



**The Ministry of Education of Azerbaijan Republic**

**ANALYZING BENCHMARKING OF BUSINESS  
PROCESSES AND ITS BASIC CONCEPT.**

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## **Abstract**

The need and desire to use the best world, not only domestic achievements, gradually reaches the Azerbaijan business. Radical economic reform, providing for a change in the form of ownership, the right of enterprises to economic independence and management of labor results, in particular in determining material, labor and financial resources, distribution of profits of enterprises and the possibility of entering foreign markets, the need to prepare for WTO accession, create objective economic conditions, and causes the need to apply new approaches, tools, styles and methods of management in the activities of enterprises. It can be reasonably argued that, with the transition to new business conditions in Azerbaijan, positive processes will increase, allowing the question of the effective management of enterprises to be put as the most important practical task. And benchmarking can and should become one of the ways to solve it.

Today benchmarking is the initial and integral basis for assessing and justifying plans to improve and enhance the competitiveness of many successful enterprises, each of which strives to become better than other market participants in one way or another or in their totality and preserve the obtained benefits for as long as possible. In the context of globalization, the creation of a mixed economy and the development of market relations in Azerbaijan poses several tasks for economics and practitioners, without solving which it is impossible to ensure a given growth rate.

Thus, benchmarking is not only an advanced technology for competitive analysis. This is, firstly, a concept that implies the development of the company striving for continuous improvement, and, secondly, the process of improvement itself. This is a continuous search for new ideas, their adaptation and use in practice. Benchmarking can bring substantial benefits to companies of any size, from small businesses to multinational corporations. This tool leads to improve work efficiency, to a reduction in production waste and rework of finished products, to the elimination of many quality problems. Benchmarking helps to improve business processes relatively quickly and at lower cost, allows you to understand how advanced companies work, and to achieve the same or better results.

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## **Introduction**

The purpose of my research is to determine the role of benchmarking in industry and to identify changes in the process of production that caused by this method. My report discusses the essence of benchmarking and explains its basic concepts and implementation process. Various benchmarking methods are presented and the objectives and benefits of each are explained.

When benchmarking is done properly, it can give a company a lot of advantages. The criteria for successful benchmarking are a well-chosen team, in-depth process detailing, management's interest in the results, integration of benchmarking results with strategic development plans. Benchmarking allows companies to go beyond your daily activities and existing restrictions and find new ideas for improving work. Through the use of benchmarking, companies can avoid many mistakes, as well as increase the profit of the organization in a relatively short time.

In recent years, benchmarking has become one of the effective methods of business improvement and is among the most popular management tools. In this work, the application of benchmarking in production is mainly studied, since the basic meaning of industry is formed in production. Therefore, more attention has been focused on production, but in the future benchmarking can be applied to other industrial systems

Azerbaijan already has organizations that use benchmarking as a tool to improve business performance. For most managers, “benchmarking” is an unfamiliar word, and the reference comparison is perceived not as a management method, but as an ordinary competitor analysis or marketing research. However, the potential of benchmarking is great, and there is the possibility of successfully applying this tool in economic analysis. In my work I considered the perspectives of applying benchmarking tool by Azerbaijani companies. One of the main reasons for the poor use of this method of management by Azerbaijan organizations is the lack of a methodological basis for its implementation. In this regard, it seems highly relevant to study the international experience of benchmarking and develop a methodology for comparative analysis of cooperative organizations.

Research questions is:

1. What is benchmarking and its advantages
2. How and in which form benchmarking is applied in the industrial production system
3. What effects does benchmark form
4. Perspectives and challenges of applying the method of benchmarking in Azerbaijani companies

## **1.1 THE UNDERSTANDING OF BENCHMARKING AND THEORETICO-METADODOLOGICAL VIEWS ON IT.**

In the conditions of unprecedented toughening of competition caused by globalization, when companies have to compete with the world's best players not only on the external, but also on the domestic market, the company need to see its own strengths and weaknesses, constantly search for and find ways to strengthen its competitive advantages, identify and eliminate lack of effectiveness. One of the ways to solve these problems is benchmarking, which is relatively new, but it has become very popular in management practice in recent years to improve the company's activities.

The term “benchmarking” is denoted as one of the tools for improving activity. The name of the methods comes from the English words bench (level, height) and mark (mark). This phrase is interpreted differently: “reference mark”, “elevation mark”, “reference comparison”, etc. The head of the Global Benchmarking Network, Dr. R.C. Camp, said: “Benchmarking is an ongoing process of studying and evaluating products, services and production experience of the most serious competitors or those companies that are recognized leaders in their fields.” (Robert C. Camp 1989)

The executive director of Allied-Signal, L. Bossidy, refers to benchmarking as analyzing specific techniques, borrowing the benefits obtained from analyzing the experience of other companies, and using in our own company the best techniques brought into it from outside. (Mikel J. Harry 2003)

B. Andersen, a professor at the Norwegian University of Science and Technology, gave the most comprehensive definition of benchmarking: “Benchmarking is a continuous measurement and comparison of a single business process with a reference process of a leading organization for collecting information that will help the enterprise in question to determine its improvement goal and to carry out improvement measures work.” (Bjorn Andersen 1999)

Most experts are of the opinion that benchmarking is the study and implementation of management methods of other organizations that successfully work with their help by comparing with them after identifying the weak sides of their organization. The key words in

these definitions are “comparison” and “standard”. Moreover, the comparison can and should be made not only with other organizations, but also within the organization with the best departments, services, processes, etc., which allows us to consider benchmarking as a method of continuous improvement of any type and level of activity by means of a reference comparison. At the same time, the standard as a conditional level cannot remain constant; it must correspond to changes in the external conditions and the capabilities of the enterprise.

Thus, benchmarking is not only an advanced technology for competitive analysis. This is, firstly, a concept that implies the development of the company's desire for continuous improvement, and secondly, the process of improvement itself. This is a continuous search for new ideas, their adaptation and use in practice. Benchmarking can be used as a method of analyzing the cost of quality.

The concept of benchmarking originated in the late 1950s, when Japanese experts visited leading companies in the USA and Western Europe to study and then use their experience. The term “benchmarking” appeared in 1972 at the Cambridge Institute for Strategic Planning (USA). Research and consulting company Pims has found that to find an effective solution in a competitive environment, it is necessary to study and use the experience of other enterprises that have success in related fields. In 1979, the American company Xerox launched the project “Competitiveness of Benchmarking” to analyze the quality of its own products and the costs associated with production, compared with the results of Japanese manufacturers. Since then, benchmarking has been treated with confidence.

The evolution of benchmarking is moving along the traditional path from simple to more complex, from generalizing practical best practices in this area to creating scientifically based methods and theories.

**The first** generation of benchmarking is interpreted as a retrospective analysis of the goods.

**The second** generation, benchmarking of competitiveness, develops like Science in 1976-1986 thanks to the activities of Xerox.

**The third** generation of benchmarking falls on 1982-1986, when quality enterprises find out how to learn from enterprises outside their sector or industry, and not from their competitors.

**The fourth** generation of benchmarking is a strategic benchmarking, which is considered as a systematic process aimed at evaluating alternatives, implementing strategies and improving performance characteristics based on a study of successful strategies of external partner enterprises.

**The fifth** generation - global benchmarking - is considered a future tool for organizing international exchanges, taking into account the culture and national characteristics of production organization processes. Thus, a new direction in management appeared - cross-cultural management, which consists in comparing the methods and principles of management, that is, management at the interface of business cultures.

The majority of opportunities for creating and maintaining a competitive advantage an enterprise lies beyond its limits, that is, consist in the effective establishment and development of business relationships with other business entities and government agencies. In order to resist the unexpectedness of competition and the influence of factors in the macro environment, it is necessary to increase attention to cooperation with the subjects of the marketing system.

In practice, marketing research is generally understood as a process of collecting and analyzing information, primarily about consumer needs and strategies of competitors, as well as about threats to the external environment. The information obtained is a valuable basis for improving the range, adjusting the pricing policy, as well as other components of the marketing mix. However, such information is often insufficient for analyzing the internal causes of excessive costs, leading to inflated prices compared to competitors; or problems with ensuring the desired level of quality. A customer survey reveals a consequence, that is, aspects of their satisfaction or dissatisfaction, but not causes, that is, necessary intercompany measures to improve the effectiveness of its activities. One of the solutions to this problem lies in finding ways to obtain information in various aspects of activity from other firms and to take measures that would be based on the best experience found and would lead to maximum efficiency. Benchmarking is a philosophy and tool for conducting marketing research in order to identify

sources of competitive advantage, increase competitiveness and form effective business strategies.

Benchmarking is especially useful in setting the task of continuous self-improvement, because it allows the company to overcome established trends to improve the quality, productivity, output volumes by the same percentage per year. Such a gradual, even development can sometimes consolidate and widen the gap between the analyzed company and the leaders who started their development earlier.

Benchmarking provides an opportunity to set more ambitious, but still realistic goals of the enterprise by analyzing the standards that characterize the best business practices and comparing the critical elements of the functioning of your enterprise with these standards. This approach has particular advantages in improving auxiliary processes, since here both direct competitors and enterprises belonging to other industries can be chosen as a benchmark for comparison, since auxiliary processes often have similarities regardless of industry affiliation.

To show possible options for benchmarking positioning in the enterprise management system, we will give some more definitions of this concept, more fully revealing its essence in comparison with the classical definition of R. Camp.

Benchmarking is a constant, systematic process of comparing one's own efficiency, expressed in productivity, quality and organization of work processes, with enterprises and institutions that are “best”.

M. Pendolini showed that benchmarking can be positioned as part of the overall decision-making process with a clear focus on improving the organization.

Benchmarking, that is, comparing with other enterprises or other departments and taking experience from those who are better at functions or processes that need changes, is a good way to stimulate change in enterprises. Using benchmarking, firms can explore many areas that affect the competitiveness of an enterprise, such as the ordering process, the product development chain from the inception of the concept to commercialization, and a variety of administrative procedures.

Analyzing the views of various authors on the essence of benchmarking, we can conclude that the practical experience of using benchmarking significantly complemented and changed the most well-known definition of Robert Camp, which appeared in the late 1980s.

Benchmarking began to pay more attention not only to collecting information for comparison and methods of selecting the best enterprises that can become the standard of behavior, but also developing a corporate culture within the enterprise that would contribute to the perception of best working methods.

In statistics, benchmarking denotes a base, i.e., with which a new or actual indicator is compared. In information technology, benchmarking evaluates the quality characteristics of a computer by comparing it with another computer with a standard configuration. In entrepreneurship, benchmarking is associated with finding and studying the best methods of organizing processes, which become the standard, reference point for the firm and it then runs its business with higher quality and more productively. Benchmarking functions represent the essence in action. Benchmarking functions are primarily product policy, pricing, communication, and sales.

Commodity policy. It determines the type of goods, or rather, what problem the client will solve. The solution to this problem is inextricably with the definition of market segments in which the company operates whose needs it intends to meet. Another major problem is finding, achieving and maintaining an optimal level of quality, i.e. the level at which the need will be met. Another problem is the optimization of the assortment, the determination of the desired degree of variety of options for the offered goods, the choice of the speed of updating the assortment. Within the framework of product policy, the problem of service is also solved in cases where it is necessary for the full and rational consumption of goods.

Pricing. In the implementation of this function, one of the most difficult problems is determining the optimal price for a new product. It is carried out most often experimentally. Here the main tools are markups and discounts. Difficult problems of both economic and psychological nature arise and are solved taking into account the market perception of price dynamics.

Communications. The most important and most voluminous block of problems is the problem of advertising as any form of non-personal representation and promotion of ideas, goods and services, paid for by a clearly established customer. Relations with the public are booming in the modern world. Personal contacts - postal, telephone, in conversation - are especially effective in promoting individualized, high-tech or simply expensive products. Recently, especially for investment goods, complex forms of generating demand and sales promotion, not limited to purely communicative functions: exhibitions and fairs, product presentations, etc., are gaining increasing popularity.

Sales. Here, first of all, it is important to have a good understanding of the types and functional purpose of the diverse categories of intermediaries and distribution channels. A serious problem - the management of distribution channels - includes goal-setting, separation of powers and responsibilities, reconciliation of claims, resolution of conflicts.

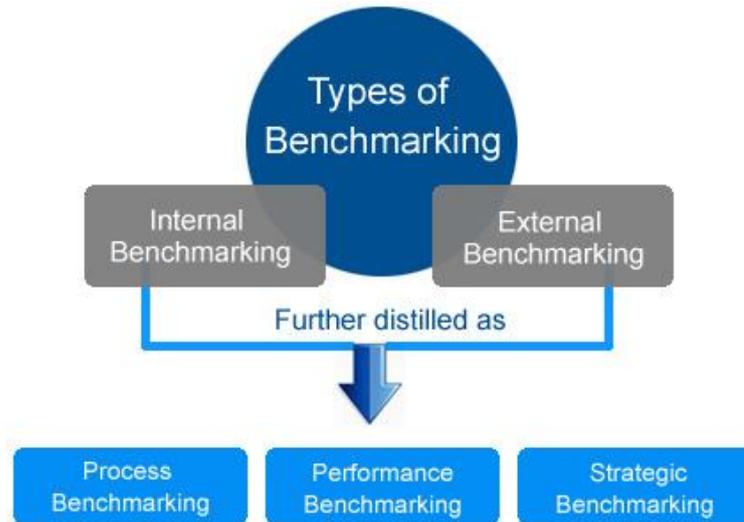
Analytical function: the study of the marketing environment, probable markets, consumers, corporate structure of the market, assessment of market conditions.

Production function: the organization of production of goods, product quality management, assessment of the competitiveness of products and enterprises, the organization of supply enterprises.

Management and control function: strategic and operational planning of the enterprise's work, management information support, organization of the communication system, organization of marketing control.

There are many types of benchmarking depending on the object of study. These objects can be inside and outside the organization. Depending on the scale of the organization, the effectiveness of the economy, the social or state system of a region, community, country, and economic indicators of an industry, corporation, company or its subdivisions may be analyzed in each of these cases. To date, there are several types of benchmarking: internal, competitive, external, process, global, functional, costly, strategic, customer behavior, operational, associative. Internal benchmarking involves comparing similar objects within an organization. External benchmarking, depending on who they are compared to, is divided into competitive benchmarking, functional benchmarking, strategic and global.

**Figure 1: Types of benchmarking**



**Source: Mohamed Zairi Paul Leonard - 1996**

By the nature of the relationship with the studied external object, benchmarking can be partnership or individual. Affiliate benchmarking is done by mutual agreement. Its objects are both sides. Individual benchmarking is carried out, as a rule, behind the scenes by collecting open and sometimes classified information. The source of open information can be self-evaluation of the object of study, made by him and published with his participation in competitions for quality awards. Information used on the Internet is used. This information can be presented as advertising by the organization itself, or as the results of analysis by third-party research or consulting structures.

Within an organization, the object of study may be processes, their characteristics, functions, and costs at different stages of the process, products (services), as well as characteristics of the organization as a whole.

## **1.2 The role of benchmarking in the management of business processes.**

The concept of a business process contains two elements: a business and a process. Consider the process element first. Here is one of the basic definitions of the process: "... is a logical sequence of related actions that transform input into results or output". (Zabulonov A. B 2002) Now you need to add the word business to the word process in order to distinguish the business process from other processes going on in the company. The concept of a business process can be defined in different ways. But today the definition proposed by Eriksson is the most common.

A business process is a chain of logically related, repetitive actions that result in the use of enterprise resources to process an object (physically or virtually) in order to achieve certain measurable results or products to satisfy internal or external consumers. (Karmazina Yu. A. 2007)

There is a huge variety of definitions of a business process, but another widely used is the following:

A business process is a logical, consistent, interrelated set of activities that consumes producer resources, creates value, and delivers results to the consumer. Among the main reasons for the organization to optimize business processes, we can highlight the need to reduce costs or the duration of the production cycle, the requirements imposed by consumers and the state, the introduction of quality management programs, mergers, intra-organizational contradictions, etc.

Thus, these definitions give us an understanding of the 3 characteristics of the business process.

Cost - it tends to the minimum value.

Duration - it tends to the maximum speed of the process.

The degree of customer satisfaction (product quality).

The main idea is that any business process has a consumer internal or external. Based on this definition, all actions within an organization (company) can be considered either as a business process or as part of it. However, business processes can also be divided depending on the task they perform. (Sizikova T. A 2009)

There are many ways to classify business processes. Many leading companies, using the process orientation, conducted an analysis of their work and identified a list of their main business processes. It turned out that their lists contain a different number of core business processes. Consequently, these lists reflect specific tasks solved by individual companies.

At the same time, other interested organizations performed the same work, but from more general positions. The goal is to compile a fairly general list of key business processes that would reflect the interests of a large number of other companies. The two main executors in this group were the International Benchmarking Clearinghouse (IBC) and the European Foundation for Quality Management (EFQM). (Zairi M. 1992)

The modeling of the work of enterprises and, as part of this task, the definition of lists of business processes was allocated to a separate independent area of research, which many scientists are engaged in. For example, researchers from the University of Plymouth (USA) have developed a hierarchy of business processes that has five levels. In this hierarchy, the processes are divided into three main groups: “production”, “management” and “support”. (Cassel C. 2010)

A simpler and more applied approach was proposed as a result of the Norwegian TORR comparative benchmarking project. This program for the development of methods to increase the productivity of production was carried out under the control of the organization NTNU / SINTEF, located in Trondheim. As a result, to create the prerequisites for the development of self-assessment methods and comparative benchmarking, a business process flowchart was proposed. All processes were divided into primary and supporting (auxiliary) in accordance with Porter's theory of value chains. Some of the supporting processes were then allocated to a separate class - development processes. These three groups of processes are defined as follows:

Primary (basic) processes are called basic and value-creating processes of an enterprise. These processes permeate the entire company, starting with the consumer and ending with suppliers. (Timoshenko N. V. 2008)

Supporting (auxiliary) processes do not create directly added value. They are needed to ensure basic processes. Such auxiliary processes can be, for example, financial and personnel management.

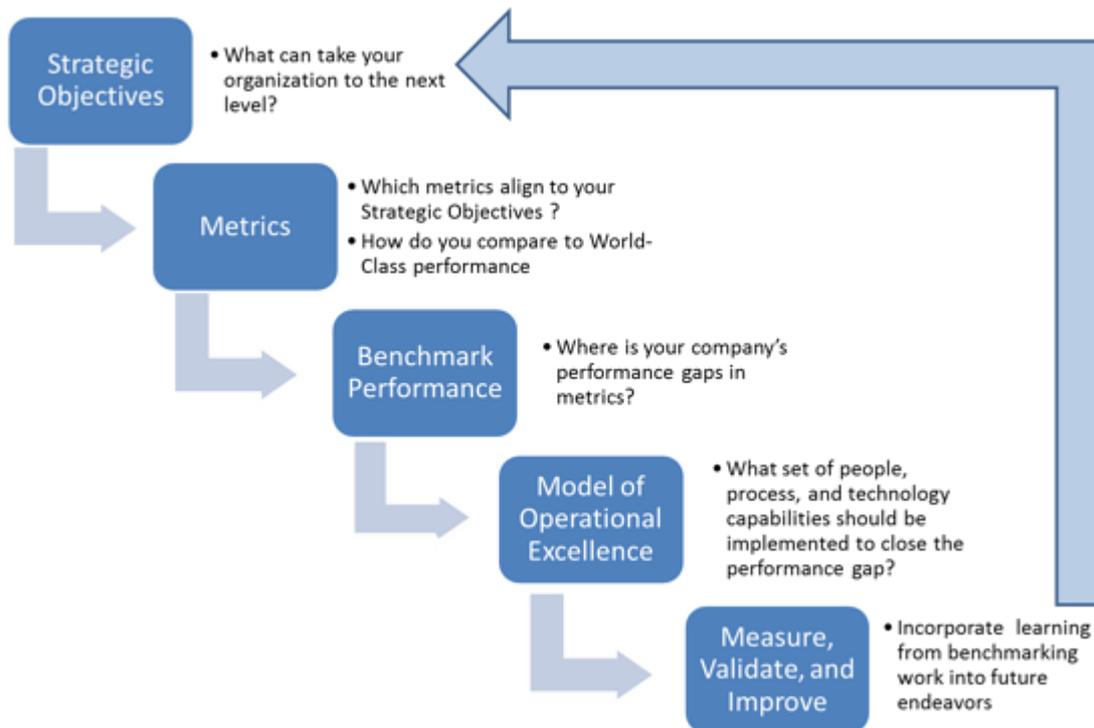
Developing processes (development processes) are those processes that will allow creating a value chain mainly and in auxiliary processes at a new level of indicators. Examples: product development and supplier development.

The results obtained during the implementation of the TORR project on comparative benchmarking were further developed during the implementation of the ENAPS program (European Network for the Study of Prospective Indicators). The program is designed to create a database for the European comparative benchmarking system.

If the main and auxiliary processes are very often found in the literature, then business development processes are often deprived of attention. And absolutely in vain. At present, the external environment changes daily, if not more often. In order to remain competitive, companies must continuously develop. To do this, you must constantly have up-to-date information about the state of your business (and information that is numerically measurable), which must be analyzed and then improved by the work of the company.

A very graphic example: the adjusted customer feedback (customers are regularly polled, for satisfaction with your goods or services, and then the information is analyzed and incorporated into the company's processes). If business development processes are not given due attention, then the company, step by step, will begin to lag behind, lose ground and give up its market to competitors. The main task of identifying and optimizing business development processes is to systematize the improvement process and make it continuous.

**Figure 2: The process of benchmarking**



**Source: [blog.insresearch.com](http://blog.insresearch.com)**

Business development processes include the following main categories: measurement, identification of inconsistencies, elimination of inconsistencies, assessment and improvement of customer satisfaction, work with customer reclamations, etc.

The list and number of business processes is different for different companies, which indicates the difference in the objectives of these companies. Such lists are a set of basic, auxiliary, and business development processes. However, regardless of the type and type of business process, the reform takes place in four stages.

The process of reforming a business process can be divided into major steps.

1. Formed the desired (necessary from the point of view of future survival and development) image of the company. The formation of the future image takes place in the framework of the development of the company's strategy, its main guidelines and ways to achieve them. Of particular importance in a number of strategic goals is customer orientation. The correct choice of reform objectives means that directions have been found that can be significantly improved and are vital for this business. (Vyugina L. 2008)

2. Creates a model of a real or existing business firm. This stage is called retrospective. Here the system of actions, works, with the help of which the company realizes the existing goals, is recreated. A detailed description and documentation of the main operations of the company are made, their effectiveness is evaluated. To create a model of an existing business, the results of the analysis of the organizational environment, the controlling data are used. Processes that need a radical restructuring are defined.

3. A new business model is being developed. There is a redesign and reform of the current business.

To create an updated business model, the following actions are performed:

a) selected business processes are redesigned, more efficient working procedures are created, technologies (including information ones) and methods of their application are determined;

b) new personnel functions are being formed, job descriptions are being processed, the optimal system of motivations is being determined, working teams are being organized, training and retraining programs for specialists are being developed;

c) information systems are created that are necessary for the implementation of the reform: equipment and software are determined, a specialized business information system is formed;

d) testing of a new model on a limited scale.

4. The introduction of a new business model in the economic reality of the company. All elements of the new model are put into practice. It is important skillful docking and the transition from old processes to new ones.

Reforming the business processes of any company is a very complex process and requires careful preparation and modeling. An important aspect of preparation is the choice of method of reform.

Business process management has proven its effectiveness, and now many companies are engaged in reforming business processes, and interest in this topic has not waned for several years. Most books on business process management give general recommendations for

reforming them, but in practice you need a set of methods that can be used by any manager who improves his business process. Below are the most frequently used methods for improving business processes.

The number of participants in the process should be minimal. Improving business processes must begin with a test of the possibility of minimizing the participants in the business process. The more participants, the more information gaps and different opinions, which dramatically slows down the business process. It is necessary to eliminate all the support staff in the process - secretaries, administrators, assistants, because the process participants will complete the process faster without them.

The participation of managers in business processes should be minimal and only when absolutely necessary. One of the methods for improving business processes is to exclude managers from the process. As a rule, the head cannot plunge into the situation in detail, and his participation only slows down the business process, in addition to this, the process participants lose their independence, which reduces the quality of the results obtained.

Unnecessary control in the process should be eliminated. As a rule, in a process that passes through many functional units, each manager looks at the results of all his subordinates, which takes a lot of time. To improve business processes most effectively, removing unnecessary control and ensuring unified control of the overall result of the business process.

The execution of functions in a business process should be made parallel if possible. Currently, the speed of the business process is an important factor in the competition and to increase the speed of business processes, it is possible to perform many jobs in parallel, which somewhat complicates the business process, but at the same time ensures the speed of implementation.

Processes must be typed. Most process variants are initiative of the participants and can be typed, and the higher the typification of the processes, the simpler their further automation and training. Many procedures may be unnecessary with certain instances of the process; therefore, improving a business process consists in defining several typed business process scenarios.

Processes should be simplified for ease of operation. The complication of the processes should be caused by an urgent need (as a rule, the requirements of external legislation - SOX). Improving business processes is to simplify (if possible) existing business processes. The simplicity of the process will allow participants in the process to work in it with fewer errors and greater speed.

**Benchmarking process.** Improving the business process by learning the best experience most effectively. Many only compare the indicators of business processes with each other, but in reality, as part of the benchmarking of the business process, a study of higher-level processes and procedures is carried out to improve the current activities of the organization. Improving processes using benchmarking is most simple when best practices are available.

**Restructuring process.** Improving a business process through its redesign (reengineering) requires the creation of a team to restructure the process, which will create a new process without attention to existing ones. Process redesign is usually applied to processes that are not performing well at the moment. The introduction of a cycle of continuous improvement of the business process. To improve business processes, it is necessary after a cardinal improvement is carried out to develop a system of continuous analysis and improvement of the business process. It is very important that by the end of a project to improve business processes, continuous improvement procedures have been developed for them.

The increased competition in global and national markets forces companies to look for new ways to improve their business. Companies can use both a single selected method and a set of such methods.

So, in order to understand the process of reforming business processes, it is very important to understand what a business process is. As described above, this is a certain logical sequence of related actions, as a result of which the resources of the enterprise are used to process the object in order to achieve certain results. From here, there are three main categories of business processes: primary, supporting and developing. When reforming the business, all three categories of the process will be involved. Business reform includes four stages: modeling the desired image, assessing the current state, developing a new business model and

introducing it. There are many methods of reforming the business, but today benchmarking is the most popular and progressive.

The most common objects for benchmarking business processes include: inventory levels, waste and scrap rates, as well as work in progress. In order to work effectively in these areas, you need to have complete information about the level of costs absolutely for each process, as well as the reasons for their occurrence. Therefore, in the process of creating an integrated management system, the use of universal models in practice does not give the desired results. We need a thorough analysis of all the actual processes. Only with its help one can get well-grounded answers to questions for the sake of which business processes benchmarking is implemented.

### **1.3 The process of industry production and its main forms**

The natural product created during the production process is not only the process of creating the benefits necessary to meet the diverse human needs, but also the reproduction of human life itself, since it provides the means of their existence, as well as the realization and development of their abilities. In the production process work and nature interact labor is a human activity aimed at creating material and spiritual benefits to meet the needs of people. However, the creation of material goods within certain limits can be carried out without direct human participation (automated production, chemical process, etc.). In this case, labor does not disappear, it moves into the sphere of regulation, management.

Labor and production are not identical concepts. Production is a process of labor that is complete, productive. Such labor is productive, and the means of its realization are means of production. If the product is produced, the production process took place. It may happen that labor took place, but for some reason the product was not created. Such production is incomplete. The labor process is carried out efficiently, i.e. with a certain productivity or efficiency, which depends on how its factors are combined and how fully they are used. At the same time, both quantitative and qualitative parameters of factors of production, and their property, on which the labor motivation of the participants in the production process largely depends, are important. When it is known which factors of production are used and how, to

whom they belong, it is possible to determine the level of the production process more or less objectively.

Production as a process of social labor consists of the following phases: directly production, distribution, exchange, consumption. It consistently passes through all these phases and is simultaneously located in each of them at a certain moment.

An important characteristic of production is its duality. At each certain moment in the production process, goods are created, that is, labor takes place and its costs are incurred, and thus the value of the goods produced is formed. From the point of view of creating specific goods (utilities), the production process is a productive force that creates itself. When he associated with the formation of the cost of production, manifested in the exchange of labor costs, embodied in various benefits for the purpose of their assignment, this process acts as the deployment of certain economic relations of production (social and organizational-economic).

The production process is the interaction of the productive forces and production relations that are in contradictory unity, but relatively autonomous in their development. The latter can be both evolutionary and spasmodic. A characteristic feature of production as a process is also a combination of elements of development and functioning in it, that is, its continuous repetition, during which the prerequisites for development are created. The increase in quantitative changes during the operation of production makes it possible to move to a new qualitative level, at which, again, more efficient operation is ensured. An important feature of the production process is the creation of not only material, but also intangible goods and services, the value of which has increased in modern conditions. (Pidruchnik A. 2006)

The types of factors of production are due to the diversity of human production in many industries, sub-sectors, areas, divisions and regions. For example, there are factors (means) of agricultural production or belonging to industry or its sub-sectors such as light industry, mechanical engineering. Workers as factors of production can be employed in material production or the spiritual sphere, in different regions of the country, etc. Types of factors of production are very diverse, which is the objective basis of the social division of labor. For the types of factors of production is characterized by certainty. They are represented by the means of production (the material factor) and the direct producers (the personal factor), endowed with

the ability to work (including entrepreneurial activity), which is implemented in conjunction with the means of labor. Personal and material factors acquire the most essential quality - public character, when they appear not as individual, but as cumulative factors. Individual factors, like individual production, are to a certain extent an abstraction. Individual factors of both types (means of production and labor) in a public form are aggregate means of production and aggregate labor. The cumulative production factor is of the same type, but many-species. The growth of the diversity of species of a factor does not have its type, but it means the development of its social character, since it multiplies and complicates the connections between different factors of production of one type (real or personal). Relationships and unity, and alienation arise between individual and aggregate factors of production.

The primary factors of production were land and labor. With the development of civilization, other material factors of production appeared, but also derived from the earth. The latter are the results of labor, industrial products. Both types of factors of production (both the means of production and labor) have a single purpose: they are productive forces, forces that influence people on nature in order to create wealth. However, their functions are different. The worker creates the means of production, determines their purpose and uses them in the labor process. Material factors of production function as a means of equipping man's labor activity, increasing his productive power. These are the subject organs of labor, a kind of continuation of the human organs of activity and the material basis of their development in the production process.

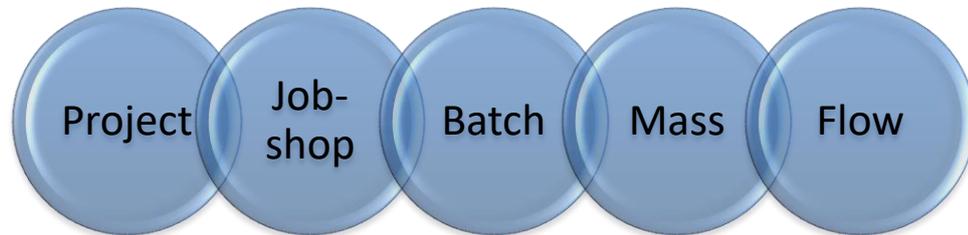
The function of the employee as a personal factor of production involves the use of his labor in the labor process as an activity aimed at changing the objects and forces of nature in order to meet their needs. The combination of physical and intellectual abilities of a person is his work force. The function of the means of production is to be a conductor of the productive influence of the worker on objects and the forces of nature. Part of the means of production is characterized by the means of labor through which workers productively transform the objects of labor. The active part of the means of labor are instruments of labor, the level of development of which in many respects is an indicator of the relationship between people developing in the production process and the degree of maturity of a current or another era.

Modern tools of labor, unlike those used in the initial stages of civilization, include not only various working machines, mechanisms, equipment, appliances, engines and transmission devices, but also automated control systems that correspond to high technologies and mainly mental labor of workers.

The passive part of the means of labor, the value of which does not diminish from this, are the means of production infrastructure that perform the function of ensuring the general conditions of production: buildings, premises, communication routes, means of communication, information and other communication systems. The object of labor as the second part of the means of production is the substance (natural or produced by previous labor), to which the labor of man is directed and from which he produces the future product. All the marked functions of the means of production and workers are necessary in the production process. Among them there is no secondary. However, this does not mean that priorities cannot be determined. As for the functions, the priority belongs to the personal factor. The potential effect of the means of production is not realized outside the leading and guiding activity of the main productive force — man. This does not mean that the material factor of production is only the passive side of the production process. For example, that part of it that is created by nature itself (objects of labor that have not undergone primary processing) directly influences labor. Often the cause of the violation of economic equilibrium in society (as the natural interrelations of the components of aggregate production) is the underestimation of the reverse effect of the natural material factor of production on the conditions of functioning of the personal factor. The action of that part of the material factor, which is a tool of labor, can be destructive for a personal factor. And yet the function-cause is inherent in living labor, and the function-consequence is the means of production. Accumulated knowledge has acquired a special role in modern conditions, science as the union of personal and material factors of production.

The type of production is a comprehensive description of the technical, organizational and economic characteristics of industrial production, due to its specialization, volume and repeatability of output. There are five main types of organization of production:

**Figure 3: Types of production**



**Source: Operations Management (11th Edition) Jay Heizer**

The decision of type of production is very much influenced by nature and quantity of the product.

Job-shop production (small-scale or individual production) is characterized by a wide range of manufactured products, a small volume of their production, and the performance of very diverse operations at each workplace. Often such a product is made for a specific customer according to its specifications or is a prototype. Large IBM computers, commercial Boeings or military jets, unique medical equipment or spacecraft — all of these products are made individually, just like custom-made products, such as surfboards, pleasure craft, furniture, clothes. In batch production, a relatively limited product range is produced. As a rule, there are  $j$  operations assigned to one workplace. Mass production (large-scale production) is characterized by a narrow nomenclature and a large volume of production of products, continuously manufactured for a long time at highly specialized workplaces. This type of production is characterized by mechanization, the use of standard parts and a conveyor assembly method. Almost all consumer goods are manufactured on the basis of mass production technology.

When considering the development of the functions of factors of production, the main attention should be paid to their interdependence and interaction. The underestimation of the value of the social sphere, the residual principle of the allocation of resources for its

development, the diminishing of the role of all that is associated with ensuring a high level of development of the personal factor of production are due to an incorrect understanding of priorities in the functional interaction of factors of production.

The functioning and interaction of factors of production is preceded by their connection. The production process involves the unification of people in a certain way among themselves and with the relevant material factors of production. The nature and method of connecting the factors of production are single-order, but not identical categories. In the nature of the combination of factors of production reflects the set of important socio-economic features of an economic system, its economic relations of production, and in the way of combining them - a specific historical combination of means of production and labor, the order of their application, i.e. features of the productive forces.

The character reflects the socio-economic, and in the way - the organizational and labor combination of factors of production. The first is the economic relations (production, distribution, exchange, consumption), which are based on property relations or property; the second is organizational and labor relations (specialization, cooperation, scientific organization of labor, discipline, resource support, realization of labor results, management of standards, quality, etc.), which are derived from relations of organization of direct use of production factors as elements of productive forces.

The combination of factors of production is not a frozen system, but a dynamic phenomenon. Among the problems that arise in the process of connecting factors of production, are the following:

- ensuring balanced development of the means of production and labor resources, their mutual qualitative and quantitative conformity;
- formation and support of motivation for the introduction of more advanced means of production;
- ensuring the replacement of manual, unskilled labor technically and technologically equipped to significantly reduce the cost of all resources per unit of product created;

- The achievement of appropriate proportions in the formation of the technical and technological base of production and the preparation of the modern worker;

- search and implementation of new, progressive forms of inclusion of workers in the production process;
- Creating and maintaining at an appropriate level a mechanism for the economic management of the processes of combining and using factors of production, at which the highest result would be achieved at the lowest cost.

The effectiveness of the use of real and personal factors of production can be reflected by the category of production efficiency (the ratio of the result of the productive use of factors of production and their costs). Production efficiency can be improved both by increasing the factors used and by using them more fully, i.e. by extensive or intensive means. In the actual production process, both paths are intertwined with the predominant role of one of them. With the development of society, an intensive way is becoming more widespread. The process of intensification of production means a more complete use of its factors, their qualitative improvement, as well as improved technologies for using their productive capabilities and a corresponding reduction in the role of simple quantitative growth of factors not associated with a significant improvement in their use.

Of course, a quantitative increase in factors of production practically takes place even when intensive development takes place, but it plays a subordinate role, providing space-time forms for the realization of the tasks of qualitative improvement of the means of production and labor. Qualitative improvement of factors of production does not give the desired effect, if not accompanied by an adequate quantitative use of their improved properties.

The most promising way to improve the factors of production is the introduction of the achievements of scientific and technological progress. However, traditional techniques and technology can be applied in different ways. The growth of the level of use of the capabilities of the existing equipment and technology is an equally important area of production intensification. In this case, the intensification of production is due to the creation of new equipment and technology, their mass use. (Bazilevich V.D. 2007)

By itself, the technical process does not automatically lead to an increase in the intensity of production. Insufficient or incomplete use of new technology not only does not increase the level of intensification and production efficiency, but, on the contrary, reduces it. Consequently, between technical progress and intensification, arbitrariness objectively exists such an important link as the use of factors of production that allows you to turn the capabilities of the first into the dynamics of the second. The best is considered the option when the production process uses factors that meet modern technical and technological and qualification and professional requirements, moreover, are fully used.

If society strengthens relationships of dependency, social indifference in pay, there is a violation of social justice in dividing the produced goods; this means that in the nature of the connection the fact of production implies the alienation of the worker from the means of production, which is not sufficiently motivated to use them intensively.

Practice shows that the intensification of production factors depends on changes in the nature of their compounds. Most economists in the world consider the privatization of production cannot be total. It is also important to activate state factors through the corporatization and commercialization of their use. At the same time, we should tirelessly expand the scale of the association of workers with our own (private), rental, joint-stock and mixed uses of the means of production.

The greatest production effect is achieved when users of tools are at the same time their owners. However, such a connection may be common and even large-scale, since this means that all members of society must be not only nominal, but also functioning owners, that is, executors of operational administrative functions. Nevertheless, each step that approximates such a combination of factors of production makes their functioning more intensive, increasing the efficiency of the production process to better meet the needs of members of society.

The progressive development of social production, its continuous improvement are the fundamental laws of the economic life of humankind. It is based on the progress of science and technology.

Science is a special kind of human activity aimed at the production of new knowledge about nature, society and thinking. Under the concept of technology understand the totality of

the means of labor that are used for production purposes and to meet the personal needs of the person.

New knowledge materializes in the new means of labor, meeting the needs generates others. New ideas and developments emerge, perfect technology, technology and consumer goods are created. They determine and summarize the necessary conditions for further quantitative and qualitative bases in the field of scientific research. This is approximately the scheme of the action of scientific and technological progress, which is a continuous process of development on technology, technology, production and consumption.

Scientific and technical revolution (STR) is carried out in two forms: evolutionary and revolutionary.

The evolutionary form of STR takes place when the techniques and technology used in production are improved on the basis of already existing scientific knowledge. An example of this form of STR is the development of energy technology, based on the principle of using the kinetic energy of steam - from a simple steam engine to high-power steam generators.

The revolutionary form of STR means the transition to engineering and technology built on fundamentally new scientific ideas. An example of this form is the transition from hand tools to machine tools, the replacement of steam energy with electric energy, the use of laser and other modern technologies, etc.

The invention and introduction into production of fundamentally new scientific and technical developments leads to significant changes in the labor process, provides for the expansion of the productive capacity of man. Therefore, in this case we are talking about the scientific and technological revolution.

The scientific and technological revolution is a qualitative leap in the development of the productive forces of society based on fundamental shifts in scientific knowledge. Such upheavals in science, technology and production occur regularly. The last of them began in the mid-50s of the 20th century, when the first computer was created, when a person began to use the energy of the atomic nucleus and engage in genetic engineering. New takeoff of the STR began with the development at the end of the XX century internet systems.

The main features of the modern scientific and technological revolution are universality and complexity. On the basis of fundamental discoveries in different branches of human knowledge, all elements of the production process change objects of labor, means of labor, knowledge, and the work of man.

Changes in the objects of labor are reflected in the use of new synthetic materials with specially structured properties (plastics, semiconductors, composite materials, artificial diamonds, etc.)

Transformations in the means of labor and knowledge are associated primarily with the advent of automatic technology and computer technology.

Machines are machines that, along with the traditional three elements (engine, transmission mechanism and working machine), also have a fourth one - a device that controls and regulates the production process.

Technique with software control makes it possible to overcome the boundaries of production due to the psycho-physiological capabilities of a person. In addition, the use of computer equipment opens wide access to the entire stream of scientific and technical information accumulated by mankind. Thus, the labor of previous generations, which contains this information, can be promptly involved in any production process. Due to this, science becomes directly the productive force of society, a constant factor of its multiplication.

Labor content is a concept characterizing the interaction of personal and material factors of the labor process, the volume and structure of a person's labor functions, his professional knowledge, and necessary labor skills.

The content of labor is a complex category, covering a significant range of phenomena of interaction between man and nature. As elements of the content of labor, categories such as "productive force", "intensity", "quality", "complexity" and "gravity" of labor can be distinguished.

The productive force of labor characterizes the technical, organizational, cultural and other possibilities of human production activity. These are objective, relative to the employee, circumstances of labor, which determine his capacity and effectiveness of efforts, for example,

technical parameters of equipment, level of general and professional culture, applied methods of work organization, fertility of land, etc. Labor productivity is expressed in the capacity of the labor force.

The completeness of the realization of the possibilities laid down in the productive labor system largely depends on its intensity.

The intensity of labor characterizes the volume of labor costs per unit of working time, the tension of labor. Each person for a certain period of working time (day, hour) is able to spend a certain amount of his workforce (physical, physiological, mental and other efforts). Depending on the volume (level of labor intensity), the actual productive force of labor is fully or partially realized.

Features labor, its differences in terms of internal properties are characterized by the category quality of labor. The latter reflects the level of professional skill of the employee, his education, integrity, creativity, interpersonal skills, etc.

Characteristics of the functions performed by workers in the production process are given by such a category as the complexity of labor.

In any labor process, the factor of production environment influences the human body. The latter characterizes such a category as the burden of labor.

All these categories reflect the different sides of human labor activity. In their changes are shifts in the content of labor, occurring under the influence of the scientific and technological revolution.

Automation and computerization significantly expand the production capabilities of workers, significantly increasing the fruitfulness of their efforts. Consequently, scientific and technological revolution is a powerful factor in the development of the productive force of labor.

More difficult is the effect of scientific and technological revolution on the intensity of labor. Numerous studies indicate that replacing manual labor with mechanized labor does not always reduce the amount of labor that is spent per unit of time. Labor intensity often grows at the expense of mental and psycho-emotional energy. With this, purely muscular efforts are

significantly reduced. As a result, the severity of labor tends to decrease in conditions when the equipment and technology used are fully adapted to the anthropometric and psychophysiological characteristics of workers. Unfortunately, the developers of new technology and technology do not always pay due attention to this side. As a result, the severity of work is manifested in excessive fatigue of a person, occupational diseases, and injuries.

The creation and introduction of socially oriented technology into the labor process: technologies are of fundamental importance in connection with the change in the place and role of people in the century under the conditions of scientific and technological revolution.

Technical progress involves the exclusion of man from the immediate production process. Consequently, workers must perform the functions of predominantly mental labor associated with the maintenance of equipment (installation and commissioning) and their management (control and regulation). In automated production, process monitoring absorbs up to 65 percent of worker time shifts.

The increase in the complexity of labor requires an increase in the number of workers with high professional and general education. Every fourth employed in the branches of the Ukrainian economy in the pre-crisis period had a higher or secondary specialized education. According to scientists, in connection with the computerization of the production of this level of education at the beginning of the XXI century. Will require 2/3 jobs. For example, more workers are now working in the information sector of the US and Japanese economies than in the sphere of material production.

Widespread use in the production of governing systems, flexible technologies leads to the fact that there is no longer a separate, relatively small, group of engineers, designers, researchers, and the majority of workers are engaged in creative work. Thus, the rigid determination of labor operations of a person by the functioning of technology and technology is overcome. From a simple element of the production process, it turns into a creator and organizer of this process. This causes the fact that, in addition to deep specialized knowledge, the employee must possess a wide range of diverse qualities.

This conclusion was made by US scientists on the results of special studies conducted at enterprises provided with computer equipment. Among the large number of requirements

that apply to employees of these enterprises, the following can be singled out: a high level of intellectual development and professional competence; creative approach; direct participation in the preparation of the work program; the desire to improve the labor process, the perception of changes in production; ability to work effectively without supervision, a developed sense of duty; critical mindset, high degree of curiosity; the integrity of nature; sociability; ability to exchange ideas and help other team members.

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## **2 Modern models and methods of industrial production improvement.**

### **2.1 Modern methods of benchmarking implementation in industry.**

Modern trends in the development of industrial structures create opportunities for the use of benchmarking for evaluating integration in the innovation environment, and thus creating innovation potential and increasing the efficiency of the enterprise's innovation activity. One cannot agree with the opinion that benchmarking is associated exclusively with improving business processes. Benchmarking as a method for researching other people's experience allows, with lower costs, to relatively quickly improve various aspects of an enterprise's activities through the implementation of innovations. As a result, benchmarking

should be aimed at the development of the entire system of key intra-company factors that, according to the resource-oriented approach, provide a stable competitive advantage for the enterprise. Improving organizational capabilities through organizational innovation is key. The benchmarking process provides an opportunity to test, explore and identify the best practices of other systems, that is, the best methods and approaches that provide outstanding results that are innovative in the use of resources and technologies and that have been recognized by experts and users.

One of the main problems, from the point of view of ensuring the adequacy of resources for sustainable development and successful formation, is the creation of the investment attractiveness of the enterprise's innovation environment. Formation of investment attractiveness should be an independent task, which requires the study of the directions of its solution with the release of the development of appropriate techniques and approaches. The study of these issues must begin with an assessment of the investment potential of the enterprise and identify ways of its formation. Currently, there are modern analytical tools that are widely used in the business environment to analyze alternatives for investment decisions.

Benchmarking today has become an integral part of the improvement and strategic planning of industrial enterprises. A long-term survival strategy requires the company to adapt to the current and future market needs and to keep developing. Benchmarking as a management tool is a systematic activity that aims to search, analyze and study the best examples, regardless of their geographic location, sphere or size. Benchmarking is considered the art of discovering what others are doing better than we are and researching, applying and improving their working methods. (Bazilevich V.D. 2015)

In general, terms, the benchmarking process is an improvement process, during which the company performs three procedures:

- ❖ compares the performance of your enterprise with the performance of enterprises that are considered the best in this area;
- ❖ determines how the leaders managed to achieve their own position;
- ❖ uses the data to improve the performance of your enterprise.

For the innovation environment, benchmarking is especially important, since at present, within the framework of the benchmarking process, it is possible to compare the activities of enterprises from one industry and from different industries. Such an approach is especially important in the framework of the innovation environment in the conditions of interaction of participants from different industries, in which each of them, using close connections, can have access to the best practices of partner enterprises. The methods and concepts used in the benchmarking process help optimize the activities of the participating enterprise, increase profits and reduce costs, thereby improving the indicators of the innovation potential. Benchmarking is also considered as a method similar to the method of measuring intellectual capital.

Benchmarking is currently used in various fields of activity. In modern conditions, the process of benchmarking is not only acceptable in the industrial sphere, but also almost mandatory. There are different approaches to the classification of species and methods of the benchmarking process. So when benchmarking business processes, each business process must be marked, that is, have several points (easily recognizable), which can be used to determine the success of the business processes and plan the implementation of changes that can track the achievements of an industrial enterprise in the field of improvement business processes.

When looking for a benchmark for comparison purposes, in order to borrow the best practices for a particular business process, one should be guided by the fact that the processes in enterprises are similar. Sources of information when looking for a partner may be different (special databases, industry magazines, professional associations, etc.). In the process of benchmarking, you need to collect as much detailed information as possible. Information is collected using secondary and primary data.

After receiving the data, you can get an idea about the method of organizing a particular business process at a partner and identify differences in your own practice. The methodology of the benchmarking process involves the relationship between differences in business processes and differences in their effectiveness. It must be remembered that the business process under study may be associated with related processes, the study of which is also

necessary, since the presence of interrelations makes it impossible to improve a specific process without improving other processes.

After analyzing and collecting all the information, considering the possibilities of its use in practice, it is necessary to develop recommendations for the development of organizational capabilities that determine the formation of a stable competitive advantage of enterprises, since it is the implementation of the recommendations that is considered the ultimate goal for which the benchmarking process is carried out. At the same time, recommendations for the development of organizational abilities are most important for innovation activities.

Thus, the benchmarking process is carried out according to a certain technology, according to which several successive steps need to be carried out, which ultimately lead to the desired result. All available models are based on a continuous improvement cycle of an industrial enterprise. The main difference between different methods is the number of stages of the benchmarking process. The number of steps may be different depending on the preferences in the level of detail when splitting the benchmarking process into steps. When carrying out the benchmarking process, it must be remembered that benchmarking is a process of continuous change and improvement of the management process, which cannot be considered as a one-time project. Any project is non-cyclical and it has a length in time. An infinitely lasting innovation project would be a serious violation of the principles of innovation management. Once started the process of benchmarking, the company must constantly carry out a comparative analysis of the most successful enterprises in order to continuously improve their own activities.

There is a certain sequence of evaluation and analysis of the integration of the benchmarking process:

1. Formation of a system of indicators to assess the innovative potential of an industrial enterprise as an integrated structure.
2. Definition of integration assessment in the innovation environment.
3. Determination of directions of improvement of the enterprise.

First, you need to determine the indicators that characterize the integration processes and have the greatest influence on the identification of the innovative potential of the enterprise. An effective solution in this case may be the use of benchmarking to improve key indicators of innovation. Their most important advantage is the development of performance indicators based on the strategy of the company. At this stage of the benchmarking process, the process of linking the research with the strategic goals of managing the innovation environment, i.e. formation of a competitive position of the results of the innovation activity of an enterprise using its intellectual potential. The method of determining the relative importance is considered to be the compilation of a list using a selective method: to determine the factors of integration; establish the task, purpose and mission of a process or function; identify processes that have a greater impact on the result, and which are considered more costly; make a list of the main claims and needs; systematize and group the indicators that characterize the innovative potential of the enterprise.

Before collecting data on objects for comparison, you need to collect basic data on your own processes, the collection of which will improve the assessment process and develop a final list of factors that will be used in the comparative analysis. Evaluation of integration will provide an opportunity to identify the indicators that are most important for the realization of the goal - the creation of an innovative environment of the enterprise, and they should be the first to pay attention to. The influence of indicators should also be taken into account when choosing the type of benchmarking process.

The most common approach is to start with an internal benchmarking process, and then proceed to functional or competitive benchmarking. Identifying potential benchmarking partners is the next stage in the study phase. The willingness of potential partners to cooperate determines the types of benchmarking to be used. Benchmarking methods initially implied the application of the most advanced experience that existed in the world and, thus, its implementation should relate to innovation, in part, the spread of innovation. Information is then collected using secondary and primary data. At the next stage, the data are systematized, classified and analyzed, the possibilities of using the obtained data and their application for setting newest goals are determined.

This type of data analysis most often contains definitions of the possibilities of using the obtained data, their interpretation and summing up, as well as the alignment of data on the partner's process and their own process, the use of the obtained data to determine the latest goals. Then the obtained experience is adapted, control procedures and implementation plan are developed, best practical developments are applied. At this stage, the development of control procedures and implementation plan is carried out through the analysis and evaluation of the implementation process, using the best practical developments.

The benchmarking process is closely related to the process of organizational change. Before you develop a strategy, you need to exchange views with the participants in the update process. The results of benchmarking should be used in budgeting, primarily in the development of the investment budget, which allows you to direct resources to implement the necessary changes and is a link between the strategy and operating activities. Practice shows that the best results from the benchmarking process are enterprises that summarize the data obtained into several basic principles.

The main implementation strategy is the selection of such solutions based on benchmarking results, which also contain an element of continuous improvement. First, it is necessary to deal with the improvement of indicators that are of the greatest importance; in achieving positive results, plan a new cycle of improvements and move on to its implementation. Consequently, a stable competitive advantage of an enterprise is gradually being formed through the development of its organizational capabilities. Improving the benchmarking process, i.e. identifying the best practices in the process itself is another implementation strategy. Continuous improvement is made to a specific process through guarantees that the process is subject to continuous benchmarking. The benchmarking process should link all the processes in the enterprise with the objectives of the enterprise and the improvement strategy, which are in turn connected with the needs of consumers.

The final step in any activity in the benchmarking process is considered to be the completion of the continuous improvement cycle. After that, you should immediately begin planning the following procedures for the implementation of benchmarking. Practice shows

that the experience gained during the benchmarking process will be a source for continuous improvement of the benchmarking process itself.

In conclusion, we note that the benchmarking process should become the art of discovering what other companies are doing better to study, implement and improve, and their working methods in practice, since the basic principle is considered “from the best to the best”. Industrial enterprises can use this analysis tool to both improve their own processes and integrate in an innovative environment, as well as a method of strategic forecasting and planning.

The reasons for the growing popularity of benchmarking in the modern world are:

1) global competition. In the context of growing international integration and globalization of business, firms are faced with the need for comprehensive and detailed research and subsequent application of the best achievements of competitors for their own well-being and development;

2) reward for quality. Recently, actions, competitions, reviews and tenders held at the national and international levels to determine and reward organizations of quality leaders are becoming more widespread and responsive to the public. The conditions for participation in such events oblige, besides the demonstration by firms-participants of the competitive advantages of their products, the obligatory use of the concept of benchmarking in the ordinary, systematic management of the company;

3) the need to comply with modern rapidly changing conditions, adaptation to them, as well as the introduction of world achievements in the field of industrial and business technologies. In order not to be set apart by their competitors, all companies (size and scope of activity are irrelevant) should regularly study the situation in other companies in order to apply best practices in the field of industrial and business technologies.

The analysis of excellence clearly shows problem areas, the shortcomings of the old structure of entrepreneurship and determines the direction, orients where to grow, develop further and what peaks can be achieved (the best results of other enterprises). The excellence analysis examines internal functions, business principles and enterprise experience for:

- 1) determine the best results;
- 2) analysis of the work of their organization;
- 3) identify deficiencies in functioning;
- 4) elimination of weak points;
- 5) creating motivation among employees to continually improve (quality and productivity of labor, level of education, qualifications, etc.).

In order for any enterprise to become successful and retain for a long time its place in the environment of many worthy opponents and with increasing competition, the company's divisions themselves must always be in a competitive environment in order to have an incentive to increase productivity. This will ensure the continued survival of the organization against the background of creating consumer utility, which will be higher than the cost of its production.

Thus, it becomes possible to identify, analyze and strengthen weaknesses in your company. This method of determining the level of your enterprise in comparison with competitors is quite simple and mobile, since it allows you to apply yourself to almost everything: starting with basic customers (such as the turnover of goods per employee) and up to customer satisfaction. The excellence analysis, widely used in benchmarking, is primarily aimed at improving the operational and strategic performance of the organization as a whole, and ultimately leads to a culture of business focusing on such useful attitudes as the ability and willingness to learn from the staff, constantly increasing the potential and achievements bosses and leading personnel, which in principle serves as an impetus for the development process.

Analysis is always focused on customer satisfaction. In addition, it helps to find the line between stability and renewal, because "too good is also bad." When using superiority analysis, many enterprises improve their position in relation to competitors, to some extent reduce costs, increase customer satisfaction with their products, and in general there is an increase in efficiency, determination and subsequent elimination of weak points in the processes of organizing activities, developing new plans, directions, ideas, improving organizational structure.

The enterprise and its employees independently carry out a choice of objects of research. Production analysis is most often applied to products, services, functions, strategies, processes, etc.

If we talk about strategic issues, then attention should first of all be paid to factors that are particularly strongly influencing the realization of competitive advantages. In practice, the criteria of measurement are usually determined that best describe these factors, and then they identify companies that have the best results in this area. After that find those methods that lead to the best results.

From an analytical point of view, there are three most important types of analysis:

- ❖ internal analysis of excellence involves comparing indicators within the organization itself (between departments, branches or product groups);
- ❖ external analysis of excellence draws attention to similar types of activities in various fields (the activities of competitors in various markets);
- ❖ functional excellence analysis compares similar functions or processes in different industries. The bottom line is finding the best results wherever they can be. The decision of a particular organization to choose one of these three types depends ultimately on the real situation.

A little insight into the essence of benchmarking, it is necessary to pay attention to the basic principles of benchmarking:

1) mutuality. Benchmarking is an activity that is impossible without reliance on mutual relations, agreement and data exchange, which provides a “winning” base for the parties involved. It should be borne in mind that reciprocity does not necessarily oblige to complete, blind trust (after all, competitors). At the very beginning, the limits of the range of information, the form of data exchange, the nature of the study are always coordinated. In a benchmarking cooperation, each partner must be confident in the behavior of others, only then can a good result be achieved by all. Everything must be pre-established and agreed, not cause other interpretations;

2) analogy. The operational processes of the partners should be similar. Any process can be researched for good, and the results can be easily translated or interpreted for your company.

The similarity of processes and the clear definition of benchmarking partners' selection parameters significantly influence the success of an activity;

3) measurement. Benchmarking is in some way a comparison of characteristics studied, measured, analyzed in several other organizations; The purpose of such processes is to establish the causes of existing differences in performance indicators, as well as ways to improve them. Here it is important to identify the key characteristics of the process, which will help improve them based on a study of the process;

4) reliability. Benchmarking must be based on evidence, accurate analysis and study of the process. Intuition is also a good feeling, but more important is validity.

## **2.2 Modern modeling methods of production process**

Business process modeling is one of the methods for improving the quality and efficiency of an organization. The basis of this method is the description of the process through various elements (actions, data, events, materials, etc.) inherent in the process. As a rule, business process modeling describes the logical relationship of all elements of a process from its beginning to its completion within an organization. In more complex situations, modeling may include processes or systems external to the organization.

Business process modeling allows you to understand the work and analyze the organization. This is achieved due to the fact that models can be compiled on various aspects and levels of control. In large organizations, business process modeling is performed in more detail and more multifaceted than in small ones, which is associated with a large number of cross-functional relationships.

The structure of the model reflects essentially the logical subject-temporal sequence of functions considered within the framework of a specific process. The general characteristics of the model are the basis for the documentation, analysis, organization, automated processing and support of the processes, as well as for their promotion and communication. Typically, various computer tools and software are used to model business processes. This makes it easier to manage models, track changes in them, and reduce analysis time.

The ultimate goal of business process modeling is to improve performance. To do this, the analysis focuses on increasing the value of the process results and reducing the cost and time to perform actions.

Actually, modeling business processes has several goals:

- ❖ First, it is the purpose of the description of the processes. Through modeling, one can trace what happens in the processes from the beginning to the end. Modeling allows you to get an "external" look at the processes and identify improvements that will increase their effectiveness.

- ❖ Secondly, rationing processes. Business process modeling sets the rules for process execution, i.e. the way in which they should be performed. If you follow the rules, guidelines or requirements established in the models, you can achieve the desired performance of the processes.

- ❖ Thirdly, the establishment of relationships in the processes. Business process modeling establishes a clear connection between the processes and the requirements that they must fulfill.

Automation of business processes implies the development of software for the already described business processes, but how to proceed if the business processes in the organization are not described, in this case one should not guess how the company works and engage in independent activities without being properly prepared, otherwise will fly into the delay of development, not set costs and clarify the relationship with the customer. You can do it in two ways, if the volume of business processes is rather complicated, the organization is a large customer, it makes sense to turn to an outside organization for help in describing business processes. They will describe the structure of the organization, business processes, make their correction, create a job description package for company employees, as well as the organization's vision and strategy for the future. After you need to understand what activity will be automated. To answer this question, you need to understand what exactly does not suit the current work of the organization. Such parameters can be process execution time, process execution cost, quality (number of errors and failures). Dedicated business processes should

be described in detail, focusing on the information (used documents, reports) that is necessary for the implementation of any process action or is the result of its implementation.

Business process modeling, as a rule, involves performing several successive stages. Because the ultimate goal of modeling is process improvement, it covers both the “design” part of the work and the work on the implementation of process models.

The composition of the stages, which includes the modeling of business processes as follows:

1. identification of processes and construction of the initial model "as is". In order to improve the process, you need to understand how it works at the moment. At this stage, the boundaries of the process are determined, its key elements are identified, and data on the operation of the process is collected. As a result, the original process model is created “as is”. This model does not always adequately reflect the work of the process, so the model of this stage can be called “the first draft” or the original model “as is”.

2. revision, analysis and refinement of the original model. At this stage, discrepancies and duplication of actions in the process are identified, process limitations, process interconnections are identified, the need to change the process is established. As a result, the final version of the model "as is".

3. development of the “as it should be” model After analyzing the existing situation, it is necessary to determine the desired state of the process. This desired state is represented in the “as it should be” model. Such a model shows how the process should look in the future, including all the necessary improvements. During this stage of business process modeling, such models are developed.

4. testing and application of the “as it should be” model. This stage of modeling is associated with the introduction of the developed model into the practice of the organization. The business process model is being tested, and the necessary changes are made to it.

5. improvement of the “as it should be” model. Business process modeling is not limited to creating the “how it should be” model. Each of the processes in the course of work continues to change and improve, so process models should be regularly reviewed

and improved. This stage of modeling is associated with continuous improvement of processes and improvement of the business process model.

Business process modeling may have a different focus. It depends on what problems are supposed to be solved with its help. Taking into account absolutely all impacts on the process can significantly complicate the model and lead to redundancy of the process description. To avoid this, business process modeling is divided by type. The type of simulation is selected depending on the studied characteristics of the process.

Most often, for the purpose of improving the process, the following types of modeling are used:

- ❖ Functional modeling. This type of modeling involves the description of processes in the form of interconnected, clearly structured functions. At the same time, a strict time sequence of functions, as it exists in real processes, is not required.
- ❖ Object modeling - involves the description of processes as a set of interacting objects - i.e. production units. The object is any object that is transformed during the execution of processes.
- ❖ Simulation modeling - with this type of business process modeling, modeling of the behavior of processes in various external and internal conditions with the analysis of the dynamic characteristics of the processes and with the analysis of the distribution of resources is implied.

Separation of modeling by type is performed to simplify the work and focus on those or other characteristics of the process. At the same time for the same process can be applied to different types of modeling. This allows you to work with one type of model independently of the others.

To date, there are quite a number of methods for modeling business processes. These methods belong to different types of modeling and allow focusing on various aspects. They contain both graphic and textual means, due to which it is possible to visualize the main components of the process and give precise definitions of the parameters and connections of the elements.

Most often in quality management, business process modeling is performed using the following methods:

- ❖ Flow Chart Diagram is a graphical method for representing the process in which operations, data, process equipment, etc. are depicted with special characters. The method is used to display a logical sequence of process actions. The main advantage of the method is its flexibility. A process can be represented in a variety of ways.

- ❖ Data Flow Diagram. A data flow diagram or DFD is used to display the transfer of information (data) from one process operation to another. DFD describes the interrelationship of operations through information and data. This method is the basis of the structural analysis of processes, since allows you to decompose the process into logical levels. Each process can be broken down into subprocesses with a higher level of detail. Using DFD allows you to reflect only the flow of information, but not the flow of materials. The data flow diagram shows how information enters and leaves the process, what actions change the information, where the information is stored in the process, etc.

- ❖ Role Activity Diagram. It is used to model the process in terms of individual roles, groups of roles, and interaction of roles in the process. A role is an abstract element of a process that performs an organizational function. The role diagram shows the degree of “responsibility” for the process and its operations, as well as the interaction of roles.

- ❖ IDEF (Integrated Definition for Function Modeling) - is a whole set of methods for describing various aspects of business processes (IDEF0, IDEF1, IDEF1X, IDEF2, IDEF3, IDEF4, IDEF5). These methods are based on the SADT (Structured Analysis and Design Technique) methodology. For business process modeling, IDEF0 and IDEF3 methods are most often used.

- ❖ IDEF0 - allows you to create a model of process functions. The IDEF0 diagram displays the main process functions, inputs, outputs, control actions, and devices interconnected with the main functions. The process can be decomposed to a lower level.

❖ IDEF3 - this method allows you to create a "behavioral" model of the process. IDEF3 consists of two types of models. The first view is a description of the work flow. The second is a description of the state of transition of objects.

❖ Colored Petri nets - this method represents a process model in the form of a graph, where the vertices are the actions of the process, and the arcs of the event, due to which the process is transferred from one state to another. Petri nets are used for dynamic modeling of process behavior.

❖ Unified Modeling Language (UML) is an object-oriented method for modeling processes. It consists of 9 different diagrams, each of which allows you to simulate individual static or dynamic aspects of the process.

Most of these methods are implemented as software. It allows you to support business processes or analyze them. Examples of such software are various CASE process modeling tools.

The main purpose of business modeling tools is to ensure mutual understanding at all levels of the organization, bridging the gap between the strategic vision of the business (in the broadest sense of the word) and its practical implementation. To this end, modern business modeling tools use special languages that are understandable and easily mastered by top managers, including financial directors, and analysts, and heads of IT departments, each with their own vision of solving business problems. Using such languages, graphic models are built, diagrams that demonstrate level by level, step by step, how business processes are built in a company, how people interact and what needs to be changed to optimize the architecture of the organization as a whole. This means that modern business modeling tools are tools for designing and analyzing business, rather than IT technologies, designed to provide information support for the successful operation of a business.

Information system design tools and their corresponding description languages (the most famous among them is the UML language - Unified Modeling Language) are designed to solve extremely important, but still auxiliary business problems. Simply put, you should first understand what you need (and whether) automate the organization's architecture, and then implement this automation. The business model, in particular (and only in particular),

helps to answer this question. The main purpose of the business model is to give a holistic picture of the life of the organization, to agree on different points of view on a constantly developing and changing business. In this regard, the thesis that “the description of business processes in itself does not do much if it is not considered as the initial stage of a project before the implementation of a complex information system” seems completely wrong. The value of a business model is determined by the extent to which it helps to answer topical issues facing the organization, how really it affects each employee of the organization. Creating, implementing and supporting a business model is an expensive investment project. And like any project, the creation of a business model should be preceded by an analysis of the feasibility and the possibility of its implementation.

The modern approach to the description of business processes involves the idea of continuous development and modification, assessment, as well as forecast and timely changes in business models. The description should adequately reflect the current state of affairs in order to be a reliable, manageable basis for obtaining a holistic view of the prospects for business development and its automation.

Business modeling tools are in a process of continuous development. Initially, using such tools it was possible to describe only the business functions (work) of the company and the movement of data in the process of their implementation. Moreover, if the same business function was used in the performance of various types of work, it was difficult to understand whether the same business function was meant or was it already different. The lack of the ability to explicitly define the hierarchy of business processes (for example, “value chain”, “business process”, “work”, “function”) created problems when using such descriptions. The descriptions themselves were just a collection of pictures. Later, tools began to appear that allowed the organization to be described not only from business functions, but also from other parties. Thus, it became possible to create separate diagrams reflecting the organizational structure of a company, data flows in an organization, the sequence of business functions that make up a single business process, with the possibility of using symbols of logic, etc. Due to the continuously increasing requirements for business modeling tools there are more and more diagrams for describing various aspects of the organization’s activities, which made the

creation of the model more and more complicated. In this regard, the next important stage in the development of business modeling tools is associated with the idea of using a single repository (repository) of objects and the idea of possible reuse of objects in various diagrams. It is these two provisions that made it possible to create a full-fledged model of an organization that describes its architecture.

Thus, we are dealing with a qualitatively new level of business modeling, in which the full-fledged model is stored in the repository and displayed as a set of diagrams representing a particular view of the organization's architecture. At the same time, it is worth noting that on the market there are still successfully existing tools of the second kind - inexpensive ones that are more like graphic tools adapted to a certain extent to the needs of business modeling, and the appropriateness of using various tools to describe the organization's architecture is determined by scope of the project. It is clear that large projects require powerful business modeling tools with well-developed functionality: with the ability to store information in a single repository, teamwork on a modeling project and verify the created model for integrity, semi-automatic chart generation, integration with other software, analysis and documentation models — whereas in small projects, for cost reasons, it would be more sensible to use the aforementioned tools of the second kind.

### **2.3. The role of benchmarking in increasing productivity and effectiveness of industrial production.**

In the context of globalization of the world economy and the intensification of competition, the search for optimal ways of doing business is becoming increasingly important. Recently, the identification of the best business management decisions and the use of these developments in their own practice - benchmarking - is becoming increasingly important for the success of an enterprise and is widely used in developing measures to improve the efficiency of current activities of the enterprise, as well as the implementation of the strategy of business entities. Understanding the essence of the term “benchmarking” in the modern world is available to a wide range of managers and marketers interested in the progressive development of the organization as a single system. At present, the concept of

benchmarking can be interpreted as one of the most effective ways of comparing the key characteristics of one organization with organizations that are market leaders.

Of course, comparing the company's performance with the results of its main competitors is not a new idea. Collecting information about the activities of competitors - a function of operational marketing. However, benchmarking is a more efficient method than just collecting information. This tool allows you to identify opportunities for self-improvement, to identify objects of improvement and to stimulate the continuity of this process in order to improve the competitiveness of the company. It should be noted that benchmarking is an integral part of the projects of the currently popular method of systematically increasing the profitability of Six Sigma production. Six Sigma companies view benchmarking as an essential tool and use it as a useful tool on the road to achieving Six Sigma. Benchmarking is successfully used in both the public and private services sectors. Thus, government agencies, hospitals and universities began to apply its basic postulates to improve their processes and systems.

In practice, various types of benchmarking are most often used, which can be classified depending on who is being compared with and what is being compared (scheme). There is no uniform methodology for benchmarking. The number of steps of benchmarking is different, because the process can be divided into smaller stages, for example, in IBM there are 15 such steps. But the basic principles of benchmarking are the same everywhere. The standard benchmarking process can be represented using benchmarking models. One of them is called "Benchmarking Wheel" and consists of a number of stages: planning, search, observation, analysis, adaptation.

In Japan and the United States, benchmarking programs are open. They are developed with state support. It is believed that thanks to this exchange of experience, the economy of the country as a whole benefits. In Europe, the benchmarking popularity, in our opinion, is very moderate.

Benchmarking, according to some scholars and practitioners, is a method of using someone else's experience, advanced achievements of the best companies to increase production efficiency, improve business processes, which is based on the analysis of specific

results and their use in their own activities. Under benchmarking one can even understand the exchange of positive experience between enterprises in various fields of enterprise activity (for example, benchmarking is used in the field of personnel management to enhance the efficiency of labor remuneration, the functioning of compensation systems and personnel retention programs). This takes into account not only the positive, but also the negative experience of the compared firm (the standard firm in this field of learning experience and comparison), as well as the possibility of direct familiarization of the company's employees with valuable experience in various fields of activity in the process of targeted internship. (Godin A. M. 2014)

Benchmarking its origin goes into marketing. For example, in France the term “benchmarking” is often replaced by the term “benchmarking”, emphasizing the relationship of benchmarking as one of the most effective marketing tools for market conquest. (Elokhov A. M 2015) It is worth noting the basic functions that benchmarking in an enterprise performs:

1. benchmarking forms the organization’s critical attitude towards understanding the processes occurring within the organization;
2. activates the activity of both management personnel and their subordinate structures;
3. It allows to improve the conditions of the organization of labor in the enterprise at the expense of information obtained from external sources. Consequently, we can say that benchmarking allows us to improve the overall organizational structure of the enterprise through borrowed successful business solutions, drawn from the external environment of the organization.

Benchmarking has taken its place among the tools of marketing analysis of competitors. Many of the world's leading leaders in their fields, such as: Samsung, Shell, General Motors and many others, use benchmarking to absorb all the best that competitors have.

Benchmarking is a constant process of studying and evaluating products, services and production experience of its most serious competitors, or those companies that are recognized leaders in their field. For a company that has faced certain difficulties in shaping a strategy,

determining more competitive characteristics of a product, and indeed any difficulties, it becomes an indispensable tool. Recently, benchmarking has become one of the most effective and recognized methods for improving business and is among the most popular management tools.

Despite the opinion of the ease of using the methods of benchmarking in theory, in practice it is often problematic to apply certain solutions developed by other companies. Benchmarking is the art of identifying what other firms are doing better, as well as exploring their working methods. It may seem that this is a “banal espionage,” but everything that will be said corresponds to the ethics of doing business. The benchmarking is based on the idea of comparing the activities of not only competing enterprises, but also advanced firms in other industries. Practice shows that competent use of the experience of competitors and successful companies can reduce costs, increase profits and optimize the choice of strategy for the organization. The fact is that copying the key success factors of one company may not take root in another one, which differs in personnel, financial, and organizational policies for building an organization. In order to introduce innovations, managers' experience in risk management is often needed, because new solutions always imply a certain risk of failure in a particular enterprise. The organizational structure of the company must be flexible, so as not to hinder, but only to promote the development of changes in the organization. In other words, the organization as a complete system should be completely predisposed to innovations, otherwise benchmarking can be considered an ineffective measure. Therefore, it is obvious that to conduct benchmarking at the enterprise, appropriate organizational conditions should be created.

Benchmarking is necessary with a balance between the costs incurred for modernization and the potential benefits of introducing new methods of organizing the work of the enterprise. Otherwise, benchmarking will bring not benefit, but only harm. Benchmarking is impossible without a systematic understanding of competitors and the position of the organization itself in the system of competitive relationships. It is unlikely that the benchmarking conducted by the market leader based on the analysis of firms that completely replicate the leader will be effective. Often effective in marketing is the analysis of market leaders of firms that are on the

life cycle at the stage of recession. Of course, this analysis can be effective for the leader in the sense that it is possible that the knowledge gained can avoid crises at the enterprise itself, however, this type of analysis does not quite correspond to the concept of benchmarking. Benchmarking is a study of the success of leaders, but not of enterprises in crisis situations. Therefore, a full benchmarking analysis of unsuccessful enterprises, albeit a very informative analysis, does not quite correspond to the definitions of the concept of “benchmarking”. (Boldyreva T. V. 2010)

To achieve the main goal of the enterprise - to maximize profits (at minimum cost) - benchmarking allows you to accurately determine the scope of the application of limited resources to achieve maximum results. On the basis of a set of measures developed as a result of benchmarking products, technological processes, management methods, etc., changes are made to current plans, as well as specific functional strategies and the overall strategy of the enterprise are adjusted. Comparison of efficiency should be carried out between enterprises operating in the same industry, according to individual parameters (products, services, technological process, etc.), since firms producing similar products are in approximately the same operating conditions. Companies from other industries can learn from management experience of a general nature, which can have a very positive effect on the company's strategy. Borrowing strengths from market leaders can be described simply as copying, but also by no means benchmarking, because benchmarking can be characterized as a thoughtful, balanced decision regarding business improvements. Simple, mindless copying cannot be considered benchmarking, because many key factors for the development of one business structure may not take root in another business structure that does not have a similar organization of management and business environment as a whole.

The process of regular information exchange between organizations in order to determine the best way to solve problems and create new knowledge can be defined by the concept of “benchmarking interaction”. Benchmarking interaction allows you to use the resources of a large number of organizations in the network. There is a relationship of trust and partnership between enterprises that implies voluntary participation and provision of information. Benchmarking has a wider range of tools compared to traditional benchmarking.

Ways of implementing benchmarking interaction to a greater degree orient organization to develop not only their own potential, but also the potential of the external environment, thereby contributing to a joint increase in competitiveness. At the same time, it is possible to solve not only current, but also strategic tasks related to raising intellectual capital and the ability to predict development directions.

In practice, it often becomes obvious that new and original business practices do not become a revelation for many modern top managers. Innovations, for the most part, are born not as something absolutely new and revolutionary, but as “well forgotten old”, replayed in a new way. Benchmarking, conducted on the basis of competitors' systems analysis, makes it possible to develop new strategies for success based on the experience gained in the market as a whole. In other words, benchmarking doesn't reveal anything fundamentally new — all the tricks are already involved in other firms, industries, and even markets. This is the main difference between benchmarking and innovations. (Berezin I. A. 2014)

It is believed that Xerox became the first to use benchmarking in practice. At that time, the company's main competitors had reached low prices for office equipment, and Xerox corporation thought about finding ways to reduce the price of its products. After analyzing the costs at your enterprise, a number of measures were taken to reduce production costs, and these measures did not affect the final quality of the products. The project bore fruit, and the company was able not only to get out of the crisis situation, but also to consolidate its leadership position in the office equipment market. Since then, Xerox pays enviable attention to marketing as one of the tools to improve the competitiveness of the organization as a whole, constantly monitoring competitors and often using the mystery shopper method, studying not only the quality of the product itself, but also related services.

It is important to note that benchmarking allows you to develop the overall level of business in the whole region, country and even globally. The best practices of world leaders are being developed by small enterprises, thereby raising the general level of economic development on a macroeconomic scale, increasing the competitiveness of enterprises, which ultimately has a positive effect on the quality of final products, works and services, and customer satisfaction. To develop effective targeted proposals for improving the enterprise's

activities, it is very important to know the specific features of the industry, the business itself and the specific market in which the enterprise operates. The goal of benchmarking is ultimately to increase the competitiveness of products, services, enterprises in general.

Benchmarking is carried out by comparative analysis. Most often, for the purpose of benchmarking, pairwise analysis is used, that is, a comparison of each factor, an indicator in pairs with a similar indicator of the main competitor. Such an analysis allows you to identify areas in which the analyzed company loses to the main competitor or the market as a whole, and to focus the main management efforts on the implementation of those activities that will catch up with competitors. It should be said that one of the conditions for successful benchmarking is trusting relationships between participants and openness information for comparison and exchange of experience. With the help of benchmarking revealed the strengths and weaknesses of the enterprise in a constantly changing market conditions.

Benchmarking has a positive effect on increasing competitiveness in order to maintain a high level of efficiency, as well as increase competition and efficiency of business processes. However, it should be noted that private issues of the implementation of the benchmarking process in specific areas of activity, implementation stages remain not fully understood, although this method is very common in various areas of activity: in marketing, personnel management, strategic planning, financial management.

Thus, benchmarking is not only an advanced technology for competitive analysis. This is, firstly, a concept that implies the development of the company striving for continuous improvement, and, secondly, the process of improvement itself. This is a continuous search for new ideas, their adaptation and use in practice. Benchmarking can bring substantial benefits to companies of any size, from small businesses to multinational corporations. Thanks to benchmarking, they manage to improve work efficiency, which leads to a reduction in production waste and rework of finished products, to the elimination of many quality problems. Benchmarking helps to improve business processes relatively quickly and at lower cost, allows you to understand how advanced companies work, and to achieve the same or better results.

### **3.1 Modern production systems applied in the industry of Azerbaijan and their modeling methods.**

Industrial production is one of the main parts of the material production. Industrialization affects not only the economy of the country, but also on all parts of public life. Industrialization shows the level development of society. The industry is called the engine of economic development.

Therefore, it is of particular interest to study industrial production of the country. For each country, the volume of industrial production depends on its specific characteristics. Such as: geopolitical position, level of equipment with natural resources, the level of industrialization, the level of application of the achievements of scientific and technological progress in production, investment, etc.

According to the law of dialectics in the market economy system, the machine the industry is moving upwards and as a result there is a complex mechanization of the production process. At this level of market systems industrialization dictates not only in production but also in all spheres of human activity. The development of industrialization on this level creates social problems in society. This includes the emergence of monopolists, the increase in unemployment, the need a stronger development of science, education, medicine, sports, etc., increase in the number of poor, social protection of the poor etc. High production development not only forms social problems, but also creates the conditions for solving them. At this time, it becomes necessary state regulation of the economy and the state takes the responsibility to solve these problems. Because high-level industrialization of the production process to increase productivity and profits of entrepreneurs. At his time due to the increase in taxes the volume of budget and the state can successfully solve these social problems.

This process is found in small European states entering into the system of modern industrialized market countries economy. For example, Norway, Sweden, Denmark, Finland and other states have taken responsibility for social unemployment protection of the population of the country. In these countries, funds allocated from state budget for the development of science, education, health and other spheres, several times more, not only from countries with transition, emerging economies, but also industrialized countries. The fact is, despite the fact

that large states are economically more developed than the small countries in this system, but they distinguish more funds for the military-industrial complex.

In terms of initial production, the industry as a whole can divide into 2 main sections:  
(Aliyev F.A. 2013)

1. Extractive industry.
2. Manufacturing industry.

Extractive industries include mining companies:

- mining and chemical raw materials;
- ores of ferrous and non-ferrous metals;
- nonmetallic raw materials for metallurgy;
- non-metallic ores;
- oil, gas, coal, peat, shale, salt;
- non-metallic building materials;
- light natural aggregates and limestone.

The manufacturing industry includes enterprises according to production:

- ferrous and non-ferrous metals;
- metal;
- chemical and petrochemical products;
- machinery and equipment;
- wood products;
- pulp and paper products;
- building materials;
- consumer goods of general use.

The manufacturing industry can also be attributed to atomic and thermal power plants, enterprises for the repair of industrial products and consumer goods.

Azerbaijan's industrial sectors are divided into 4 large groups:

- ❖ mining industry;

- ❖ manufacturing industry;
- ❖ production, distribution and supply of electricity and gas;
- ❖ water supply, cleaning and waste disposal.

According to the statistical data of 2014 of the Azerbaijan Statistical Committee 73% of the total industrial product is mining and chemical raw materials. And 86.7% of mining and chemical raw materials is crude oil and natural gas.

The key to a successful and stable state economy is its industrial potential. Therefore, one of the main priorities national economic policy is to develop an effective state industrial strategy. Progressive industrial the policy should be shaped in accordance with the realities of modern the world, in other words, its driving force should be the development high-tech industries, modernization and use innovative results of scientific and technological progress.

Azerbaijan, being a developing country, is undertaking successful steps for turning into a post-industrial country and integration into world economic processes. To date, the main objectives of the Azerbaijani industrial policy are undoubtedly deep structural transformations of all industries; the introduction of high-tech products; automation and modernization manufacturing processes; development of the non-oil sector industry, as well as the most important priority is the transition from import-substituting policies to the export-oriented model, conducive to improving the competitiveness of the country in the world the market. In the implementation of an effective industrial policy exceptional the role belongs to the state, as supporting and encouraging small and medium-sized enterprises engaged in innovation activities, and also successful investment policies will contribute significant inflow of foreign capital, which ultimately will help achieve the main objectives of industrial by politics. Improving the industrial potential under which implies an increase in competitiveness and solvency, as well as an increase in demand, supply and profits, is the main reference point of development of the state economy.

A fresh look at the principles of the implementation of industrial policy from a perspective such as the totality of all state actions exerted for a certain impact on enterprises, corporations, organizations, entrepreneurs, etc. In other words, it can be said that industrial policy is no longer directed to specific sectors - it falls out of the system of economic policy,

since it is a complex combination of various types of policies (monetary, tax, competitive, etc.) that are synchronized between by myself. (Dementiev V.E. 2006)

In the period of high oil prices, the republic has turned from an importer of natural gas and electricity into an exporter, and the infrastructure of the industry has improved significantly. During this period, in addition to infrastructure projects, public investment was also directed to other projects that contribute to economic development. A favorable business and investment environment were created, state financing of private sector projects was carried out on concessional terms and, if necessary, government share in such projects.

As part of industrialization measures implemented in recent years, along with the successes achieved in the field of oil and gas, gold and other extractive industries, industry diversification has been expanded, equipment with new production capacity has been commissioned, and competitive enterprises based on modern technologies have been created.

New competitive enterprises were recently created in such areas as mechanical engineering, equipment manufacturing, instrument engineering and the production of building materials, including the Nakhchivan automobile plant, the tractor-agricultural machine-building plant in Ganja, the electronic plant in Mingachevir, the solar cell plant in Sumgayit, the metalwork plant in Garadagh and the factory of ceramic tiles in Hajigabul, etc. form the basis of the country's non-oil industry. At the same time, in recent years important projects have been implemented to create a powerful defense industry, where in a short time about 50 new production lines were installed. (17)

Opening of a shipbuilding plant in Baku, increasing production capacity of Garadagh cement plant, construction and commissioning of a new cement plant in Gazakh and Nakhchivan, aluminum production in Ganja, as well as gold and copper processing plants in Dashkesan and Gadabay, the creation of the Azerbaijan Metallurgical Plant, and the modernization of the petrochemical industry in Sumgait create wide opportunities for further non-oil industry to diversify stage of development.

Over the past 10 years, new enterprises of the textile industry (production of clothes, leather goods, footwear, paper and cardboard, furniture) and other areas of the non-oil industry have also been put into operation in Baku and other regions. The development of agriculture,

on the one hand, and the improvement of regional infrastructure, on the other, has stimulated the creation of new competitive enterprises in the food industry in recent years. Over the past period, the Imishli sugar plant, the Absheron salt plant, the Sumgait vegetable oil plant, the corn processing plant and the glucose plant in Oghuz, as well as the dairy, canning and food factories for the production of different regions of the country. Extractive industry, especially hydrocarbon production is still leading among other industries. However, non-oil industries, among which the food production, light industry and electric power industry show the greatest production results, also contribute to the increase in the country's GDP in recent years.

The creation of industrial institutions and the expansion of their activities play an exceptional role in accelerating the process of industrialization today. Sumgayit Technology Park consists of 17 plants including plants for the production of precision technology and electrical equipment, heavy machinery, cable plant, for the production of plastic pipes, hot galvanized, etc. Balakhani Industrial Park was built in order to raise the social level of the population, including increase the number of jobs, as well as to introduce modern technologies that meet international standards. Balakhani Technopark is specialized in the recycling of household appliances and the provision of related services under the leadership of Clean City OJSC. (18)

Considering the largest sectors of industry in our country, it should be noted that in recent years a large-scale restructuring of enterprises has been launched in the chemical industry, projects are being implemented to create our own energy production based on the installation of a high-pressure steam generator. Foreign investment plays an important role in the development of the chemical industry.

The major hydropower plants include Mingechaur, Varvarinskaya, Shamkhor, whose equipment is significantly outdated and needs to be updated. At this stage, measures are being taken for the technological modernization of existing power plants with the support of foreign capital.

The machine-building complex is represented by a wide differentiation of the goods produced: electric motors, means of automatization, household air conditioners, various cables, refrigerators and others, which are also exported. Petroleum engineering, including the

production of drilling and operational equipment, occupies a leading position in the industry of the country. The metallurgical potential of Azerbaijan is represented by such plants as the pipe-rolling plant in Sumgayit, the mining and enrichment plant in Dashkesen for the extraction of iron ore, the plant for the production of aluminum oxide, i.e. alumina (capacity 1 million tons per year) in Ganja and Sumgayit aluminum plant (which capacity reaches 25 thousand tons per year). The light and food industries are also moving to a new stage of production; previously, the demand for products was mainly satisfied by imports. The food industry is represented by milling, canning, bakery production, and the manufacture of alcoholic beverages (the country produces various types of wines, brandies and champagne), fish processing, tea and tobacco products, which are supplied to foreign countries. Today in Azerbaijan there are ample opportunities for the development and improvement of these industries.

The main goal of the national industrial policy is to increase the competitiveness of industry in the global market. It is necessary to ensure flexibility in the regulation of the tariff policy, which will be accompanied by a stimulating tax and customs by the medium. In addition, it is necessary to stimulate the flow of investment in the non-oil sector, to ensure the use of government-run soft loans and leasing opportunities. At the same time, building public-private partnerships using global experience plays an important role.

The benchmark in the direction of information technology, automation and modernization plays a key role in the successful improvement of all sectors of the economy, especially industrial. The technological potential of our country should be fluttered by strengthening the activities of existing industrial and technological parks, creating new industrial parks and industrial districts, and increasing the industrial potential of individual regions.

Azerbaijan is turning into an industrial country; a favorable oil and gas strategy allows our country to push its positions to the world level as a strong competitor. The oil and gas industry remain the main advantage of our state and the key to the sustainability of financial resources, and also contributes to enhanced opportunities for the rational use of industrial resources. Looking through the statistical data of the main branches of the Azerbaijani industry

over the past 10 years, there has been a tremendous increase in industrial production (by 2.7 times), the production of building materials has increased by 2.5 times, the metallurgical industry has increased by 2.2 times, electrical equipment - by 2.1 times, textile production - 2.5 times. (20)

In the conditions of dynamic development and accelerated globalization, the main task of our country is to prevent a lag in the process of development and adaptation to rapidly changing conditions. Therefore, Azerbaijan needs to eliminate the existing dependence on the oil sector and focus on the development and modernization of the non-oil sector. So, today, over 250 enterprises, including more than 75 industrial enterprises, are being built throughout the country, about 70 manufacturing and processing enterprises will be commissioned in the near future.

In modern conditions, the improvement of the structure of the national economy, in particular, its leading industry - industry, acquires great relevance. The policy of restructuring the industry of the Republic of Azerbaijan, associated with the need for large investments, with the development and implementation of investment projects, in a new way sets the task of rational use of the potential of the republic, of improving the efficiency of capital investments. Today, it is necessary that the best options to ensure the growth of social production as a whole are selected from the set of possible solutions.

As is known, the structure of the industry is characterized mainly by three important indicators — the volume of production, the average annual cost of the main industrial and production assets and the average number of employees employed in a particular industry. It should be noted that an important indicator that has a decisive influence on the structure of the economy as a whole and especially industry, is the volume of industrial production.

Diversification - expanding the range of manufactured products and reorientation of sales markets, the development of new types of production in order to improve production efficiency, obtain economic benefits, prevent bankruptcy. Such diversification is called production diversification. The need to diversify production is an urgent task, especially for countries that are highly dependent on the export of minerals. Individual countries, in particular, Malaysia, Chile and Indonesia, managed to diversify their economies. Like any

country that survived the transition period, Azerbaijan also used its natural resources to build a strong economy, but at the expense of revenues from the sale of these resources, succeeded in diversifying the economy and reducing its dependence on oil to a minimum. As a result of this strategy, there continues to be a consistent growth trend in the construction, tourism, agricultural, transport and information sectors, as well as in the field of communication technologies.

International financial institutions emphasize the importance of the agricultural and tourism industries. Thus, 44% of the employed population of the country work in this particular area. According to the figures in the report of the Cabinet of Ministers, compared to 2003, the production of agricultural products in the country in 2011 increased by 34%. The Asian Development Bank, which closely cooperates with Azerbaijan, also considers agriculture and tourism to be the leading development directions in the country of the non-oil sector. The Bank believes that subsidizing producers of agricultural products and preserving tax concessions for them help the development of the agricultural sector, which has great potential in Azerbaijan. Thus, the rich tourism potential of Azerbaijan and the rapid development of tourism infrastructure in the country in recent years promise large revenues for the country in this area of the non-oil sector.

At present, non-oil products manufactured in Azerbaijan, including electrical machinery and equipment, spare parts, chemical products, construction materials, finished textile products, etc., are exported to various regions.

Thus, Azerbaijan is successfully using its rich oil and gas fields to achieve long-term and sustainable economic development. The strategy of transforming “black gold” into a leading force in the development of the non-oil sector continues to bear fruit - human capital, and by using oil and gas revenues, building a strong, competitive economy independent of these revenues in the future.

### **3.2 The opportunities of applying the benchmarking in industrial enterprises of Azerbaijan and its effect on modeling of production**

The modern system and the ongoing global socio-economic trends impose certain requirements on each country wishing to embark on the path of accelerated economic development. Azerbaijan is no exception. The main source of sustainable growth can be the development of science and technology. The country needs not just a quantitative growth of economic indicators, but their qualitative improvement, i.e. improving the "quality" of economic growth (application of advanced technologies and education, reduction of unit costs of resources per unit of growth, preservation of the environment, etc.).

The consolidation of market relations in macroeconomics requires the most efficient use of available economic resources and more concentrated attention and skills of the entrepreneur in maintaining competitiveness. Obviously, proper and effective organization is feasible with the use of proven practices, in particular, benchmarking.

According to the consulting company Bain & Co, the past two years benchmarking is one of the three most common business management methods in large international corporations, because benchmarking helps to improve business processes relatively quickly and at lower cost. It allows you to understand how advanced companies work, and to achieve the same, and perhaps even higher, results.

Benchmarking results are the basis for the development of three main production strategies:

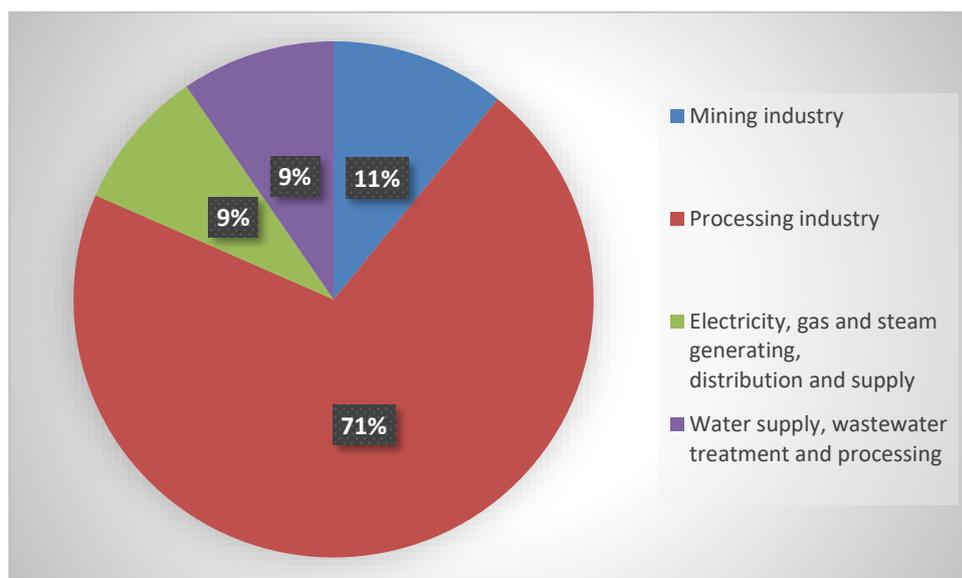
- cost leadership, that is, identifying sources of cost reduction; this is primarily the rationalization of the distribution network, access to new markets, an increase in investment in research and development (R & D);
- market development (based on modernizing production, improving quality, entering existing markets with new products);
- increase in the general output of products with high added value, which is achieved mainly through the introduction of new technologies and the creation of joint ventures.

Benchmarking allows you not only to identify and summarize the best examples of high-performance work, it also helps to select priority markets.

The Azerbaijani economy is trying to adapt to new global conditions and the state implements the measures to improve the business environment. In an increasingly competitive environment, Azerbaijani companies operating in the industry need to accelerate the transition to international production systems to be more sustainable. Traditional production methods are no longer innovative and competitive. Traditional entrepreneurs are trying to renew their production systems, taking into account global challenges, which supports their entry into the world markets.

Entrepreneurs in Azerbaijan are mainly engaged in production of food, textile, construction materials, mining, mechanical engineering and other industries that require innovative production models and technologies.

**Figure 4: Distribution of industrial enterprises in Azerbaijan**



**Source: DSK**

Bejmarking is one of the key platforms that will support the transition to more efficient and productive production systems in Azerbaijan. Of course, joining this process may not be interesting to every entrepreneur. The key role here is that the state can provide stimulating support to entrepreneurs in this area. While large industrial companies operating in the country

are already widening their business activity, small and medium-sized businesses are vulnerable in this area and there are several reasons for this.

- Poor financial opportunities
- Insufficient cadmium reserves
- Use of traditional production technologies
- Transition to corruptive management system
- Low scarcity research
- Uncertainty of the legal framework
- Insufficient stimulation

The global quality movement suffers from the notion of “News” - it is always looking for a “new and different” approach that rejects all those that were previously. In fact, the very first comments on how to improve quality still appear in the form of performance standards and performance management. However, there is no longer a “new” focus of quality, since its role has been approved and its continued presence in the quality management system is largely underestimated as part of the usual quality. In addition, we still have the aspect of checking (controlling) the quality of the finished product, and we use quality assurance to evaluate the product from the client’s point of view. Combining these basic quality approaches with the team-based improvement method created Total Quality Management and Six Sigma. When we look for information about Six Sigma, we actually find nothing really new, since most of the elements were developed earlier. However, in the Six Sigma approach, these elements are reorganized, and the effective implementation of this approach is contained in the organization’s working method. This means that now quality is the work of everyone, and that every person has the means, methods, and directions to acknowledge his or her responsibility for the task of improvement.

Benchmarking is an important part of the organization's improvement efforts. This methodology forces an organization to evaluate its performance on the basis of external results, and not just to evaluate its own development trend. When organization comparison standards are self-focused, for example, the comparative results of one reporting period to the same previous period, then the organization may be subject to external events. Benchmarking

externally protects the organization from falling into the trap of self-limited forecasts, which are likely to overestimate or underestimate the potential. In terms of organization, reality is external, not internal. All internally focused measures ignore the "World of Opportunity", which is outside of our walls. We must work to improve both dimensions at the same time — by improving the quality of our methods so that they produce fewer losses and be more consistent, while at the same time aligning these processes with external control signals from the market to increase flexibility within our organization, and also make it more susceptible to changes and trends in the market. If we are not on the alert, then we will often get unpleasant surprises that will change our way of doing business, instead of adopting a guided approach that puts the organization ahead of the impact of external changes. As for Azerbaijan, benchmarking is needed to learn the lessons that your global competitors have already learned and to ensure that your business does not waste time “transforming” things that are common knowledge from outside.

Many domestic enterprises have long been engaged in activities similar to benchmarking, they just do not use the term itself. Managers, entering into informal relationships with partners or competitors, often learn from each other the best achievements. As for the "official" benchmarking, then only a few of them use it. These are mainly representatives of big business, having business contacts with foreign partners.

In order not to be left behind its competitors, all companies, regardless of size and scope of activity, must constantly study and apply best practices in the field of production and business technologies. With knowledge of the strengths and weaknesses of competition, you can make an important step towards creating a successful market strategy, and by targeting the best, you can find and develop the potential for optimization within the company and even the industry as a whole. Advanced countries came to the need for benchmarking events at the end of the last century, I think our companies are already approaching the realization of the need for this function.

Benchmarking companies are able to succeed, as they are constantly focused on market research, and this allows them to improve their performance and competitiveness.

For our companies, benchmarking practice today is rare, although the potential of this management tool is necessary and possible to implement, gradually introducing benchmarking into the arsenal of managers, teaching them how to conduct benchmarking, creating an infrastructure for benchmarking. However, in order for this mechanism to work, it is necessary to attract not only businessmen, but also government agencies in order to regulate and stimulate this business management tool. Today it is time to move away from unhealthy competition based on the concept of "someone won - someone lost", it's time to move on to the concept of cooperation "everyone wins."

The development of benchmarking will contribute to openness and business development, increasing its efficiency, which is so necessary for our economy today. Mastering this method of managing and improving business will allow our companies, not only large but also small and medium-sized, to keep up with the times and take a worthy place, including in the global market.

Speaking about the opportunities for the development and application of global benchmarking in Azerbaijan, it should be noted that the successful experience of the best Azerbaijan companies, their approaches to building an effective management system and achieving competitiveness should be generated in a database of best business practices. The information contained in it should be open to the domestic business community.

## **CONCLUSION AND RECOMENDATITIONS**

Benchmarking is a modern management method which is widely used in industry especially in production management. This mechanism has become more often used recently due to dynamism. As we know in the modern world, companies are trying to get ahead of each other as competition has increased. Therefore, companies use the best production systems of other more advanced companies in their operations. Using benchmarking allows companies to outperform their competitors.

Benchmarking is becoming a powerful tool for improving business processes and identifying best practices. This method is applied not only in production but also in all industrial systems such as marketing, management, finances, etc. Benchmarking a company, production, manufacturing operations, products and services can be a powerful tool for identifying opportunities to improve a company's performance, its competitiveness and applying the most effective techniques in relevant business operations, production and sales.

It can be concluded that the use of benchmarking only in production cannot ensure the effectiveness of an industrial company. Benchmarking is a complex method. This system should also be applied not only for a certain period but should be applied continuously.

In Azerbaijan carried out reforms in the industrial sector as the era of the oil industry comes to an end. For the development of the non-oil sector in the industry, Azerbaijani companies must produce competitive products. And for production competitive products such

management tools as benchmarking should be applied in the production system. Azerbaijani companies should study the best examples of systems used in industry.

One of the problems about applying the method of benchmarking in Azerbaijan is the limited availability of qualified personnel and companies in Azerbaijan consider the costs of benchmarking unnecessary. Some companies do not use benchmarking as a continuous process and therefore cannot receive all the privileges from using this method.

Recommendations to Azerbaijani companies can be to preach a benchmarking culture and acquaintance domestic companies with this system. And also, stimulation by the government using method of benchmarking in firms.

However, there is no doubt that one of the indisputable advantages of benchmarking is the opportunity to look at ourselves, which gives an objective understanding of the organization's current competitive positions. At the same time, it becomes possible to obtain new ideas, principles and tools of management that have already proven their effectiveness, which generally supports innovative activity in the company, which is so important in today's situation.

As such, the company does not have the right to use all the facilities for which it is impossible to do so, as well as for the first time, to take advantage of the unwanted reputation and to create a competitive edge. The most commonly used objects are called the total number of objects that are called priority objects. The crucial level of priority is exacerbated by factors such as the philosophy of the company; total financial resources; analyze the cost of the problem; professional level staff; motivation staff.

It is necessary to teach, that benchmarking - this is a business, not a single person, but a team, a businessman, not planning strategically to build a business plan. Providing strategically important changes to the company is a challenge. Whether it's the first time you decide on the link, any changes will come in handy, which will eventually be overwhelmed by the fact that it does not succeed, and who changes it. With a sense of management, companies need to devise, modify, modify, and demonstrate the highest level of trustworthiness in their own right and commitment to pursue realistic program change.

In conclusion, we note that benchmarking is not just a technique for studying and implementing successful solutions. This is a practice of conducting and developing a business that requires continuous execution and interrelation with other approaches to management.

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