality, quality assurance, reengineering, quality management methods

Володимир Давиденко, Ірина Суворова. «*Підтримка якості інноваційно-орієнтованого підприємства*». Стаття присвячена якій підтримці інноваційно-орієнтованим підприємствам. У статті викладені теоретичні і практичні аспекти напрямки розвитку інноваційно-орієнтованих підприємств. Висвітлено класичні підходи до управління інноваційно-орієнтованими

підприємствами. Проаналізовані методи управління інноваційно-орієнтованими підприємствами. Надані розширені пояснення щодо методів управління інноваційно-орієнтованими підприємствами. Розглянуто основні причини, які призводять до виникнення ресурсних втрат. Проведено аналіз базових інструментів та методів, які можуть бути застосовані при запровадженні якісного управління інноваційно-орієнтованими підприємствами. Розглянуто можливості отримання переваг від запровадження нових та прогресивних технологій забезпечення якості, що працюють на підвищення конкурентоспроможності. Розглядається інструменти, які базуються на інноваційному типі розвитку промислових підприємств. Визначаються основні напрямки вдосконалення в системі управління інноваційно-орієнтованими підприємствами. Були визначені критичні аспекти в системі управління інноваційно-орієнтованими підприємствами. Проаналізовано можливості використання сучасних методів управління інноваційно-орієнтованими підприємствами. Зазначені класичні моделі управління інноваційно-орієнтованими підприємствами. Запропоновані основні переваги від застосування методів управління інноваційно-орієнтованими підприємствами. Надано рекомендації подальших досліджень в області управління інноваційно-орієнтованими підприємствами.

Ключові слова: інноваційний розвиток, інноваційно-орієнтовані підприємства, якість, забезпечення якості, реінжиніринг, методи управління якістю.

Introduction. In today's conditions of accelerating scientific and technological progress and the desire of countries to increase their influence on the global distribution of market niches, the study of quality assurance opportunities in innovation-oriented enterprises is of particular relevance and importance.

The innovation potential of an enterprise is a set of various resources necessary and sufficient to carry out the required scale of innovation activity with the specified criteria of its effectiveness. For this purpose, qualitatively heterogeneous elements of the innovation potential should be organized as independent subsystems and adapted to the structure of a more complex enterprise system.

The direction of innovative development of an enterprise is a certain path or movement based on the introduction and implementation of innovations that lead to an improvement in the quantitative and qualitative characteristics of the enterprise, ensure the strengthening of its market position and create conditions for progressive development [3].

It is extremely important to realize the importance of the transition to a qualitative innovation breakthrough by an enterprise.

Insufficient attention to stimulating the innovation activity of industrial enterprises has led to Ukraine's sharpest lagging behind the global level of development of advanced countries, including low welfare of the population.

A special and distinctive feature of innovation-oriented enterprises is the extreme dynamism of their external environment. The processes taking place in the external environment of innovation-oriented enterprises are not only non-deterministic, but the factors determining the dynamism and variability of the external environment of enterprises are also increasing.

Analysis of recent research and publications. G. Azgaldov, G. Bagiev, B. Berman, B. Burkinsky, M. Gerasymchuk, A. Glichev, P. Zavyalov, J. Petrovich, E. Reichman, and others have had a significant impact on the modern theory and practice of quality assurance. The activities of innovation-oriented enterprises have been studied by foreign and Ukrainian scholars: J. Bailey, I. Blank, V. Geets, V. Hryneva, V. P., S. Ilyashenko, G. Kozachenko, Fedulova, O. Yastremska and others.

Identification of previously unresolved parts of the overall problem. Modern

quality management theories are based on the idea of satisfying the needs and expectations of a particular consumer. In fact, the concept of "quality" refers not only to the product, but also to quality assurance in general. The quality object is understood as [4]:

- an activity or process;
- product, which in turn can be tangible or intangible, or a combination of both;
- organization, system or individual;
- any combination of them.

A qualitative approach to the management of innovation-oriented enterprises involves the study of current actions to achieve the desired goals in the future.

The main external and internal factors that hinder the development of innovation potential include [3]

- uncertain state policy in the field of innovation development;
- lack of financial assistance to innovation-oriented enterprises;
- high wear and tear of technological equipment, lack of a modern production base for development;
- lack of specialists in the field of innovation implementation capable of managing innovation activities at the level of quality assurance;
- lack of an effective organizational and management mechanism for the development of innovation activities, no methodology for managing innovation potential;
- inconsistency of the business model of the enterprise with the chosen innovation strategy;

- lack of a model of cooperation with other enterprises engaged in innovation and research centers;

- the existence of the "phenomenon of resistance to innovation" on the part of both the management of enterprises and functional executives;

- lack of coherence between the innovation strategy and the culture that supports innovation.

Summary of the main research material. Quality assurance is carried out using the main modern methods and tools, in particular, the following:

- Business Process Reengineering (BPR);
- TIPS - the theory of inventive problem solving;
- Innovation and technology policy of the enterprise;
- Just in time method;
- Balanced Scorecard (BSC);
- ABC/ABM methodology.

Reengineering is a fundamental rethinking and radical redesign of business processes to achieve significant improvements in such key performance indicators for modern business as costs, quality, customer service and efficiency [1].

Business process reengineering (BPR) is necessary to achieve strategic goals and bring the organizational structure in line with the organization's development strategy. Business processes are the standards of operations on which the correction of the organizational and functional model is based, and policies and procedures for personnel activities are prescribed (Fig. 1).

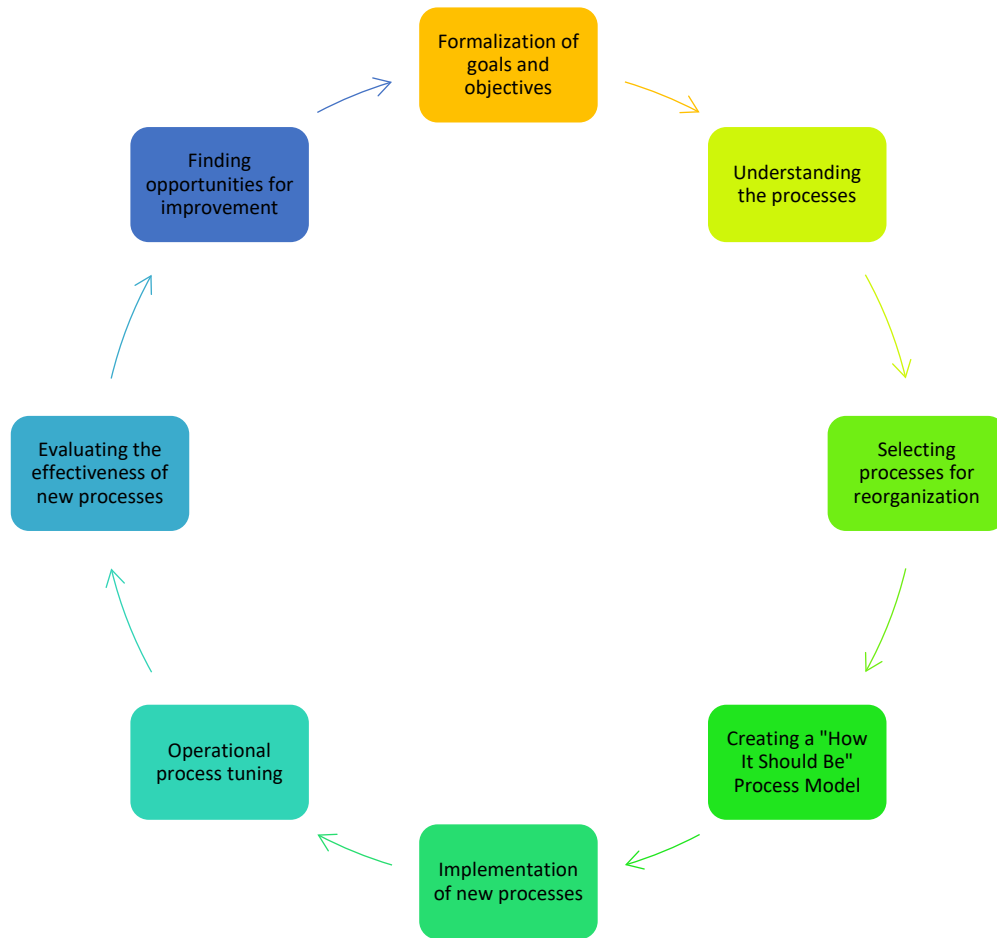


Figure 1. Business process reengineering

The object of change in reengineering is business processes. This is the main difference between reengineering and restructuring, for example, where the object of change is the organizational structure. Reengineering technologies are based on the fact that business processes are primary, and the company's organizational structure is secondary and is only a means of executing processes. Therefore, improving the company's operations should start with improving business processes, not the organizational structure. After reengineering, the company's work should be process-oriented, and the company's management model should use a process approach, which should be reflected in the organization's organizational structure.

In BPR, new goals and methods have been brought to the forefront, which are

dictated by the situation of increased competition: reducing the time spent on performing functions, reducing the number of staff and other costs of performing functions, working with clients and partners anywhere in the world, working with the client in the 24*365 mode, increasing staff mobility, fully meeting client needs, and introducing new technologies [1].

To ensure the effective operation of BPR, TIPS is sometimes used in conjunction with it. The Theory of Inventive Problem Solving (TIPS) is designed to solve inventive problems and form inventive thinking. Inventive thinking is a systemic thinking that identifies and resolves contradictions that lie in the depths of a complex problem (inventive problem) (Fig. 2).

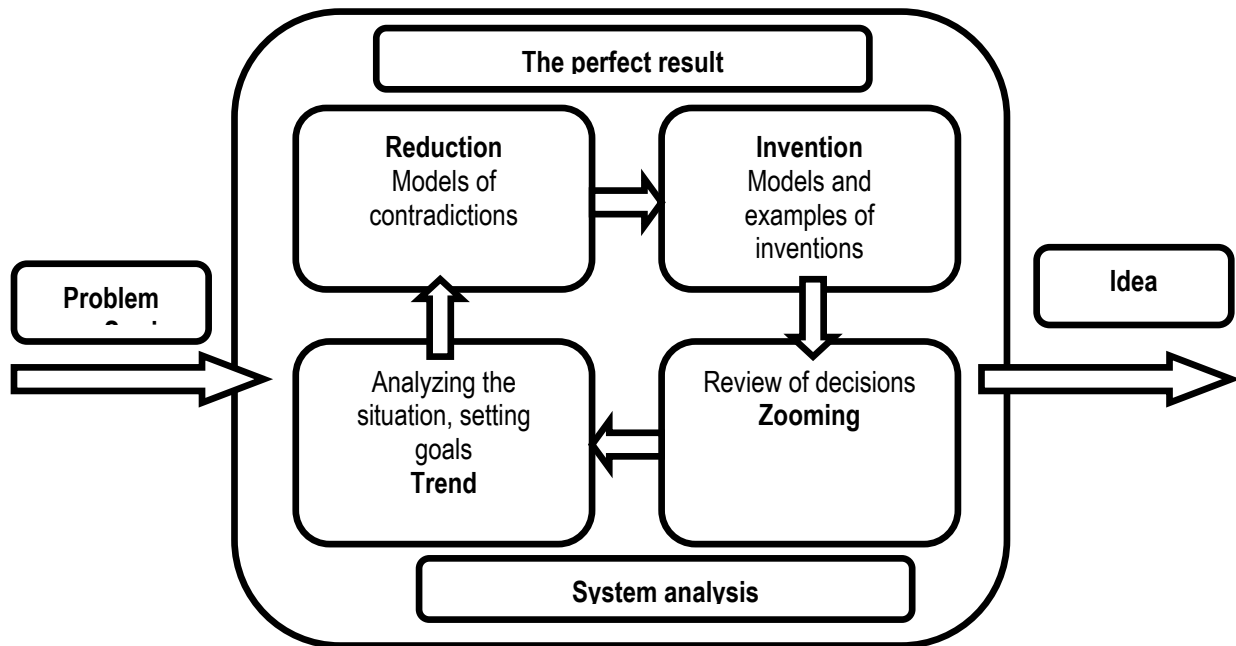


Figure 2 – The theory of inventive problem solving

TIPS allows not only to solve complex inventive problems, but also to predict the development of systems (including technical ones) and develop creative thinking [6]:

- Stage. At the first stage, the problem is diagnosed, the causes of the problem are investigated, and the goal and direction of the problem are outlined.

- Reduction. A model of the problem is built, its adaptation to a simpler format, in the form of a standard or radical contradiction.

- Invention. Creativity and professional knowledge are involved. Standard models of transformation of the initial situation are used in order to eliminate contradictions and obtain an "ideal" result.

- Zooming. Consideration of a new idea on a new scale and in a diverse systemic environment

TIPS functions [5]:

- solving creative and inventive tasks of any complexity and direction without going through the options;

- solving scientific and research problems;

- identification and elimination of the causes of defects and emergencies;

- maximizing the efficient use of resources and equipment to solve problems;

- forecasting the development of technical systems, their objective assessment and obtaining promising solutions;

- systematization of knowledge in any field of activity, which allows for more efficient use and development on a fundamentally new basis;

- development of creative imagination and thinking, qualities of a creative personality and creative teams.

Another quality assurance tool is the company's innovation and technology policy. The company's innovation and technology policy is mainly aimed at achieving strategic goals in the field of ensuring the competitiveness of its products, technologies, production and other facilities. Without an innovation and technology policy, an enterprise would not be able to survive in the current environment, when the competitiveness of the enterprise and its products are the most important factors of its activities and economic sustainability (Fig. 3).

At all levels of enterprise management, the main goal is to achieve sustainable development of its economy, which is characterized by an increase in key statistical indicators and final indicators in certain amounts and in the optimal ratio between them.

The sustainable state of an enterprise is its state in which the enterprise is able to maintain profit at a given level. A given level

of profit should ensure the constant development of the enterprise over time.



Figure 3 – Innovation and technical policy of the enterprise

Economic sustainability can be defined as ensuring that an enterprise is able to conduct profitable production and innovation activities by improving the efficiency of production resources and enterprise management, a stable financial position by improving the asset structure, as well as stable development of the enterprise's capacity and social development of the team through self-financing. It is the ability of an enterprise to withstand the threat of bankruptcy. The economic sustainability of an enterprise is determined by the level of its economic potential, which depends on the implementation of a number of strategic conditions.

Sustainable development of an enterprise is directly related to the sustainability of individual elements of the system of socio-economic development of an enterprise, which largely depends on the innovation and technical policy of the enterprise. It is the innovation and technical policy of an enterprise that determines the reaction of the enterprise management

system to changes in the external environment in order to prevent the collapse of the managed system and the parameters of its functioning going beyond certain limits. At the same time, an enterprise is a dynamic system capable of changing under the influence of the external environment. The economic sustainability of an enterprise depends on its internal capabilities to effectively use all the resources at its disposal. A properly developed innovation and technical policy of the enterprise determines the main resources of the enterprise, and therefore its economic sustainability.

The innovation and technical policy of an enterprise is a system of strategic measures carried out by the management of the enterprise in the field of product quality improvement, resource saving, organizational and technical development of production as components of the management system [3].

Innovation and technical policy is a part of the overall strategy, which provides for a clearer planning of actions and steps to be

taken to implement this strategy at the level of production processes [3].

The stages of development and implementation of the innovation and technology policy of the enterprise include [3]

- conducting marketing research to determine the level of competitiveness of manufactured goods and developing strategic measures to achieve the competitiveness of goods in the future;

- development of the company's strategy, which includes the ideology of innovation and technology policy;

- conducting research and development work to create competitive goods;

- organizational and technological preparation for the production of new goods;

- production and sale of new goods of the enterprise.

Resource saving is considered an important factor in innovation and technology policy. Resource saving methods include technological processes, organizational and economic methods of saving resource consumption. Resource saving methods are implemented through organizational and technical measures.

Resource saving strategies at the enterprise can be the following [3]: simplification of the structure, principle of operation of the product; interspecies and intraspecies unification of the components of the product; improvement of the manufacturability of the product design; organizational and technical development of production, etc.

Just-in-time is a concept of management of manufacturing enterprises. "Just-in-time" (JIT) is a production philosophy aimed at continuous improvement and based on the systematic elimination of all unnecessary things, i.e., everything that leads to an increase in the cost of products without increasing their consumer value [4]. In a narrow sense, it is the supply of the necessary materials to the right place at the right time, which implies a high degree of synchronization of production operations.

To achieve the main goal within the ideology of cost reduction, three auxiliary goals must be achieved [4]:

1. Volume management. Production volume planning - both monthly and daily - must be flexible to respond to fluctuations in demand.

2. Quality management. A system must be in place to guarantee defect-free products at every stage of production. To ensure product quality, the JIT system involves the implementation of a total quality control system or TQM.

3. Respect for employees. It is impossible to achieve high productivity (as well as cost reduction) if the company does not effectively develop the talents and skills of employees, does not encourage their enthusiasm and does not respect them.

JIT is a philosophy of effective management, the main principles of which include the following [4]:

- any unnecessary actions that increase the cost of production but do not increase its consumer value should be eliminated;

- "Just-in-time" is not a fixed result, but a continuous process that never stops, and involves certain steps and boundaries;

- Inventories are unnecessary, their reduction increases the efficiency of the enterprise;

- the main factors that determine product development and production are customer preferences. This is the trend of continuously bringing the properties of the final product closer to the needs of consumers;

- flexibility of production, which includes a quick response to customer requests, as well as changes in qualitative and quantitative parameters, is extremely important for maintaining high quality and reasonable prices for products;

- principles of mutual respect and support should prevail both within the organization and in relations with suppliers and customers;

- an employee who is well versed in his or her role is the best resource for ensuring

the process of continuous improvement. In other words, not only the hands of employees should be used, but also their brains.

Thus, JIT is not only a way to minimize inventory, but also a system of product quality management and employee management, which also improves coordination and increases the efficiency of the enterprise.

In order to be able to constantly adapt to changing market conditions better than their competitors, to outperform them in terms of quality, speed and flexibility of service provision, product range or price, company executives need to receive prompt information about the company's activities to make timely management decisions. The conceptual and technological link between the strategy and the organizational solutions used is of great importance.

The Balanced Scorecard (BSC) ensures the integration of financial and non-financial indicators, taking into account the cause-and-effect relationships between the resulting indicators and the factors under which they are formed. This allows for detailed monitoring of the company's activities in a strategic focus, increasing the efficiency and effectiveness of management decisions, controlling the most important financial and non-financial performance indicators, that are targeted for the company and the degree of achievement of which determines the company's movement in accordance with a given strategy.

The Balanced Scorecard translates the mission and overall strategy of an organization into a system of interrelated goals and indicators, since, according to the developers of the system, management is essentially the translation of strategy into measurable goals.

When applying the balanced scorecard, the strategy is usually broken down into four aspects [5]:

- financial aspect;
- aspect of customer relations;
- the aspect of organizing internal business processes;
- training and development aspect.

A balanced scorecard allows you to control the company's activities, signals emerging problems, combines strategic and operational management, and reflects the main financial and non-financial performance indicators of the company. Performance indicators are necessary to measure the degree of achievement of strategic goals based on the company's strategy, as well as to calculate the efficiency of personnel, the effectiveness of business processes, etc.

The difference between the balanced scorecard and other management systems is as follows [5]:

- it manages not only financial indicators, but also non-financial ones;
- it is a system of management by means of indicators, not a system of measuring indicators;
- manages the company by combining all processes together;
- it is a management system not only for the company's managers, but also for all employees.

It is believed that more advanced business processes provide the most significant and easily sustained benefits than products. It is much more difficult for competitors to copy them than product ideas. The use of ABC, an operationally oriented alternative to traditional financial approaches, allows us to emphasize the close connection between the organization of processes and financial results of the business. This highlights possible ways to improve the organization's financial performance through improved operations. In addition, it allows you to respond flexibly to a variety of orders - to satisfy them quickly and at an affordable price.

The result of applying the ABC methodology is an accurate determination of the profitability of a product, service or organizational unit, which allows you to make the right decisions in the future. The total cost of each function is the sum of individual cost elements; functions can form a hierarchical structure and be grouped into functional centers. Together, these objects and the

relationships between them form the ABC / ABM model. The total cost of each function is transferred to value objects using functional

factors. A functional factor is a measure of the use of a given function by a cost object (Fig. 4).

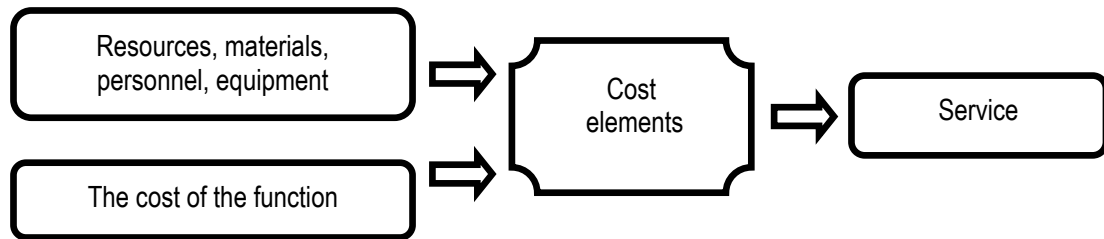


Figure 4 – Model ABC/ABM

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factors. A functional factor is a measure of the use of a given function by a cost object.

A prominent place among these methods is occupied by statistical methods in the quality management system. As a rule, they are widely used in the process of quality control in production. However, in modern conditions, the scope of their use has significantly expanded to the areas of planning, design, marketing, logistics, etc.

Table 1 – Statistical methods in the quality management system

Areas of work	Characteristics	Methods
Functional and cost analysis	Calculation of the real value of an object (product, service, technology, organization) based on the analysis of its functions at different stages of the life cycle; identification of cost centers; analysis of cost factors and performance indicators of business processes.	VA, ABB, ABC, ABM, ARP
Functional and structural modeling	Description of business processes in the form of a system of interconnected functions, definition of performance indicators.	SADT, IDEF0, DFD
Information modeling	Description of the system in terms of objects; description of the information structure of objects; identification of relationships between objects.	IDEF1X, ERD
Analysis of business organization	Determining the mission, hierarchy of goals, business principles; analyzing processes from the perspective of quality management; evaluating the effectiveness of business processes; specifying requirements for an information support system.	BPR, TQM, STD, CPI, BPI, Benchmarking
Simulation modeling	Modeling the behavior of an enterprise (enterprise model) in different conditions; analysis of critical operating modes; analysis of dynamic characteristics of business processes; analysis of resource allocation.	CPN, STD, IDEF3

Conclusions. It is worth noting that the presented list of modern methods and tools of quality management is not exhaustive and

can be supplemented and expanded in the process of analyzing the experience of modern innovation-oriented enterprises.

Quality improvement as one of the tasks in the enterprise quality system is a continuous management activity of the enterprise aimed at improving the technical level of products, the quality of their manufacture, improvement of production elements and the enterprise quality system itself. In a competitive market, an enterprise is interested in obtaining results that are better than the initially established standards. Ensuring the optimal functioning of the

company's quality system is the basis of its competitiveness.

In order to meet the ever-changing needs of customers and respond to the actions of competitors who also want to meet them, competing organizations must solve a new problem. They must constantly collect information about changes in customer needs, strategies and tactics of competing firms, as well as changes in their resources, technological capabilities and capacities.

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