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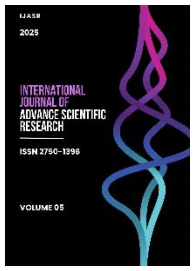

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Research Article

Analysis Of Indicators Of Learning New Technologies And Technical Level And Efficiency

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Abstract

This article covers the study of new technologies, their technical level, innovative potential and assessment of performance indicators. The degree of automation of technological processes, energy efficiency, environmental safety and economic profitability are analyzed. The article also shows the advantages of introducing advanced technologies used in modern industry, ways to increase production efficiency using digital control systems, artificial intelligence and Internet networks. The results of the study justify the need for an integrated approach to the selection and implementation of new technologies in production processes.

Keywords

New technologies, technical level, efficiency, innovation, energy efficiency, environmental safety, digital management, automation, scientific analysis, production efficiency.

Introduction

Modern technological progress has a profound impact on all spheres of humanity. The study and implementation of new technologies is of great importance in increasing production efficiency, rational use of resources, and improving labor productivity. Therefore, when evaluating technologies, their technical level, innovative value, and economic efficiency are separately analyzed [1,2,3,4].

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Scientific foundations of studying new technologies. The process of studying technologies requires a thorough study of their scientific foundations, principles of operation, energy consumption, environmental impact and economic efficiency. The following factors are important in this [1,2,5,6,7]:

– The level of scientific and technical innovation - the advancement of technology, the presence of innovative components.

– Technical indicators - production capacity, energy efficiency, level of automation.

– Environmental indicators - waste, greenhouse gas emissions, resource efficiency.

– Economic indicators - investment cost, production cost, profit and payback period.

Criteria for assessing technical level and efficiency.

The following main criteria are used to determine the technical level:

1. Production efficiency: $Q = A / t$

2. Energy efficiency: $E = P_{out} / P_{in}$

3. Technological reliability coefficient: $K = t_{useful} / t_{general}$

The indicator of the level of technology is the coefficient of proportionality in the equation that relates the change in labor productivity in a technological process to the change in technological tools. The level of technology is a characteristic of each technological process inherent in the method of manufacturing a particular product. This property is determined by the idea of the technological process and the technical implementation of this idea. The idea of the technological process is expressed in the nature and sequence of working and auxiliary actions of the technological process [2,8,9,10,11,12].

If in the process of improving the technological process its main idea does not change, that is, there is a rational development of technology, the level of technology remains unchanged. This is the qualitative side of the indicator of the level of technology. In quantitative terms, this indicator is a general assessment of the effective usefulness of this type of technology from the point of view of society.Ishlab chiqarish texnologik darajasi mahsulotning sifati bilan baholash mumkin [3,13,14,15,16].

The level of technology is determined by the product of living and past labor productivity and represents the overall efficiency of the technological process in terms of the independent performance of living and past labor [2,17,18].

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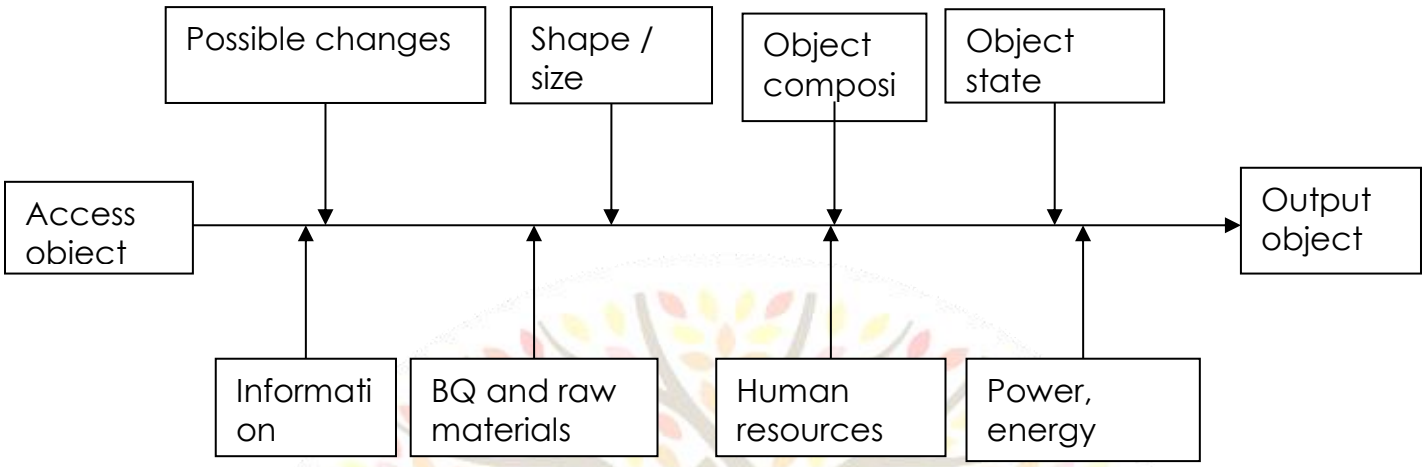

Figure 1. Schematic of the technological process

When assessing the level of technology, the advantages of new technologies are not clearly visible at the initial stage of their implementation, even if they are superior to the old technology, that is, the dynamics of process changes more clearly reflect the development prospects [7,19,20,21,22].

Evaluation allows us to compare different technological processes in terms of quality. For example, according to the level of technology, it is possible to compare the level of improvement of the technology of press and plastic, fabric production, and any product [4,23,24].

METHODS

Indicators of the level of technological development. In a market economy, an enterprise must analyze the technical level and efficiency of new equipment and technologies. Such activities are carried out to improve production activities, since one of the main conditions for the successful development of this enterprise is innovation. For this, generalizing indicators of the technical level and efficiency of new equipment and technologies are used [2,4,5,25,26].

At the research and development stage: responsiveness, patent purity, level of standardization and unification, research and development costs, economic efficiency, scientific intensity, design continuity, product complexity, variability, ergonomic performance, aesthetic performance, safety, environmental performance.

At the production stage: productivity, speed, parameters and dimensions, controllability, optimal structure, optimal operation, reliability and safety; economic indicators: labor intensity, material consumption, capital intensity, fixed costs, labor productivity, specific capital investments, degree of mechanization, automation.

At the stage of use: reliability, safety, stability, performance indicators, power, production capacity, duration of the operating period, efficiency, design, operating costs, availability of

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components and spare parts, serviceability, warranty. That is, the indicators of the innovative technical level of production characterize the economic efficiency of measures for its technical and organizational development [5,27,28,29,30].

Table 1. Indicators of the technological level of production

Indicators of the technological level of production	
Scientific and technical level Production level	Scientific and technical level Production level
New product Technological discipline	New product Technological discipline
Technological efficiency Production flow	Technological efficiency Production flow
Technological progress Technical and energy equipment	Technological progress Technical and energy equipment
Level of development of production technological equipment Automation, support and re-equipment of production	Level of development of production technological equipment Automation, support and re-equipment of production
Technical and technological level of production	

The state of production technology is the most important factor that determines the quality of manufactured products. Therefore, each product is the most complete and accurate indicator of the development of production technology [3,31,32,33].

The state of production technology is the most important factor that determines the quality of manufactured products. Therefore, each product is the most complete and accurate indicator of the development of production technology [3,31,32,33].

At the same time, technological development depends on a number of elements of production that actively influence it:

1. Formation of a fleet of equipment;

2. Staffing;

3. Use of new materials, fuel and raw materials.

RESULTS

Analysis of innovative technologies. The study of innovative technologies includes determining their

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practical utility, competitiveness, and technical and economic advantages [2,34,35,36,37].

Table 2. Analysis of innovative technologies

Technology type	Energy efficiency (%)	Environmental safety	Automation Level	Efficiency
Traditional	60–70	Average	Low	Average
New automated	85–90	High	High	High
Digital control based	90–95	Very high	Full	Very high

The technological level is the technological cycle of production, in which a person who controls the means of production performs professional operations necessary to create a certain labor product. Technology can be a production technology at an enterprise for individual products and groups of products, individual units, assemblies and spare parts in general [7,38,39].

External indicators of the level of technology include:

1. The coefficient of mechanization of work, mechanization of labor and mechanization by labor intensity:

2. The coefficient of automation;

3. The share of advanced technological processes;

4. The factor of thoroughness;5.Ishlab chiqarish uskunalarining nisbati;

6. The share of products manufactured using progressive technological methods and the ratio of work performed using progressive technologies;

7. The specific weight of machine time in technological labor intensity;

8. Technological discipline indicators;

9. The coefficient of unification and standardization.

The level of technology also depends on the following [5,7,40]:

1. The level of mechanization and automation of technological management,

the level of technological impact of various methods (physical, chemical, mechanical, etc.);

2. The subject of labor, the level of technological intensity of the process,

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the level of use of material, energy and time parameters of the technological process;

3. The level of technological management - the ability to change technological processes when external factors change, to achieve the highest productivity and maximum production efficiency in order to obtain the highest profit;

4. The level of technological organization of the process (continuity, quantity, optimal composition of the process);

5. The level of adaptation of the technological process - the ability of the technology to operate in accordance with this mode in conjunction with the existing production and environment.

Indicators of the technical level and efficiency of new technology.

Innovative technologies ensure the technological progress of production and largely determine the technical level and efficiency of technology [5,9,11,41].

Level of technological impact:

• mechanization, automation, electronicization;

• physical, chemical, mechanical, electronic, ionic, other types of impact.

• level of use of computers and ABT.

The level of technological intensity:

• metal cutting speed,

• raw materials, materials, energy consumption;

• duration of the technological cycle;

• level of utilization of production space and equipment, etc.

The level of technological organization:

• combination of technological methods;

• continuity of processes;

• number of technological stages of processing;

• number and directions of material flows.

The degree of adaptation of the technological process:

• reliability, smoothness and safety;

• preservation of equipment and technologies,

• compliance with the requirements of technical aesthetics and ergonomics.

Technology factors [3,7,38,39,40,42]:

- Dynamic changes - the implementation of any actions and processes (for example, production processes - chemical fiber production, iron smelting), their stages can be depicted in technical documentation with drawings, diagrams, pictures and technical means or described verbally.
- Feature – indicates the appropriateness of technological processes in achieving a certain result.
- Internal supply (necessary tools, material resources, appropriately trained and

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qualified performers, strict adherence to technological regimes (power, energy, heat, etc.)

- Interaction between means of production and the external environment (planning of enterprise activities on a national economy scale and ecological balance of production with the environment)

• Logic - a strict sequence of actions, operations, etc.

- Modern technological processes as economic objects. The level of development of modern technology largely determines the competitiveness of an enterprise and therefore has an economic impact. This impact has a different impact on each layer of the enterprise in the production process [14,15,16,17].

- An operation is understood as a complete part of a technological process, performed continuously, as a rule, at one workplace.

- Workplace - a suitably equipped work area in a workshop, workshop or other area or near equipment, designed to carry out a specific technological process.

- Raw materials - natural or artificial (derived from natural materials) materials used to produce products; they are, in turn, divided into organic (wood; artificial - viscose, acetate fiber) and mineral (natural - iron ore; artificial - silicate, metal fibers).

- Semi-finished product - a product that is produced in one production area and used to produce a product in another. Often, a semi-finished product acts as a finished product.

- The result of a technological process is any change in the production object associated with a change in the shape, dimensions, condition or state of this object during its production and delivery to the consumer.

• *The result of the production process is a finished product that can be used by consumers for their intended purpose.*

Ways to improve the efficiency of technological innovations [18,19,20,21]:

• Increasing the level of automation - improving the quality and sustainability of production by reducing the human factor.

• Introduction of digital technologies — process management using IoT, Big Data, and AI systems.

• Energy-efficient equipment — use of new pumps, heat exchangers, reactors, and sensor systems.

• Compliance with environmental standards — introduction of waste reduction and recycling systems.

Comprehensive analysis to determine the effectiveness of new technologies:

When assessing effectiveness, calculations are made based on integral indicators: $\mathbf{S_{Total} = \alpha_1 Q + \alpha_2 E + \alpha_3 K.}$

Here: α_1 , α_2 , α_3 – weighting coefficients;

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Q , E , K – production efficiency and reliability indicators.

The results allow us to determine the suitability of new technologies for use in the production system.

Practical example: For example, as a result of the introduction of energy-saving rotary kilns in cement production plants: energy consumption was reduced by 15–20%, product quality was improved by 10%, waste was reduced by 25%, and production efficiency increased by 1.2 times [2,4,5,43,44].

CONCLUSIONS

The study of new technologies, analysis of their technical level and efficiency is one of the main factors in achieving high results in industry, agriculture and service sectors today. Technological innovations allow automating production processes, increasing labor productivity, reducing energy consumption and ensuring environmental safety.

The conducted analyses show that as a result of the introduction of new technologies, production efficiency increases by an average of 15–30%, and energy savings amount to 20–25%. In addition, digital control systems, artificial intelligence and automated control modules increase the stability of the process, reduce errors caused by the human factor.

Thus, the scientific study, analysis of technologies and the application of their results in production are of great importance in increasing the competitiveness of Uzbek industry, expanding its export potential and maintaining ecological balance.

Proposals

1. Improving the system for assessing technological innovations - it is necessary to develop criteria for technical level, energy efficiency and environmental safety for each industry.

2. Strengthening the activities of innovation centers - establishing mechanisms for cooperation between research institutes and manufacturing enterprises.

3. Improving personnel skills - training specialists who can apply new technologies in practice and expanding their regular retraining programs.

4. Widespread introduction of digital technologies — increasing efficiency through the use of IoT, AI, and “Smart Factory” systems in production processes.

5. Strengthening state support mechanisms — encouraging the introduction of new technologies through financing innovative projects, grants, and tax incentives.

6. Expanding programs aimed at energy and resource conservation — widespread introduction of waste reduction and recycling technologies in industrial sectors.

7. Bringing technical standards for local manufacturers up to international standards — will allow increasing the export of technological products.

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